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National Register of Historic Places Multiple Property Documentation Form - Historic, Archaeological and Traditional Cultural Properties of the Hanford Site, Washington

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1.0 Introduction for Multiple Property Documentation

1.1 Background

The U. S. Department of Energy's Hanford Site encompasses an area of 560 square miles straddling the Columbia River in southeastern Washington (Fig. 1). Since 1943, the Hanford Site has existed as a protected area for activities primarily related to the production of radioactive materials for national defense uses. For cultural resources on the Hanford Site, establishment of the nuclear reservation as a high security area, with public access restricted, has resulted in a well-protected status, although no deliberate resource protection measures were in effect to mitigate effects of facilities construction and associated activities. Thus, the Hanford Site contains an extensive record of aboriginal archaeological sites and Native American traditional cultural properties, along with pre-Hanford Euro-American sites (primarily archaeological in nature with the removal of most pre-1943 structures), and a considerable number of Manhattan Project/Cold War era buildings and structures.

The recent mission change from production to clean up and disposal of DOE lands created a critical need for development and implementation of new and different cultural resource management strategies. As a federal agency, the U. S. Department of Energy was directed by the Congress and the President to provide leadership in the identification, evaluation, and protection of prehistoric, historical and traditional cultural properties on lands it administers. Federal statutes, regulations, and directives assigned to the Department of Energy, Richland Operations Office (DOE-RL) the responsibility for the management of cultural resources on the Hanford Site, including the protection of properties listed in or determined eligible for the National Register of Historic Places (Register) pursuant to Section 110 of the National Historic Preservation Act (NHPA) as amended (16 U.S.C. 470 h-2). DOE-RL must also assess the effects of any federally-involved undertaking or action upon properties included in or eligible for the Register pursuant to Section 106 of NHPA (16 U.S.C. 470f).

Accordingly, DOE-RL has undertaken a preservation planning effort for the Hanford Site based on the 1989 Hanford Cultural Resources Management Plan (HCRMP). The intent of this Plan is to enable DOE-RL to organize data and develop goals, objectives, and priorities for the identification, evaluation, registration, protection, preservation, and enhancement of the Site's historical and cultural properties. Decisions made about the identification, evaluation, registration and treatment of historic properties are most aptly made when relationships between individual properties and other similar properties are considered. The historic context and the multiple property documentation (MPD) process provides DOE-RL the organizational framework for these decisions. Once significant patterns are identified, contexts developed, and expected property types are defined, the MPD process provides the foundation for future decisions concerning the management of significant cultural resources on the Hanford Site.

1.2 Multiple Property Documentation Form

Description and Purpose

The National Register of Historic Places Multiple Property Documentation (MPD) Form (NPS 10-900-b) documents and nominates groups of thematically related properties. The themes, trends, and patterns of history shared by the properties are organized into historic contexts and the associated property types that represent those historic contexts are defined on the form. The MPD Form facilitates the evaluation of individual properties by

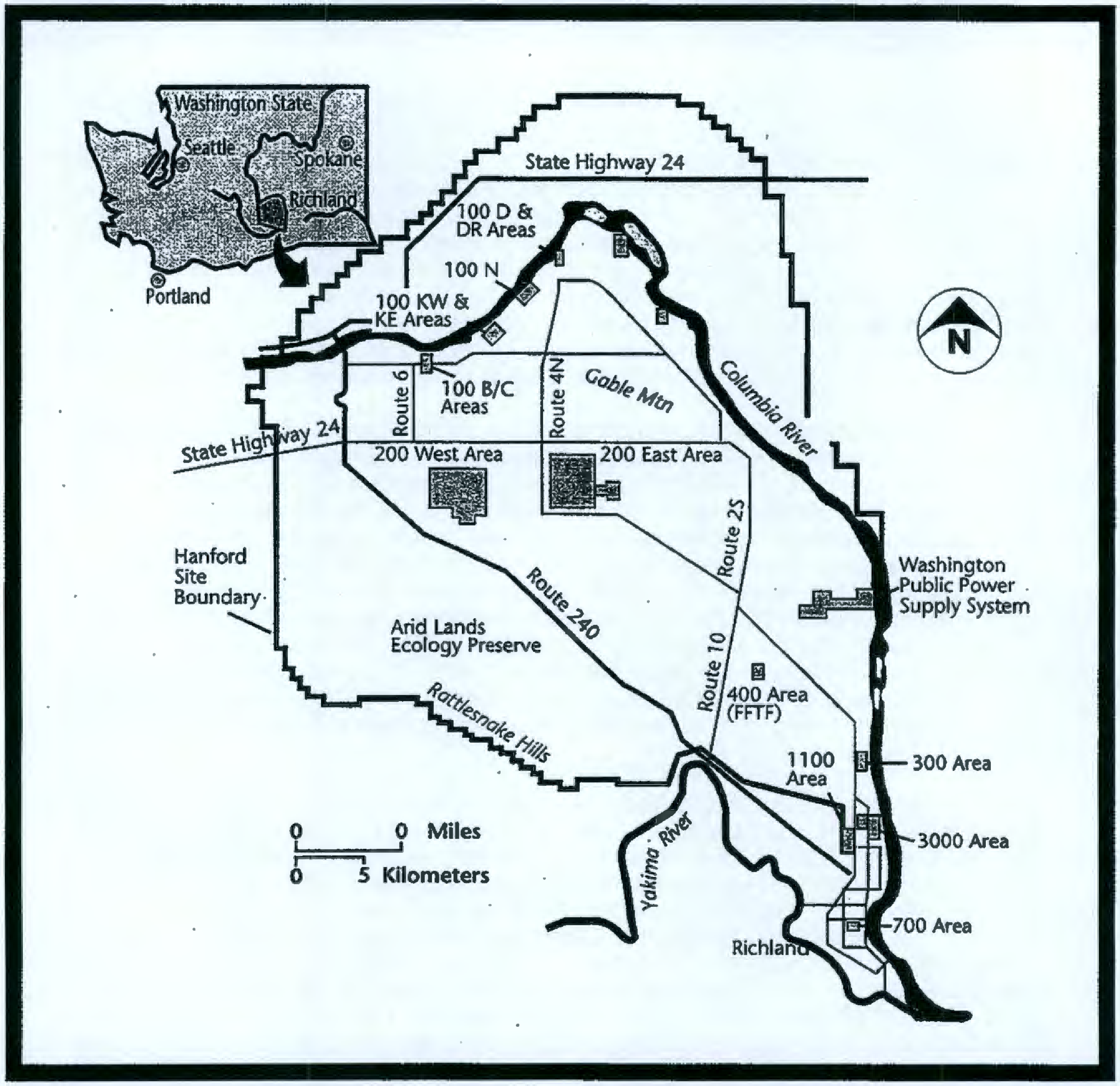

Figure 1. Vicinity Map of the Department of Energy's Hanford Site, Washington.

comparing them with resources that share similar physical characteristics and historical associations. Information common to the group of properties is presented in the MPD Form, while information specific to each individual building, site, district, or object to be nominated is placed on an individual registration form (National Park Service 1991b: 2).

The MPD Form is a cover document and not a nomination in its own right, but serves as a basis for evaluating the National Register eligibility of related properties. It may be used to nominate and register thematically related historic properties simultaneously or to establish the registration requirements for properties that may be nominated in the future. The name of the thematic group, denoting the historical framework of the nominated properties, is the **multiple property listing**. When nominated and listed in the National Register of Historic Places, the Multiple Property Documentation Form, together with individual registration forms, constitute a **multiple property submission** (National Park Service 1991b: 2).

As a management tool, this thematic approach can furnish essential information for historic preservation planning because it evaluates properties on a comparative basis within a given geographical area and because it can be used to establish preservation priorities based on historical significance and integrity (National Park Service 1991b: 2).

Organization and Submission

National Register Bulletin #16B, *How to Complete the National Register Multiple Property Documentation Form*, provides the general guidelines for organizing multiple property submissions. The MPD form defines and describes one or more historic contexts, describes associated property types related to historic contexts, and establishes significance and integrity requirements for nominating properties to the National Register (National Park Service 1991b: 4).

The organization of a multiple property submission has both general and specific components. Under the general heading, one or more historic contexts may be identified under the multiple property listing. The contexts must include three elements: a historical theme, geographical area, and chronological period. The property type analysis occupies the middle ground between the general historic context and the individual property. At the most specific level, the National Register Registration Form illustrates how an individual property or historic district relates to the historic contexts, represents a property type, and meets registration requirements (National Park Service 1991b: 3).

In order to be approved by the Keeper of the National Register, the submitted MPD Form must include at least one historic context and one associated property type. Additional historic contexts and associated property types may be submitted at a later date. Individual National Register Registration forms may accompany the MPD Form, or they may be submitted later. The nomination of each building, site, district, structure, or object within a thematic group is made on the National Register Registration Form (NPS 10-900) (National Park Service 1991b: 3).

1.3 Associated Historic Contexts

The multiple property listing for the Hanford Site, *The Historic, Archaeological, and Traditional Cultural Properties of the Department of Energy's Hanford Site, Washington*, currently include five associated historic contexts:

- The Prehistoric Period of the Hanford Site and Associated Portion of the Columbia River, Washington, circa 10,000 B.P. - A.D. 1805.

- The Ethnographic/Contact Period of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

- The Euro-American Resettlement of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

- The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990.

- The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990, Architectural Context Supplement.

Context Overviews

The Prehistoric Period of the Hanford Site and the Associated Portion of the Columbia River, Washington, circa 10,000 B.P. - A.D. 1805.

For the purposes of this context, the period of time referred to as "prehistory" is considered to be that period of time encompassing the late Pleistocene to early Holocene through the initial contact with the Lewis and Clark expedition in 1805. The geographic extent of the prehistoric context is the Hanford Site although the context includes information from the surrounding environs as well. The restrictive federal land use policies in place on the Hanford Site since 1943 have resulted in an expansive preserve of natural habitat and archaeological deposits which have been only minimally impacted by Site construction and industrial development. The archaeological record of comprehensive prehistoric use as cultures changed through time is preserved along the Hanford Reach and islands of the Columbia River and the interior as well.

The Ethnographic/Contact Period of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

This context is a narrative of the themes, trends, and patterns of history of the Indian peoples at the Hanford Site beginning with the Lewis and Clark expedition through the area in 1805 and ending with the establishment of the Hanford Engineer Works (HEW) in 1943. From the first introduction to European influences in the form of trade goods and diseases prior to the Lewis and Clark expedition, the indigenous peoples of the region experienced cataclysmic changes in their subsistence and settlement patterns. During this time period, Indian use of the Hanford Site continued until the establishment of the HEW in 1943. This document emphasizes events that took place during this time period and that had an impact on Indian culture and life ways prior to the Manhattan Project Era at Hanford.

The Euro-American Resettlement of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

This context is a narrative of the themes, trends, and patterns of history of the Euro-American resettlement of the Hanford Site that occurred during the period between the Lewis and Clark expedition (1805) and ending with the establishment of the HEW (1943). This context emphasizes homestead/farming resources since most of the historic archaeological remains at Hanford pertain to the resettlement and agricultural period at the Site. This document is about how non-Indian peoples, primarily Euro-Americans, resettled the Hanford region after the Indian occupants were disposed of their land and how these new settlers managed to impose their land use systems on the region. The arrival of white explorers, traders, and fur trappers, and later arrival of Euro-American settlers (ranchers, farmers) can be viewed in terms of resettlement of an already occupied and settled land.

Although the Hanford region lagged behind other areas of the Pacific Northwest in terms of timing and magnitude of Euro-American settlement, the coalescence of transportation links, government and private incentives to promote land settlement, and both private and government sponsored reclamation/irrigation projects culminated in a small-scale farmsteading "boom" in the Hanford Site locality in the late 19th and early 20th centuries. Once established, the small agricultural communities of Hanford, White Bluffs, and Richland continued their development until the establishment of the HEW in 1943.

<u>The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990.</u>

This context encompasses the Manhattan Project (1942-1946) and Cold War periods (1946-1990) of the Hanford Site. This document identifies and describes the important themes and property types associated with plutonium production/nuclear technology for national defense and non-military purposes, energy production, and human health and environmental restoration. The development of plutonium production at the Hanford Site represents a significant national and international event that profoundly influenced the final outcome of World War II and defined and shaped national defense efforts during the Cold War. The context provides a concise discussion of these important events and their association with the development of the Hanford Site, and a discussion of production activities at the specific "areas" within the Site. Property types and subtypes are discussed in terms of physical description and function followed by statements of significance and registration requirements for National Register listing. Buildings and structures representative of the identified property types are discussed at length.

<u>The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990, Architectural Context Supplement.</u>

This architectural context is a supplement to the Manhattan Project and Cold War Era context for the Hanford Site. This context discusses Hanford's built environment and Site layout, emphasizing principal building types and architectural styles and methods of construction, and the influence of scale, proportion, materials, workmanship, stylistic details, and spatial arrangements of facilities on the physical fabric of the Site. Identified property types include Hanford's industrial vernacular landscape, Site design and planning, primary construction materials, methods of construction and distinctive architectural features, former military facilities, and limited examples of high-style (e.g., Art Deco, Art Moderne) architectural forms.

1.4 National Register Eligibility

National Register criteria define, for the Nation as a whole, the scope and nature of the historic, archeological and traditional cultural properties that are to be considered eligible for listing in the National Register (National Park Service 1991b: 1). Significant sites are those listed in, or determined eligible for listing in, the National Register of Historic Places. To qualify for listing, a property must possess characteristics that make it representative of an important theme or pattern in the history, architecture, engineering, archaeology, or culture of a locality, state, or the nation (National Park Service 1982, 1991c).

Significance

Significance is evaluated according to published Federal Criteria (36 CFR 60.6 and 36 CFR 800.10) for evaluation of properties important on the national, state, or local level. Places considered eligible are those that have **integrity of location, design, setting, materials, workmanship, feelings, and association,** and meet one or more of the following Criteria set forth in the regulations:

- **Criterion A:** Association with events that have made significant contributions to the broad pattern of our history;
- **Criterion B:** Association with the lives of persons significant in our history;
- **Criterion C:**
  - (1) Embodiment of the distinctive characteristics of a type, period, or method of construction,
  - (2) Representative of the work of a master,
  - (3) Possession of high artistic values,
  - (4) Representative of a significant and distinguishable entity whose components may lack individual distinction;
- **Criterion D:** History of yielding, or potential to yield, information important in prehistory or history.

A property of *local* significance helps us understand the history of a community, county, or small scale geographic unit through the impact of particular events or persons; architectural types or styles; or information content. Properties significant at the *state* level help us understand the history of events at the state level, while those of *national* significance aid in our understanding of the nation as a whole (National Park Service 1982, 1991c). The Criterion and level of significance employed depends on the nature of the resource and its place in history. In the absence of any associations with important individuals, decisions are often based on whether or not the historic site has standing buildings and structures. Criteria A and C are often used to evaluate sites where structures, buildings or objects are present while D is used to evaluate archaeological sites.

Criterion A

Some properties are significant due to their association with important historic events. A property may be associated with either of two types of events; a specific event marking an important moment in American history, or a series of events that made a significant contribution to the development of a community, state, or the nation (National Park Service 1982, 1991c). A site must be a good representative of the event or series of events and of the themes they represent. The correlation between the property and the event or series of events must be documented.

Criterion B

Persons significant in our past means individuals whose activities were important within significant themes in national, state, or local history. The individual must be specifically identified and their association with the property must be demonstrated. The site should be compared with other properties associated with the individual to determine if it is a good representative of the person's contribution and the themes represented (National Park Service 1982, 1991c).

Criterion C

Criterion C consists of four sub-Criterion (see above). In particular for Hanford, the most important sub-Criterion is "the embodiment of the distinctive characteristics of a type, period, or method of construction. In this limited context, the property must clearly illustrate the pattern of what was common to a class of resources, the individuality or variation that occurred within a class, the evolution of a class over time, or the transition between classes (National Park Service 1982,1991c). Most rural and many urban buildings in the Hanford Site vicinity can be categorized as vernacular architecture; few are representative of the classic styles (e.g.,Gothic Revival, Italianate). In the absence of identified styles or architectural significance Criteria, vernacular buildings are most often evaluated on the basis of their historical significance, especially as representative of a historically unique building type in a geographical region (e.g., railroad tie cabins - cf. Hardesty 1986: 60). The phrase "type, period, or method of construction" refers to properties related by cultural tradition, or function; by date of construction or style; or by choice or availability of materials and technology (National Park Service 1982, 1991c).

Criterion D

Criterion D is employed where resources are important if they contain information that may assist in the resolution of scientific and scholarly issues or questions. Such questions are not standardized and may vary considerably, depending on the nature of the resources found in an area. It is most often used to evaluate the importance of prehistoric archaeological sites. At the Hanford Site, where most of the pre-1943 cultural resources are archaeological in nature, Determination of National Register eligibility under Criterion D must address:

- whether the resource contains information that can contribute to our understanding of history; and,
- whether that information is important to the resolution of identified, significant research questions.

Evaluating Significance

Hardesty (1986: 61) noted that a major problem in the evaluation of historical sites is how to separate trivial research questions from significant scientific and scholarly questions. Trivial questions are those that are not truly related to significance issues, but rather deal with the pragmatics of site examination and interpretation (e.g., reconstruction of food practices, houses, industrial technologies, or environments) unless they are put into a much broader scientific and scholarly framework that establishes their local, state, or national significance. The absence of good regional research strategies in historical archaeology is often the reason why so many trivial questions are used in site evaluations. This results in site-specific research questions being used to evaluate the significance of historic sites. When viewed in the perspective of the National Register, few site-specific scientific questions are likely to be considered significant under Criterion D.

Another problem is vague research questions that address significant issues but are either completely implicit or unworkable when applied to archaeological data (Hardesty 1986: 62). Cultural resource overviews are often used as reference documents for assessing historic site significance. These overviews usually only provide a historical context and do not go far enough to be useful as a workable document for historic site evaluation. Identified historical themes usually suggest what kinds of resources are present and which may be important, but the leap from these implicit generalizations to specific evaluation Criteria is seldom made (Hardesty 1986: 62). Thus, vague research questions are often used to assess the significance of specific sites, buildings, and structures.

Integrity

Not only must a property be significant, but it must also have integrity. Integrity is the ability of a property to convey its significance, but the evaluation of integrity is sometimes a subjective judgment (National Park Service 1991c). Evaluation of integrity must always be grounded in an understanding of a property's physical features and how they relate to its significance. A property that possesses integrity will possess several or all of the following aspects of integrity: **location, design, setting, materials, workmanship, feelings, and association.**

Location is the place where the historic property was constructed or the place where the historical event occurred. Design is the combination of elements that create the form, plan, space, structure, and style of a property. Setting is the physical environment of a historic property. Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. Feeling is a property's expression of the aesthetic or historic sense of a particular period of time. Association is the direct link between an important historic event or person and a historic property (National Park Service 1991c: 44-45).

For properties eligible under Criterion D, including archaeological sites and standing structures studied for their information potential, less attention is given to their overall condition, than if they were being considered under Criteria A, B, or C. Archaeological sites, in particular, do not exist today exactly as they were formed since cultural and natural processes may alter the deposited materials and their spatial relationships. For properties eligible under Criterion D, integrity is based upon the property's potential to yield specific data that address important research questions, such as those that may be identified in the historic context of a statewide preservation plan or in a research design that meets the Secretary of the Interior's Standards for Archaeological Documentation.

Since each type of property depends on certain aspects of integrity, more than others, to express its historic significance, determining which of the aspects is most important to a particular property requires an understanding of the property's significance and its essential physical features (National Park Service 1991c: 48). Under Criteria A and B, a property important for association with an event, historical pattern, or person ideally might retain some features of all seven aspects of integrity. Integrity of design and workmanship, however, might not be as important to the significance, and would not be relevant if the property were a site. For archaeological sites that are eligible under Criteria A and B, the seven aspects of integrity can be applied in much the same way as they are to buildings, structures, or objects. The site must have *demonstrated* its ability to convey its significance, as opposed to sites eligible under Criterion D where only the *potential* to yield information is required.

A property significant under Criterion C must retain those physical features that characterize the type, period, or method of construction that the property represents. Retention of design, workmanship, and materials will usually be more important than location, setting, feeling, and association. Location and setting will be important for those properties whose design is a reflection of their immediate environment. For archaeological sites that are eligible under Criterion C, the seven aspects of integrity can be applied in the same fashion as they are to buildings, structures, or objects. The site must have *demonstrated* its ability to convey its significance, as opposed to sites eligible under Criterion D where only the *potential* to yield information is required. For properties eligible under Criterion D, setting and feeling may not have direct bearing on the property's ability to yield important information. Evaluation of integrity probably will focus primarily on the location, design, materials, and perhaps workmanship.

Criteria Considerations

Several kinds of properties are not commonly considered eligible for listing in the National Register: religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties achieving significance within the past 50 years. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories, called Criteria Considerations:

Criteria Consideration A: Ownership by a religious institution or use for religious purposes. This Criterion requires additional justification beyond religious grounds due to the necessity of the U.S. government to avoid any appearance of favoring a particular religious doctrine. A religious property deriving primary significance from architectural or artistic distinction or historical importance can qualify.

Criteria Consideration B: Relocated properties. Relocation from the traditionally important location generally disqualifies a property, unless the relocation is to an historically appropriate setting, or unless the property has retained its significance in an historic move. A building or structure removed from its original location but which is significant primarily for architectural value or which is the surviving structure most importantly associated with a historic person or event can qualify.

Criteria Consideration C: Birthplaces and graves. Such sites are eligible only if their significance is for reasons that go beyond their association with a famous person. A birthplace or grave of a historical figure of outstanding importance can qualify if there is no appropriate site or building directly associated with his productive life.

Criteria Consideration D: Cemeteries. These sites are ineligible unless they derive their primary significance from graves of persons of transcendent importance, from age, from distinctive design values, or from association with historical events. Sites that contain cemeteries are not necessarily ineligible because of their presence, and the graves may in fact be an intrinsic component of the overall cultural significance.

Criteria Consideration E: Reconstruction. A reconstructed building can qualify when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived.

Criteria Consideration F: Commemoration. Properties constructed to commemorate an event or person are not eligible based on association with the person or event alone. A property primarily commemorative in intent can qualify if design, age, tradition, or symbolic value has invested it with its own exceptional significance.

Criteria Consideration G: Significance achieved within the past 50 years. A property achieving significance within the past 50 years can qualify if it is of exceptional importance.

Contexts and Register Eligibility

To qualify for listing in the National Register of Historic Places, a property must be significant; that is, it must represent a significant historic context in the history, architecture, archaeology, engineering, or culture of an area, and it must have the characteristics that make it representative of properties associated with that context. For the multiple property submission, the statement of historic context is a written narrative that describes the unifying thematic framework. The historic context statement must be developed in sufficient depth to support the relevance, the relationships, and the importance of the properties to be considered.

Register eligibility criteria were used to evaluate properties in the following historic contexts of the Hanford Site:

Prehistoric Period
This prehistoric context will be used to evaluate the National Register eligibility of individual sites that are associated with the prehistoric time frame. Sites determined to be eligible will be managed and preserved for future generations, those determined to be ineligible will not (National Park Service 1991b). It is imperative that the Prehistoric Context provide appropriate standards of measure against which prehistoric archaeological sites can be compared during the National Register evaluation process. The standards of measure used to determine significance and eligibility must

(1) include involvement by traditional indigenous cultures to ensure that ancestral archaeological sites are evaluated because of their significant role in Native American history, culture, and religion,
(2) recognize that the Native American way of life is intricately bound to the land and that holistic preservation of the human and natural environment is preferred over 'place preservation', and
(3) encompass a research orientation or approach where many issues, goals and hypothesis can be addressed.

Ethnographic/Contact Period
It is essential that Indians participate in the identification and evaluation of traditional cultural properties (TCPs), and should play a major role in defining the specific eligibility criteria by which their TCPs can be evaluated for National Register eligibility. It is acknowledged that some of the four National Register eligibility criteria may not work well since the Indian cognitive approach and/or world view is so different. Thus, there is a crucial need for specific eligibility criteria that would supplement the established National Register criteria, and to demonstrate how TCP integrity can be measured. For TCPs, location, setting, feeling and association are more relevant for measuring integrity. Design, materials and workmanship have little bearing on TCPs, such as fishing sites or plant gathering areas. One possible approach to develop a supplemental criteria by which integrity and eligibility can be assessed is to follow a cultural resource study methodology shown to be sensitive to the cultural of the Indian people. This study methodology, developed by Stoffle and Evans (1990: 96-97), is described in the *Ethnographic/Contact Period Context of the Hanford Site*.

Euro-American Resettlement of the Hanford Site

The most critical question in evaluating archaeological remains from the pre-1943 Euro-American period for National Register eligibility is the issue of integrity. Under most circumstances, when historic period structures are demolished, they most certainly lose critical aspects of integrity (design, materials, workmanship, feeling). With the majority of the physical features associated with 19th and 20th century Euro-American resettlement activities obliterated/removed during the construction of the HEW between 1943-1945, farms, ranches, irrigation systems, and townsites became archaeological sites. Due to the unique circumstances surrounding the creation of the HEW that included the rapid evacuation of local residents, hundreds of historic period archaeological sites were created, many which retained remarkable archaeological integrity due to over 50 years of strict Site-wide security. Other sites, however, have been modified as a result of several site "clean-up" campaigns oriented toward elimination of health and safety risks associated with structural ruins and debris.

Since all properties change over time, it is not necessary for a property to retain all its historic physical features or characteristics. However, the property must retain the essential physical features that enable it to convey its historic identity (e.g., those features that define both *why* a property is significant and *when* it was significant). Under Criteria A and B, a property significant for its historic association is eligible if it retains the essential physical features that made up its character or appearance during the period of its association with the important event, historical pattern, or person(s). Archaeological sites eligible under Criteria A and B must be in overall good condition with excellent preservation of features, artifacts, and spatial relationships to the extent that these remains are able to convey important associations with events or persons (National Park Service 1991c: 46).

Although few pre-1943 structures still stand in the Hanford Site, a property important for illustrating architectural style or construction technique (Criterion C) must retain most of the physical features that constitute that style or technique (e.g., Bruggerman's cobblestone fruit warehouse). A property that has lost some historic materials or details can be eligible if it retains the majority of the features that illustrate its style in terms of the massing, spatial relationships, proportion, pattern of windows and doors, texture of materials, and ornamentation (e.g., possibly the Allard pump station building). The property is not eligible, however, if it retains some basic features conveying massing but has lost the majority of the features that once characterized its style. Archaeological sites eligible under Criterion C must be in overall good condition with excellent preservation of features, artifacts, and spatial relationships to the extent that these remains are able to illustrate a site type, time period, method of construction, or work of a master (National Park Service 1991c: 46).

In respect to 19th and 20th century archaeological sites, National Register criteria is at times viewed as inadequate for providing a workable definition of site significance. Archaeological sites from this period are a relatively recent interest and therefore lack both a large amount of research data against which new information can be measured. In certain parts of the country, such relatively recent farmsteads are extremely plentiful, are in varying states of preservation, and may still be a functioning part of current cultural and economic systems (Lees and Noble 1990: 11). The concept of a MPD and "context", thus, has proved increasingly useful in organizing data and providing a format to articulate major themes and trends, identify property types, and measure significance of important sites.

Manhattan Project/Cold War Era

Determining the historical significance of Cold War properties faces similar obstacles as 19th and 20th century archaeological sites. The National Register criteria does not provide adequate guidance for evaluating World War II/post-World War II properties. Only recently have the Manhattan Project Era properties on the Hanford Site reached the 50 year threshold; while a fraction of Cold War properties are over 50 years of age. Nomination (or determination of eligibility) of properties under 50 years of age are determined under Criteria consideration "g"; *A property achieving significance within the past 50 years if it is of exceptional importance*. But defining "exceptional importance" is ambiguous at best. Fifty years is a general estimate of time needed to develop historical perspective and to evaluate significance. For facilities under 50 year of age, there is often a lack of historical perspective to determine if the property is of exceptional importance. Many properties built in the past 50 years cannot be evaluated because of the lack of scholarly research available to provide an overview of the nature of the property within the context of the particular historical period. Thus, a fully researched and developed context is all that more important for properties under 50 years of age, providing the necessary format/vehicle for scholarly research and evaluation.

Manhattan Project/Cold War Era - Architectural Supplement
The value of the architectural context is that it will serve as a basis for evaluating the National Register eligibility of related properties under criterion C. In reference to the Manhattan Project/Cold War Era built environment, criterion C applies to properties significant for their physical design and distinctive construction characteristics and applications, expressed in terms such as form, proportion, plan, stylistic qualities, or materials used.

Properties eligible under criterion C must meet a more stringent standard of physical integrity, and may require a high level of both interior and exterior integrity. Because criterion C also honors engineering significance, eligible properties at Hanford should possess all of the qualities which originally made them significant as engineering properties. Regarding additions/modifications to Hanford's buildings or structures, because of the utilitarian and technological nature of the Hanford Site, design compatibility is not as important for integrity purposes. Additions which reflect changes in technology or mission could be viewed as significant compatible accretions to the original building fabric.

1.5 Preservation Goals

It is important to set forth preservation goals in order to prioritize how the associated property types should be identified, evaluated, registered, and treated. Preservation goals should be oriented toward the greatest possible protection of historic sites and should be based on the principle that archaeological sites and standing structures should be preserved in place if possible. The Secretary of the Interior's Standards urge that the goals for a historic context should be a coherent statement of program direction covering all aspects of the context. For each goal, a statement should be prepared identifying:

- The goal, including the context and property types to which the goal applies and the geographical area in which they are located;
- The activities required to achieve the goal;
- The most appropriate methods or strategies for carrying out the activities;
- A schedule within which the activities should be completed; and

- The amount of effort required to accomplish the goal, as well as a way to evaluate progress toward its accomplishment.

Once goals have been developed they need to be ranked in importance. Ranking involves examining each goal in light of a number of factors:

- General social, economic, political and environmental conditions and trends affecting the identification, evaluation, registration and treatment of property types in the historic context. Some property types in the historic context may be more directly threatened by "clean-up" operations, deterioration, land development patterns, contemporary use patterns, or public perceptions of their value, and such property types should be given priority consideration.

- Major cost or technical considerations affecting the identification, evaluation and treatment of property types in the historic context. The identification or treatment of some property types may be technically possible but the cost prohibitive; or techniques may not be currently perfected (e.g., where "clean-up" technologies may cause more harm than good to the cultural resources).

- Identification, evaluation, registration and treatment activities previously carried out for property types in the historic context. If a number of properties representing aspect of a historic context have been recorded or preserved, treatment of additional members of that property type may receive lower priority than treatment of a property for which no examples have yet been recorded or preserved.

Hardesty (1986: 66) has observed that preservation actions by state and Federal agencies undertaken on behalf of the public and federal preservation activities are calling for ever greater levels of public involvement in the decision making process. Public attitudes are of particular importance with regard to historical sites since they often enjoy a high emotional, or community spirit or value. In mos
t cases, public and scientific attitudes about the significance of a historic site will be similar, both groups agreeing a site is important or expendable. However, in some cases, public attitudes toward a historical resource may differ from those expressed by the scientific community. The public might express an interest in a site deemed insignificant by scholars and scholars may value a site for which the public has little use. It is not uncommon for a SHPO or the Advisory Council on Historic Preservation to use greater flexibility in the application of criteria of integrity when there is a high level of public interest in a site.

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2.0 THE PREHISTORIC PERIOD OF THE HANFORD SITE AND ASSOCIATED PORTION OF THE COLUMBIA RIVER, WASHINGTON, CIRCA 10,000 B.P. - A.D. 1805

By

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2.1 Introduction

Federal agencies have responsibility for the identification, evaluation, registration, and protection of properties with historic, archeological, architectural, engineering, or cultural significance. Accordingly, agencies are encouraged to undertake a preservation planning effort which is based on the following principles: 1) important historic properties cannot be replaced if they are destroyed, 2) effective preservation planning must begin early, and 3) public involvement is a necessary component.

Decisions made about the identification, evaluation, registration and treatment of historic properties are most appropriately made when relationships between individual properties and other similar properties are considered. The historic context provides the organizational framework for these decisions. The context must take into account "the significant broad patterns of development in an area that may be represented by historic properties" and provide a definition of expected property types against which individual properties may be compared. Once the significant patterns are identified and expected property types are defined, the [pre]historic context provides the foundation from which future decisions about property identification, evaluation, registration, and treatment are handled (48 FR 44717).

This historic context will be used to help the U. S. Department of Energy evaluate the National Register eligibility of prehistoric properties and districts located on the Hanford Site. Therefore, it is imperative that the context provide a framework for assessing management needs and registration requirements against which prehistoric archaeological sites can be compared during the National Register evaluation process. For the purposes of this study, 'prehistory' is considered to be that period of time encompassing the late Pleistocene to early Holocene through the initial contact with Lewis and Clark in 1805. The geographic extent of this prehistoric context is the administrative boundary of the Hanford Site although the context includes information from the surrounding environs as well.

The restrictive federal land use policies in place since 1943 resulted in an expansive preserve of natural habitat and archaeological deposits which have been minimally impacted by resettlement of the Hanford Site (see Bard and Cox this volume) and the industrial development (see Gerber, Harvey, and Longenecker this volume) that followed. The archaeological record of comprehensive prehistoric use as cultures changed through time is preserved along the banks and islands of the Columbia River and throughout the interior plateau as well.

2.2 Statement of Historic Context

This historic context statement contains a synopsis of known information relating to the prehistoric setting and cultural developments of the area now known as the Hanford Site. The statement discusses what is currently known about the prehistoric environment, prehistoric cultural chronologies, and the archaeological record as it has been documented on the basis of surface observations, analyzed excavations, and archaeological reports.

2.2.1 Geography and Environment

The areal extent of the 1450 km² (560 mi²) Hanford Site lies within the Pasco Basin which is part of the larger geographic region known as the Columbia Plateau province. The Columbia Plateau province, extending over much of eastern Washington, eastern Oregon, and southern Idaho, makes up most of the Intermontane Plateau physiographic unit. In eastern Washington State, landform elevations average between 300 and 600 m (984 ft and 1968 ft) in altitude. Much of the Columbia Plateau consists of a thick sequence of basalt that was formed during Miocene time by successive lava flows. In eastern Washington, Pleistocene cataclysmic floods, associated with the sudden release of water from ice-dammed lakes, were responsible for the morphology of the Channeled Scabland. Floodwaters scoured basalt bedrock as well as preexisting fluvial-lacustrine suprabasalt sediments before a blanket of relatively coarse-grained flood deposits were laid down over low-lying areas of the central Columbia Plateau.

The complexities of prehistoric environmental, geographic, and cultural relationships are compounded by a sparsity of data from the study area. Much of what we know about the early prehistoric vegetation history on Hanford comes from pollen samples retrieved off the Hanford Site in moist bogs and lakes of the interior Northwest (Barnosky, Anderson, and Barlein 1987; Barnosky 1985 and 1983; Mack, Rutter, and Valastro 1979; Mack, Rutter, Bryant, and Valastro 1978; Mehringer, Jr., and Wigand 1986; Mehringer, Jr. 1985; Mehringer, Jr., Arno, Petersen 1977). In contrast, the complex geologic record of Hanford has been well researched (Bjornstad 1984; Bjornstad, Fecht, and Tallman 1987; Reidel, Fecht, Hagood, and Tolan 1989) and offers an excellent stage for research into the timing and frequency of major catastrophic flooding (Fecht, Reidel, and Tallman 1987; Mullineaux, Wilcox, Ebaugh, Fryxell, and Rubin 1978) and the impacts of climate change on Columbia River fluvial systems (Chatters and Hoover 1992; Chatters, Neitzel, Scott, and Shankle 1991). Other information, contained in prehistoric archaeological sites, is also preserved within the sediments of the Hanford Site (Rice 1980; Rice and Chavez 1980; Chatters, Cadoret and Minthorn 1990; Chatters, Gard and Minthorn 1991; Chatters and Gard 1992; Chatters et al. 1993; Last et al. 1994) and can be used to define cultural chronologies and man's response to environmental change (Fryxell 1963; Aikens 1983).

During the close of the Pleistocene, the environmental setting in the Columbia Plateau region was punctuated by a series of catastrophic events which precipitated associated responses in climate, vegetation patterns, and human adaptation. Each response was uniquely modified by local factors. General accounts of these catastrophic events and the associated natural and human responses are available in several sources (cf. Barry 1983; Aikens 1983; Heusser 1983; Antevs 1955). Some of the detail missing in the general descriptions can be found in more specific environmental studies addressing the prehistoric environment of the study area (cf. Petersen et al. 1993; Chatters and Hoover 1992; Chatters, Neitzel, Scott, and Shankle 1991; Chatters 1989).

Basalt Flows

On the Hanford Site, the principal rock unit is the Miocene Columbia River Basalt Group. Covering approximately 164,000 km² with 174,000 km³ of basalt (Tolan et al. 1989 quoted in Reidel, Lindsey, and Fecht 1992), the Miocene Columbia River Basalt Group is primarily underlain by Tertiary continental sedimentary rocks and overlain by late Tertiary and Quaternary fluvial and glaciofluvial deposits (Reidel, Lindsey, and Fecht 1992:1-3).

Catastrophic Flooding

During the Pleistocene, lobes of the western Cordillera ice-sheet extended southward to cover low hills in northern Washington to the Continental Divide of southwestern Montana. The glacial ice dammed rivers causing great lakes to form. The largest of these was Glacial Lake Missoula which covered about 3,000 square miles and contained an estimated 500 cubic miles of water. (Weis and Newman 1989). It is estimated that 40 separate catastrophic flooding events (Waitt 1980:674; Waitt 1984) occurred as the ice dam impounding Glacial Lake Missoula water was repeatedly breached . The channels created by the early releases from glacial Lake Missoula led eventually to the Pasco Basin.

As the frequency of these catastrophic floods increased and the released volume of water decreased through the close of the Pleistocene (Waitt 1980) with the final flood occurring at approximately 13,000 B.P. (Mullineaux, Wilcox, Ebaugh, Fryxell, and Rubin 1978). Locally, these flood sediments have been reworked by winds, depositing dune sands in the lower elevations and loess in the margins of the Pasco Basin (Reidel, Lindsey, and Fecht 1992:2). Large floods, confined to the Hanford Reach of the Columbia River have occurred since the last of the catastrophic floods at approximately 13,000 B.P. The largest flood occurred before 6,500 B.P., the remainder resulted from high water stages of the Columbia River.

2.2.2 Paleoenvironments and Cultural Adaptations

The complexities of reconstructed technological developments and cultural responses to environmental change in the study area from the close of the Pleistocene through the early Holocene has generated numerous chronologies and phase designations focused on technological innovations and modifications (Figure 2.1). While these chronological sequences serve to organize material culture into temporal patterns, they are also used to infer cultural adaptations to the environmental change (Figure 2.2).

The Late Pleistocene (15,000 to 10,500 years B.P.)

In the millennium preceding the close of the Pleistocene, a cold steppe environment with localized variations dominated throughout much of the interior Pacific Northwest (Heusser 1983; Mehringer 1985; Mack et al., 1976). A variety of mammals including megafauna were part of ecosystem along with early man (Anderson 1984). Evidence of early man's hunting abilities, e.g., Clovis projectile points, and the remains of Jefferson's mammoth (M. jeffersonii exilis) have been found in kill sites throughout Canada, the United States, and Mexico (Kurten and Anderson 1980:352).

The timing of man's arrival in the New World is disputed and plagued by insufficient data prior to 12,000 B.P. (Kunz and Reanier 1994) and some researchers have begun to question the hypothesis that people using the Clovis tool assemblage were the first to enter into the

New World (Whitley and Dorn 1993). Genetic connections between the dentition of early Americans and early inhabitants of northeast Asia have been investigated (Turner, III, 1992) and similarities between the American Clovis tool kit (except for fluted points) and the Upper Paleolithic tool kits from Central Asia and eastern Europe have been noted (Haynes 1987).

Although sparsely represented, Paleoindian sites exist throughout the New World. Recent work on the Mesa site in arctic Alaska provides additional evidence of a Paleoindian occupation in North America between 11,000 and 12,000 B.P. (Kunz and Reanier 1994). The recent discovery of Clovis projectile points associated with the Paleoindian period at the Ritchie-Roberts site near Wenatchee, Washington suggest that early man was present in the Pacific Northwest between 12,000 and 11,000 B.P. (Bonnichsen, Stanford, and Fastook 1987).

The Paleoindian adaptation pattern is thought to be one of nomadic hunting that included a tool assemblage generally accepted as the first "clear-cut", securely dated evidence for human occupation in the Americas. These early nomadic people with diverse hunting and gathering strategies likely took advantage of local resources such as bison and salmon (Nelson 1969). Their tool assemblage included the fluted Clovis with lateral and basal edge grinding. Other tools associated with the fluted Clovis point included: triangular bifaces with convex bases, triangular end scrapers, side scrapers, and bone foreshafts or points (Bonnichsen, Stanford, and Fastook 1987); thumbnail scrapers, gravers, large side scrapers, and grinding stones; prepared blade cores, blades, lithic wedges, and other perhaps locally unique implements (West 1983).

From approximately 10,950 to 7,950 B.P. early peoples of the study period and surrounding environs began to shift gradually away from a focus on big game hunting to hunting smaller game with a growing emphasis on plant gathering activities. Clovis points are not known after 10,000 years B.P. (Bonnichsen, Stanford, and Fastook 1987). This fact coupled with megafauna extinctions at approximately 11,000 B.P. (Meltzer and Mead 1983), a change to Folsom cultures and concurrent switch to bison hunting (Kurten and Anderson 1980:352-353), and indications of gradual environmental warming (Heusser 1983; Mehringer 1985) provide substantial evidence of widespread, and perhaps punctuated environmental change.

The Early Holocene (10,500 to 8,000 years B.P.)

The interior Northwest saw a period of gradual warming after 10,500 years B.P. (Heusser 1983; Mehringer 1985). At lower elevations, the decreasing effective moisture meant contracting lakes and the expansion of shadscale and sagebrush plant communities into grassland and forest ecosystems (Mehringer 1985). In the study area, this cool, dry climate may have supported a variety of small animals as well as large; examples include bison, elk, deer and pronghorn (Chatters 1989).

The people of this period were apparently well adapted to their environment and followed a diversified seasonal round of subsistence activities (Chatters 1989) using a tool assemblage commonly referred to as Windust (Rice 1972a). The lithic technology of this period was well developed. Cryptocrystalline silicates were the dominant toolstone material selected although fine-textured basalts were also used (Leonhardy and Rice 1970:4). Tool types associated with this period include short-bladed projectile points with straight or contracting stems and straight or slightly concave bases with variously sized shoulders. The most common and varied lithic items of this period were utilized flakes. Cobble tools with large planes, choppers, utilized spalls and large scraper-like tools are also recognized as part of this tool assemblage with basalt the preferred material for large chipped stone tools used for crushing, scraping,

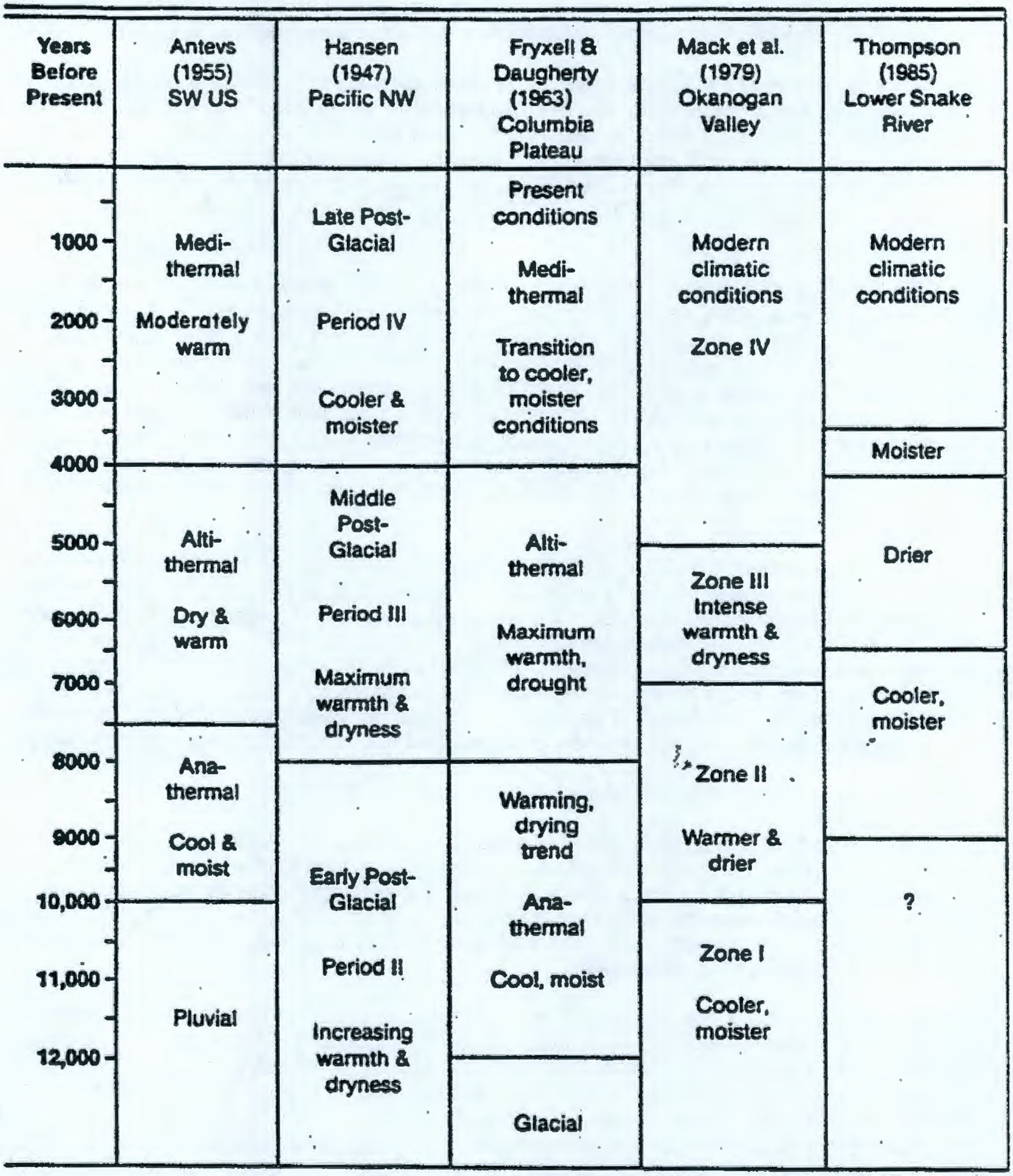

Figure 2.1. Holocene Climatic Sequences (after Stilson 1986 and Galm, Hartmann, and Masten 1985).

Date Before Present	Lwr Snake R. Daugherty 1962	Lwr Snake R. Schalk 1980	Lwr Snake R. Leonhardy & Rice 1970, 1980	Mid-Columbia Plateau Nelson 1969	Mid-Columbia Plateau Galm et al. 1981	Mid-Columbia Plateau Browman & Munsell 1983	Priest Rapids Wanapum Greengo 1982	The Dalles Butler 1959, 1965	The Dalles Cressman et al. 1960	Yakima R. Warren 1968
Present	HISTORIC	III 100-220 BP	NUMIPU	HISTORIC	HISTORIC		HISTORIC	HISTORIC	HISTORIC	PLATEAU PATTERN
			Late Subphase	CAYUSE III	Late Subphase	VII	LATE 2, 1			
1,000	LATE STAGE			CAYUSE II				(Plateau Cult.)	Full Protohistoric	
			-- HARDER --	CAYUSE I	-- CAYUSE --		MIDDLE 4			
2,000		II	Early Subphase				MIDDLE 3			
				QUILOMENE BAR	Early Subphase		MIDDLE 2			SELAH SPRINGS PATTERN
3,000	DEVELOPMENTAL STAGE			FRENCHMAN SPRINGS		VI	MIDDLE 1		LATE	
4,000			TUCANNON	COLD SPRINGS	FRENCHMAN SPRINGS			MIDDLE (Cold Springs)		
5,000									Initial Protohistoric	
			Late Subphase	VANTAGE	Late Subphase	IV and V	EARLY 2			
6,000	TRANSITIONAL STAGE									
			CASCADE							
7,000		I			VANTAGE	III	EARLY 1		TRANSITIONAL	
8,000			Early Subphase		Early Subphase				Final Early	
					?			EARLY		
9,000				?		II		(Old Cordilleran)	Full Early	
	EARLY STAGE		WINDUST		WINDUST					
10,000									Initial Early	
					?					
11,000						I				

Figure 2.2 Cultural Adaptations for the Columbia Plateau (after Stilson 1986 and Galm, Hartmann, and Masten 1985).

chopping, grinding, milling, and pounding. Other items present but to a lesser extent, include bone needles, atlatl spurs, and burins. Stone tool manufacturing techniques were lavallois-like, a trait characteristic of both the Windust and later Cascade phases (Leonhardy and Rice 1970:4) which includes thin, fine finished tools (Rice 1972a).

The Upper Mid-Holocene (8,000 to 5,000-4,000 years B.P.)

During this period, combined effective moisture on the Hanford Site would have been less than today. Such a scenario would have resulted in a reduced vegetative cover and open drifting sands. Animals such as elk were likely absent, mountain sheep rarely present, and deer likely present in the study area (Chatters 1989).

Locally, the cultural adaptation to this period is called the Cascade (Leonhardy and Rice 1970) and/or Vantage Phase (Nelson 1969). Inhabitants of this period were faced with continued gradual environmental desiccation. As a result, big game hunting was a diminishing activity replaced by a generalized hunting and gathering strategy that placed an emphasis on hunting smaller animals, food gathering, and plant processing as people moved into riverine environments (Nelson 1969). The Hanford Site may have been an ominous place during this time where the only water sources were the Columbia and Yakima rivers (Chatters 1989).

Artifacts common to the Cascade Phase include well-made lanceolate and triangular knives (Cascade) and large side-notched projectile points (Cold Springs) which appear after 6,850 B.P. (Chatters 1989; Leonhardy and Rice 1970), and tabular and keeled end scrapers with numerous utilized flakes in most assemblages. The large side-notched projectile points of this period are also known as the Bitterroot Side-Notched in parts of the southern Columbia Plateau and Idaho (Nelson 1969). Atlatl weights are rare while cobble tools include large scraper-like tools, pounding stones, small grinding stones, manos, and the edge-ground cobble. Bone items include bone atlatl spurs, bone awls, and bone needles of various sizes. The only shell artifacts known to be associated with the Cascade Phase are Olivella beads (Leonhardy and Rice 1970:8-9).

Unlike the preceding Windust Phase, tool stone materials associated with the Cascade Phase are generally fine-textured basalt, although cryptocrystalline silicates are common in some earlier assemblages (Leonhardy and Rice 1970:8-9). The end of the Cascade Phase has not been clearly defined nor is the beginning of the following phase known. Neither the Cascade, Frenchman Springs (Nelson 1969), or Tucannon (Leonhardy and Rice 1970) phases that followed appear to be related historically (Leonhardy and Rice 1970:11).

The Mid-Holocene (5,000-4,000 to 3,400 years B.P.)

The pace of moisture reduction had slowed by 5,400 B.P. and an upswing in apparent moisture became evident by 4,000 B.P. The return of apparently cooler, moister conditions after 4,000 B.P. in southeastern Washington and southwestern Columbia Basin resulted in the retreat of sagebrush steppe as a more humid, cooler phase developed after 4,000 B.P. (Mehringer 1985). In the study area and surrounding environs sagebrush dominated the steppe environment (Daubenmire 1956, 1970) and was at least 50 kilometers beyond its present perimeter (Mack, et al. 1976, 1978).

People continued to use the riverine environment during this period, subsisting on a variety of small species and ungulates. Various roots and seeds were consumed as well.
Locally, artifacts assigned to this period are referred to as the Frenchman Springs Phase (Swanson 1962; Nelson 1969) and/or the Tucannon Phase (Leonhardy and Rice 1970).

These tool assemblages include semi-triangular projectile points or knives, gravers, a variety of scrapers, core tools, edge-ground cobbles, grinding slabs, pestles, bone points, antler splitting wedges, bone projectile points, and awls(?) (Nelson 1969). This period also contains a variety of projectile point styles which often make recognition and date determination difficult (Chatters 1989).

A brief hiatus in regional knowledge is apparent from approximately 3,800 to 3,400 B.P. During this period, housepit features disappear from the archaeological record (Leonhardy and Rice 1970, Chatters 1989). The house form and the Tucannon and Frenchman Springs artifact styles reappear after 3,400 B.P., but they are is found in association with a different subsistence strategy - one that includes intensification of food processing activities in conjunction with a storage based economy (Chatters 1989).

The types of documented archaeological sites increase during this period; housepits are present as are hunting sites with hearths and the remains of large and small mammals, plant processing sites with earth ovens, quarry sites, and open campsites with lithic scatters and mussel shell middens.

The Lower Mid-Holocene (3,400 to 2,000 years B.P.)

A gradual return to a dryer climate and environment occurred during this last portion of the Holocene heralded the onset of our modern climate. Although the Hanford Site may not have been a favored location for pronghorns during this period (Chatters 1989), it is estimated that bison returned to the Central Columbia Basin (Schreodle 1973) and the Hanford Reach sometime after 3,300 B.P. People may have taken advantage of the increased ratios of elk and mountain sheep to deer populations (Chatters 1986). Archaeological sites assigned to the earliest part of this period reflect year round use of the riverine environment (Chatters 1989) with seasonal hunting and gathering activities designed to use many of the resources also considered important in early historic times (Nelson 1969). After 3,400 B.P., storage facilities appear as features in archaeological sites assigned to this period and subsistence patterns began to include evidence for large-scale food processing activities.

Artifacts of this time period changed very little from the earlier Frenchman Springs and Tucannon Phases. The Tucannon artifacts remained the same while change in the Frenchman Springs assemblage is evident in the predominance of narrow-bladed, contracting stemmed projectile points, frequently called Rabbit Island stemmed points. The earlier portion of this period include Rabbit Island style projectile points and the large corner-notched or triangular basal Quilomene Bar projectile point styles up to approximately 2,000 B.P. Known archaeological property types include those present circa 5,000-4,000 to 3,400 years B.P.

The Late Holocene (2,000 years B.P. to A.D. 200)

Inhabitants of this period faced a decline in resources which required increased travel time between resources and an intensification of collection activities at selected resource areas. After 1,500 B.P. large villages are common throughout the study area.

After that time, arrowpoints of various types in association with large villages become common (Chatters 1989). This latter period is commonly known as the Harder Phase (Leonhardy and Rice 1970) or the Cayuse Phase (Nelson 1969). The characteristic Cayuse Phase site is often an open site which contains the remains of house structures, storage shelters and pits, rock art, fish walls, and other associated features such as burials (Nelson 1969).

The variety of recognized property types increase dramatically during this period of time. Large housepit villages and fishing stations are present along rivers with plant collection and processing camps, hunting camps, quarries, and open campsites all situated nearby. Most sites contain some form of storage facility, a reflection of a more sedentary lifestyle linked to fishing, hunting, and plant /root collection in the plateaus and uplands.

The arrival of the horse at approximately 200 B.P. (cf. Hunn 1990; Uebelacker 1984) increased group mobility in innumerable ways. Travel to selected resource collections areas was enhanced as were inter-regional trade networks. The more portable mat house was increasingly used at the expense of the housepit during this period.

Summary

The prehistoric Columbia Plateau region has been impacted by basalt flows, catastrophic flooding, and environmental change which has meant that prehistoric regional inhabitants adapted their cultural subsistence systems as necessary to survive. The moist, cool conditions of the early Holocene meant that early people were probably mobile, taking advantage of available resources in an organized fashion.

As the environment became drier after 8,000 years B. P., it is likely that the descendants of these early people developed a more mobile, generalized riverine-based economy. The arrival of a more moist and cool environment at approximately 4,500 years B. P. was coupled with year-round residency and a hunter-gatherer subsistence pattern which was modified briefly at 3,800 years B.P.

Approximately four-hundred years later, circa 3,400 years B.P., the climate cooled once again but the sedentary lifestyle did not return to the study area until 3,000 years B.P. After this point, populations increased along the rivers as groups focused on salmon, roots, and ungulates. A significant increase in storage and food processing activities was common to many people throughout the Columbia Basin although the mobility of the hunter-gatherer lifestyle remained a strong component into the ethnographic period.

2.2.3 History of Archaeological Research in the Study Area

A history of archaeological research conducted on the Hanford Site has already been summarized in detail elsewhere (Rice 1980 and 1983; Rice and Chavez 1980; Chatters 1989; Chatters 1992). Present purposes require inclusion here of a brief review of these studies.

Before the arrival of professional archaeologists, local relic collectors operated throughout the study area (Cowles 1959; Strong 1959). The collectors cooperated with the early researchers who sought, in part, to define culture areas based on artifacts and objects (Smith 1905; Holmes 1919; Krieger 1927). Smith (1905) set up an operational base camp in the Yakima Valley hoping to find the cultural boundary between The Dalles and the Thompson River cultures. He concluded, on the basis of material recovered during the expedition, that the Yakima Valley was inhabited by a people who had numerous communications with the inhabitants of the Thompson River region to the north and The Dalles area to the south (Smith 1905:119). In 1926 and 1927, Krieger (1927) surveyed the Middle Columbia River valley from the mouth of the Yakima River to the Canadian border then tested eight sites including one at Wahluke (45GR306). Krieger did not identify the location of his test pits at Wahluke although selected cultural items from his excavation were described and photographed (Krieger 1927, 1928). Both Smith and Krieger had a shallow sense of time although Krieger recognized connections between the "early occupants of Wahluke" and the historic "Salish, Shahaptian, and Shoshoean cultures" of the western plateau (Kreiger 1928:8). Their published works were 'state-of-the-art' studies that focused on the objects, artifacts, and funerary practices of the regions they investigated and neglected the cultural, temporal, and historic context within which these items were found.

A decade later, the Historic Sites Act of 1935 brought about active federal involvement in archaeological investigations (Schiffer and Gumerman 1977). It was this Act that spawned numerous archaeological investigations under a national archaeological survey and salvage program called the Inter-Agency Archaeological Salvage Program, River Basin Surveys. In the study area, River Basin Surveys focused on lands surrounding the proposed McNary and Priest Rapids Reservoirs as part of the a larger survey project conducted in the Columbia River watershed. Drucker (1948), Director for the Pacific Coast region of the River Basin Surveys Program, wrote in his final report of the McNary Reservoir survey that the Columbia River was important to the ". . .history of aboriginal culture growth in western North America" and was the ". . .most important aboriginal trade route in the West. . ." (Drucker 1948:3-4). He recommended that 52 of the 120 sites found be tested to obtain ". . .the complete range of materials since man first entered the Columbia Basin. . ." (Drucker 1928:10). Archaeological survey and excavation work undertaken within the proposed McNary Reservoir generated extensive survey and excavation data that was later reported through the Smithsonian Institute and the Bureau of American Ethnology (Shiner 1961, 1951, 1952a and 1952b, 1953; Osborne 1949, 1957; Osborne and Shiner 1950, 1951).

A River Basins Survey was also conducted for the proposed Priest Rapids Reservoir (Campbell 1950). The bulk of Campbell's final report is comprised of site forms for the approximate 75 archaeological sites he encountered within the reservoir. Campbell found the most difficult challenge of the survey to be "breaking down the area into separate sites. . ." because along some portions of the river ". . .one can walk for several miles without once losing sight of artifacts, camp refuse, middens, hearths, etc. . ." (Campbell 1950:1). He recommended that only four sites within the proposed reservoir be excavated ". . .as representative sites" although he designated many others as suitable for excavation (Campbell 1950:1). Lee (1955), an amateur, reported "the collection of artifacts. . .begun in 1938 and continued at irregular intervals until 1954" (Lee 1955:141) from sites in Grant County as an 'archaeologial survey' for the Columbia Basin Project. His 'survey' was not connected with previous work conducted for McNary or Priest Rapids Reservoirs. Two sites included in Lee's brief narrative are located on the Hanford Site.

Archaeological research continued outside the fences and buffer zones of the Hanford Site after 1943 but inside neither archaeological research or preservation of archaeological resources were considered as construction activities and national defense issues proceeded through the early 1970s. The Wanapum band, represented by their leader Puck Hyah Toot, requested protection in the early 1950s for their cemeteries located on the Hanford Site. Several years passed as issues involving site identification and protection were negotiated. In 1955, two years after cemetery locations had been visited by Wanapums and an AEC official, maps showing their locations were placed on file for use in site planning and police patrols were recommended to deter looting. Nearly twenty years later, these cemeteries were marked on-the-ground (Chatters 1992).

The passage of two important laws, the National Historic Preservation Act in 1966 and the National Environmental Protection Act in 1969 provided the impetus needed for federal agencies to initiate historic preservation programs and establish comprehensive procedures governing the management of environmental, historical, and cultural resources. At Hanford, these legal drivers helped to fuel archaeological assessments specifically tied to site-wide planning for a variety of proposed projects. The first large-scale reconnaissance on Hanford was conducted in 1968 in response to proposed construction of the Ben Franklin Dam. During reconnaissance one hundred-five prehistoric sites were documented within the proposed pool reservoir (to the 400 foot contour line) along the Columbia River from Wooded Island to Priest Rapids Dam (Rice 1968a). The first reconnaissance survey to document historical and ethnohistorical archaeological sites in addition to prehistoric sites was also undertaken in 1968 (Rice 1968b). Although only selected portions of the Hanford Site (outside of fenced security areas) were investigated during these projects, the latter effectively confirmed the presence of archaeological sites well away from the Columbia River.

From 1970 through 1979, various agencies commissioned archaeological assessments on the Hanford Site; most involved field survey and a few included minor test excavations. Small scale surveys (Smith, Uebelacker, Eckert, and Nickel 1977; Jackson and Hartmann 1977) reconnaissances (Rice 1972b; Rice, Stratton and Lindeman 1978), and test excavations were conducted (Rice 1973; Rice 1976) during this period (Rice 1980 and 1987; Rice and Chavez 1980). These efforts resulted in the documentation of new archaeological sites (Smith, Uebelacker, Eckert, and Nickel 1977; Jackson and Hartmann 1977; Rice 1972b) and provided evidence of continuous prehistoric use along the banks of the Columbia River (Rice 1973). Occasionally site testing and/or site excavation was initiated during these early years to 'salvage' archaeological sites that would be lost during construction. Although the salvage objective was achieved, other benefits resulted as well. The significance of Rice's (1973) excavations at 45BN179 and 45BN180 is readily apparent. Work at these sites resulted in the first excavation report to connect site stratigraphy, diagnostic tools, and radiocarbon dating with cultural chronologies for the greater Mid-Columbia region. Information taken from oral history, artifacts, and stratigraphy were also combined to establish a pattern of continuous use from approximately 6500 years B.P. to the Wanapum band who used the area as a dog-salmon fishing site during the spring and summer seasons of the historic period (Rice 1973:9; Relander 1956:306). Rice's recognition of ties between prehistoric use and historic use by the Wanapum people continued to be a factor in his subsequent work on the Hanford Site (Rice 1973).

During the 1970s, Rice directed Mid-Columbia Archaeological Society excavations (Table 2.1) and conducted test excavations at a historic log structure (45FR266) on the east bank of the Columbia River at the White Bluffs ferry landing (Rice 1976). Although the bulk of his findings at the latter were historic in nature, his excavation confirmed an earlier prehistoric presence at this important river crossing. Two overviews produced in 1980, a document produced for the Washington Public Power Supply System (Rice 1983), and a compendium map of "cultural resource surveys" conducted through 1987 (Rice 1987b) provided comprehensive synopses of known archaeological sites, excavations, and surveyed areas completed during the 1980s (Rice 1980; Rice and Chavez 1980; Rice 1983).

Numerous archaeological surveys were conducted during the early 1980s as the Department of Energy's major contractors and other companies and agencies commissioned their own archaeological investigations in response to an expanding pace of construction (ERTEC 1981 and 1982; Thoms and others 1983; Rice 1981; Rice 1983; Rice 1985; Rice 1984a and 1984b, 1987a, 1987c). In spite of this effort, ". . .many construction activity areas were not surveyed for cultural resources and most construction excavation went unmonitored. . ." during this time period (Rice 1987b). Recognizing this fact, U.S. Department of Energy established a cultural resource compliance program in 1986 to consolidate and standardize cultural resource management for all Hanford activities (Rice 1987b). Thereafter, cultural resource compliance reviews became a standard procedure (Chatters 1989; Chatters, Cadoret,

Table 2.1. Test Excavations Conducted on the Hanford Site

Property Name	Excavation Conducted By
45BN090	Western Washington University
	Hanford Cultural Resources Laboratory
45BN143	
45BN149	Mid Columbia Archaeological Society
45BN157A	Mid Columbia Archaeological Society
	University of Idaho
	Columbia Basin College
45BN163	Hanford Cultural Resources Laboratory
45BN179	University of Idaho
45BN180	University of Idaho
45BN157A	Rice
45BN307	ERTEC, Northwest Inc.
45BN423	Hanford Cultural Resources Laboratory
45BN432	Hanford Cultural Resources Laboratory
45BN433	Hanford Cultural Resources Laboratory
45BN447	Hanford Cultural Resources Laboratory
45FR266h	University of Idaho
45GR302A	Mid Columbia Archaeological Society
45GR306	Krieger
	Central Washington University
	Hanford Cultural Resources Laboratory
45GR306B	Mid Columbia Archaeological Society
45GR317	Mid Columbia Archaeological Society
45GR318	Mid Columbia Archaeological Society

and Minthorn 1990; Chatters, Gard and Minthorn 1991; Chatters and Gard 1992; Chatters et al. 1993; Last et al. 1994). In recent years, tribal involvement by the Confederated Tribes of the Umatilla Indian Reservation, the Wanapum Band, the Yakama Indian Nation, and the Nez Perce Tribe provided the input necessary to more successfully manage and conserve the prehistoric record of the Hanford Site.

Summary

A majority of archaeological survey and research work conducted on the Hanford Site has been conducted in response to Section 106 and Section 110 actions. This approach to cultural resource management practices has meant a steady increase in the number of acres surveyed and archaeological sites documented. Future work should include the completion of an intensive cultural resource surveys on the remaining unsurveyed portions of the Hanford Site. This will balance early biases toward the documentation, evaluation, and nomination of large prehistoric village sites to the National Register at the expense of other prehistoric property types.

2.3 Prehistoric Archaeological Property Types

The archaeological record of the human activities on Hanford includes information about the past lifeways matrixed with information about past environments. The record is culturally diverse. Since 1970, several archaeological districts have been identified and listed on the National Register of Historic Places. These districts are, for the most part, located along the Columbia River. Many other prehistoric properties have been determined to be eligible for listing on the National Register and receive the same level of management as National Register sites (Table 2.2).

Table 2.2. Archaeological Sites and Districts Listed and Determined Eligible for Listing in State and National Registers

Prehistoric Cultural District, Archaeological District, or Site	Eligible for NR	Listed on SR	Listed on NR	Comments
Coyote Rapids Archaeological District	•	•		NR nomination pending, listed on the SR 5/23/75
Gable Mountain Cultural District	•	•		NR nomination pending, listed on the SR 11/15/74
Hanford Generating Plant Archaeological District				NR nomination pending
Hanford Island Archaeological Site			•	Listed on the NR 8/28/76
Hanford North Archaeological District			•	Listed on the NR 8/28/76
Hanford South Archaeological District		•		NR nomination pending, listed on the SR 8/26/83
Locke Island Archaeological District			•	Listed on the NR 8/28/76
McGee Ranch/Cold Valley District	•			Historic and prehistoric sites included in district
Paris Archaeological Site			•	Listed on the NR 9/20/78
Rattlesnake Springs Sites			•	Listed on the NR 5/4/76
Ryegrass Archaeological District			•	Listed on the NR 1/31/76
Savage Island Archaeological District			•	Listed on the NR 8/28/76
Snively Canyon Archaeological District			•	Listed on the NR 8/28/76
Wahluke Archaeological District		•		Listed on the SR 5/23/75
Wooded Island Archaeological District			•	Listed on the NR 7/19/76
Archaeological Site 45BN423	•			Determined eligible for the NR 5/17/94
Archaeological Site 45BN434	•			Determined eligible for the NR 5/31/95

Archaeological properties on Hanford have been described in terms of site function as defined on the basis of surficial evidence, (e.g., fishing station, campsite, burial), features, (e.g., depression, shell midden, lithic scatter), artifacts (e.g., cobble tool, projectile point), or a combination of all three. The surficial evidence has been greatly reduced through time as collectors, relic hunters, archaeological studies, and natural erosional processes have taken their toll. Fifty years ago Drucker (1948) described the archaeological camp and village sites seen during his river surveys in McNary Reservoir portion of Oregon and Washington:

> **The village and camp sites are indicated by concentrations of artifacts, such as arrowpoints and blades of chipped stone, stone choppers, celts, hammers, and net-sinkers, awls and similar tools of horn and bone, and ornaments of shell beads and other materials. In addition there are quantities of organic refuse, river clam shells, fish and animal bone, ash and charcoal from the cooking-fires, mixed into the natural soil and drift sand of the river terraces.**

Shallow depressions, marking the pits of semi-subterranean earth lodges, are often to be seen also (Drucker 1948:6).

Although the diversity of surficial cultural materials observed by Drucker no longer exists as it did in 1948, archaeological sites are still most commonly documented on the basis of surficial evidence. Over 380 property types can be identified as components or probable components of the prehistoric period in the study area. Prehistoric archaeological properties have been described by many researchers since Krieger visited the Columbia River in 1926 and 1927 (Krieger 1928; Drucker 1948; Rice 1968a; Rice 1968b; Rice 1980a and 1980b; Rice 1983; Cleveland et al.; Morgan 1981; Jackson and Hartmann 1977; Lynch 1976; ERTEC 1982; Den Beste and Den Beste 1974, ERTEC 1981; Rice 1981, Rice 1984 a and b). The archaeological property type listing which follows identifies the predominant property types reported by Hanford Site researchers (Table 2.3).

Table 2.3. Prehistoric Archaeological Property Types

Properties Associated with Habitation
- Cave
- Ethnographic Use
- Housepit Villages
- Open Campsite
- Rockshelter

Properties Associated with Procurement Activities
- Butchering/Kill Site
- Fishing Station
- Hunting Station
- Plant Collection
- Quarry

Properties Associated with Processing Activities
- Fish Drying/Processing
- Lithic/Tool Scatters
- Plant/Seed Processing

Properties Associated with Religious, Burial, and Ceremonial Activities
- Burials
- Petroglyph and Pictograph
- Rock Cairn/Rock Alignments

Properties Associated with Transportation
- Trails

2.4 National Register Evaluation Criteria and Statement of Significance

Once identified, prehistoric properties are evaluated against the National Register criteria to determine their ability to convey significance. Significance is based on the degree to which properties retain and convey integrity of location, design, setting, materials, workmanship, feeling, and association. All seven of the integrity variables must be considered, however certain aspects of integrity more than others, may express the significance of a prehistoric property. Selection of the appropriate aspects is based upon an understanding of the property's significance and its essential physical features.

When evaluating any property's significance, it is vital to do so from the standpoint of those who may ascribe significance to them (Parker and King n.d.:4). Native Americans value archaeological sites as elements of a single whole, a concept which includes the integration of humans, nature, and the supernatural. The evaluation of archaeological sites as Native American traditional cultural properties is addressed in The Ethnographic/Contact Period (Lewis and Clark 1805 - Hanford Engineer Works 1943 of the Hanford Site, Washington. In essence, tribal involvement will be necessary throughout the National Register evaluation process as the significance of Hanford's prehistoric archaeological sites is considered.

A prehistoric property may be eligible for listing on the National Register if it meets one or more of Criteria A, B, C, or D or the Criteria Considerations, is associated with an important historic context, and retains integrity of those features necessary to convey its significance. Criteria considerations are individually applied to properties, however, only Criteria Consideration A, C, D, F, and G are more commonly used with prehistoric archaeological properties.

Each of the National Register criteria may be used to evaluate prehistoric archaeological sites and districts, however, Criterion D is more commonly used than Criteria A, B and C. The characteristics of each criterion as it relates to the evaluation of prehistoric archaeological sites is discussed in the following section.

2.4.1 Criterion A

If a prehistoric property or district is selected for nomination under Criterion A, it must be documented, through accepted means (including oral history), to have existed at the time of the event or pattern of events and to have been associated with those events. Well reasoned inferences drawn from data recovered at the site can be used to establish the association between the site and the events. Mere association with historic events or trends is not enough - the property's specific association must be considered as well (National Park Service 1991:12).

If an archaeological property is also a traditional cultural property and is evaluated under Criterion A, its significance must be derived from the role it plays in a community's historically rooted beliefs, customs, and practices and its association with events, or series of events, significant to the cultural traditions of a community. "Historically rooted" may be taken to include traditional oral history as well as recorded history. The means of research commonly employed to deal with traditional cultural resources include ethnographic, ethnohistorical, and folklore studies, as well as historical and archaeological research history (Parker and King n.d.:11).

2.4.2 Criterion B

Under Criterion B, persons associated with the archaeological property must be individually significant. Usually, archaeological properties considered under this criterion are associated with a person's productive life and the period of time in which significance was achieved. Well reasoned inferences, gathered from data recovered at the site are acceptable documentation of this association (National Park Service 1991:15). "Persons" can refer to persons whose past tangible, human existence can be inferred on the basis of historical, ethnographic, or other research, and to "persons" such as gods or demigods who feature in the traditions of a group history (Parker and King n.d.11).

2.4.3 Criterion C

Prehistoric archaeological properties evaluated under Criterion C must represent significant physical design or construction, including elements such as landscape architecture, architecture, engineering, and artwork (National Park Service 1991:17). Although this criterion is more often used to evaluate historic archaeological sites and historic structures and/or buildings, prehistoric villages may be evaluated under this criterion if they represent important concepts in prehistoric community design, planning, and construction techniques. A property may also be significant for construction techniques and subsequent adaptation if it illustrates the evolution of historic character of a place over a particular span of time (National Park Service 1991:19). Prehistoric properties with artwork valued by a group for traditional cultural reasons, such as a petroglyph or pictograph site, may also be evaluated under this criterion.

In addition to the above, a prehistoric property may be regarded as representative of a significant and distinguishable entity, even though it may not be individually unique, if it represents is an intregal part of a larger entity of traditional cultural importance. For instance, certain locations along the Columbia River in the study area may have been highly valued by Native Americans as excellent fishing locations. Although the fishing locations themselves are virtually indistinguishable to the untrained observer, they are representative of, and vital to, the larger entity of fishing rites and practices as they have been connected through time.

2.4.4 Criterion D

Criterion D is most commonly used to nominate prehistoric archaeological sites and districts to the National Register. Any property nominated under this criterion must meet two requirements:

- **the property must have, or have had, information to contribute to our understanding of human history or prehistory, and**
- **the information must be considered important (National Park Service 1991:21).**

Properties nominated under this criterion must be associated with human activity and usually contain or are likely to contain information that can contribute to important archaeological research questions. Often this information is represented in artifact configurations, stratigraphy, natural and cultural features, and structural remains. To support the contention that a prehistoric property has the necessary information, appropriate investigative techniques should be used to establish the presence and integrity of relevant data categories (National Park Service 1991:21).

Traditional cultural properties such as Native American villages are often prehistoric archaeological sites which have already yielded, or have the potential to yield, important information through oral history, ethnographic, archaeological, sociological and other studies. This potential, is however, usually secondary to its association with the traditional history and culture of the group that ascribes significance to it (Parker and King n.d.:12).

2.4.5 Criteria Considerations

Several kinds of properties are not commonly considered eligible for listing in the National Register: "religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties achieving significance within the past fifty years". These kinds of properties may be eligible "if they meet special requirements, called Criteria Considerations, in addition to meeting" Criteria A, B, C, and D (National Park Service 1991:25). Criteria considerations are individually applied to properties, however, only Criteria Consideration A, C, D, F, and G are more commonly used with prehistoric archaeological properties.

2.4.6 Integrity and Prehistoric Archaeological Properties

During the evaluation process, properties are considered for the aspects of location, design, setting, workmanship, materials, feeling, and association which retain integrity and which convey historic significance. Although all of these elements may be present in most properties, some may convey significance more strongly than others. Prehistoric archaeological properties are evaluated differently than other property types. In the section that follows, each aspect of property integrity is discussed as it relates to prehistoric properties.

Integrity of Location

"Location is the place where the historic property was constructed or the place where the historic event occurred . . . Except in rare cases, the relationship between a property and its historic associations is destroyed if the property is moved" (National Park Service 1991:44). Unlike buildings, a prehistoric site is rarely, if ever, intentionally moved from its original location because of the inseparable relationship between the cultural feature and/or artifact and the stratigraphic matrix within which the archaeological deposit resides. Therefore, establishing integrity of location or connections between place and historic event requires a characterization of the stratigraphic separation of cultural components both spatially and temporally. Cultural and natural formation processes (Schiffer 1987) must be taken into account throughout the characterization process.

Integrity of Design

"Design is the combination of elements that create the form, plan, space, structure, and style of a property . . . Design includes such elements as organization of space, proportion, scale, technology, ornamentation, and materials" (National Park Service 1991:44). Integrity of design may be perceived in a variety of ways. Design elements are commonly considered to be represented in the technology of the archaeological record; the form and style of culturally modified and finished tools. Other elements of design may be represented in the spatial placement of features within a multi-component archaeological site or the extended associations between separate, temporally related archaeological sites and the landscape.

Integrity of Setting

"Setting is the physical environment of a historic property . . . The physical features that constitute the setting of a historic property can be either natural or manmade, including such elements as: topographic features (a gorge or the crest of a hill); vegetation; simple manmade features (paths or fences); and relationships between other features or open space" (National Park Service 1991:45). The symbiotic relationship between previous inhabitants and their physical environment has long been recognized. While the consideration of setting integrity for archaeological properties is fairly straightforward, it is the consideration of the orientation, placement, and density of archaeological sites that may provide the most information about past environments and successful human response through the millennia. Therefore, an evaluation of setting integrity may include a determination regarding the current setting in terms of disturbance or alteration due to 'modern' development as well as a determination regarding the possible contemporaneous physical environment(s) as they are temporally defined in the archaeological record.

Integrity of Materials

"Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property. The choice and combination of materials reveals the preferences of those who created the property and indicate the availability of particular types of materials and technologies" (National Park Service 1991:45). When materials are present in an archaeological context it is important to establish the integrity of the material and the cultural components comprising the cultural deposit. Therefore, deposits of natural lithic materials must be distinguishable from culturally modified lithic materials while vegetal and fauna materials must be identifiable. Further, the materials must be associated with datable materials and/or stratigraphic separation of cultural components. The use of locally available materials as opposed to exotic materials could provide insight into possible trade networks.

Integrity of Workmanship

"Workmanship is the physical evidence of the crafts of a particular cultural or people during any given period in history or prehistory . . . Workmanship is important because it can furnish evidence of the technology of a craft, illustrate the aesthetic principles of a historic or prehistoric period, and reveal individual, local, regional, or national applications of both technological practices and aesthetic principles . . . Examples of workmanship in prehistoric contexts include Paleo-Indian Clovis projectile points, [and] Archaic period beveled adzes . . ." (National Park Service 1991:45). In the case of a prehistoric archaeological site, workmanship is most apparent in the technology and artifacts that are present. This evidence is most likely to survive even if the site has lost its integrity of location, setting, or association through natural and/or cultural
transformations.

Integrity of Feeling

"Feeling is a property's expression of the aesthetic or historic sense of a particular period of time . . . A grouping of prehistoric petroglyphs, unmarred by graffiti and intrusions and located on its original isolated bluff, can evoke a sense of . . . spiritual life" (National Park Service 1991:45). A majority of the prehistoric archaeological sites located on the Hanford Site retain integrity of feeling due to the restricted public access and absence of extensive urban and/or industrial development in much of the preserve since 1943. Integrity of feeling is intermeshed with the physical setting and location of the archaeological site. On the Hanford Site, integrity of feeling may be expressed in many property types.

Integrity of Association

"Association is the direct link between an important historic event or person and a historic property. A property retains association if it is the place where the event or activity occurred and is sufficiently intact to convey that relationship to an observer" (National Park Service 1991:45). Clear, defensible associations between the cultural components of an archaeological site, e.g., temporally diagnostic artifacts and materials, as well as site location and setting provide the knowledge to determine the external links and associations between the site and an important historic event or person. Internal associations between cultural components are essential if the site is significant for its ability to yield information important in prehistory or history.

2.5 Associated Property Types

Known archaeological properties on the Hanford Site date from approximately 6,000 to 8,000 B. P. to the recent ethnographic past. In the discussion that follows, documented archaeological sites are grouped and described according to similar, visible, physical attributes.

2.5.1 Properties Associated With Habitation

In general, habitation properties should retain the potential to yield information about prehistoric lifeways and adaptation strategies. Properties with evidence of habitation such as housepit features will usually meet registration requirements because of semi-subterranean form, floor plan, cultural materials and associated features such as storage pits and/or shell middens. In the case of natural shelters such as caves and rockshelters, eligibility considerations may focus on preservation issues and geologic information in addition to the cultural material and features present. The integrity of location, materials, design, setting, and association of habitation properties can be demonstrated in various ways. For example, integrity may be argued on the basis of associations between floral and faunal remains and cultural materials, the presence of datable materials, the architectural design of individual housepits, intact spatial relationships between features, various living and activity areas, and the cultural landscape.

Several prehistoric habitation subtypes not included here have been documented in nearby areas. These subtypes may be added if they are later encountered on the Hanford Site: 'used depressions' and 'circular rock alignments' lacking evidence of artificial or natural depressions have been presumed to represent the placement of stones around the perimeter of a mat or skin dwelling (Chatters 1986).

Subtype: Cave

Description: This resource type is defined by the presence of a natural cavity or opening in a rock outcrop or rock exposure. Along the Priest Rapids reservoir Greengo (1986) found evidence of habitation "in virtually every opening in the basalt rock large enough to hold at least one person" and artifacts were found in smaller openings as well. Although individual caves and openings have not been documented on the Hanford Site, a small portion of the Site does include landforms that may contain this type of resource. The information and cultural materials associated with this resource type will help to gain an understanding of past technology, resource procurement, subsistence strategies, trade networks, transportation, ritual, and adaptation to environmental and climatic fluctuations.

Significance: Almost all caves contain sediments that date from the Upper Pleistocene and Holocene periods. Hence, caves offer the unique opportunity to investigate the prehistoric use of caves as well as the fluctuations of paleoenvironments and climates. Caves have provided living sites and shelter for small groups of people and storage space for foodstuffs and other objects throughout the Mid Columbia region. Caves are important because it is possible to deduce, on the basis of sediment analysis, the sequence and causes of the geological events and their relationship to use by people. The study of cave sediments is thus the study of earth's most recent history which may include cultural materials left by prehistoric people and the degree to which people influenced cave deposits (Schmid 1963).

National Register Registration Requirements: Caves are eligible for the National Register under Criterion D particularly if their "integrity is based upon the property's potential to yield specific data that addresses important research questions" (National Park Service 1991:46). Caves containing cultural resource deposits are important because of their ability to link information about paleoenvironments with the lifeways of previous occupants. As an individual properties caves are likely to contain floral and faunal remains in direct association with cultural materials. If so, the supporting argument for site integrity will rest on association, material, and location (if the stratigraphy demonstrates separation of cultural components). A second argument may be made for those aspects of integrity that focus on material, design, workmanship and association if lithic debitage, stone tools and/or datable materials are present and are stratigraphically intact.

Subtype: Housepit Village

Description: Large housepit villages and/or smaller residential sites with housepit features are common to the Hanford site; most are situated along the river shore and on islands (Greengo 1986). Depressions associated with this property type may be difficult to define on the ground due to the rapid rate of deposition and/or previous flooding episodes which may obscure, or in the case of flooding, eliminate depressions. The use of historic aerial photography has been found to be an essential component of identification. In general, housepit depressions are commonly saucer-shaped to oval in form and range in size from 7 to 9 or more in diameter. This resource type may exhibit different construction techniques such as a steep-walled depression versus shallow saucer-shaped depression (Nelson 1969; Schalk 1983) capable of supporting a variety of structural elements: "semi-subterranean earth lodges, large mat lodges constructed over shallow pits, or intermediate forms combining fairly deep pits with mat covered superstructures" (Nelson 1969:53). Researchers have encountered variations in the sizes of housepit depressions (Chatters 1986; Schalk 1983; Osborne 1957). The construction details which may be temporally sensitive (Schalk 1973).

Archaeological sites containing housepit features represent a more sedentary lifestyle as groups of people settled into a year-round or seasonal residential pattern. This property type, more than any other, may potentially hold data relating to nearly all aspects of the prehistoric lifestyle including social organizational, technology, resource procurement, subsistence strategies, trade networks, transportation, adaptation to environmental fluctuation and change, and other important information.

Significance: Housepit villages and residential sites with housepit features are significant because of their potential to provide a wide array of data relating to late prehistoric subsistence strategies, settlement patterns, and adaptational strategies. They may be considered for eligibility as individual sites or as part of an archaeological district. All of these elements, if present, may provide information specified in research questions such as correlations between property types and microenvironments, the origin, spread, and temporal distribution of housepit villages in the Mid-Columbia region, the temporal and spatial variations in subsistence orientation, the process of change from prehistoric cultures to those observed ethnographically, the history of ethnic groups in the Plateau region since earliest habitation, and information about local and regional trading patterns.

National Register Registration Requirements: To be eligible under Criterion D, a property of this type must exhibit stratigraphic integrity, preservation of floral and faunal remains, and datable materials with little post-depositional disturbance. If construction techniques of the housepit and associated features can be demonstrated, the site may be eligible under Criterion C. Housepit sites may be significant under Criteria A and B if the property is related to an important event or chain of important events or if it is "associated with the productive life" of an important person (National Park Service 1991:15). Under Criterion D, aspects of integrity used in the eligibility evaluation will focus on associations between cultural materials and organic remains, the design of housepits and/or finished tools, the organic materials present, and the location (spatial and temporal) of cultural materials within the stratigraphic context. The integrity of association will be greatly enhanced by the presence of nearby features such as storage pits, burials, and trail systems. If eligible under Criterion A and B, the property must also exhibit integrity of setting while consideration under Criterion C requires retention of essential design features and evidence of assembly techniques and workmanship.

Subtype: Open Campsite

Description: The "open camp" (Drucker 1948, Lee 1955; Rice 1968a, 1968b, 1980a, 1980b; Jackson and Hartmann 1977; Chatters 1989) appears to be the most predominant property type in the study area (Rice 1968; Greengo 1986). These sites may contain scattered or concentrated fire-cracked rock, hearth features, stone tools, shell, ground stone, and lithic debitage may also be present in lesser quantities although housepit depressions are absent. This property type is found along the river shoreline and beaches on alluvial fans and gravel bars (Greengo 1986), on islands, and to a lesser extent, in the interior of the Hanford Site and may range in size from a single hearth area to several thousand meters.

Open campsites are likely the remains of temporary occupation by small groups of people moving from resource area to resource area within a seasonal subsistence cycle. As such, these properties potentially hold data about lithic technology, subsistence and adaptive practices, resource procurement, and other information about past inhabitants.

Significance: The significance of prehistoric campsites rests with their potential to provide information about the settlement and subsistence strategies, lithic technologies, resource procurement and use activities of past occupants. This property type in particular may potentially reveal more about subsistence and settlement strategies than any other property type. When open campsites are not considered as eligible properties on an individual basis, they may be eligible as contributing properties to an archaeological district because of their potential to provide information about settlement and subsistence strategies and association with other property types in the study area.

National Register Registration Requirements: Open campsites may be individually eligible for the National Register under Criterion D if they contain intact stratigraphic deposits. Optimally, the cultural deposits should be intact from the surface through the subsurface matrix with minimal post depositional disturbance. Soils should be well stratified with datable materials and good preservation of faunal and floral material. It is likely that only a portion of the prehistoric property will meet or approach these requirements, therefore, eligibility evaluations should be structured around the intact portion of the property.

Campsites with artifact diversity and a high frequency of cultural materials may be individually eligible. Even without subsurface cultural materials and datable materials, these sites may provide enough information to investigate patterns of raw material use, spatial relationships, social organization, trade, and technology. When datable materials are absent, the information provided by this property type may be limited in application but may contribute to broad general patterns in prehistoric subsistence strategies.

When open campsites are located near major travel corridors such as the Columbia River or the cross country route now known as the White Bluffs Road, they may contain important information about transportation and trade strategies of prehistoric people. Equally as important, these sites may help to identify the location of prehistoric transportation networks.

Subtype: Rockshelter

Description: Rockshelters may be defined by a natural cavity or rock overhang where shelter was obtained in the past. Associated cultural materials, soil staining, and soot on the upright walls of the feature are attributes often found in association with this property type. This resource type is restricted to rocky outcrops and is therefore minimally represented on the Hanford Site.

Significance: Rockshelters may be associated with temporary occupation by groups of people seeking shelter, perhaps moving from resource area to resource area within a seasonal subsistence cycle. As such, these sites potentially hold data about subsistence and adaptation, hunting activities, lithic technology, storage and/or caches, and other information about past inhabitants. Pictographs and petroglyphs have been found in association with this resource type.

National Register Registration Requirements: Rockshelters may be eligible under Criterion D if they contain datable materials, lithic debitage, caches and/or storage pits, intact stratigraphy, and clear associations between cultural material and floral/faunal remains - or variations thereof. Aspects of integrity to be investigated when determining eligibility include those elements that pertain to materials, association, location, design, and perhaps workmanship (if pictographs and petroglyphs are also present). As an individual property, this resource type should retain datable material and lithic materials and/or intact stratigraphy to be eligible. However, if datable materials are not present, a rockshelter may still be eligible as a contributing property to an archaeological district because it contains information about the broad patterns of subsistence and settlement strategies used by past inhabitants.

2.5.2 Properties Associated With Procurement Activities

To qualify for listing, procurement of natural resources must be shown to have been done by prehistoric people. The properties must be intact examples of resource procurement in the subtypes identified below: quarrying of toolstone materials, harvesting of fish and freshwater aquatic species, and hunting of large and small animals. Unless otherwise specified, procurement resources must have integrity of association, location, materials, and design.

Subtype: Butchering/Kill Site

Description: Cultural material found at this property type will include specific tools in association with animal remains. The animal remains will include bone fragments and tooth enamel (*Bison*, pronghorn, elk, etc.), in association with projectile point fragments, lithic debitage, hammerstones, and utilized flakes. Discrete work stations, reflecting primary disarticulation activities may also be present at kill sites (Slaughter, Fratt, Anderson, and Ahlstrom 1992:52). In addition, the natural terrain at the site is likely to contain geophysical features such as box canyons, precipices, and dune ridges (Chatters 1995). These landform features are important factors in the identification of this resource type.

Significance: Sites of this type are important for their ability of provide information about the hunting practices and strategies used by prehistoric people in their pursuit of large game. Information retrieved from this resource type may be applied to studies of correlation between property types and microenvironments, temporal and spatial variations in subsistence strategies, and paleoenvironments.

National Register Registration Requirements: Under Criterion D, butchering/kill sites must contain cultural materials in association with faunal remains that have the potential to yield information about prehistoric subsistence strategies. In addition to clear associations between the cultural materials and faunal remains, other elements must also be represented including features of the natural terrain that may have enhanced the hunting success of prehistoric peoples. Evaluation of integrity are likely to focus on associations between cultural materials and faunal remains, the location and separation of these components in their stratigraphic context, and on the tools.

Subtype: Fishing Station

Description: Features such as low cobble walls, large boulder aggregations, and shallow depressions have been encountered at fishing stations. Small tools commonly associated with this property type include concentrations of grooved cobbles and/or notched stones used as net weights. Many of the tools and evidence associated with prehistoric fishing activities were perishable (fish remains), highly portable and perishable (leisters, and harpoons, etc.), or have been destroyed by natural post depositional processes and are therefore not part of the archaeological record. More importantly, the use of nets and net weight fishing strategies to harvest fish may have been specific to a particular fish species or season of the year. Hence, other attributes may need to be used in conjunction with the archaeological record to define this property type including river channel morphology and anadromous fish behavior (Gard 1991).

Significance: Fishing stations are important because of their ability to reveal information about fishing strategies, to the define the full range of fish species and other aquatic animals sought by prehistoric peoples, and the types of tools used to harvest fish and other aquatic animals. Information gained from this resource type will provide data requested in broad research questions dealing with subsistence strategies, social organization, season-of-use determinations, tool technologies, and ritual activities.

National Register Registration Requirements: Under Criterion D, fishing stations must retain cultural materials, e.g. net weights, in association with floral and faunal material or be likely to yield such information. Fishing stations are typically situated near the Columbia River and are susceptible to post-depositional impacts caused by changes in river levels imposed by dam operations, collector digging, and loss of net weights due to surface collecting activities by amateur enthusiasts. Evaluations should focus on that portion of the site containing a high degree of integrity such as intact stratigraphy and separation of cultural components and/or the presence of datable materials. The presence of perishable material in the form of fish or other aquatic remains is essential information and intensive analysis is required for evaluation.

Fishing stations can be evaluated under Criterion A and B if it can be <u>demonstrated</u> that the property is "important for association with an event, historical pattern, or person...". For example, a fishing station that was also the location of important fish ceremonies as demonstrated by oral history accounts may qualify for listing under Criterion A, Criterion B, and Criterion D (as described above). To establish the property's integrity under Criterion A and B, the prehistoric setting must be recognizable as it exists today (National Park Service 1991:48).

Fishing stations that are severely deflated or eroded by post depositional impacts such as water erosion along cutbanks and on cobble beaches are not eligible as individual properties. Deflated or eroded fishing stations may however contain information about the broad patterns of settlement and subsistence throughout prehistory. As such, these resources can be considered for eligibility as contributing properties within an archaeological district.

Subtype: Hunting Station

Description: Hunting stations may include several attributes including lithic debitage, projectile points and point fragments with the most important of these attributes being geomorphology and geological features attractive for use as hunting blinds or stations. Although opportunistic hunting strategies were employed by prehistoric people, hunting stations were often selected to take advantage of unique elements in the natural terrain. Geologic features encountered in association with hunting stations include prominences, saddles, natural constrictions in basaltic outcrops, talus, and precipices. Prehistoric man also altered these vantage points by creating low uncoursed rock walls to funnel animals into box canyons or natural constrictions, by creating depressions in talus and scree slopes to hid or camouflage the body, or by building semi-circles of stone behind which to crouch. The latter have been described as 'hunting blinds' particularly when their crescent shape has a greater height in the center as opposed to the 'wings' which wrap, in a curve, around the sides of the alignment. When situated on the top of prominence these alignments vary in length from 1.5 to 3.0 meters (4.9 to 9.8 feet) (Smith 1977).

Significance: This resource type is important because of its ability to retain information about tool technology, resource procurement, and hunting strategies of prehistoric people.

National Register Registration Requirements: Under Criterion D, hunting stations must retain the potential to yield information important to prehistory. Accordingly, hunting stations must retain primarily undisturbed cultural materials in association with floral and faunal remains and/or datable materials. Unique geologic features may also be present. Evaluations will focus on those aspects of integrity that deal with materials, association, and design if finished stone tools are present. Some elements of the prehistoric setting may be intact if geologic features such as overlooks, prominences, and box canyons are also present.

If diagnostic materials, clear distinctions between naturally and culturally modified materials, or stratigraphic integrity are lacking, the hunting station will be ineligible for listing as an individual property. However, if enough information is available to support broad patterns of subsistence and settlement, a hunting station may be considered eligible as contributing property in an archaeological district.

Subtype: Plant Collection

Description: Plant and seed collection occurred in many settings but the archaeological record may not retain much evidence of plant gathering locations because of the perishable nature and portability of plant digging tools and baskets, mats, or other items used as collection vessels. Digging sticks were used to secure food plants such as roots, bulbs, and tubers, other tools were used to gather other plant materials such as hemp, tule reed, and willows, etc. Prehistoric plant gathering areas may not be identifiable on the basis of the archaeological record alone. Distinctions between specific types of plant gathering activities such as areas where specialized gathering techniques were productive or areas where particular plant species were exploited may not have been adequately addressed during the course of site documentation. Identification of these prehistoric resource areas may be enhanced by paleoethnobotanical reconstuction efforts at prehistoric residential areas (Lennstrom and Hastorf 1995) and through paleoenvironmental reconstruction of the region as a whole.

Significance: Plant gathering activities and resource areas although not well represented in the archaeological record are important because of their potential to yield information about prehistoric subsistence strategies and cultural adaptations to climatic change. Such information can be used to study relationships between the intensification of plant gathering and processing activities, increasing reliance on vegetal foods, and cultural adapations as they relate to sedentism and demography.

National Register Registration Requirements: Under Criterion D, plant gathering areas may qualify for listing if they have the potential to yield specific data such as datable materials, intact stratigraphy, culturally modified tools and preserved floral remains that can be used to answer important research questions. Such requirements are rigorous and it is not likely that these requirements will be met solely in the archaeological record because of modern semiarid environment which is not conducive to the preservation of pollen and floral remains. Additional analysis may be required in paleoenvironmental reconstruction and paleoethnobotanical studies undertaken at contemporary residential sites to identify prehistoric plants used in the past and establish their likely range before individual plant gathering sites can be listed on the National Register.

Subtype: Quarry

Description: Natural toolstone material is readily available throughout the Hanford Site (petrified logs, chalcedony, e.g., chert and agate, and cobbles of various lithologies) and natural sources of these materials have been documented in the surrounding mountain ranges of the Hanford Site and along the cobble beaches of the Columbia River. Some or all of the following attributes are associated with this property type: tested pieces of toolstone material, discarded cores, blanks, and a dominance of decortication flakes. Hammerstones, hammerstone spalls, anvil stones, fire-cracked rock (heat treatment), flaked cobble scatters, and spatially discrete knapping areas may also be present. The cobble scatters, whether unifacial or bifacial flaking has occurred are considered to represent an early stage of tool manufacture associated with quarrying of selected toolstone materials from the cobble beaches of the river shoreline (Thoms et al. 1983).

Toolstone materials may exhibit similar flaking patterns whether the material is flaked by natural mechanisms or by the tool maker - particularly during the early stages of manufacture or later as postdepositional damage to flaked tool edges is introduced by natural movement or human trampling. Therefore, considerations of eligibility must include a discussion of attributes used to identify cultural flaking debris versus the attributes used to identify natural alteration. Technical attributes that have been used to differentiate culturally modified toolstone from naturally modified toolstone include identification of "a relatively unweathered fracture surface" and the presence "prepared platforms, acute platform angles, and multiple dorsal flake scars that originate from different directions" (Root 1993). Flaking debitage is the most dominant attribute of this resource type; finished tools are not commonly present in high numbers.

Significance: The lithic analysis of this property type may reveal attributes that are characteristic of a particular reduction technique or provide information about finished, temporally diagnostic stone tools and reveal new information about the microenvironments most often exploited for natural toolstone material. Identification of natural toolstone materials, their sources, and the reductive technique(s) employed at a quarry site may be expanded to provide information relating to mobility pattern(s), trade or exchange, organization of technology distinguished by specific periods of time and spatial location, travel routes to and from a prime resource area, and procurement strategies used by prehistoric peoples.

National Register Registration Requirements: Quarry sites considered under Criterion D must retain stratigraphic separation of cultural components and clear associations between floral and faunal material and/or datable materials. Lithic debitage, finished stone tools, cobble tools, hammerstones, or manufacturing tools must be present in sufficient quantities to potentially yield information about the reductive techniques employed at the site. Site integrity may focus on the *associations* between a source of natural toolstone and tool preforms, including representative examples of the byproducts of each stage of tool manufacture. If workmanship and style can be demonstrated in the manufacture of temporally diagnostic stone tools, this property type may be considered under Criterion C in addition to Criterion D as discussed above.

2.5.3 Properties Associated with Resource Processing Activities

Places or properties falling within this category will contain tool classes reflective of the processing activities carried out at the site. The types of processing strategies and tools used by prehistoric people as they manufactured stone tools, harvested fish, ground seeds, and/or processed berries and plant vegetal matter for later use are varied. (Other processing activities such as working hides and creating paints from local or traded minerals may also be present on the Hanford Site although they have not been documented as individual properties.) Any disturbance that has occurred at sites where processing are evident must not have compromised the potential of the site to yield information relevant to prehistoric activities or associations between cultural materials and floral and faunal remains.

Subtype: Fish Drying/Processing

Description: Fish processing sites are likely to retain utilized flakes, flaked cobble cores, activity areas centered around fish drying racks, and grinding implements. Associated features may include cobble piles, small depressions, and fish remains. This property type is likely to be adjacent to and/or part of a fishing station, open campsite, or village site, near the Columbia River.

Significance: Fish processing sites are important for their potential to yield information about prehistoric subsistence strategies. Processing sites are more likely to provide information about the full range of fish species and other aquatic animals sought by prehistoric peoples and the tools they used than cultural materials associated with fish harvesting activities. Information gained from this resource type may potentially provide data on subsistence strategies, social organization, season-of-use determinations, and tool technologies.

National Register Registration Requirements: Under Criterion D, fish processing sites must retain the potential to yield information about prehistoric fishing practices and strategies. Fish remains, e.g., accumulations of offal and fish bone, must be found in clear association with cultural materials representing fish processing activities, e.g., drying rack activity centers and activity areas where pulverization of whole fish occurred, etc. (Gard 1991).

Fish processing sites may fail to qualify for listing due to the poor preservation of cultural materials and fish remains and the routine disposal/removal of these elements at the processing site because of storage needs and consumption elsewhere. In this case, fish processing sites should be considered for listing, not as individual sites, but as sites contributing to an archaeological district.

Subtype: Lithic/Tool Scatters

Description: Tool manufacturing sites must contain clear associations between lithic debitage and/or finished tools. This property type is located along the Columbia River, often in association with residential sites, and as individual sites located in interior areas well away from the Columbia River. The areal extent of lithic scatters may vary significantly from less than 3 meters in diameter to more than several thousand square meters. Attributes of this property type include flaking debitage resulting from the final stages of tool manufacture, finished tools or tool fragments, cobble and ground stone tools, anvil stones, and hammerstones/pecking stones for both flaking and/or pecking activities.

Significance: Stone tool manufacturing sites are important records of lithic technologies. A wide range of data can be derived from the analysis of a lithic property: the stages of reduction passed through during tool manufacture, labor, use, and discard rates associated with stone tool manufacture, reductive technique(s) used, and the variation of tool types (Slaughter, Fratt, Anderson, and Ahlstrom 1992:52). Such information will assist in developing general cultural chronologies and in establishing tool typologies for the Mid Columbia region.

National Register Registration Requirements: Under Criterion D, a tool manufacturing site important for yielding information on lithic technologies will contain lithic debitage, cobble tools, finished flaked tools, hammerstones in clear association, usually within an undisturbed stratigraphic context. The presence of datable materials and floral and faunal remains will further enhance the eligibility of this property type. Evaluations of integrity will focus on the lithic materials present and the associations between these cultural materials and other elements such as floral and faunal remains and/or datable materials.

Deflated or eroded tool manufacturing sites that have lost clear associations between cultural materials and datable materials or floral and faunal remains will not qualify for listing as individual sites. However, these sites may contain information applicable to cultural chronology and broad patterns of settlement and subsistence. In this case, they may qualify as contributing properties within an archaeological district.

Subtype: Plant/Seed Processing

Description: This property type contains milling and/or grinding stones and pestles or manos. It is likely to be associated with plant gathering areas or to be included as an associated activity area within the confines of an open camp or housepit village site.

Significance: Plant processing sites are important because of their potential to yield information about prehistoric subsistence strategies, paleoenvironments and cultural adaptations to climatic change. Plant processing sites must retain the potential to yield specific information that addresses important research questions can be used to study relationships between the intensification of plant gathering and processing activities, increased reliance on vegetal foods, and cultural adapations as they relate to sedentism and demography.

National Register Registration Requirements: Under Criterion D, evaluations of eligibility must establish the presence of well preserved floral and faunal remains found in clear association with grinding and milling tools, stratigraphic integrity, and datable materials. Evaluations may also be made under Criterion A and B if it can be demonstrated that the plant processing site was associated with a significant event or person. Evaluations of integrity will focus on materials, association, location, and design for eligibility considerations made under Criterion C; on location, setting, and materials for Criterion A and B.

2.5.4 Properties With Religious, Burial, and Ceremonial Associations

Information about properties associated with religious, burial, and ceremonial activities is restricted under several laws and regulations. Evaluation of this type of archaeological site can only proceed with tribal involvement and/or the appropriate ethnic community.

Subtype: Rock Cairn

Description: These sites may consist of one or several cairns. Cairns are small, cone-shaped piles of placed basalt rubble containing four to 12 individual rocks. Individual rocks may range in size from 10 to 30 cm (3.9 to 11.8 inches) in diameter (Smith 1977). Rock features within this category are usually situated, singly or in groups, on prominences and may represent religious and ceremonial activities and/or burials/cemeteries.

Significance: Such properties are important because they represent religious and spiritual values of prehistoric people. These properties are also highly important to modern Native Americans and may be in active use. Several laws govern the management of these properties including the Native American Graves Protection and Repatriation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act, and the National Historic Preservation Act.

National Register Requirements: Properties considered for eligibility under Criterion D and Criteria Consideraton A, C, D, or F must retain the ability to yield information about religious or spiritual values of the past. The configuration of prehistoric cairns may be similar to historic cairns placed by early surveyors or cattlemen to define property lines or mark trail locations. Documentation and evaluation of this property type must identify and define these differences. The property must have characteristics such as lichen coverage, preserved natural and cultural features/materials that may bear information about religious aspects of prehistoric culture. However, it is likely that a clearer case for National Register nomination can be made under Criterion A by Native people rather than under Criterion D which deals primarily with the ability of archaeological sites to yield scientific data.

Subtype: Petroglyphs and Pictographs

Description: Petroglyph is defined as a rock engraving or drawing that has been created in a variety of ways. The most common method involves the repeated striking of a sharp stone against a rock surface (pecking) to produce a shallow pit which is slowly enlarged to create a design (Keyser 1992). Once common in the Priest Rapids area (Cain 1950), these features were inundated by pool reservoirs following dam construction. Pictographs have also been described as rock paintings, often made with mineral pigments that were combined with organic binding agents such as fat, eggs, blood, urine, or plant juice to make paint (Keyser 1992). Once applied, these pigments survive natural elements very well.

Petroglyphs and pictographs have not been documented on the Hanford Site. Their potential presence is expected to be rare and restricted to a very limited topographic setting. The designs commonly encountered in areas adjacent to the Hanford Site include human, animal, and geometric forms.

Significance: Petroglyphs and pictographs are important because of their ability to relay visual information created by prehistoric people. This resource type may yield information about hunting strategies, the timing of events, and places of prehistoric importance. Although problematic, cation-ratio dating techniques may be used to establish dates for panels when rock surfaces have a veneer of naturally created varnish.

National Registration Requirements: This resource type may qualify for listing on the National Register under Criterion C and Criterion D. Under Criterion C, this resource type must represent an aesthetic ideal more fully than other properties of the same type (National Park Service 1991a). Consequently, the pictograph and/or petroglyph must have the essential features of its design intact to retain integrity, e.g., design, feeling, workmanship, association, and location. If the property is considered under Criterion D, it must potentially yield information about prehistoric subsistence and hunting strategies, contain a varnished surface that may be datable, or be clearly associated with cultural materials. Evaluation of integrity under Criterion D will likely focus on the location, design, and material aspects.

2.5.5 Properties Associated with Transportation

Description: Transportation systems were present during prehistoric times but little evidence of their presence can be seen today. Early visitors were often guided across trail systems on their way to the western part of the Oregon Territory by Native people. These transportation systems predated the exploration and resettlement period. Within the study area, the Columbia River and shoreline provided both an avenue and obstacle to travel across the Hanford Site.

Subtype: Trails

Description: Trail systems were in use by native people before the arrival of Euro-Americans. On the Hanford Site, the White Bluffs Road has been determined to be eligible for the National Register based on its antiquity as a trail and a historic road.

Significance: Trail segments and systems were intregal elements of prehistoric settlement and subsistence strategies but they are especially difficult to associate with any particular time or cultural group unless associated properties such as open campsites located at river crossings and trail intersections, lithic scatters, or construction details and/or ruts can be discerned. This property type has not been widely documented on the Hanford Site for the prehistoric time period but it is recognized as significant because of the information it may potentially yield about prehistoric settlement and subsistence patterns, social organization, and local, regional and national trade networks.

National Registration Requirements: Evaluations must focus on the potential of the individual property to yield data about prehistoric travel and transportation. Under Criterion D, the property must have been used by prehistoric people and should contain clear associations between cultural materials, e.g., lithic debitage and hearth features, etc., and the trail segment itself. Trail networks may contain segments which no longer retain characteristics that qualify them for listing on the National Register, these may be included as contributing segments to the property as a unit.

Table 2.4. Thematic Goals for Research*

1. Culture History
   - Chronology
   - Ethnic History
   - Stylistic and Technological Traditions
   - Migration, Diffusion, and Territoriality

2. Social-Cultural Reconstruction
   - Economy
   - Technology
   - Community and Settlement Patterns
   - Social Organization
   - Artistic and Stylistic Expression
   - Ceremonial and Burial Practices
   - Contacts with External Groups (trade, warfare, etc.)

3. Cultural Process/Evolution/Ecology
   - Temporally Delimited Property Types
   - Land Use and Settlement Patterns
   - Mobility-Sedentism
   - Subsistence and Diet
   - Storage-Resource Intensification
   - Evolution of Society

3a Environmental Reconstruction
   - Prehistoric Landscape Reconstruction/Geomorphology
   - Zooarchaeology-Paleontology
   - Palynology-Paleoethnobotany
   - Paleo-Climatology

3b Paleo-Anthropology
   - Demography
   - Health and Nutrition

Research areas within the context of thematic goals may include but are not limited to:

Research Area 1:
Temporally Delimited Intra-Site/Place Connections
Cultural Landscape

Research Area 2:
Evolution of Tool Technology
Temporally Delimited Tool Types
Temporally Delimited Food Processing Activities

Research Area 3:
The Effect of Technological Change on Land Use
and Settlement Patterns

*After Wessen 1985 and Stilson 1988

2.6 Thematic Goals For Archaeological Research

There are general principles of cultural evolution and there are also unique conditions, events, and processes (Gumerman 1994:4).

A representative picture of prehistory may be gained if we pose and work to answer three general research questions: What environmental and cultural changes have occurred in the region? What impact did the environmental and cultural changes have on settlement and subsistence behavior, technological development, population size, social organization, interaction patterns, and religion of the inhabitants? What were the mutual interactions among these related variables?

Current knowledge of local prehistory on the Hanford Site and vicinity has increased only moderately since the first researchers visited the study area. Consequently, archaeological sites of discernible types representing the full range of time in each period have not been yet been clearly defined. Using what we know about local prehistory then contrasting and comparing that knowledge with other local prehistories should help to create a complete picture of the human history in the study area and the surrounding Mid-Columbia Basin region.

2.6.1 Theoretical Issues

Throughout prehistory, the occupants of the Hanford Site have subsisted by hunting, plant gathering, and fishing. Such peoples have come to be known as hunter-gatherers or hunter-fisher-gatherers. Because of the dependence on naturally occurring food species as opposed to domestic ones, some believe that the ecological and social adaptations of these people differ from those of agriculturists. An extensive array of specific research questions can be asked of the archaeological record in an effort to illuminate major research questions about prehistoric hunter-gathers. All of these questions require acquisition of data on settlement patterns and subsistence, dwelling type and size; floral and faunal remains; stone, bone and shell tools; and/or various facilities used to process and store food to formulate answers or hypotheses. Data collected in pursuit of such questions must be done conservatively and as thorough as the state of the art will allow to avoid the potential loss of significant information. The results generated from analysis can be used to complete the image of regional culture history.

The major themes identified here (Table 2.4) reflect three different but associated categories and one associated subset category. The first, cultural chronology, serves to center research questions around specific time periods and the elements of culture which may be discernible in the archaeological record. Important questions to pursue include those which address gaps in local prehistoric sequences particularly as they pertain to radiocarbon assays. The second, social-cultural reconstruction, provides a thematic focus on regional chronological systems and the local development of culture. Here research questions should attempt to capture data that will assist with investigations of areal linkages, ethnic distributions, subsistence, technology, demography, and onset of the housepit and village phenomenon. The third thematic goal, cultural process, focuses on cultural response and adaptation to environmental change. Environmental research is essential for evaluating the effects of resource distribution on prehistoric settlement and subsistence patterns. A subset category of this last goal is paleoenvironmental reconstruction and paleo-anthropology.

2.6.2 Specific Research Questions

Archaeologists studying the prehistory of the Columbia Plateau Region have observed discontinuities in the archaeological record that warrant explanation. In developing the evaluation component for the Resource Planning and Protection Process Mid-Columbia Study Unit, the Washington Office of Archaeology and Historic Preservation compiled some of these questions, and a few more are added here (Table 2.5). The answers to all of these questions could be obtained from the representative sample of the archaeological resource base of the area; therefore, details of the data required to answer each question are not presented. This task, creating a research design, is left to any individual investigator seeking a permit to conduct research on one or more of these questions on the Hanford Site (Chatters 1989).

Table 2.5. Research Questions Posed for the Mid-Columbia Study Unit[a]

1. Is there a relationship between the dependability of water or minimum annual river flow and the continuity of cultural traditions? Those areas near riverine systems that would be least affected by climatic fluctuations seem to have the most stable cultural systems. Is this observation correct?

2. Which of the various competing land use models currently in use is the most accurate? Is each, in fact, applicable to only a portion of the region?

3. What is the character of the lithic assemblage through time? What are the lithic sources and why do they change through time? What is the projectile point sequence, especially that from the Hanford Site?

4. Does the Plateau pattern really exist? If so, what are its spatial and temporal origins?

5. What is the correlation between property types and microenvironments? Do such microenvironments as springs, dunes, basaltic badlands, rapids, and major and minor tributaries, contain specific property types? How important are such factors as sun and wind exposure, and proximity of botanical resources? Have the correlations changed through time?

6. What are the origin, spread, and temporal distribution of housepit villages in the Mid-Columbia region? Are they in evidence at the Hanford Site early in its sequence? How many houses in a village were occupied contemporaneously? What is the seasonality of house occupancy in different time periods? What are the characteristics of the supporting adaptations?

7. What are the temporal and spatial variations in subsistence orientation? This information should be manifested in tool assemblage, faunal and floral assemblages, projectile point frequencies, and site locational data. What are the environmental parameters of these variations? Do such variables as salmon variability and annual mean river level fluctuations play a major role in these variations?

8. What was the process of change from pre-historic cultures to those observed ethnographically? What were the cultural impacts of: the horse, the fur trade economy, depopulation from disease, the introduction of new tool technologies, and the introduction of domestic plants and animals (other than the horse)?

Table 2.5. (Cont'd). Research Questions Posed for the Mid-Columbia Study Unit[a]

9. What is the history of ethnic groups in the Plateau region since earliest habitation. How long have the different groups held their historically observed territories?

10. What is the history of trading patterns in the Plateau and how has trade contributed to the stability of adaptations?

[a]Largely from: Stilson 1987, Chance 1980, Chatters 1989.

Table 2.6. Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
12,000-10,500	Butchering or Kill Site	Technology, Subsistence and Diet	Faunal remains in association with weapons and/or butchering tools.	None Identified
	Cache	Technology, Stylistic Technological Traditions	Dense, spatially restricted clusters of tools and raw materials.	None Identified
	Camp Site	Community and Settlement Pattern, Social Organization Chronology, Migration, Diffusion, and Territoriality	Any site representing this time that contains tools and may include features, floral and faunal remains.	None Identified
	Cave	Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet, Evolution of Society	Any site representing this time that contains tools and may include features, floral and faunal remains. Presence/absence of storage facility can be determined.	None Identified
	Lithic/Tool Scatter	Technology, Stylistic Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Rockshelter	Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet, Evolution of Society	Any site representing this time that contains diagnostic tools and may include features, floral and faunal remains.	None Identified
10,500-8,000	Butchering or Kill Site	Technology, Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet	Faunal remains in association with weapons and/or butchering tools.	None Identified
	Burial	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains	None Identified
	Cache	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Dense, spatially restricted clusters of tools and raw materials.	None Identified
	Camp Site	Community and Settlement Patterns, Social Organization, Mobility-Sedentism, Evolution of Society	Any site this time that contains scattered tools and may include features, floral and faunal remains, holes, depressions, and domestic debris.	Potentially 45BN179

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
10,500-8,000	Cave	Community and Settlement Patterns, Social Organization, Mobility-Sedentism, Evolution of Society	Any site representing this time that contains scattered tools and may include features, floral and faunal remains.	None Identified
	Lithic/Tool Scatter	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Quarry	Technology	Raw material sources, artifacts made from source materials.	None Identified
	Rockshelter	Community and Settlement Patterns, Social Organization, Mobility-Sedentism, Evolution of Society	Any site representing this time that contains scattered tools and may include features, floral and faunal remains.	None Identified
8,000-5,000/4,000	Butchering or Kill Site	Technology, Community and Settlement Patterns, social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet	Faunal remains in association with weapons and/or butchering tools.	None Identified
	Burials	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains	None Dated
	Cache	Technology	Dense, spatially restricted clusters of tools and raw materials	None Identified
	Camp Site	Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet	Post hole patterns, stone circles, scattered tools and concentrated domestic debris. Small pits containing processed food debris	Potentially 45BN307, 45BN423, 45BN446, 45BN455, 45GR317
	Cave	Community and Settlement Patterns, Social Organization, Mobility-Sedentism, Evolution of Society	Any site representing this time that contains scattered tools and may include features, floral and faunal remains.	None Identified
	Lithic/Tool Scatter	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Pictographs, Petroglyphs	Religious, Ceremonial, Traditional Cultural Places	Rock surfaces with pictographic or petroglyphic panels	None Known
	Quarry	Technology	Raw material sources, artifacts made from source material.	None Known

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
8,000-5,000/4,000	Rockshelter	Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet	Shelter with full range of tools, floral and faunal remains, intact stratigraphy	None Identified
5,000/4,000-3,800	Butchering or Kill Site	Technology, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Faunal remains in association with weapons and/or butchering tools	None Identified
	Burial, Cemetery	Religious, Ceremonial, Traditional Cultural Places	Buried human remains	None Dated
	Cache	Technology, Chronology, Stylistic and Technological Traditions	Dense, spatially restricted clusters of tools and raw materials	None Identified
	Camp Site	Community and Settlement Patterns, Social Organization, Chronology, Subsistence and Diet, Mobility-Sedentism, Storage-Resource Intensification	Any site of this time contains scattered tools and may include features, floral and faunal remains, depressions or pits containing remains of processed food.	Potentially 45BN157a 45GR306b, 45BN423, 45BN446, 45BN455, 45GR317
	Cave	Chronology, Storage-Resource Intensification	Any site of this time that contains identifiable floral and faunal remains and storage feature(s). Dated depressions or pits containing remains of processed food.	None Identified
	Food Procurement and/or Processing	Economy, Technology, Community and Settlement Patterns, Mobility-Sedentism, Subsistence diet, Storage-Resource Intensification	Any site of this time that contains predominance of similar feature types, identifiable floral and faunal remains of limited diversity, scattered tools	None Identified
	Housepit	Technology, Community and Settlement Patterns, Social Organization, Chronology, Subsistence and Diet, Mobility-Sedentism, Evolution of Society	Any site of this time containing scattered tools and represents the full range of domestic activities; may include features, floral and faunal remains; construction attributes such as post holes, depressions or pits containing remains of processed food.	None Identified
	Pictograph, Pectoglyphs	Religious, Ceremonial, Traditional Cultural Places	Rock surfaces with pictographic or petroglyphic panels	None Known

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
	Rockshelter	Chronology, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Any site of this time that contains scattered tools and may include features, floral and faunal remains. Dated depressions or pits containing remains of processed food.	None Known
3,800-3,400	Butchering or Kill Site	Technology, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Faunal remains in association with weapons and/or butchering tools	None Identified
	Burial, Cemetery	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains	None Dated
	Cache	Chronology, Storage-Resource Intensification	Any site of this time that contains identifiable floral and faunal remains and storage features. Dated depressions or pits containing remains of processed food.	None Identified
	Camp Site	Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Any site of this time that contains scattered tools and may include features, floral and faunal remains. Represents the full range of domestic activities.	Potentially 45BN157A, 45BN307, 45BN423, 45BN446, 45BN455, 45BN459
	Cave	Chronology, Storage-Resource Intensification	Any site of this time that contains identifiable floral and faunal remains and storage feature(s); dated depressions or pits containing remains of processed food.	None Identified
	Food Procurement and/or Processing	Economy, Technology, Community and Settlement Patterns, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Any site of this time that contains predominance of similar feature types, identifiable floral and faunal remains of limited diversity, scattered tools.	None Identified
	Housepit	Technology, Community and Settlement Patterns, Social Organization, Chronology, Mobility-Sedentism, Subsistence and Diet	Any site of this time that contains scattered tools and may include features, floral and faunal remains. Represents the full range of domestic activities.	Potentially 45GR306B, 45BN157A
	Pictograph, Pectoglyphs	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains.	None Identified

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
	Quarry	Technology	Raw material source, artifacts made from source material.	None Identified
3,800-3,400	Rockshelter	Chronology, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Any site of this time that contains scattered tools and may include features, floral and faunal remains. Dated depressions or pits containing remains of processed food.	None Identified
3,400-2,300	Lithic/Tool Scatter	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Burial, Cemetery	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains	None Dated
	Butchering or Kill Site	Technology, Community and Settlement Patters, Mobility and Sedentism	Faunal remains in association with weapons and/or butchering tools.	Potentially 45BN225
	Cache	Technology	Dense, spatially restricted clusters of tools and raw materials	None Identified
	Campsite	Community and Settlement Patterns, Social Organization, Chronology Mobility-Sedentism, Storage-Resource Intensification, Evolution of Society	Any dated site representing this time that contains tools and may include feature, floral and faunal remains and contains small pits with evidence of processed food.	Potentially 45BN179, 45BN307, 45BN423, 45BN446, 45BN455, 45BN459, 45BN461, HT89029
	Cave	Community and Settlement Patterns, Social Organization, Chronology Mobility-Sedentism, Storage-Resource Intensification, Evolution of Society	Any dated site representing this time that contains tools and may include feature, floral and faunal remains and contains small pits with evidence of processed food.	None Identified
	Fish Traps/ Control Features	Settlement Patterns, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Artificial rock alignments or depressions in riverbed or along the shore	None Identified
	Food Procurement and/or Processing	Economy, Technology, Community and Settlement Patterns, Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Any site of this time that contains predominance of similar feature types, identifiable floral and faunal remains of limited diversity, scattered tools.	None Identified

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
3,400-2,300	Housepit	Community and Settlement Patterns, Social Organization, Chronology Mobility-Sedentism, Storage-Resource Intensification, Evolution of Society	Any dated site representing this time that contains tools and may include feature, floral and faunal remains. May include evidence of small pits with associated processed foods.	Potentially 45BN157a
	Lithic/Tool Scatters	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Pictographs, Pectoglyphs	Religious, Ceremonial, Traditional Cultural Places	Rock surfaces with pictographic or petroglyphic panels	None Known
	Quarry	Technology	Raw material sources, artifacts made from source materials.	None Identified
	Rockshelter	Community and Settlement Patterns, Social Organization, Chronology Mobility-Sedentism, Storage-Resource Intensification, Evolution of Society	Any dated site representing this time that contains tools and may include feature, floral and faunal remains and contains small pits with evidence of processed food.	None Identified
2,300 - A.D. 200	Butchering or Kill Site	Technology, Community and Settlement Patterns, Mobility and Sedentism	Faunal remains in association with weapons and/or butchering tools	Potentially 45BN412
	Burial, Cemetery	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains from this time period	None Dated
	Cache	Technology	Dense, spatially restricted clusters of tools and raw materials	None Identified
	Cairns	Religious, Burial, Ceremonial, Traditional Cultural Places	Cairns on ridges, hills, buttes	Gable MT/Gable Butte A.D.
	Campsite	Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Chronology, Migration, Diffusion and Territoriality, Mobility-Sedentism, Storage-Resource Intensification	Any dated site representing this time that contains tools and may include features, floral and faunal remains, and represents the full range of domestic activities. Dated depression or pits containing remains of processed food.	Potentially 45BN423, 45BN257, 45BN157a, 45BN180, Wahluke A.D., Rattlesnake A.S., 45BN474
	Cave	Storage-Resource Intensification	Dated depressions or pits containing remains of processed food.	None Identified

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
2,300 - A.D. 200	Food Processing/ Procurement	Community and Settlement Patterns, Subsistence and Diet	Any site of this time that contains predominance of similar feature types, identifiable floral and faunal remains of limited diversity, scattered tools.	Snively Basin A.D., Rattlesnake Springs
	Housepit Village	Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Chronology, Migration, Diffusion, and Territoriality, Mobility-Sedentism, Evolution of Society	Any dated site representing this time that contains tools and may include features, floral and faunal remains, and represents the full range of domestic activities. Dated depression or pits containing remains of processed food.	Potentially Hanford Island, Hanford North A.D., Wooded Island A.D., Paris A. S., Locke Island A.D., Ryegress A.D., Wahluke, 45BN179, 45BN180, 45BN423, and 45GR306b
	Lithic/Tool Scatter	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	None Identified
	Pictographs, Pectoglyphs	Religious, Ceremonial, Traditional Cultural Places	Rock surfaces with pictographic or petroglyphic panels.	None Known
	Quarry	Technology	Raw material sources, artifacts made from source materials.	None Identified
	Rock Alignments, Pits	Community and Settlement Patterns, Subsistence and Diet	Artificial rock walls, pits at game intercept points e.g., game traps, hunting blinds.	Gable Butte/ Gable Mountain A.D.
	Rockshelter	Storage-Resource Intensification	Dated depressions or pits containing remains of processed food.	None Identified
	Trails	Economy, Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Migration, Diffusion, and Territoriality, Mobility-Sedentism	Transportation systems of this age with artifacts, camps, and points of destination	White Bluffs Road
A.D. 200 - A. D. 150	Butchering or Kill Site	Technology, Community and Settlement Patterns, Mobility and Sedentism	Faunal remains in association with weapons and/or butchering tools	None Identified
	Burial, Cemetery	Religious, Burial, Ceremonial, Traditional Cultural Places	Buried human remains from this time period.	None Dated
	Cache	Technology	Dense, spatially restricted clusters of tools and raw materials.	None Identified
	Cairns	Religious, Burial, Ceremonial, Traditional Cultural Places	Cairns on ridges, hills, and buttes.	Gable MT/Gable Butte A.D.

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
A.D. 200 - A. D. 150	Campsite	Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Chronology, Migration, Diffusion, and Territoriality, Mobility-Sedentism, Evolution of Society	Any dated site representing this time that contains tools and may include features, floral and faunal remains, and represents the full range of domestic activities. Small pits containing remains of processed food.	None Identified
	Cave	Storage-Resource Intensification	Dated depressions or pits containing remains of processed food	None Identified
	Food Procurement/ Processing	Economy, Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Mobility-Sedentism, Subsistence and Diet, Storage-Resource Intensification	Site containing a predominance of feature types and limited diversity floral/faunal remains	None Identified
	Housepit Village	Community and Settlement Patterns, Social Organization, Contacts with External Groups (trade, warfare, etc.), Chronology, Migration, Diffusion, and Territoriality, Mobility-Sedentism, Evolution of Society	Any dated site representing this time that contains tools and may include features, floral and faunal remains, and represents the full range of domestic activities. Small pits containing remains of processed food.	Wooded Island A.D., Locke Island A.D., Hanford Generating Plant, Vernita
	Lithic/Tool Scatter	Technology, Artistic and Stylistic Expression, Chronology, Stylistic and Technological Traditions	Any site from this time period that contains tools and lithic debitage representing tool manufacturing techniques.	
	Quarry	Technology	Raw material sources, artifacts made from source materials.	None Identified
	Rendezvous	Contacts with External Groups (trade, warfare, etc.).	Sites which historic reports state were used as meeting places for members of diverse tribes	None Identified
	Rock Alignments	Community and Settlement Patterns, Social Organization, Subsistence and Diet, Storage-Resource Intensification	Artificial rock alignments and depressions in river shore/bed, pits at game intercept points, e.g., fish traps, game traps, hunting blinds	Gable Butte/Gable MT A.D.

Table 2.6 (Cont'd). Property Type, Time Period, and Theme Associations

Years B.P.	Property Type	Dominant Theme(s)	Required Data	NR Properties on the Hanford Site
A.D. 200 - A. D. 150	Rockshelter	Storage-Resource Intensification	Dated depressions or pits containing remains of processed food	None Identified
	Trails	Contacts with External Groups (trade, warfare, etc.).	Traceable pathways with associated scatter of artifacts, sites associated with river crossings, trail intersections.	White Bluffs Road

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3.0 ETHNOGRAPHIC/CONTACT PERIOD (Lewis and Clark 1805 - Hanford Engineer Works 1943) OF THE HANFORD SITE, WASHINGTON

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3.1 Statement of Purpose

This is a historic context statement for the ethnographic/contact period at the U.S. Department of Energy's 560 square-mile Hanford Site in southeastern Washington [Fig. 3.1]. It is a narrative of the themes, trends, and patterns of history for the time period beginning with the Lewis and Clark expedition in 1805 and ending with the creation of the Hanford Engineer Works (HEW) in 1943.

This context statement deals with the sensitive issue of the impact of Euro-American culture on the indigenous peoples of the Hanford Site region. Not only did the Indians lose most of their original land base, their cultural resources (however broadly defined by the tribes), often reverted to the control of others. In the case of Hanford, the same United States government that took over control of much of their land in the mid to late 19th century, seized control of the land once again in 1943 to create a reservation for the production of plutonium for weapons of mass destruction. Many years after creation of the Hanford Site, the same government created a complex regulatory framework to preserve America's historic properties.

Although the first direct "contact" between Euro-Americans and many of the Indian peoples of the Columbia Plateau occurred with Lewis and Clark in 1805/1806, European influences from other parts of the North American continent had resulted in varying amounts of indirect contact many years prior to that expedition. Not only had Indians come into contact with European trade goods but also suffered from introduced diseases. In fact, Indian subsistence and settlement patterns observed by Lewis and Clark and others may have already reflected post-contact conditions. From their first contacts with Euro-Americans until the establishment of the HEW in 1943, the indigenous peoples of the area experienced cataclysmic changes in their life ways. During this time period, Indian use of the Hanford Site continued until interrupted by wartime events in 1943.

This context statement emphasizes the Indian perspective on the events that took place during this time period and their impact on Indian culture and life ways prior to the establishment of the Hanford Site. The main operating premise is that the significance of historic properties that concern Indian people must be evaluated from the perspective of Indian's themselves. This context statement should facilitate Indian participation in decision-making regarding the significance and National Register eligibility of historic properties dating from 1805 (or before) to the creation of the HEW in 1943.

This context statement is intended to be a dynamic document that can and will be changed to reflect new knowledge or understandings.

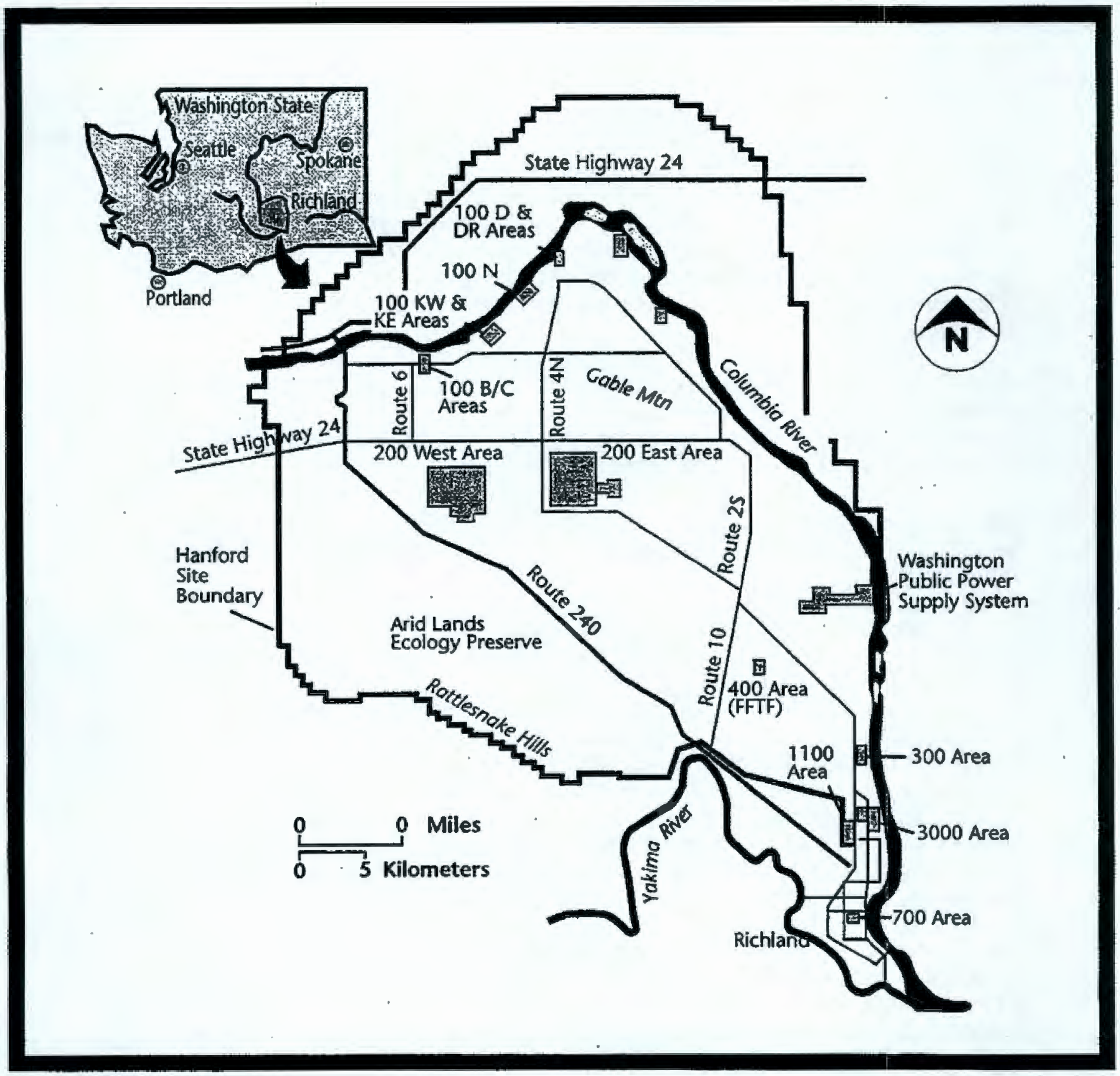

Figure 3.1. Vicinity Map of the Department of Energy's Hanford Site, Washington.

3.2 Introduction

This context statement is first and foremost about the Indian people of the Hanford Site - a people dispossessed of their land and culture by strangers from the East. The Hanford Site and its surrounding areas was home to Cayuse or Sahaptian (Shahaptian) speaking Indians [Fig. 2]. Their descendants are now called Cayuse, Palouse, Nez Perce, Umatilla, Walla Walla, Yakama, and Wanapum [Fig. 3]. In 1855, the Cayuse and representatives of other tribes and bands signed a treaty with the U.S. Government establishing their exclusive right to the Yakama, Nez Perce, and Umatilla reservations and maintaining the right to fish, hunt, erect fish-curing structures, gather food, and graze stock on open/unclaimed portions of the lands ceded to the government. The Palouse and Wanapum refused to treaty with the white newcomers and continued to live in and use their lands.

As DOE-RL protects natural and cultural resources, their greatest challenge will be to understand Indian world view. They will need to understand that Indians lost their land because of government policies or economic expediency. From the 1840s to the present, Indians lost tens of thousands of acres of land. They lament this loss, but not because they have been deprived of a piece of real estate or an investment, rather, because they have lost a part of themselves and their people. They have lost a part of their culture, heritage, livelihood, and sense of place. They have lost elements of their religion (Trafzer 1989:5).

The dispossession of the Indian from his land started in Colonial times through genocidal warfare, the infusion of smallpox, and by giving disease-tainted blankets to the Indians (Relander 1962:9). Dispossession has continued through legislation. Soon after their establishment, the Indian reservations were opened by allotting land and granting acreage's to specific individuals, thus allowing land patents or titles to be granted. Sale to non-Indians naturally followed and townsites and communities within reservations came into being even though the reservations were set aside by sacred and solemn treaty for exclusive Indian use. More reservation land changed ownership through irrigation development and leasing with subsequent land sales. Legislation and the quasi consent of the Yakama Tribe permitted the Northern Pacific Railway to be built through the reservation, bringing the stimulus of townsite developments and land settlement.

The first whites who came in the early 19th century were not interested in taking Indian lands, removing Indians to reservations, or making them civilized members of white society. Rather, they were traders intent on earning money for themselves and their companies. They significantly changed Indian society by introducing manufactured goods, diseases, and economies that divorced the Indians from the natural world. They offered to the Indians pots, pans, tomahawks, knives, fish hooks, guns, and a host of other metal items. In trade, the Indians provided them with furs and this altered the way in which Indians viewed their environment. Before the whites came, Indians in the Hanford area were dependent on a hunting, fishing and gathering lifestyle and lived in harmony with the land and animals as brothers. But after the whites came, some joined in the killing of fur-bearing animals for profit. Plateau Indians bartered their quality horses for mass-produced trade goods and Indian life changed as a result of the trade as many became dependent on whites for trade goods. Factions within the Indian community emerged as some questioned whether or not to engage in trade with whites.

Indians extended into their worldview a sense of oneness with the environment, where the taking of life from their brothers and sisters - the winged and four legged creatures - was viewed as part of the natural cycle of life. Thus, Indians never took more than they could use. They traded and bartered with other tribes in the area long before the coming of the white man's trading posts. The white traders who established new trade routes and practices also brought their own type of christianity which perked the interest of the indigenous people who held a strong sense of spiritualism.

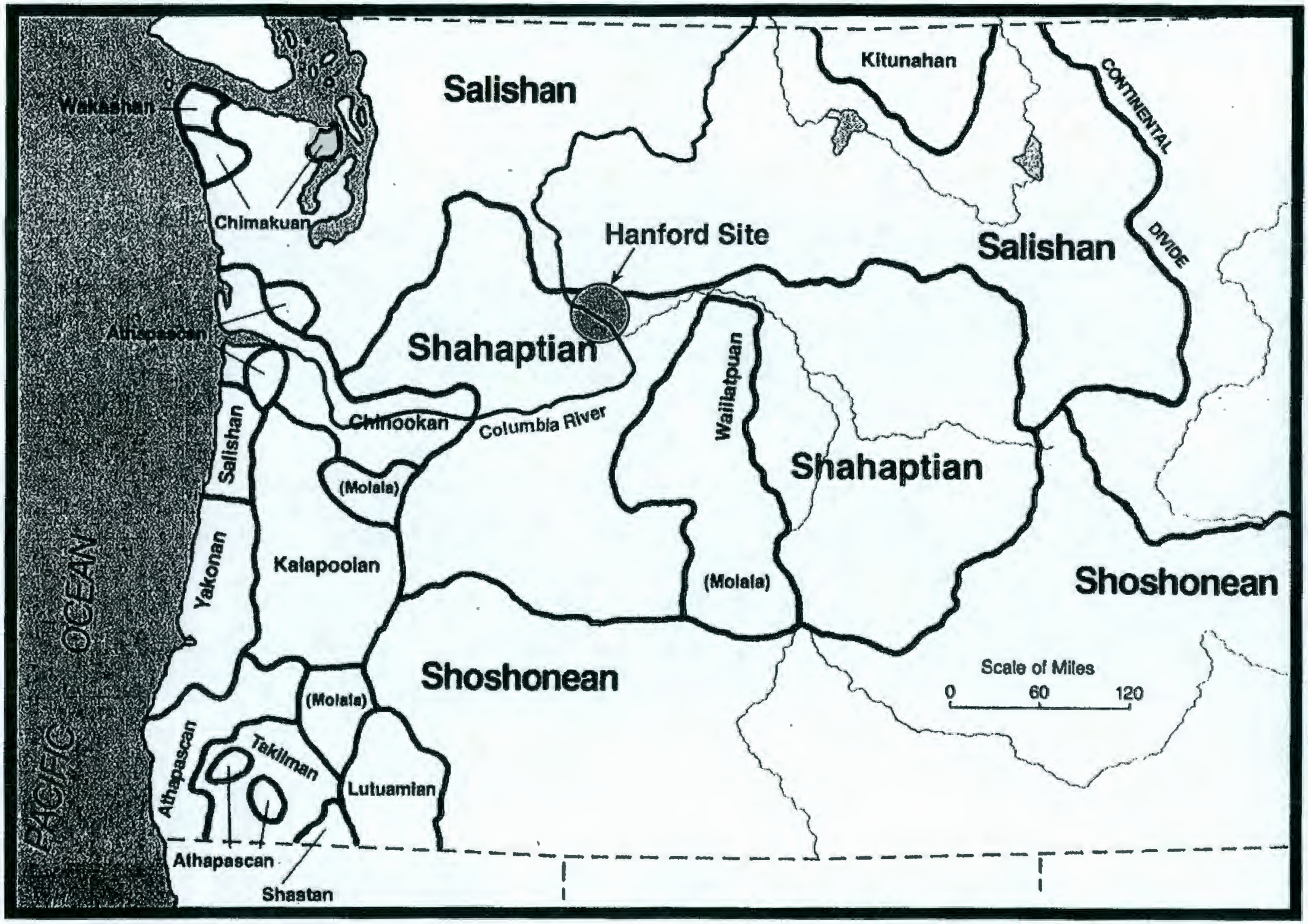

Figure 3.2. Language Families of the Pacific Northwestern Tribes (after Ruby and Brown 1988: 38).

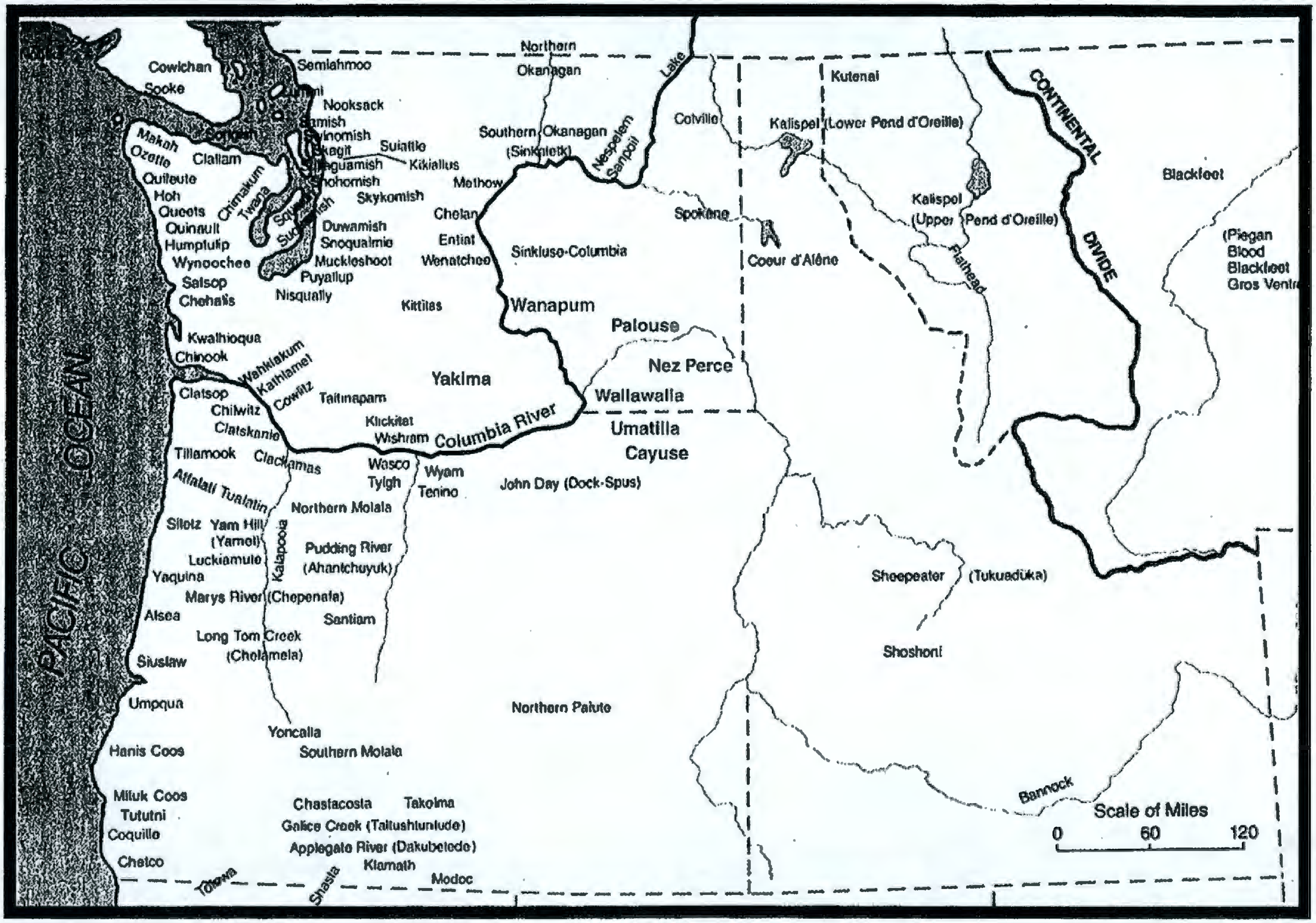

Figure 3.3. Indian Tribes of the Pacific Northwest (after Ruby and Brown 1988: 39).

While white fur traders were not interested in making over Indians or creating a civilized race in their image, they were soon followed, however, by whites determined to uplift and enlighten their red brothers. Protestant and Catholic missionaries moved into the region in the 1830s and 1840s to proselytize Indians. Some Indians gravitated toward the new religion while others rejected it and soon pro- and anti-Christian and anti-Catholic factions emerged to divide the Indians. Some Indians maintained the old spiritualism, clinging to ancient ceremonies, songs, and ways. This movement, epitomized by Smohalla of the Wanapums, reached its peak in the late 19th/early 20th centuries and continues today.

In the 1840s, traders, missionaries, and immigrants came into the region along the Oregon Trail, bringing their diseases with them. Epidemics killed more Indians than did open warfare and unlike whites who had for generations faced the effects of smallpox, chicken pox, influenza, measles, mumps, and other infectious diseases, Indians had never been so exposed and had no natural immunity. There were outbreaks of smallpox in 1775 and 1801 resulting in a population decline in the Plateau of about 45% (Campbell 1989). The Yakamas, Palouses, Walla Wallas, Umatillas, Wanapums, Cayuses and others suffered severely from the measles epidemic in 1847. Along the Oregon Trail, the loss of land, rights, and Indian life went unpunished for many years. Without seeing a sense of justice or protection of their rights, the Cayuses took revenge on November 29, 1847 when a few warriors could contain their anger no longer and killed the Whitmans who they blamed for the measles epidemic.

Once in control of lands south of the 49th parallel, the U.S. government soon divided the region into the Washington and Oregon territories in 1853 and began to establish political, economic, and military control and transplanted its Indian policy to the new territories. This included liquidation of Indian title, the removal of Indians to reservations, and their governance by the BIA (which became part of the Department of the Interior in 1849). The Indians did not welcome American Indian policy. The various bills and treaties dealing with Indians enacted into law by Congress and signed by the U.S. presidents were not policies established by Washington Indians but policies established for the benefit of American citizens and not the native people. The Indians did not ask for treaties, removal, or reservations nor did they ask to be ruled by the BIA. They did not ask for a unique trust relationship with the U.S. that would set them apart constitutionally from all other Americans. They did not ask to be acculturated, assimilated, or civilized. These were all things forced on them by the treaty process. They could stand and fight or try to accommodate the newcomers.

During the treaty negotiations, Governor Stevens asked the Indians to surrender their sovereignty, abstain from using alcohol, and end Indian slavery. In return, Indians secured from themselves the right to fish, hunt, gather, and graze horses on and off their reservations. These rights were not established by Treaty, only recognized by Treaty. One reason Governor Stevens agreed to "usual and accustomed" subsistence practices on and off the reservations was that the government would not have to feed their new charges. As an added inducement to the Indians, the U.S. promised to educate and provide quality health care. In May 1855, some 10,000 Plateau Indians met with Stevens at the Walla Walla Council. Indian positions stated at the Walla Walla Council represented the views of most Plateau Indians in what is now Washington - the land was sacred and given to the Indian people by the Creator and it could no more be sold than the air or the sky.

None of the Indians were anxious to sign the treaties but decided it would be prudent to do so since they had little choice but to sign. Stevens assured them it would take years before the Senate ratified the treaties and until then, the Indians could live peacefully on their own land. Yet, even before Stevens left the area to continue his treaty tour into Montana, he wrote dispatches to the major newspapers on the West Coast announcing that eastern Washington was open for white settlement.

White miners discovered gold near Colville, as well as on the Nez Perce Reservation, which resulted in a gold-rush stampede across the Indian lands of eastern Washington. When miners were killed for raping and murdering Indians, Yakama Agent Andrew Bolon, a man disliked by whites and Indians alike, interceded and was himself killed by the Indians. His death was the proximate cause of the Yakima War of 1855-1858, a conflict that had been brewing for years. Although the fighting started east of the mountains, it spilled over to the Coast where Indians and whites engaged in combat on the White and Green Rivers.

As the wars continued to go badly for the Indians, active supporters began to drift away from the cause. Some went to search for their families, many of whom had already been forcefully removed to reservations. The government used the wars as an excuse to round up and remove peaceful Indians to reservations, despite the fact the treaties had not been ratified by the Senate or signed by the President. Regardless that the treaties were not the law of the land, the removals took place. Meanwhile the U.S. Army became more deeply involved east of the Cascades and constructed Forts Walla Walla and Simcoe. A victory of sorts over troops led by Colonel Steptoe only brought a renewed campaign by Colonel Wright who ultimately defeated the Indians and sealed their fate as "wards" of the United States, subject to laws enacted by a distant Congress and executed by the BIA.

As traditional Indian leaders were pushed aside by the new system of government, they had no alternative but to deal with a foreign system of government which had a history of broken promises and unenforceable documents. Some refused to cooperate by withdrawing into their own world and doing things the old way, like Smohalla and his followers. Most Indians tried to live within the constraints of the new political order but maintained as much of the old way as possible. The distant East Coast white government set reservation policies and tried to control the lives of non-reservation Indians as well. In the 1860s and 1870s, the government adopted policies to transform Indians, accustomed to fishing, hunting, and gathering into farmers. BIA programs broke up families and bands and hastened the destruction of the old tribal social system. Indian ways were not permitted to coexist under the new order as the BIA, and not the elders, decided what was best for everyone. This program was particularly harsh on children who were literally stolen from their homes and sent away for months at a time to government established Indian schools, where they endured forced acculturation.

The Indians were not permitted to determine for themselves whether or not they would leave the reservation and go to school. Parents were forced to send children away to institutions far from their homes. Children five years and older were placed in first grade where teachers sought to destroy the part of them that was Indian: tribal ties, language, religion, food, dress, and philosophy. In modern terms, the teachers were "mainstreaming" the children by teaching them English, math, geography, and history - as written by whites in the East. As important was the fact that the boys and girls were given vocational rather than professional training so that they could be prepared to work for the dominant society. American Indians were not recognized as U.S. Citizens until an Act of Congress establishing citizenship in 1924. Thus, prior to 1924, they had no constitutional right of redress.

Government policies also aimed to destroy age-old customs, traditions and practices. Agents placed people from numerous groups onto a single reservation, thus pitting Indians of differing, often conflicting cultural backgrounds against one another and creating competition for services, food, blankets, supplies and land use. This was U.S. policy and Indians had no say in the matter. The government sought also to end the influence of traditional elders which in turn affected the family. The basic family structure was altered as the BIA became the *de facto* parent of all Indians. This impact cannot be underestimated since Indian communities have long placed greater importance on the basic family structure, as well as on the old extended family made up of friends and relatives. In recent years, there has been a renewed emphasis on the family in Northwest Indian communities. Revitalization of the old spiritualism and heightened concerns for the family are encouraging signs the Indians are weaving a new social fabric that draws on the great strengths of traditional Indian life.

In 1887 Congress passed the Severalty (Dawes) Act which called for breaking up of reservations into parcels to be eventually owned outright by individual Indians. The individual ownership concept was foreign to the many tribes and bands as was the concept of land title. Decisions affecting land use still remained under the jurisdiction of the BIA and was only transferred as competency hearings were conducted pending the sale of the land to non-Indians. The reformers believed the Indians would have a stake in society and work hard to develop their individual allotments. But savvy whites soon realized that Indians did not view property ownership like whites and the Act actually facilitated white purchase of Indian lands and did nothing to help Indians join the dominant society. Under the 1934 Indian Reorganization Act, Indians moved to reverse the process by which their land was alienated but have been able to regain only a small fraction of what was lost as a result of allotment. In the 1930s, Washington State began regulation of Indian fishing, hunting, gathering, and grazing, even though federal law superseded state law in regard to Indians. The state also tried to control or manage water, mineral, and forest product resources belonging to Indians. Tribal and state officials fought several courtroom battles and one notable success for the tribes was the Boldt decision of 1974 which affirmed Indian treaty rights to fish at their usual and accustomed grounds and stations off the reservation and in common with other citizens.

The Indians could not understand why the Euro-American newcomers begrudged them a final small sanctuary of fish, deer, wild game, food roots, huckleberries and a few scattered bands of wild horses. The Creator did not give Indians title to the land like so much property. Rather, the Indians were instructed to be caretakers of the earth. Their land was their religion and their religion was the land (Trafzer 1989:4). No one today can recompense the Indian people for their losses, nor make amends for the holocaust they suffered at the hands of the newcomers who overran their land. The "cultural resources" of the Indians—the earth, the waters, the fish, the animals, the plants—can be preserved. This context document, then, is to help the DOE-RL understand the Indians who once called Hanford their home - and to make wise decisions to preserve that which is important to the Indians.

3.3 Methodology

The federal regulatory requirements (e.g., National Historic Preservation Act of 1966) under which the Hanford Site operates requires the Department of Energy to take active stewardship responsibility for cultural resources under its jurisdiction. The federal regulations require that significant resources (resources eligible for listing in the National Register of Historic Places) be identified and evaluated. Those properties determined eligible for listing in the National Register are then managed to maximize their protection from the adverse effects of federally involved undertakings or actions. One thing has not changed, however. The land at the Hanford Site was originally Indian land and many of the cultural resources (however defined by the tribes) associated with both the prehistoric and ethnographic/contact periods are Indian resources. Recent changes to federal cultural resource regulations now recognize, encourage, and mandate full participation of Native Americans in the cultural resource management arena.

This context statement was compiled by members of CH2M HILL's cultural resource consulting staff (Dr. James C. Bard and Mr. Robin McClintock) using some primary and mostly secondary and tertiary reference materials on file at libraries at Portland State University library, Oregon State University, and the Hanford Cultural Resource Laboratory (Pacific Northwest Laboratory, Richland). In addition, several individuals assisted by providing both published and unpublished materials pertinent to the study area (Dr. Cliff Trafzer, Ms. Mona Wright, Dr. Gail Thompson, and Mr. Michael Gallagher). Dr. Paul Nickens and Ms. Mona Wright of the Hanford Cultural Resource Laboratory solicited review comments on the draft manuscript from the Wanapums, Nez Perce, Yakama, and Umatilla tribes. Only the Nez Perce provided review comments and this document incorporates their comments and concerns.

3.4 The Setting

3.4.1 The Natural Setting

The demography and economy of the Columbia Plateau Indians have always been profoundly affected by topography, climate and drainage (cf. Nelson 1973:372). The Plateau culture area, which includes parts of southeastern British Columbia, northern Idaho, western Montana, eastern Washington, and the Columbia River Gorge and northeast Oregon, is an area with seasonally and geographically restricted supplies of surface water. In some areas it is possible to travel from a semiarid biotic community subsisting on less than 10 inches of rainfall to pine/fir forests subsisting on more than 30 inches of rainfall over a distance of 10 miles or less (Nelson 1973:372). In these transitional biotic communities, which commonly range from 10 to 50 miles in breadth, are found the densest populations of game animals such as deer, elk, mountain sheep, and pronghorn antelope.

Low temperatures and snow severely limited the distribution of Indian populations during the winter months from October to March. Although most of the Columbia Plateau lies only between 1000 and 1500 feet above sea level, winters are severe with temperatures dropping below freezing in all but the most sheltered areas. Indian populations thus concentrated in the narrow, sheltered valleys of the major rivers at the fringes of the Plateau. Ungulates were driven into these same areas as snow covers their forage at higher elevations. The distribution of important edible plants is effected by climate and topography since plant maturation is linked with altitude and temperature. The most stable protein source was the salmon whose spawning migrations follow a highly predictable four year cycle. Migratory salmon are typically in the trunk streams and their stable tributaries from late in the spring to the end of autumn.

3.4.2 The Human Setting

Early descriptions of Indian life on the Plateau (cf. Bancroft 1886; Coues (ed.) 1893; Curtis 1911a,b; Kane 1856; among others) made the culture sound like an odd mixture of Plains and Northwest Coast lifestyles but by the 1930s, a concept of a distinct "Plateau" culture area was advanced by Verne Ray. The early investigators observed a wide diversity of culture as well as geographic characteristics and linguistic differences that best suited the people of each area. Kroeber, Spinden and others believed that the Plateau was not a distinct culture area since the Plateau cultures shared traits with the Plains, Great Basin, and Northwest Coast peoples.

Fishing, hunting, gathering, and ceremonies were the basic components of the Plateau economy and each had its own season and location. The Indians thus followed a widely varied round of activities that lead to a semi-sedentary life in which they often engaged and disengaged themselves from cooperative task groups. Miller (1985:23) argued that the Plateau cultural system was threatened by the effects of the Little Ice Age - a 300 year-long period of severe weather conditions beginning around 1550 A.D. Dendrochronological and palynological analyses from the Columbia River suggests that during this time period, the availability of roots, nuts, and berries were reduced and archaeological evidence provides some substantiation of this hypothesis as bison, pronghorn antelope, and mountain sheep disappeared entirely as food items in some areas during these critical years. With these foods in short supply, salmon would have been an even more important source of nourishment than usual.

When the climate improved at the beginning of the 18th century, warmer and dryer weather increased the length and quality of the growing season and produced bumper crops of berries, roots, and meat. Also, with the spring runoff reduced, heavy salmon runs once again penetrated deeply into the upper Columbia system. Around 1731, the weather turned consistently cold and wet. While Plateau culture survived the first 250 years of the Little Ice Age relatively unscathed, the return of this destructive climatic regime after 1731 coincided with the arrival of a series of other equally destructive forces that imperiled life itself.

While the Indians were adapting to severe weather conditions, Europe was in the midst of an unprecedented period of expansion and eventually the white man would arrive in Mexico and along the eastern seaboard to send wave after wave of dislocation throughout the Indian world. The first wave to hit was the horse frontier around 1700 A.D., just as the brief climatic improvement was at its peak. Indian tradition suggests the horse has been a part of Indian life for a very long time and Indian philosophy emphasizes a spiritual connection with the horse and with the environment.

Other evidence suggests the horse was a bio-invader into the environment. The Indians made numerous cultural adjustments to make good use of the horse. Because horses permitted hunters to penetrate father into the mountains after game and to bring back larger loads of meat, the fall hunt acquired added importance and the buffalo became a regular part of the annual round for many groups. Decreased travel time allowed parties to venture to the Yellowstone and back every fall. The increased volume of buffalo meat and by-products triggered greater trade and economic power and flexibility to the Plateau groups. The horse was a welcome counterweight to the deteriorating climate (Miller 1985:28).

Being on the horse frontier placed the Plateau Indians in the path of raiders. As waves of white population pressure grew and the fur trade was in full swing, several eastern tribes were pushed onto the Plains and soon thereafter, Numic speaking peoples, such as the Shoshone, began to feel the pressure. The eastern tribes formed a defensive coalition (the Eastern Alliance) that was able to repulse the Numic raiders but they were unable to stop the encroaching whites. By the 1750s when the Plateau groups entered into the situation, Plateau Indians had mastered the horse which facilitated passage over Lolo Pass and through the Bitterroot/Salmon River country to get to the Plains to hunt. By the 1770s, the threat of Numic raiders had subsided but continuing white pressure caused further waves of resettlement of Eastern tribes. In the late 1700s the disease frontier also moved west resulting in a major epidemic of smallpox among the Plateau Indians - evidence of which could be seen on the aging faces of the Indian survivors that met Lewis and Clark in 1805 and 1806. Epidemic disease was merely the last of many destructive waves that swept across the Plateau in the 18th century, but it was the most devastating of the lot. The combination of sickness with the coming of horses, guns, climatic deterioration, and near constant war put unbearable strains on the Plateau Indian world (Miller 1985:35).

The Plateau Indian people who called the area of the Hanford Site their home were a deeply spiritual people, as are their descendants today. And with the exception of some of the rougher characters associated with the fur trade, the whites with whom the Indians first came into contact were deeply spiritual people as well. It was during the time period of the fur trade and later missionaries that the worlds of the Indian and white converged for the first time.

Along with the introduction of foreign diseases and foreign ideas and religion, volcanic activity in the Washington Cascades during the first decades of the 19th century may have also been a contributing agent in the break down of Plateau culture. Prior to the falling of the "dry snow" (ash), some of the Plateau peoples had believed that the world had always existed and would continue to exist forever. Suddenly, in the face of a powerful display of mother nature, the Indian Prophets announced a novel creed in which a newly conceived supernatural being called Chief had, with Coyote's assistance, created the world and predestined its end. The Prophets urged their followers to dance so as to hasten the happy apocalypse and preached that happier days would come quickly if their followers practiced proper moral behavior. Though things looked bleak, the Indian prophets promised that a solution was on its way.

On September 20, 1805, an Indian prophecy came true with the arrival of Lewis and Clark, who explained to the Nez Perce and their allies that the American government wanted the Indians to live in peace and that guns and other useful items would be provided through peaceful trade. Unfortunately, the Americans were unable to provide the promised factories and military support and the Plateau Indians were left to face increased Blackfoot hostility unarmed. Thus, instead of leading to the happy times promised in prophecy, Lewis and Clark's arrival on the Plateau only raised false hopes and worsened conditions. Lewis and Clark were not the ones carrying a book to the Indians but were, however, advance agents for others like David Thompson of the Hudson's Bay Company, who built posts and brought material goods and brought to fruition all the Plateau Indian's diplomatic and trade strategies and also helped pacify the Indians (Miller 1985:50).

It seems the Indians regarded Thompson as a messenger from Chief . As prophet dances were performed from village to village, a great spiritual awakening was taking place as the Indians began to expect Coyote's return. The remaining condition of Chief's agenda was the arrival of strange messengers from the rising sun bringing a book that would teach the Indians everything (Miller 1985:52). By the early 1830s, morning and evening prayers, grace at meals, and the observance of the Sabbath had become so widely accepted throughout Plateau cultures that hardly an explorer or fur trader failed to notice them (Miller 1985:53). Thus, the Plateau Indians had been led to expect not only the white people, but their religion as well and the rapid spread of the amalgamated faith reflected the anticipation of fulfillment of the prophecies.

Fur trader George Simpson, ever eager to expand the Hudson's Bay operations, encouraged missionaries to work among the Plateau tribes since he saw the promulgation of Christian values amongst the Indians as an antidote to what he perceived as Indian apathy and independence. Driven by such a compelling motivation as improving profits while ingratiating himself with both his (Hudson's Bay) company and the missionary society, Simpson began promoting the cause of the Gospel with marked enthusiasm (Miller 1985:56). He assigned Alexander Ross to the task and eventually several young Indian lads were taken to Canada to study at the Red River School. Upon their return, Kutenai Pelly and Spokane Garry were hailed as great prophets and their arrival spurred another Plateau-wide revival. But to the Indians, progress toward the millennium seemed hopelessly slow. Pelly and Garry carried back only two Bibles and the Church Missionary Society was unable to fund the establishment of missions.

The exact circumstances and motivations of the famous Flathead-Nez Perce "delegation" to St. Louis is shrouded in mystery, but the end result was that this particular delegation was instantly mythologized and was the pivotal factor in the coming together of the white and Indian prophets (Miller 1985:60). While it was true that these Indians had come to St. Louis to seek the true mode of worship that only the white people possessed, the clergymen in St. Louis could not have known how different the Indian's conception was from their own. Nevertheless, they put out the call that God had prepared the Indians for deliverance from their benighted state (Miller 1985:62). G.P. Disoway, a pious businessman which had heard about the Indian delegation, spread the word that the Church should awake and attend to the salvation of these "wandering sons of our native forests."

The whites, for their part, were part of this unfolding drama as well. When missionaries such as Dr. Whitman came west to live among the Plateau Indians, America was a religious nation concerned about seizing control of its frontiers before evil Europeans could grasp it and turn the Indian occupants against America. This meant that American authority, institutions, and culture must expand into the wilderness. Miller (1985:71) wrote that the Protestant awakening coupled with American liberalism prepared Americans well for this task. A belief in their own superiority accompanied by altruistic conviction prompted reborn Americans to become as evangelical about their culture as their religion. American expansionism was seen as fulfillment of God's eternal plan and their mission found full expression in the movement to annex the "Oregon Country."

The Indians wanted to learn the lessons offered by the missionaries and the Protestants wanted to convert the Indians. This apparent convergence of goals kept both groups occupied in trying to live up to the words of their prophets in order to bring about their separately conceived millennia (Miller 1985:89). But the Protestants were extremely anxious over the presence of Roman Catholic missionaries working among the Indians and therefore felt compelled to launch a full-scale assault on the social and economic structure of Plateau Indian life. The Protestant missionaries viewed Indian subsistence as pitiable, having to rely upon roots, fish, and game which required constant seasonal movement. The hunting and gathering life-way was seen as an impediment to religious instruction. Miller (1985:92) observed that the Indians permitting Henry Spaulding to treat them with a heavy handed approach demonstrated the power of their revitalization and the intensity of their investment in the prophesied course of events. Like their Protestant counterparts, they were incapable of understanding the true situation; even in the face of humiliating treatment, they remained committed to learning everything from the missionaries. As Catholic missionaries stepped up their activities in the area, the Indians, whose prophecies had not prepared them for competing truths, found themselves in the middle of a propaganda war between two Christian faiths, each of which used the Indians as pawns in a continuing game of sectarian chess (Miller 1985:93).

The Whitman killings in November 1847 were also related to this collision of expectations. As the Indians were decimated by disease brought by white immigrants, some Cayuse Indians came to fear that Whitman was deliberately trying to kill them with poison released into the air. But more importantly, Plateau Indians attributed disease to either malevolence (poisoning) or spiritual transgression. It was the Indian concept of spiritual transgression that inevitably led to the rise of new Indian prophets who urged a return to traditional religion and rejection of Christianity and the white man's ways. The Indian world had fallen to pieces by the 1850s, but no happy millennium followed, only more fragmentation and division as the white take-over accelerated and the Indians were being removed to the reservations.

Smohalla, as the whites called him, began preaching a message of hope for those Indians who could not live in the white man's world. The Great Chief was angry at their apostasy and commanded the Indians, through Smohalla, to return to the old ways, blaming their miserable condition in the presence of the whites to their having abandoned their own religion and violating the laws of nature and the precepts of their ancestors (Miller 1985:119). When a severe earthquake rocked the Pacific Northwest on December 14, 1872, among the reports of quake damage was the death of several Indians near White Bluffs by falling rocks (Ruby and Brown 1989:61). Smohalla, who reportedly had predicted the quake, became host to frightened Indians fleeing to P'na Village to dance the *Washat* to appease the angry Spirit. The Indians believed that the Earth Mother was shaking the land in anger at whites and those Indians who were desecrating her (Ruby and Brown 1989:61). At this time, Smohalla was preaching that the Chief's intentions had been misunderstood by the old Indian prophets. Because of this mistake, the world, instead of ending in the blissful return of the Earth Mother as previously predicted, had crumbled, leaving behind only despair. While Smohalla blamed his own people for their problems, he also blamed the whites.

To revive the old spirit power, Smohalla called upon the survivors to abandon the new ways and resume the ways of the old law. He preached that those who cut up the lands would be defrauded of their rights and punished by God and that all the dead will come to life and their spirits will come to their bodies. He urged his followers to wait and dream, and be ready to meet them in the bosom of their mother earth (Miller 1985:120). The new faith spread in direct proportion to the spread of the reservation system and the elimination of self-rule and self-determination. The spirit power remained alive in this new Indian world and the white invaders could not penetrate it. In its isolated realm the "dreamers" found the peace and safety that had prevailed under the old law (Miller 1985:121). The Plateau Indians continued to work toward their destiny which involved trying to find a spiritual system that would allow them to pull their shattered world together.

3.4.3 Sahaptian Culture

The Indians of the Hanford Site (see Fig. 4) were hunters and gatherers, originally with a band and later a tribal level of social organization. Sahaptian kinship structure and political organization has been reviewed by Anastasio (1972), Hunn (1990), Schuster (1975), Walker (1967), and Chatters (1989:D.31-33) while intertribal relationships during the 19th century have been explored by Garth (1964). Before the introduction of the horse, social organization might have closely resembled a band level of sociopolitical organization (Service 1966). Bands are small mobile hunter/collector groups that choose leaders on the basis of personal characteristics rather than inheritance, practice exogamy or ambilocal residence, and practice bilateral or patrilineal descent reckoning. Exogamy fostered peace among bands through marriage, which opened local resources to the bands into which its youth marry. Flexibility in post-nuptial residence and frequent intermarriage between bands helped form alliances and friendships and sharing of resources from one location to another, thus ensuring survival.

Political organization generally extended beyond the village level. In relation to outside groups, the loose band, composite band, and tribal organization would supersede the power of a local group or village. Food production and consumption occurred on a local level with sharing of local resources with neighboring and distant groups. Indians shared economic resources with members of their own band or tribe, and Sahaptian-speakers received preference over non-Sahaptians (cf. Walker 1967). Intertribal access to usual and accustomed resources and resource areas has probably always been a matter of tribal sovereignty and governed by traditional or customary guest-host agreements (Bearchum, et al. 1988:87). Extensive intergroup, interareal, and interregional trade networks served to even out any disparities among groups in the access to critical resources. Hoarding was abhorrent and generosity was expected and respected. Hunn (1990:219) emphasized that this moral imperative remains strong today. Exchange networks, reciprocity, and mutual assistance were intelligent social and economic means of survival and peace keeping that served the Indians well, both in the past and in the present.

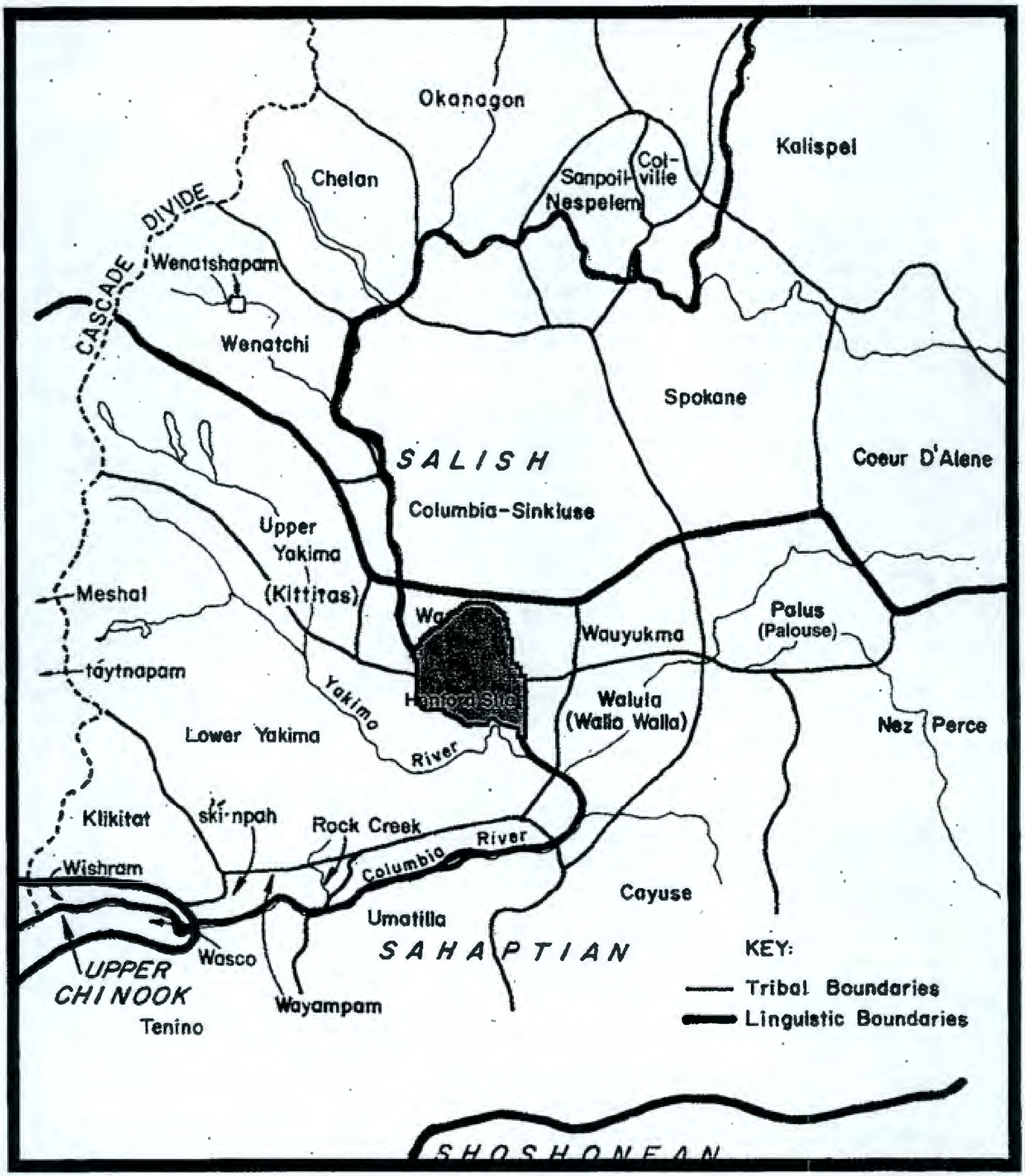

Figure 3.4. Distribution of Tribal Groups and Major Linguistic Boundaries in the Mid-Columbia Area (after Schuster 1975: Fig 2; Jacobs 1931: 94 and 1937: 56; Ray 1936: 119; and Meinig 1968).

Trade networks tended to bond groups in special ways by establishing certain economic and social ties - ties that were increasing when non-Indians came into the region. The Plateau Indians traded salmon to the Idaho Kalispell and Flathead bands in exchange for meats and plants and to the Great Plains bands in exchange for pipestone, buffalo meat and hides, horses, and certain styles of clothing and ornaments. Obsidian and roots came in from the Shoshone and Bannocks of Utah and northeastern Nevada while slaves, basketry, and wocas came from the Northern Paiutes of Oregon and Nevada. Marine shells came from the Puget Sound bands and chiefdoms (Zucker, Hummel, and Hogfoss 1983:43). Salmon, berries, and roots were stockpiled at the Dalles and Celilo Falls for later transfer to trading partners outside the Sahaptian area in return for the goods mentioned above. An incipient marketplace was forming in the lower Columbia where Indians used shells and beads as a means of monetary exchange. The use of horses, canoes, and rafts increased the speed and efficiency with which trade goods, rituals, dress style, and information was moved and Indians ideas and customs were transformed. Trading fostered information exchange, entertainment, and opportunities for courtship and exogamous marriage as well as creating socio-economic ties that secured certain rights/useages and passage through territories that belonged to one tribe or band.

Political organization was hierarchical and extended beyond the village level into confederations of villages into bands, macro-bands, and confederations of tribes. The leadership of each political level was recognized by all villages in the grouping and each level had its ruling council with formal rules and procedures of government. Some regional political integration occurred as confederacies maintained by intertribal alliances, but these were sometimes weak and short-lived. Authority was based on the special characteristics of leaders in fairness, intelligence, and generosity (Walker 1967; Hunn 1990). Inherited leadership was rare and occurred only in cases when a leader's son proved equal to or surpassed his father's talent. The Sahaptian governance system was maintained by checks and balances. Leaders in economic, social, and spiritual affairs had to prove their worth and if they failed, villagers withdrew their support (without violence). Clear division of authority, as noted above, usually guaranteed social stability.

Fish

Centuries before the Europeans came, the rivers met the needs of the salmon and the salmon met the needs of the Indian [Fig. 5]. The tribes and the salmon benefited from this partnership, secure in their adaptation to the environment and to each other. The Indians knew they had to protect the quality of the rivers. Under conditions of abundance, their religious and technological precautions ensured the perpetuation of the fish (Cohen 1986:29) and it has been estimated that 33 to 40 percent of their food came from salmon (cf. Hewes 1973; Hunn 1981:12, 1990; but see also Schalk 1986:23-24 for a cautionary note relative to Kane's (1925:219) observation that the Walla Walla lived almost entirely upon salmon throughout the whole year).

The importance of salmon varied from group to group with the Columbia River peoples being the most fish dependent, followed upstream by the Nez Perce and finally the largely non-riverine Cayuse. Salmon numbers seasonally fluctuated with few fish available from late October to late April and high water prevented fishing in most years from late May to late June. Further, salmon runs peaked for only a few days to weeks at a time. The fish were taken with dip or gill nets from shoreline platforms, with seines from canoes and shore, and with gaffs, tributary fish weirs, and by hand after spawning. Other important fish were suckers, eels (technically lamprey), sturgeon, trout, whitefish and red-sided shiner. Freshwater mollusks were collected from river bottoms where they grew in large quantities but probably were a minor food resource given the considerable

Figure 3.5. The Plateau Seasonal Round (after Hunn 1991: 8).

labor necessary to collect sufficient mussels to equal the food value of one deer or a few large salmon. While the actual proportion of fish in the traditional diet is not certain, exploitation of the river fisheries and the successful sharing of fish with other non-riverine groups, required high levels of regional political and economic integration.

Roots

As measured by caloric values, plants, particularly bitterroot, skolkol and camas, comprised over 50 percent of the annual diet followed by fish and other animals, especially venison (10 to 12 percent)(cf. Benton, et al. 1973, Keely 1982, Norton, et al. 1984, Hunn 1981, Watt and Merrill 1963). The most common plants collected, processed and consumed were bitterroot, cous, Indian celery's (*lomatiums*), camas, and huckleberries [see Fig. 5]. Some of these plants were available on or near the Hanford Site. The Wanapum and Palouse traded with "tribes to the west..." who sought skolkol, or "Indian carrot" (*Lomatium canbyi*) (Relander 1986:112). Indian carrot is found only at Priest Rapids in sufficient quantities for significant harvests. Also confined to Priest Rapids was *Lomatium hambleniae*. *Calochortus macrocarpus*, a winter root found in the deserts, was likely taken at the Hanford Site.

According to research conducted by Lucy Jayne Harbinger of Washington State University in 1964, roots were an essential dietary mainstay and were as important as camas, khouse, wild carrot and bitterroot. The roots were not only important for food, but were used in teaching young girls the proper care and preparation of foods and were used for various trades between tribes for both social and economic exchanges relating to marriage and giveaways. Women were the primary gatherers, preparers and preservers of traditions associated the use of roots and other important food plants. As such, they played an important role in maintaining Indian lifestyles. The first roots dug and the first berries picked were important events and allowed a feast and celebration in honor of the young girls as well as a time for praise and recognition within the familial and tribal structures. The special root feasts held early each year and with the later salmon and huckleberries feasts provided the important spiritual connectedness of the celebration and continuity of Indian lifestyles.

Roots were essential to the diet and most of the 25 species of root plants used were small, herbaceous, spring-flowering species - the edible parts consisting mainly of tubers, corms, bulbs, tuberous roots, and underground sprouts (Hunn 1990:171-172). The most widely used were cous (*Lomatium cous*), skolkol (*L. Canbyi*), "Indian carrot" (*Perideridia gairdneri*), "Indian potatoes" (Claytonia lanceolata), camas (*Camassia quamash*), the Yellowbell (*Fritillaria pudica*), and a hyacinth (*Brodiaea hyacinthina*). A woman could collect about one bushel (ca. 60 pounds) of skolkol or cous in a day's work and could harvest about 60 bushels (ca. 3600 pounds) in a season (Hunn 1990:175-176). This underscores the importance of roots, but it is also important to note that the season of abundance lasted only from March to July.

Berries, Fruits and Nuts

Berries, fruits and nuts contributed only about five percent of the total annual average food intake. Black mountain huckleberry (*Vaccinium membranaceaum*) was the most important and was collected in mid-August when a celebration was held. The berry season opened with collection of sweet currants in June, followed by the white dogwood fruits at the end of June. Chokecherries (*Prunus virginians*) and serviceberries (*Amelanchian ainifolia*) were collected in the lowlands and foothills between late June and mid-August. Grouseberries (*V. scoparium*), blue mountain huckleberries (*V. parvifolium*), and the low mountain blueberry (*V. caespitosum*) were collected. When huckleberries were collected into October, black tree lichen (*Bryoria fremontii*) was gathered and baked as a confection to go with the berries.

Trees

Over 30 species of trees were recognized by the Indians but most used for food and other purposes were located outside the Hanford Site. The whitebark pine (*Pinus albicaulis*) was a source of pine nuts and the Ponderosa pine (*P. ponderosa*) provided edible inner bark. The lodgepole pine (*P. contorta*) was used to construct poles for lodges. The Garry Oak (*Quercus garryana*) was used as a food source if its acorns were leached of bitter tannins and its wood was used to fabricate digging sticks. Garry Oak is not present on or near the Hanford Site. Maple was used to fashion dip-nets and Ocean spray (*Holodiscus discolor*) was used as bracing. The main source of firewood was sagebrush (*Artemisia tridentata*) and driftwood. Elderberry (*Sambucus caerulea*) was used for venting underground ovens and Peachleaf willow (*Salix amygdaloides*), which occasionally grows to 50 feet without a branch, was used for longhouse frames.

Fibers

The Indians, who were highly mobile in the pursuit of food and fuel, fabricated containers from light weight fibers. Similarly, nets, bindings, and baskets were essential to the hunting and gathering way of life [see Fig. 5]. Mats and clothing were also made of plant fibers such as Indian hemp (*Apocynum cannabinum*) and tule or bulrush (*Scirpus actus/S. validus*). Hemp string was fashioned into a "time" ball by Yakama women who knotted the string to mark special occasions in their lives. Cedar root served as the main structure of berry-collecting baskets, which were imbricated with bleached beargrass leaves (*Xerophyllum tenas*) and the red bark of the bitter cherry (*Prunus emarginata*). Tule mats were used to cover summer teepees and winter longhouses. Twig needles of the greasewood plant (*Sarcobatus vermiculatus*) was also woven into tule mats and the common reed (*Phragmites communis*) was also used for this purpose. Large, soft containers were made from cattails (*Typha latifolia* and were used to store dry salmon. Giant wild rye (*Elymus cinereus*) was used to separate sections of salmon.

Medicines

Over 75 species of plants had medicinal uses and many were also used for body and spirit. Cultural differences between tribes and between Euro-Americans and Indians prevent the complete sharing of information about medicinal plants. It was the tribal medicine man who had knowledge of the medicinal uses of the various herbs and roots. Among those plants known by the non-Indian community are the fern-leafed lomatium (*L. dissecturm*) was used as a fish poison, spring vegetable, and as a scalp-itch treatment; the root pulp was used as a poultice to treat infected wounds and boils and to kill lice and bacteria (Hunn 1990:113). Diluted in a drink, it was used to treat upper respiratory infections and the root was chewed to treat sore throats. The lovage (*Ligusticum canbyi*) was also used for this purpose. Conifer pitch was applied to sores and wounds. Young Ponderosa pine and larch were used for teas to treat influenza and tuberculosis, respectively. Balsam firs (*Abies* spp.) were cleansers for spirit and mind. The grand and silver firs are still used in sweat lodges, and the steam is strengthened by the subalpine *fir (Abies lasiocarpa)* (Hunn 1990:185). Sumac (*Rhus alabra*) was used to treat venereal disease. Several plants were used to aid the human spirit including spruce tea for spiritual malaise, wild tobacco (*Nicotiana attenuata*) for emotional crisis, and wild rose (*Rosa* spp.) or juniper and red cedar branches for spiritual sickness.

Mammals

Mammals may have provided up to 10 or 12 percent of the diet for river dwelling bands but much more for upriver and nonriverine groups such as the upper Yakama, Nez Perce, and Cayuse. Hunting was an important pursuit for men and boys and a source of pride - a first kill inaugurated a boy's entry into manhood. Hunting was a year round activity but autumn was the most productive period when elk and deer aggregated for the rut and moved toward their winter ranges. The bow and arrow was the primary weapon until the introduction of the gun and arrows were fletched with hawk feathers bound with hemp and sealed with spruce gum. Prior to the introduction of the bow and arrow, the atlatl and dart were the primary hunting weapons. Mule deer (*Odocoileus hemionus*) and black-tailed deer (*O. hemionus columbianus*) were hunted most often but the American elk (*Cervus canadensis*) was infrequently hunted [see Fig. 5]. White-tailed deer (*O. virginiana*), bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*) and the pronghorn (*Antilocapra americana*) were hunted on occasion. Bison were a major part of the diet for equestrian groups who moved en masse to the plains for year-long hunts.

Sharing game was a common practice but wasting game was punished by sickness or bad luck in hunting. The yellow-bellied marmot was hunted near summer fishing grounds. The hoary marmot, which lived in higher elevations, was not hunted since it was associated with the "little people" whose whistling might seduce the lone hunter into losing his sense of time, space, and identity (Hunn 1990:142). The Townsend's ground squirrel (prairie dog), found in large numbers in sandy soils of the plains and foothills, was another important source of food. Streams were diverted to flood its colonies, after which the hunters clubbed or shot the squirrels. Jackrabbits and cottontails were netted in sagebrush flats in communal hunts using long hemp nets and rabbit fur was used for winter vests and socks. Although beaver, otter, muskrat and other fur-bearers were trapped, there were not a major source of food. Trapping was carried out to obtain furs; otter skins were used for decorative and symbolic hair braiding; and beaver musk glands were used as an aphrodisiac and love charm.

Birds

About 60 to 70 of the 260 bird species found in the Mid-Columbia region were recognized by the Indians. The 21 duck species share a single generic Sahaptian name and many were hunted, such as the Canada goose (*Branta canadensis moffitti*) on islands in the Columbia River. Eggs of some species of waterfowl were collected, but the ethnographic data suggests that waterfowl hunting and egg-collecting was not commonplace (Hunn 1990:144-145). Mallard ducks (*Anas platyrhynchos*) and the common merganser (*Mergus merganser*) were among the most frequently hunted waterfowl. Tundra and trumpeter swans (*Otar columbianus, O. buccinator*) that wintered along the Columbia River provided additional winter food. The sharp-tailed grouse (*Pediocetes phasianellus*) and sage grouse (*Centrocercus urophasianus*) were frequently hunted [Fig. 5]. The blue and ruffed grouse (*Dendraga pus obscurus, Bonasa umbellus*) were occupants of the forests and were hunted much less often. The flicker's red-orange flight feathers (*Colaptes cafer*) and the tail feathers of bald and golden eagles (*Haliaeetus leucocephalus, Aquila chrysaetos*) were required to dress the remains of the deceased for a journey to another world. Hawk feathers kept arrows in true flight. Eagle feathers still have power when used in men's dance costumes.

Religion

Indians believe they were placed on the land by the supreme creator to serve as caretakers of the natural world. Each group was created in place and given responsibility for that place in perpetuity. The earth and all that lives on it is thus part of a sacred trust. In the lower Columbia River Basin area, the form of the religion based on this trust is the Washani (see below). The supreme being is the Creator and life-giver and helping spirits are present in all beings (animals, plants, insects, rocks, clouds, and streams). Humans must treat the Creator and helping spirits with respect as a matter of spiritual law. Rudeness and disrespect entail withdrawal of support (animals and fish and other sources of life will abandon one or persistently evade one's efforts in the hunt). Special messages of dread or joy are delivered by Coyote and also by the raven, the great horned owl, and the meadowlark. Each living thing teaches a lesson, and just as these beings must be treated with respect, so must each human being.

Vision quests for guardian spirits were central to provide the strength to survive and endure the hardships of life, moral development, and the cultivation of one's unique talents. The spirit quest involved a lonely vigil, a vision, a sickness following newly acquired power, and a "coming out" with assistance from a spiritually endowed relative. This sequence often took years (cf. Ray 1939:68-131; Schuster 1975:114-120). Quests were undertaken by boys and girls nine or ten years old, and the coming out (public display of new powers) took place in winter with the shamanic power dances (Ray 1939:69-70). Often, it was years between receipt of a vision and the disclosure of powers and the vision powers were to be kept secret during that interval. The guardian spirit was a mammal, bird, or reptile, bestowing its special gifts to the seeker of the vision. Schuster (1975:118-119) noted that belief in the efficacy of guardian spirit power becomes a self-fulfilling prophecy: one needs power for success; if successful, one has power.

Washani Religion

Euro-Americans triggered declines in Indian populations from diseases and cultural catastrophe. Some Indians joined the non-Indian world in trade, religion, and politics while others eschewed the non-Indian beliefs, institutions and devices. The Indian's spiritual world was not separate from the physical world and the Plateau Indians practiced their religion based on songs and traditions of their elders for many hundreds of years. With the white invasion, disease, death, and uncertainty that the Euro-Americans introduced, the religion begin to adapt to the changes. For some members of the bands, this led to the beginnings of the Dreamer or Drummer religion, although the old Medicine religion was also practiced by some of the elders. Many of the latter were led by prophets who spoke of the restoration of the Indian ways and rejection of Euro-American customs and powers. The prophet cults might have started with the advent of smallpox in the Plateau. This catastrophe which was accompanied by economic, religious, and technical upheavals brought about by Euro-Americans, seemed to foster conditions ripe for the ascent to power of prophets (Hunn 1990). The prophet initiated sects were widespread on the Plateau and the most powerful of these was found among the Wanapums, whose founder, Smohalla, spent most of his life near what is now the Hanford Site.

Born sometime after 1810, Smohalla is first mentioned in a 1861 military report. The army was scouting the mid-Columbia River and attempting to prevent Indian/white conflict when the Northern Pacific Railroad was being constructed across the plateau. Smohalla's greatest influence was in his ability to foretell events and to enter a trance state, journey to the Spirit Land, and return with messages of the world's renewal and songs of spiritual power (hence the term "Dreamer"). He rejected Euro-American culture and was appalled at white alterations to the land; the sacred being of Indian religion. Smohala held meetings near Priest Rapids where he taught his religion (which was largely a formalization of the traditional Washani). His vision came to him on the eastern prominence of a large mountain or butte within the border of the Hanford Site (probably Rattlesnake Mountain). A carved image of his spirit bird (the Bullock's Oriole, *Icterus bullockii*) stood on a pole atop Smohalla's tule-mat home and called to the salmon on their spring run. The Dreamer religion was the dominant sect among the Wanapum and Palouse, although it also was a powerful influence on some members of all Sahaptian bands and some Salish groups (Mooney 1896) in Washington, Oregon and Idaho. At about the same time period, Wovoka led the Ghost Dance religion in northern Nevada.

Prior to Smohalla's time, around 1725, was born a Wanapum child called Shuwapsa. Oral tradition reveals that food was plentiful, and secure from want, the Wanapums forgot the need to give thanks for the earth's bounty. This troubled the old medicine man who tutored Shuwapsa. Seeing that the Wanapums were not showing the proper respect for the Creator and Mother Earth, and fearing that disaster would result, the old man repeated to Shuwapsa the creation story which has been handed down into the 20th century (and recorded by Sharkey 1984:26-27). Shuwapsa acquired the power of *yamish* on his teenage vision quest and became the Wanapum's first major spiritual leader and foretold of the coming of the whites. He predicted that these men would be friendly at first and then become enemies, spreading war and disease. He believed that dancing, praying, and worshipping in a prescribed manner could avert these disasters.

The concept of the Earth as Mother was fundamental to the Washani religion and under Shuwapsa's leadership, the Wanapum's belief that religion and life were one came to full fruition (Sharkey 1984:29). The Wanapums needed to remember that there was a price to be paid in order to receive the succor of Mother Earth and the continued protection of *Nami Piap*. Shuwapsa urged his followers to share food and shelter as the earth shared her gifts with the Indians. The smallpox epidemic of 1782 was seen as evidence of Nami Piap's wrath and this probably helped cement Shuwapsa's teachings firmly into Wanapum life. By the time of Lewis and Clark, Shuwapsa had developed the Washani faith into a form recognizable to the whites as a religion, with "priests" leading ceremonies that included dancing, singing, and preaching.

Twenty years after Shuwapsa's death, Smohalla was born (ca. 1813-1820). Until their lands were overrun by the whites, the Indians lived a peaceful and plentiful existence apart from periodic skirmishes with neighboring bands and occasional natural disasters (Sharkey 1984:38). During the fishing season, the banks of the Columbia were crowded with several thousand Indians living in camps of up to two hundred. The relative ease of food gathering during this period allowed for religious practices, Washani's rituals of traditional first food feasts, dancing, and drumming to meet the spiritual needs of those who relied upon Mother Earth for sustenance. Smohalla was influenced by this religious complex and the Prophet Dance, which included beliefs in prophecy, resurrection, a Supreme Being, group worship, and confession. Some have speculated that Smohalla might have been influenced by Christian practices (Sharkey 1984:43) and some Christian elements crept into the Washani religion.

Smohalla believed that Nami Piap would provide as long as the Indians game Him thanks and feared the blackness which would follow if they turned to the white ways. As he saw the Indians turn to Christianity and adopt the white culture, even to the point of living near the missions and tilling the soil, he began to worry about Nami Piap's exhortations and feared that if the people ignored the old ways, the end of the world would come

(Sharkey 1984:45). Against a backdrop of disease, seismic and volcanic activity throughout the 1840s and 1850s, Smohalla believed the Creator was displeased with His children. As Sharkey (1984:45-46) notes, Shuwapsa's teachings did not contain a great deal of ritual designed to protect the Indians from their current difficulties and Smohalla knew that this must change. Around 1850, he undertook a vision quest to the sacred mountain of LaLac; as hunger and thirst overtook him and he slept the "sleep of the dead," he awoke with a new spirit song, powers, and knowledge to add to the Washani religion. Smohalla reinforced Shuwapsa's kneeling dance and drumming services and added new elements to strengthen Washani and keep the Indians from following the ways of the whites (Sharkey 1984:46).

One reason the Wanapum refused to sign a treaty with Governor Stevens is that the concept of living on a reservation was incompatible with Washani precepts, that is, Nami Piap would not sanction their giving his gift of land away (Sharkey 1984:54). Smohalla knew that food was often scarce on the reservation or at the missions and that the "plow and Bible" policies of the Indian agents were opposed to Washani and dreaming. Since dreaming was how the spirits and Indians communicated, anything which interfered with this was unacceptable. Tilling the soil to raise food was disturbance of Mother Earth and to be avoided. As treaty promises went unfulfilled or were broken, and as reservation lands were reduced, Smohalla's teachings gained credence among his followers and the reservation dwelling Indians. This, coupled with the unpunished acts of white agression against the Indians and the division/fragmentation of the various bands due to religious differences created an environment of mistrust. Furthermore, the religious divisions between those following their ancestral religion and those adopting the Christian faith, caused a great rift among the many Sahaptian bands. One Drummer religious leader at Tygh Valley along the Columbia was arrested by Indian police and drug behind a horse for over thirty miles for practicing his religion. He fled with some of his followers and sought refuge at Priest Rapids until befriended by a Catholic priest who saw his safe return to his homeland.

Today, many continue to practice the Washani rituals. In 13 longhouses throughout the Northwest, the adherents dance to the seven drums, incorporating ancient rites of gratitude for the fruits of the earth on Sunday and other feast days. Indians gather at Priest Rapids, Toppenish, White Salmon, Lapwai, Tutawill, Nespelem, Simansho and elsewhere for feasts of thanksgiving and Sunday meetings are held at all the longhouses. The Indian Shaker religion, a syncretic religion combining elements of traditional Puget Sound Salish religion with Christianity, is also practiced on some of the reservations. Likewise, generalized shamanism by Indian doctors is commonplace. Despite efforts by federal and church officials to destroy the traditional religion in its various forms, these cherished customs continue. Columbia River bands of the Yakama and Wanapum escaped some of the worst persecution due to their geographical isolation from the missions and government posts. Today, traditional religions are experiencing revitalization.

3.4.4 A Brief Introduction to the Indian Groups

The Hanford Site itself lies within lands ceded to the United States by the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes and Bands of the Yakama Indian Nation [Fig. 6]. The Umatilla, Cayuse, and Walla Walla peoples are organized within the Confederated Tribes of the Umatilla Indian Reservation and the Yakama and other groups are organized within the Confederated Tribes and Bands of the Yakama Indian Nation. The Nez Perce visited the Hanford Site to fish and trade with local peoples and to partake in ceremonial gatherings and the Palouse lived very close to

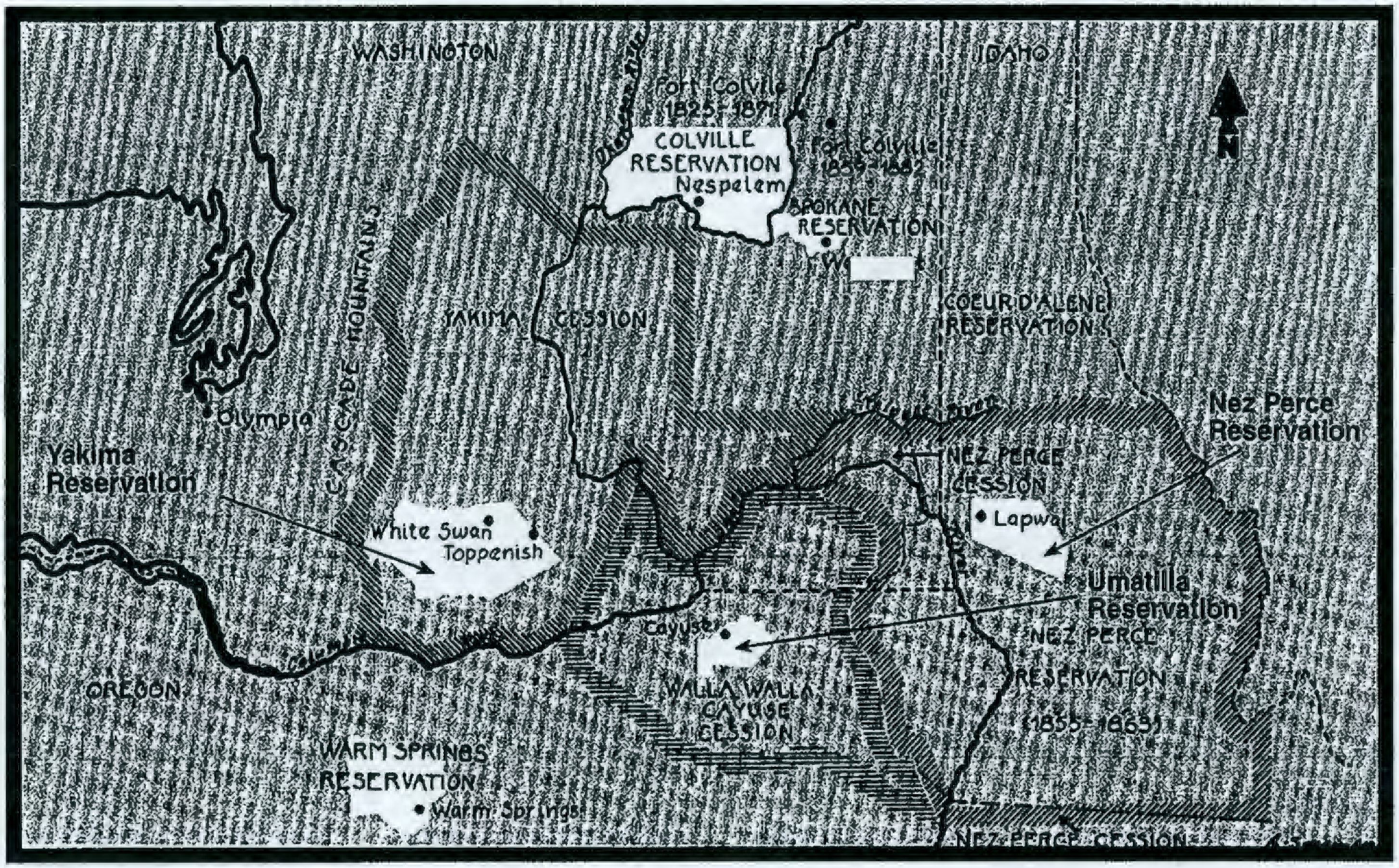

Figure 3.6. Inland Northwest Treaty Cessions (after Trafzer and Scheuerman 1986: 208).

the Hanford Site and certainly used its lands in the past. Until 1943, the Wanapum lived within what is now the Hanford Site. The following summaries are derived from Ruby and Brown (1992).

Confederated Tribes of the Umatilla Indian Reservation

The origin of the Confederated Tribes of the Umatilla Indian Reservation goes back to the June 9, 1855 "Walla Walla Treaty" (12 Stat. 945, ratified March 8, 1859) between the **Cayuses, Wallawallas,** the **Umatillas**, and the United States. These tribes agreed to remove to the Umatilla Reservation in northeastern Oregon and ceded 2,151,680 acres in Oregon Territory and 1,861,120 in Washington Territory to create the 245,699 acre reservation. Initially, each of the tribes kept a measure of separateness on the reservation although bearing a common name (Umatilla). The Umatilla Tribes became officially confederated on November 4, 1949. The Slater Act of March 3, 1885, reduced the reservation and provided for allotment to the Indians, but limited allotment to 120,000 acres. Of the roughly 157,000 acres reserved for the Indians, only 95,273 remained in 1969 (15,438 were tribally owned and 79,835 allotted).

Early 19th century French-Canadian fur trappers called the **Cayuses** the cailloux, a French word for stones or rocks. Closely related culturally and geographically to the Nez Perces, they eventually adopted the language of the latter. The Cayuse language survived into historic times and could be heard on the Umatilla Reservation in the 1950s and 1960s but it was not a Sahaptian language (see Rigsby 1969). Like the Nez Perces, they were noted for their horse culture and originally lived in what is now north-central Oregon and moved away from their linguistic neighbors (the Molalas) and reached a new homeland on the upper reaches of the Walla Walla, Umatilla, and Grande Ronde rivers (see Garth 1964:45). Their lands stretched westward from the Blue Mountains to the John Day River.

The Cayuse horse was named for the tribe, who, according to tradition, received their first horses from the Shoshonis. The Cayuse were able to use the horse to dominate sedentary peoples living nearby. The Cayuse considered fishing a demeaning occupation and had no desire to own anything but the hunting and pasture land away from the river (Garth 1964:46). The horse enabled the Cayuse to journey as far east as the Great Plains to trade, hunt, and fight and they thus acquired cultural elements of the Plains tribes. The early 19th century fur traders were unable to get the Cayuse to gather furs.

In 1818, the North West Company built Fort Nez Perces (Fort Walla Walla) in the lands of the neighboring Wallawallas. From there, the they (and through the 1821 merger with the Hudson's Bay Company) sought the good will of the Cayuse to facilitate fur trapping and travel through Cayuse lands and up into the fur rich Snake River country. At the urging of the North West Company, the Cayuse entered into a tenuous peace with enemy tribes on the upper Snake River, whose furs the British sought to collect before competing Americans took them.

The Cayuse are believed to have participated in the November 29, 1847 killings of Reverend (Doctor) Marcus Whitman and his wife, Narcissa, at their Waiilatpu Mission on Cayuse lands near present-day Walla Walla, Washington. The underlying causes of the killings stemmed from squabbles between the Cayuse and the missionaries over ownership of mission lands, unhappiness at immigrants traversing their lands, fears that these travelers were carrying measles, the practice of killing doctors who failed to cure patients, and agitation among Walla Walla valley "half-bloods". The ensuing Cayuse War of 1848 culminated in the June 3, 1850 Oregon City hanging of five Cayuses deemed guilty by the provisional Oregon territorial government. The Whitman killings ended mission work among the Cayuses by the American Board although Roman Catholic missionaries continued their work in the area.

Losses from war, disease, and white inroads prompted the Cayuse, despite their hostile feelings, to sign a treaty on June 9, 1855 (12 Stat. 945) which was ratified March 8, 1859 and proclaimed April 1, 1859. They submitted to the United States and agreed to live on a reservation to be established in their homelands. Four months later, some Cayuses joined an Indian confederation in fighting the Yakima War of 1855-1856 against American volunteer and regular army forces. Suffering much and broken in spirit after their military defeats, they settled on the Umatilla Reservation. In 1780, the Cayuses might have numbered some 500, but numbered only 370 in 1937. Their original Waiilatpuan language appears to be lost.

The **Wallawallas** lived along the Columbia at its confluence with the Walla Walla River, and east along the Walla Walla to its junction with the Touchet River. Because of their proximity and repeated exposure to their traditional foes (the Shoshone), the Wallawallas had close ties with the Nez Perce and Umatillas, as well as with the Waiilatpuan-speaking Cayuses. In 1805-1806, the Wallawallas met Lewis and Clark and five years later (and for several years thereafter), they met personnel of the fur-trading companies traveling up and down the Columbia River. In 1818, Fort Nez Perce (Fort Walla Walla) was built near the confluence of the Columbia and Walla Walla. In 1836, they came under the ministrations of the Whitmans. In 1844, when the son of Wallawalla chief PeoPeo MoxMox was killed by a white man at Sutter's Mill in California, the Americans feared that a thousand Walla Walla would return to wreak vengeance upon them. A band of Indians did return to California two years later but were weak and few in number. The Wallawallas did not participate in the Whitman killings but some joined the Cayuse in their ensuing war against the Americans in 1848.

The Wallawallas attended the treaty council that bears their name and signed on June 9, 1855. During the Yakima Indian war in the fall of 1855, after the Wallawallas pillaged Fort Walla Walla, PeoPeo MoxMox was shot and killed and his body mutilated by white volunteer troops. There was no rush of Wallawallas to the Umatilla Reservation after that, but they slowly drifted onto that confine as whites occupied their former lands. The Wallawalla might have numbered 500 in 1836, but by 1962, their descendants in Oregon numbered between 100 and 200.

The **Umatilla** lived on the lower reaches of the Umatilla River and along both banks of the Columbia from present-day Arlington, Oregon, east to the mouth of the Walla Walla River. They may have numbered 1,500 in 1780 but were reduced to 124 by 1937. Before acquiring horses early in the 18th century, they depended mostly on salmon and other fish. The Umatilla had few intertribal political ties, but under threat from their most feared enemy (the Paiute), they formed a war alliance with the Nez Perce. Their stronghold against mounted Paiute raiders, Blalock Island, was covered behind the flood waters of McNary Dam. In 1848, they sent warriors to join their Cayuse neighbors after the Whitman killings. Living along the Oregon Trail, the Umatillas were alarmed at the increasing numbers of immigrants passing over their lands in the 1840s. Aware of Indian restiveness caused by white immigration, Congress passed the Donation Land law on September 29, 1850 which allowed whites to homestead lands in Oregon not yet ceded by the Indians. Indian restiveness also prompted the government to establish the Utilla (Umatilla) Agency on the Lower Crossing of the Umatilla River near present-day Echo, Oregon in 1851. The Roman Catholic mission of Saint Anne (later Saint Joseph and then Saint Andrew) was established in 1847 near Pendleton but abandoned in 1848 after the Whitman killings and the Cayuse War and reestablished in 1851. Like the Cayuses, the

Umatillas frequented the Utilla Agency to obtain food and intelligence concerning the activities of the whites. They suffered at the hands of incompetent agents, one of whom encouraged them to steal immigrant cattle which he later purchased from them.

White cattlemen fled the Umatilla valley in October 1855, the year the Tenino Indians burned the agency building. In the same month, the (1855-1856) Yakima War broke out. In May and June, 1855, the Umatillas met the Washington and Oregon superintendents of Indian affairs, Isaac Stevens and Joel Palmer, at the Walla Walla Treaty Council. They signed a treaty on June 9, 1855 (12 Stat. 945) that was ratified on March 8, 1859 and proclaimed on April 11, 1859 ceding their lands to the United States in return for a reservation north and south of the middle Umatilla River. On one occasion at the height of the Yakima War, when they were in council with the Cayuse and the Yakama in the Grande Ronde valley, they were attacked by Paiutes and forced to flee, abandoning their old, young, and crippled.

Confederated Tribes and Bands of the Yakama Indian Nation

The Confederated Tribes and Bands of the Yakama Indian Nation has its roots in the Yakima Treaty signed on June 9, 1855. After that treaty some of the signatory bands, primarily Klickitats, joined the Yakamas on the Yakama Reservation of the Simcoe Agency. The Yakama Tribes stress their nationhood because unlike tribes on reservations established by executive orders, they were party to a treaty in the manner of sovereign nations. Today, Yakama tribesmen live on a reservation of over one million acres in south-central Washington and on farms in the Yakima River valley, or in reservation towns such as Toppenish, Wapato, Parker, and White Swan. Others live off-reservation in nearby towns and cities. Tribal membership in 1984 was about 6,853, more than double the estimate of 3,000 attributed to Yakamas proper in 1780. Under the Yakima Treaty of 1855, the Klickitats became the most numerous people on the Yakama Reservation next to the Yakamas proper. The Klickitats were removed there in 1867 due to white pressure in the Willamette valley of Oregon, where for many years they had gone to trade, hunt, and farm.

During the early reservation period, the Yakama came under the strong hand of Reverend James ("Father") Wilbur, a Methodist minister who became agent in 1864. Except for a brief hiatus, Wilbur remained in that office throughout the period of President Grant's Peace Policy era of the 1870s and early 1880s. He ruled under the standard of "The Plow and the Bible" and his administration was regarded by the white Protestant community as a model of Indian agency management. The Indians, however, were unenthusiastic about farming, and the teaching of the Bible led to friction between Protestants and Roman Catholics over management of the Simcoe Agency.

In the late 19th century, whites began encroaching on the Yakama Reservation with such projects as irrigation dams that were built across the Yakima River in 1891. In 1894, agent L.T. Erwin attempted to bring the Yakama people closer to the white world by constructing the Erwin Ditch with the proceeds from the sale of the Wenatchapam Fishery that had been reserved for them under the treaty. Controversies among Yakamas and whites regarding fishing, water, and land-use rights continued into the 20th century. Allotment of the reservation began in the early 1890s and was mostly completed by 1914 when some 440,000 acres of the reservation had been allotted. As the 20th century advanced, Yakama peoples were brought more closely into the white world, but not always on friendly terms. During World War I, Yakama traditionalists believed their youth were sent to fight so that Americans could destroy them. Given a long heritage of dissatisfaction with the United States, the Yakama did not organize under the Indian Reorganization Act of 1934 (48 Stat. 984) until 1935.

The **Yakama** numbered some 3000 in 1780. Union Gap, south of present-day Yakima, was the site of their main village, Pa'kiut ("hills together") and they lived in the watershed of the Yakima River. The Lower Yakamas, or Yakamas proper, occupied the lower Yakima watershed from the ancient Selah Village (just north of present-day Yakima) south to present-day Prosser. The Upper Yakamas (Kittitas) occupied the upper Yakima valley north of Selah and the Kittitas Valley. Among the Yakama are traditions of a Flood, prophets dying for three days and returning to earth, and predictions of the coming of black-robed (Roman Catholic) priests. Their first direct contact with whites was with Lewis and Clark and soon after other white travelers and traders passed through their lands. By the late 1830s, they came under the ministrations of Catholic priests.

The Yakama headmen who signed the Yakima Treaty on June 9, 1855 represented various lower-middle Columbia River bands. Despite opposition to the treaty, 14 tribes under the Yakama standard ceded to the United States about 10 million acres of present-day central Washington for their main reservation, which was less than 1,250,000 acres. Designated under the treaty as the head Yakama chief, Kamiakin led a coalition of interior tribes against the Americans in what became known as the Yakima War of 1855-1856. Despite some initial victories, the Yakamas and their allies were defeated in November 1855 at Union Gap. During the war, Yakama unity was disrupted by friction between Kamiakin's Lower Yakama faction and that of the Upper Yakamas who regarded this son of a Palouse father as an outsider. After treaty ratification on March 8, 1859, the 14 confederated tribes formed the Yakama Indian Nation.

Nez Perce

The Nez Perce, who call themselves Nimipu, first came into contact with Anglo-Americans in 1805 with members of the Lewis and Clark Expedition as they descended onto the Weippe meadow above the Clearwater River. The Tribes reputation for friendliness began with this visit. Traditionally, the Nez Perces lived in scattered villages and maintained few political institutions. The aboriginal homeland, the western slopes of the Rockies was marked by high plateaus and deep river valleys. Tribal life evolved around small, semipermanent villages that lay along the shores of the major streams and creeks. The village site varied upon bands ranging from 10 to 75 members with over 300 known Nez Perce village sites in Oregon, Idaho and Washington encompassing over 13.5 million acres.

On the antiquity of his tribe, Nez Perce warrior Howlis Wonpoon, War Singer (known as Camille Williams - a naive linguist and interpretor in the 1930s) stated:

> **On the North Fork of the Clearwater River a few miles below Bungalow Ranger Station, Idaho, the footprints of a human being are plainly seen, sunken into the basaltic rock formation. The tracks are those of a man running upstream as if in pursuit of something, probably game. On the Snake River there are stony tracks of a woman and child. Also [there are] tracks at a bathing place near Fir Bluff, today a solid rock formation.**

Further, Wottolen, Hair Combed Over Eyes, a blind old warrior and noted native historian said:

> **There are two places up on the Salmon River where the people lived, on these places and none on the Clearwater or Lapwai or Snake Rivers. The first generations of Nez Perce grew up at those two places. I do not know how many snows back of that time. The buffalo was hunted on the head of the Salmon. Next few snows they would go a little farther east. (L.V. McWhorter files)**

In summer, as stated by present day historian Allen Slickpoo, Sr., the Nez Perce have occupied this land from time immemorial.

Because their survival required that the bands move in this annual gathering cycle, there were no permanent sites and very little extended politcal organization beyond the band headmen and peace leaders who ensured the women, elderly and children were provided for. The tribal identity was derived from the commonality of language, land, family and religion. Euro-American contact is what brought about the smallpox epidemic, the horse in the 1730s and the new trade and warfare items that were acquired with other tribes.

The horse reached the Nez Perce in the 1730s and dramatically changed the lifestyle of the Nez Perce. With greater mobility they travelled more often to the buffalo country as well as on trade missions to the Columbia. The longhouses were still utilized in the winter months, but families adapted the portable teepee style dwellings. Further, the Nez Perce along with the Cayuse tribe, were the only known tribes to selectively breed horses to improve their stock; culling those horses of inferior traits. This added to the wealth and reputation of the Nez Perce in terms of trade goods and territory. The trade practice was increased not only within bands of the Nez Perce, but with outside tribes, including the Yakama, Umatilla, Walla Walla, Palouse, Blackfeet, Crow and Sioux.

Shortly after the introduction of the horses, the first known Euro-Americans introduced epidemics that coupled with the increased mobility brought devastation and death to all tribes of the Plateau. The first documented smallpox outbreak among the Plateau Indians was in the 1770s and another outbreak occurred in 1801 resulting in a population reduction of around 45% (Boyd 1985, cited by Campbell 1989:22). Although no reliable early census data is available, the Nez Perce were reportedly numbering around 6,000 at the time of Lewis and Clark.

In 1836, the Nez Perces began a new relationship with Euro-American influence that produced a permanent change that still affects the tribe today. During this time a group of Presbyterian ministers arrived in Idaho and settled in the heart of Nez Perce country. The bands in the Kamiah area took them in establishing a mission there and one at Lapwai. Thus began the fragmentation of the Nez Perces based on spiritual and material survival needs. Those Nez Perces who adopted the Christian religion found advances could be made in terms of material wealth and land acquisition. Those Nez Perces who clung to the Dreamer religion soon realized that this division would tear the Tribe apart for many generations (E. Jane Gay 1919).

At mid-century, the Indian Office began moving Indians in the Northwest onto reservations to separate them from the growing number of white settlers as well as for religious differences. The Treaty of 1855 resulted in 7.5 million acres set aside for the Nez Perce. It also required recognition of the American government and the imposition of a Office of Principal Chief which was not acceptable to many bands of the Nez Perce. The official recognition of Head Chief was assumed by Chief Lawyer of Kamiah, who was friendly with the whites and also a Christian convert. Notably, when gold was discovered on the Nez Perce reservation in 1860, his band was helpful in bringing suppliess to the miners. In 1863 another treaty was signed which greatly divided the Tribe. It reduced the acreage to 750,000 abandoning claims to lands in Oregon and Washington and parts of Idaho. The land occupied by Chief Lawyer and his band was not ceded to the United States, however the lands where the "dreamer" bands still resided were then ceded. In 1887 the Dawes Allotment Act was passed resulting in 500,000 of those acres to be opened for white settlement. Today, only 13% of the Nez Perce reservation is still owned by the Tribe.

In 1877, General O.O. Howard issued an ultimatum for the remaining non-treaty Nez Perce to be on the Idaho reservation within 30 days. In complying with this order, the Chief Joseph Band of Oregon crossed the Salmon River to the WhiteBird territory. During this time, three young warriors avenging the murder a few years prior of one of their fathers, shot and killed a white trader. Thus began the Nez Perce War at the Battle of Whitebird. The Nez Perce involved in the war numbered 750 of which 250 were warriors and the remaining are women, children and the elderly travelling with 2,000 head of livestock that outran the army a distance of 1,800 miles. The bands involved formed an alliance recognizing the skills of the band chiefs of which Ollokut, Joseph's brother, White Bird and Lookkingglass would plan war strategies while Josephy would be responsible for the safety of the women and children (L.V. McWhorter files).

In October, during a snow storm at the last battle of the war at BearPaw, Montana; only 30 miles from the Canadian border, Joseph surrendered. It is estimated by tribal participants in the war that 233 escaped into Canada with Chief WhiteBird; of these, 140 were men and boys and 93 were women and girls. Of the remaining Nez Perce; 431 went with Joseph into exile as prisoners of war. Of these, 87 were men, 187 were women and 160 were children (L.V. McWhorter files). While in exile from 1877 to 1885, only 268 Nez Perce survived the malaria and hunger in Oklahoma. Of these, 118 were allowed to return to the Idaho Nez Perce reservation, the remaining 150 were declared as too subversive and were then sent to the Colville Reservation in Washington, never allowed to return to their homelands in Wallowa valley of Oregon as promised at BearPaw. In 1891, the BIA agency census for the Nez Perce reservation was 1.700 and the 1892 census was 1,828 which is quite a significant decline since the advent of Lewis and Clark. Today there are currently 3,200 enrolled Nez Perce of which 2,450 reside on or near the Nez Perce reservation.

Palouse

The **Palouse** called themselves the Nahaum (or Palous after the "standing rock" at the mouth of the Palouse River near their main village, which was also called Palus). The Palouse consisted of three autonomous bands along the lower Snake River to the Columbia-Snake confluence. The ethnologist James H. Teit believed the Palouse were a Yakama, or closely related people, that once occupied the lower middle-Columbia River, from which some of them moved to the lower Snake and Palouse rivers. In 1780, the Palouse numbered about 1,800. In 1805-1806, they might have numbered 1,600 but by 1854, they numbered only about 500. When visited by Lewis and Clark, the Palouse lived in wooden houses, in contrast to the mat tipis of their neighbors.

The Palouse were primarily fishermen, but migrated from their permanent fishing villages to gather roots and berries and to hunt. Early 19th century fur traders often purchased horses from the Palouse, who managed their herds with a skill equal to the Nez Perce. The Palouse were one of the tribes whom the white treaty makers designated as members of the Yakama Nation in the Walla Walla Treaty of 1855. During the 1855-1858 war that followed the treaty signing, they fought against the Americans. The leader of the Indian coalition in the Yakima phase of the war (1855-1856) was Kamiakin, a man of Palouse-Yakama ancestry. In September 1858, Army Colonel George Wright invaded the Spokane-Coeur d'Alene country to retaliate against the Palouse and other tribes who defeated the army command of Col. Edward Steptoe in May 1857. Col. Wright ordered the killing of 800 horses owned by the Palouse.

In the immediate postwar period, the Palouse had dwindled to a small remnant. Living at the center of a triangle between the Nez Perce, Yakama and Umatilla reservations, the government urged the Palouse to remove to one of them. The Palouse avoided removal and refused government aid claiming the government failed to abide by its treaty obligations to compensate them for their lands. Agent James Wilbur was particularly zealous in seeking their removal to the Yakama Reservation. In 1872, at the start of the Peace Policy era, the Palouse numbered 150. While some Palouse agreed to remove to the proposed Spokane or Coeur d'Alene reservation, they continued until the end of the 19th century subsisting on small farm patches in their homelands. Some Palouse Dreamers fought alongside Chief Joseph against American forces in 1877 and went with him into exile in the Oklahoma Indian Territory from which they returned to settle on the Colville Reservation in 1886. Traps and fish wheels on the Columbia and ever encroaching ranchers and farmers denied the Palouse their native sources of food. In 1919, they numbered only 82 and today are virtually extinct but for their blood which flows through the veins of Indians on several reservations.

Wanapum

The Wanapums were composed of groups, one of which was called "Sokulks" by Lewis and Clark, that lived along the Columbia in the Priest Rapids area (today obliterated by the backwaters of the Priest Rapids Dam). Priest Rapids was named by fur traders who on August 18, 1811, encountered a native priest there. Smohalla preached the sacredness of the earth and its final restoration to aboriginal purity. Through his ceremonials he was able to attract to his rush-mat lodge in P'na ("fish weir") village those traditionalists avoiding reservations ("renegades" according to the whites). Under his influence and leadership, the Wanapums maintained their independence despite the efforts of Indian agents to confine them to reservations. The Wanapums were successful partly due to conflicts between Indian agents and army officials, who disagreed on the proper distribution of the tribe, and partly due to the barrenness of their Priest Rapids homelands, which did not invite white settlement. After his death in March 1895, Smohalla was succeeded by his son, Little Smohalla, who froze to death in 1917. A direct descendant, Puck Hyah Toot (Johnny Buck), was a Wanapum leader until his death on September 11, 1956. In contrast to the other tribes, the Wanapums did not enter into any treaties with the United States.

A 1939 Washington state law allowed the Indians to take fish for personal and ceremonial use, but not for commercial purposes. Recodification of the laws in 1949 removed this provision, but in 1981, the state enacted another law requiring the Wanapum to obtain permits to fish for ceremonial and subsistence purposes. During World War II, the Wanapums, who were living in mat dwellings, were removed to the foot of the Priest Rapids from the area set aside for the Atomic Energy Reservation at Hanford. The Wanapums maintain that the only "treaty" they have signed with whites is an agreement dated January 15, 1957 which four of their men signed with the Grant County Public Utility District. In addition to providing cash, lifelong housing in individual homes, electricity and water, a longhouse, and employment at the dam, the utility promised the Wanapums their right to hunt and fish and agreed to move some petroglyphs from Whale Island in the Columbia River to the Wanapum burial grounds and a recreation area. In 1770, the Wanapums might have numbered 1,800 but by 1870 their population dropped to about 300. Only four Wanapum families remained in 1980.

3.4.5 Indian Use of the Hanford Site

Walla Walla and Umatilla

The Walla Walla and Umatilla fished in common with neighboring groups in their own territory and at Horn Rapids on the Yakima. Suphan (1974:54) stated that the lower Yakima River and the White Bluffs-to-Priest Rapids region was of relatively little interest to the Umatilla, Walla Walla, and Cayuse, but Walker (1988:20) asserts that these groups recorded usual and accustomed fishing sites in the same areas and a reservation of a home site and trading post site for PeoPeo MoxMox on the Lower Yakima River in the Treaty of 1855. PeoPeo Mox Mox was a principal Walla Walla chief who reserved a fishing and trading site for himself on the lower Yakima River and insisted on including the Hanford Reach of the Columbia River within ceded lands of the Walla Walla, Umatilla, and Cayuse confederation. This suggests that these fisheries, which were under the resource sovereignty of the Wanapum and lower Yakama, were also used and valued by the Walla Walla and their confederates. Walker (1988:20) thus concludes that this general area is of substantial significance to all three groups, but especially to the Walla Walla.

Suphan (1974) served as a consultant to the Government during Indian land claims cases in the 1950s and drew conclusions congruent with Trafzer and Scheuerman (1985) and Relander (1956), who were strongly supported by the tribes they wrote about. Suphan's conclusions are also consistent with nuance of the treaty language signed by the Walla Walla and their allies in 1855. Interestingly, Deward Walker (1988:18) in his review of Chatters (1989) asserts that Chalfant's (1974) and Suphan's (1974) position was highly adversarial in that they both worked as expert witnesses for the Department of Justice. Suphan's assignment was to minimize tribal land claims and he was opposed, and his research largely discredited by, Verne Ray who worked as an expert witness for the tribes. Chalfant, in perhaps a legally-inspired tactic, attempted to dismember the Palouse as a political entity in his role as the government's expert witness (Walker 1988:18). Suphan (1974:54) stated that the Umatilla and Walla Walla visited and exploited certain places along the lower portion of the Yakima and Columbia rivers above their junction, but it was primarily the Yakama and the Wanapum that exploited this land. Suphan (1974:53-54) also noted that the Umatilla, Walla Walla, Cayuse, and Nez Perce visited this area to trade but that their exploitation of the natural resources was decidedly secondary to that of the Yakama and Wanapum as well as secondary to their own utilization of the land east of the Columbia and south of the Snake. Walker (1988:20) rejected Suphan's conclusion and asserted that all of these tribes retained an interest in this region because it was of vital importance to them as evidenced especially in their treaties and usual and accustomed usage.

Palouse

In western Palouse settlements, Palouse dialects were more closely related in language to the Wanapum who resided along the mid-Columbia and this linguistic connection suggests frequent Palouse-Wanapum contacts. The Palouse consisted of three groups with separate resource territories (Trafzer and Scheuerman 1985). The lower Palouse (Nahanam) occupied the area around, and a few miles above, the mouth of the Snake and their main village was Quosispah which is located near present-day Sacajawea State Park at the mouth of the Snake. They cohabited Columbia River villages with the Chamnapum and Wanapum, at least during the early fall fishing season. They visited the White Bluffs area for fishing and often fished at Horn Rapids and were familiar with lower portions of the Hanford Reach of the Columbia.

Cayuse and Nez Perce

Both groups lived east and south of the Hanford region, separated from it by the Blue Mountains and the territories of at least one other group. Neither the Cayuse nor Nez Perce is known to have utilized the Hanford area as a resource base but relied more on areas to the south and east. According to Suphan (1974), they visited the area to trade and participate in rendezvous, and may have engaged in some minor resource-gathering activities at the same time. Given the limited resource potential of the Hanford area, fishing for spring Chinooks at Prosser or Horn Rapids, or for fall Chinooks at White bluffs are the most likely resource gathering activities for these peoples.

Wanapum and Yakima

According to most authors (Smith 1982), the Hanford Site area was primarily inhabited by the Wanapum and Chamnapum. The Chamnapum were believed to be a band of lower Yakama, although Black (in Rich 1947) described them as part of the Walla Walla on the basis of language. Like the Walla Walla, Palouse, Yakama, and Umatilla, the Chamnapum and Wanapum were Sahaptian speakers.

Historical and ethnographic accounts (cf. Ross 1922; Ray 1936b, 1938; Relander 1956; Suphan 1974; Mooney 1896), indicate the Wanapums customarily occupied the right bank of the Columbia from the confluence of Crab Creek in the north to some point between White Bluffs and the confluence of the Snake, and on the left bank from just below Priest Rapids to the same southern area. Immediately downriver were the Chamnapum on the right bank and the Palouse on the left bank and intermarriage between these groups was common. They routinely traveled westward and northward to mingle with the Yakamas, and northeastward to mingle with the lower Palouse and Sincayuse (Relander 1986). The lower section of the Yakima River and the Columbia above the junction of the two rivers was used primarily by the Chamnapum band of Yakama and the White Bluffs and Priest Rapids Wanapum (cf. Suphan 1974:141; but see Umatilla and Walla Walla above for Walker's 1988:18 alternative perspective).

A trail from Priest Rapids and White Bluffs to the Yakima River was used by the Yakama and Wanapum when visiting each other to feast and dance. At Celilo Falls on the Columbia, the Wanapums fished, mingled, and intermarried with their cultural and linguistic kindred (Relander 1956:34). The Wanapums were the primary seasonal occupants of two fishing places (Wy-yow-now near the village at White Bluffs and Wan-a-wish at the Horn Rapids irrigation dam site on the lower Yakima River). Although other Indians came to visit, the Wanapums (and Chamnapums) had sovereignty over the fishery there (Swindell 1942:248-288). Wanapum villages and other use sites have been documented by Relander (1956:296-318). Wanapum and Yakama use of the Hanford Site is documented in their legends (Beavert 1974:10-24, 182).

3.5. Statement of Historic Context

3.5.1 Lewis and Clark

Lewis and Clark's 1805-1806 Corps of Discovery expedition has long symbolized the westering impulse in American life and no other exploring party has so fully captured the imagination of ordinary citizens or scholars. Much has been written about Meriwether Lewis and William Clark in primary sources (Coues 1893, DeVoto 1953, Gass 1958, Jackson 1978; Moulton 1983, Thwaites 1904-1905) and a number of secondary sources. One work in particular, James P. Ronda's (1984) Lewis and Clark Among the Indians, was authored from a perspective sensitive to the Indian people. Over the generations, the significance and achievements of the Lewis and Clark expedition have undergone constant reappraisal. Their journey has been viewed as an epic of physical endurance and courage and they have been viewed as pioneer western naturalists, cartographers, and diplomats. Jefferson knew that his explorers would pass through the sometimes invisible universe of Indian politics and European rivalries and understood that the lands from St. Louis to the great western sea were neither empty nor unclaimed. The political and economic face of the land had already been transformed by a generation of intense competition between tribal peoples and agents of Spain, France, and Great Britain. Although formal direct "contact" between Euro-Americans and the Plateau Indians first occurred with Lewis and Clark, European influences from other parts of the North American continent had resulted in varying amounts of indirect contact many years prior to the expedition. Not only had the Indians come into contact with trade goods but also suffered from introduced diseases. The native subsistence and settlement patterns observed by Lewis and Clark may have already reflected post-contact conditions (see Campbell 1989).

Jefferson understood that if the expedition was to be successful, whether for science, commerce, or statecraft, it would need to navigate through troubled Indian waters (Ronda 1984:1). Jefferson cautioned Lewis that the expedition must treat the Indians in the most friendly and conciliatory manner and to gather information about the Indians while living at peace with them. Attorney General Levi Lincoln urged Jefferson to have Lewis take some cowpox matter along to administer to the Indians since if they were to have extensive contact with whites, they needed to be protected against smallpox. Dead Indians could not participate in trade and dying natives could only blame the explorers for spreading disease (Ronda 1984:2). Although Jefferson did not fully understand the complexity of Indian exchange systems operating on the northern plains and Pacific Northwest, he was intent on expanding American commercial influence and knew that fur traders and other eager entrepreneurs needed information about future markets and sources of supply. Jefferson saw western America as a vast trade empire to rival a similar system already being forged by agents of the Hudson's Bay Company and the North West Company. Jefferson's belief that accurate information about Indians was essential in order to shape a peaceful environment for both peoples was rooted in his passionate boyhood interest in things Indian.

Representing the United States, Lewis and Clark were expected to pursue the Indian policy goals of the republic - acquire native lands at low cost while urging tribal people to shuck off hunting and breechcloths for plows and trousers (Ronda 1984:4). Couched in the language of Christian philanthropy, Jeffersonian Indian policy pursued national expansion with zeal, but west of the Louisiana Purchase, Jefferson was less sure of both policy and strategy. Those new lands might be more appropriate for traders than settlers and might even provide a refuge for native people dispossessed by the farming frontier.

When dealing with tribes east of the Mississippi, Jefferson's program was for civilization with land acquisition. West of the Mississippi, trade was the prime focus of his program. While tactfully ignoring questions of power and sovereignty, Lewis and Clark were ordered to acquaint Indians with "the position, extent, character, peaceable and commercial disposition of the United States, and of our dispositions to a commercial intercourse with them."

Perhaps more naive were Jefferson's instructions to Lewis to organize delegations of chiefs and elders to be sent to Washington. Jefferson assumed that Indians would be properly impressed with the wealth and power of the new nation. Jefferson hoped the expedition might find some young Indians willing to be "brought up with us, and taught such arts as may be useful to them." It was a dream that had haunted missionary and bureaucrat alike - native children gladly leaving their parents to embrace new fathers. While some Indian delegations did travel east and some Indian youth also headed east with missionary Marcus Whitman, Jefferson's dream, if fully realized, would have hastened the demise of Indian culture (Ronda 1984:6).

Colonial experience demonstrated that fruitful diplomacy and peaceful relations with Indian peoples required the exchange of gifts at each meeting. Some Europeans perceived gifts as bribes, but blankets, pots, and guns meant something else to the Indians (Ronda 1984:8). The act of reciprocal gift giving symbolized the concern of different people for each other and was a recognized part of the protocol of Indian diplomacy. Lewis learned from sources in the Pacific Northwest fur trade that blue glass beads were highly valued as were brass buttons. Unfortunately, Lewis did not pack sufficient numbers of these items, an oversight that cost the expedition dearly among the Nez Perce and Chinookan Indians (Ronda 1984:9).

After Lewis and Clark left the Nez Perce villages located along the Clearwater in early October 1805, at the confluence of the Snake and Columbia, Lewis and Clark entered an Indian world increasingly distant from the plains traditions that had been so much a part of expedition-Indian relations [Fig. 7]. On the Columbia, salmon was king and fishing was the enterprise that gave shape to Indian life. Large houses with wooden frames, clothing a strange mixture of native and European fashions, graceful canoes with "curious images" at their bows, and practices like head-flattening, all pointed to a native environment dominated by Pacific ways (Ronda 1984:163). Lewis and Clark encountered Indians long accustomed to dealing with English, American, and native traders. In those transactions, it was the Indian middleman - whether Wishram or Chinook, who expected to set the price, while outsiders were to pay or go without.

Lewis and Clark duly recorded ethnographic information about the mid-Columbia tribes. When they met with Yelleppit, two other Walula chiefs, and a chief from either a Cayuse or a Umatilla band, the explorer-diplomats did the best they could to convey their "friendly intentions towards our red children perticelar [sic] those who opened their ears to our Councils" (Ronda 1984:167). Anxious to receive more goods, Yelleppit urged Lewis and Clark to tarry with them longer. As the expedition continued down the Columbia and neared the mouth of the Umatilla River, Indian reaction began to change dramatically. The welcomes offered by Yelleppit vanished and were replaced first by fear and then by ill-concealed hostility. That fear became evident on October 19 as the explorers left Walula territory and entered that occupied by Umatillas. Throughout the afternoon, they saw hastily abandoned villages and frightened Indians. Although the expedition's records offer no explanation for this sudden shift in native attitudes, an event later that afternoon does suggest how Indians with little or no contact with whites responded to the expedition believing that Lewis and Clark were gods (cf. Ronda 1984:168).

As the expedition moved closer to Celilo Falls and The Dalles, the Indians continued to show signs of fear and distrust [Fig. 7]. Perhaps Lewis and Clark were identified with Paiute warriors who frequently raided the region. Something more than Indian edginess captured their attention. On October 20, Clark saw the first piece of European clothing on a river Indian. Even more trade goods were in evidence when the explorers visited the Upper Memaloose Islands. Known as the "place of the departed", the islands contained many large burial vaults filled not only with human and equestrian remains, but with all sorts of trade goods of European manufacture (Ronda 1984:168). By the time Lewis and Clark were around the John Day River, non-Indian clothing and implements were everywhere.

Although trading and fishing took place from Celilo Falls down to The Dalles, the most intense bargaining was done at the main Wishram village of Nixluidix ("trading place") located at the head of the Long Narrows. Towering stacks of dried salmon, estimated by Clark at about 10,000 pounds, illustrated the vast quantities of goods exchanged in the Pacific-Plateau network. Trading took place from spring through fall during the three major salmon runs, with most activity reserved for the fall season. During September and October, dried fish and roots were freshly prepared and in abundant supply. To The Dalles trade fair came the nearby Yakamas and Teninos as well as the more distant Umatillas, Walulas, and Nez Perce. Local groups brought food products including meat, roots, and berries which were exchanged for dried salmon and European cloth and ironware. Distant groups, especially the Nez Perce who had access to the plains, brought skin clothing, horses, and buffalo meat. Less interested in fish than their Columbia cousins, the Plateau groups were drawn to The Dalles in search of metal and beads (Ronda 1984:170).

By the time the Lewis and Clark prepared to return home in 1806, they had spent the winter with the Clatsop [see Fig. 7 - Lewis and Clark Winter Camp 1805-1806] and had grown increasingly weary from their long journey. Their attitudes towards the Indians had hardened as a result of their mounting frustration and worry over their homeward schedules. When returning through The Dalles in late April, 1806, incidents of petty theft and harassment increased and their last two days in The Narrows (April 21 and 22) held more unpleasantness with Indians than any comparable time in the history of the expedition. Determined to deny the Indians even castoff items, Lewis ordered canoes, poles, and paddles burned. When Lewis spotted an Indian taking one of the iron sockets from a canoe pole, he struck him several times and kicked the Indian out of camp.

Four days after slipping free from The Dalles, Lewis and Clark finally met up again with Yelleppit of the Walulas. The chief was eager to show his pleasure and provided food and fire wood to welcome the expedition. On the westbound journey, Lewis and Clark had not been able to spend much time with Yelleppit's folk but had promised to be more neighborly on their return. The chief, interested in gaining a prominent place in the American trade system, was not about to let that promise go unfulfilled. On April 28, he presented Clark with a "very eligant white horse." The chief had his eye on acquiring some kettles, but the expedition was dangerously short on cooking pots and he was instead offered Clark's sword, 100 rounds of ammunition, and some trade goods (Ronda 1984:220). These items did not satisfy this Walula chief who was not ready to let Lewis and Clark slip away so easily from his grasp. He was willing to provide horses, food, canoes, and information but his price called for the Americans to stay in camp for at least an extra day and he artfully recalled the promise made the year before. Just how much the presence of Lewis and Clark meant to Walula prestige became plain when Yelleppit revealed that he had invited a large party of Yakamas for a grand feast and dance. Sensing that it would be both impolitic and impolite to disappoint the chief, Lewis and Clark agreed to spend a day before attempting a river crossing (Ronda 1984:221). In the last days of April, 1806, the explorers crossed the Columbia blessed with 23 "excellent young horses," most of them from the Walulas. Lewis and Clark looked forward with pleasure to once again be amongst the Nez Perce on the Clearwater (Ronda 1984:221).

The expedition bound together the Indians and explorers in a common struggle to survive. Formal conferences, personal friendships, and chance meetings all bridged the cultural divide. Indians were so much a part of the life of the expedition that when no Indians were present as actors and audience, Lewis and Clark felt strangely alone. Exploration was a cooperative endeavor that required substantial information and support from the Indians. The anticipated behavior of the Indians was a decisive factor in the choice of equipment, personnel, routes, camp rules, and even ultimate destination. Whatever the official expedition objectives, the explorers carefully considered their presence. Indians were active participants in exploration, as the first comers to the land and later, as guides. They lent their intelligence, skill, and nerve and certainly Lewis and Clark benefited greatly from Indian knowledge and support. Maps, route information, food, horses, and open-handed friendship all gave the expedition the edge that spelled the difference between success and failure. As guides, packers, interpreters, and cartographers, the Indians were essential to Lewis and Clark's achievement (Ronda 1984:252-255).

The assertion that the Corps of Discovery acted like "a conquering army" of hungry imperialists does not square with either the Lewis and Clark record or the larger history of North American exploration. Lewis and Clark neither enslaved Indians as did DeSoto, nor pillaged pueblos as did Coronado.

The pattern of friendship and sharing that generally characterized Indian-expedition relations was not the result of any special nobility of character on either side of the cultural divide. Native hospitality was both genuine and useful as the Indians sought trade or attempted to manipulate the expedition for personal ends. For their part, Lewis and Clark recognized the necessity of Indian cooperation inspite of occasional moments of swagger, bluster, and arrogance. For most of the journey, there was mutual respect born of expediency but that respect and friendship was genuine nonetheless. Lewis and Clark left behind a legacy of nonviolent contact and those who came later enjoyed that legacy and too often betrayed it (Ronda 1984:253).

Lewis and Clark believed that official diplomacy was a simple matter of rearranging Indian patterns to suit the needs of the new nation. Proclaiming American sovereignty, establishing trade connections, and constituting delegations to visit Jefferson all seemed goals within easy reach. When they tried to implement those policies, they often met unyielding realities of village and band politics. In a world where "peace" meant "truce" and where warriors fought one day and traded the next, Lewis and Clark were simply unable and sometimes unwilling to face the facts of Indian life. What seemed failure to Lewis and Clark was often success for the chiefs. When Lewis and Clark came into the Pacific Northwest, native political sovereignty and autonomy were still potent realities. Despite Lewis and Clark's rhetoric, western Indians were not "our red children" but mature adults with a substantial measure of freedom to choose those parts of the American program that best suited their own needs. Diplomacy during the journey was ceremony and talk among equals, even if Lewis and Clark did not always so recognize. If the captains failed to persuade the Indians to become children of a distant father, it was because the Indians still had the power to accept American guns while rejecting less useful gifts (Ronda 1984:254).

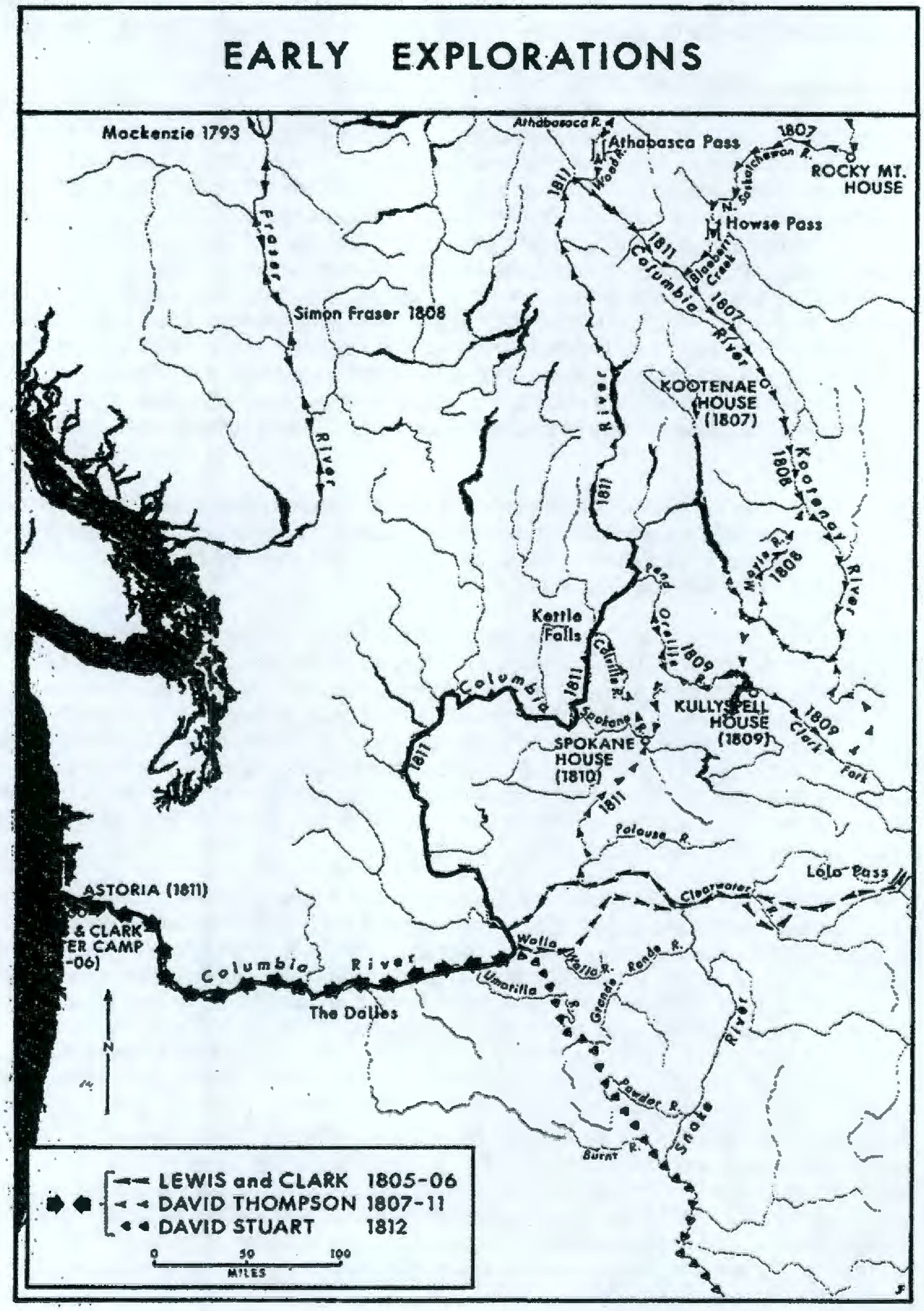

Figure 3.7. Travel Routes of Lewis and Clark and Other Explorers (after Meinig 1968: Map 4).

3.5.2 Horses and Guns

Prior to the coming of the whites, the arrival of the horse had a profound impact on the Indian people of the Hanford Site. Smohalla believed that horses did not come from the white man but had been known to Indians long before white settlers arrived. Haines (1938:434-436) examined early diaries of explorers and fur traders to trace the spread of horses from their presumed source in the Spanish colonies in what is now New Mexico. The Spaniards settled the area prior to 1600 and jealously guarded their prized stock. It was forbidden under severe penalty throughout Mexico for an Indian to ride a horse, yet the 17th century colonial empire had fallen on hard times and the Indian Pueblos revolted in 1680, driving the Spaniards out for a time (Hunn 1990:23). Thousands of liberated Spanish horses spread up both sides of the Rockies and reached the Nez Perce and Cayuse sometime after 1730. Lewis and Clark encountered horses all along the Snake and Columbia rivers to the edge of the timber below The Dalles (Thwaites 1904).

The horse was adopted as if the Indians had long awaited its coming since they were always a mobile people and their lives depended on an extensive seasonal round (Hunn 1990:24). The horse facilitated movement from the winter village to the river fisheries, root digging grounds, high mountain berry fields, and hunting grounds. It did not radically change Plateau life so much as it accelerated existing patterns by enhancing this mobility. A group without horses could not long withstand the pressure of mounted neighbors who began to use their horses to attack the weaker groups nearby. Where Ray (1939) saw Plateau peoples as "pacifists", Kent (1980) suggests that "pacifism" was a matter of cultural values. Plateau peoples maintained largely peaceful intervillage relations because intermarriage and trade was advantageous. The horse seems to have tipped the scales in favor of violence in many cases (Hunn 1990:24).

Lewis and Clark observed that Columbia River villages were mostly located on the north shore or on islands in the stream which afforded protection against "Snake Indian" raiders. These Snake Indians were Numic speakers from the Great Basin, who at one time were peacefully preoccupied with gathering their annual supplies from a land considerably less generous than the Plateau. Bannocks (Northern Paiutes) adopted horses and a wide-ranging predatory life style, hunting bison herds up the headwaters of the Snake, Missouri, and Yellowstone rivers. A similar, mobile, predatory life-style became the norm among the Northern Paiutes of northern Nevada and southern Oregon, but with white migrant trains as the targets. Soon, the Nez Perce and Cayuse and then Walla Wallas, Umatillas, and Yakamas adapted to and adopted elements of this new horse-oriented life-style (Hunn 1990:25).

Not long after horses enlarged the scope of intergroup raiding, fur traders began extending their frontier outposts toward the eastern base of the Rockies. In exchange for furs, guns and ammunition were provided to the Indians. Just as the Indians quickly perceived the value of horses, they could appreciate guns as vastly superior to their own hunting and fishing equipment. As each new group acquired the gun from fur traders, they pressed their newfound advantage over their unarmed western neighbors. The latter, in turn, were forced to obtain guns for themselves, for defense on their eastern flank and for offense on their western borders. Horses and guns, once available, spread quickly (Hunn 1990:25).

This new pattern of warfare, however, probably had little effect on the basic ecological relations of people and resources along the mid-Columbia, but bison hunting may have greatly increased game in the diet of groups on the eastern border of the Plateau (cf. Farnham 1843) since these groups had more limited access to mid-Columbia salmon.

Given the trade value of bison robes and the importance of bison meat, the horse and gun greatly facilitated the work of these bison-hunting "task groups" (cf. Anastasio 1972). Indeed, the horse itself became a standard of wealth, and wealth gave rise to ambitions which strained inter band harmony.

3.5.3 Pestilence and Disease

The new life promised by the coming of the whites and widely prophesied brought a heavy price. Boyd (1985:81-90) believed that the first smallpox epidemic came from the west around 1775 from Pacific exploring ships. Smallpox raged again in 1801, attacking a new generation of susceptibles grown up since the first visitation. Boyd (1985:99-100) estimated that perhaps half of the original Indian population had died off by the time of Lewis and Clark's expedition. Old men with pockmarked faces and Indian accounts of a disease that struck their people a generation before was recorded by Lewis and Clark (cf. Thwaites 1904; Boyd 1985:78-80, 91-92, 102-103). Disease among the Nez Perce at about this same time had been documented by Asa Bowen Smith (Drury 1958:136) and two more waves of smallpox may have afflicted the Indians in 1824-1825 (Boyd 1985:338-341) and in 1853, as documented by the McClellan railroad survey party (McClellan 1854).

Dobyns (1983) believes that demographic and consequent cultural changes were initiated throughout the New World in the early 16th century as a result of a panhemispheric smallpox epidemic with mortality rates around 75%. Based on archaeological data, Campbell (1990:186) concluded that introduction of infectious diseases caused population decline in the Plateau prior to the late 18th century and that Old World diseases spread into the Plateau early in the 16th century which contradicts traditionally accepted notions of regional disease history that held that Old World disease was first introduced in the late 18th century.

Smallpox was devastating, but the 1830 outbreak of "fever and ague" at the Hudon's Bay Company's Fort Vancouver proved to be the worst killer of Indians (Hunn 1990:27; cf. Cook 1955; Boyd 1985:112-145). It raged unchecked for four years, was clearly seasonal, and it emptied the Chinookan villages of the lower Columbia and decimated Indian populations throughout the Willamette Valley and the Central Valley of California. Sober estimates of the mortality directly or indirectly attributable to this scourge is 90% between 1830 and 1833 (Hunn 1990:31). Historical epidemiologists agree that the disease was malaria which was frequently aggravated by influenza and other exotic diseases. "Fever and ague" did not spread much above The Dalles, sparing Plateau peoples the near total extinction suffered downriver. It did not spread north to Puget Sound or Canada. Hunn (1990:31) notes that Oregon's major cities bear the names such as Portland, Astoria, Eugene, and Salem, while Washington's have Indian names such as Seattle, Tacoma, Spokane, and Yakima reflecting the distribution of malaria.

While spared from malaria, Plateau Indians found themselves in the path of thousands of immigrants crossing on the Oregon Trail. Seasonal respiratory diseases had become common among the Indians who congregated at fur trading posts each winter (Boyd 1985:341-348), a pattern repeated at the missions. With the immigrants came a potpourri of diseases against which the Indians had no resistance (Hunn 1990:31). In 1844, there was scarlet fever and whooping cough and in 1846, more scarlet fever (Boyd 1985:349-350). Many white settlers saw this mortality of the Indians as an act of God, clearing the rich bottomlands of the Willamette for Christian settlement (Scott 1928). Scott's (1928:144-145) reflected on the bitter reality of how disease among the Indians advanced the white take-over of Indian land. Without the ravages of disease, settlement by the white pioneers would have been delayed one or two decades and then would have encountered protracted warfare with the tribes (Scott 1928:144). Delay of settlement would have deferred the Oregon boundary adjustment with Britain, which was made in 1846, and might have enabled Britain to annex to Canada that part of the present state of Washington which lies north of the Columbia River. Britain was impelled to accept the treaty of 1846 and the present boundary by the rapid settlement of Oregon by Americans (Scott 1928:144). Missionary Samuel Parker (1839:191) noted that the Indians made matters worse by plunging into lakes and rivers to alleviate fever - the rarely survived the cold stage which followed and whole villages were depopulated and/or disappeared. Scott (1928:146) noted that throughout the West, the Indians were victims, but perhaps nowhere else so badly as in the Pacific Northwest; and nowhere else were the results so good for the whites.

Hunn (1990:32) observed that the coincidence of Whitman's hosting the hordes of settlers arriving each fall from their arduous overland journey and the outbreak of new epidemics was not lost on the Indians. When measles erupted about the time of the immigrants' arrival in 1847, the Indians concluded that Whitman's murderous influence must be stopped. It is possible that the measles was introduced earlier that summer by an expedition of Walla Walla Indians returning from California (Heizer 1942). On November, 29, a group of Cayuses attacked the mission, killing the Whitmans and 11 other whites, and taking some 50 captives (later ransomed by Peter Ogden of the Hudson's Bay Company). The killings inspired revenge and fear among the settlers and precipitated a series of confrontations; the Cayuse, Yakama, and Palouse "wars" between the whites and the remnant Plateau people. The history of Indian-white relations, therefore, has been first and foremost a history of the ravages of disease (Hunn 1990:32). Transmitted by Old World immigrants to defenseless New World populations, disease dramatically reduced Indian populations and disrupted their social and spiritual fabric. Only after confinement on reservations did the significance of disease fade in relation to political events that affected Indian life.

3.5.4 The Fur Trade

In the late 18th century, fur clothing was in great demand in Europe and China and staggering profits could be made with access to the untapped potential of the North American forests (Hunn 1990:32). Hudson's Bay Company first claimed rights to the furs of the boreal forests and had a secure foothold on the Northwest Coast but the North West Company, also British-owned, controlled the St. Laurence-Great Lakes area and was expanding west across the continent at the southern edge of the great northern forests.

David Thompson, during his travels of 1807-1811, laid the foundation for the North West Company's dominant trading position in the northern Plateau where he accurately mapped the Columbia and its headwaters [Fig. 7]. He established good working relations with the Indians and founded a series of trading posts in Kootenai, Flathead, Spokane, and Pend Oreille territory before pushing down the Columbia to Astoria in 1811 [Fig. 8]. The British fur trading companies were busily setting up long overland supply routes and communication lines. Meanwhile, the Americans were pursuing a daring alternative bankrolled by John Jacob Astor. Astorian ships of the Pacific Fur Company left New York, rounded Cape Horn, visited the Sandwich Islands (Hawaii) and recruited native seamen (some of whom married Northwest Indian women and were absorbed into local Indian society). Astor's ships docked at their new outpost, Astoria, which was established in 1811 just prior to Thompson's arrival from upriver (Hunn 1990:34).

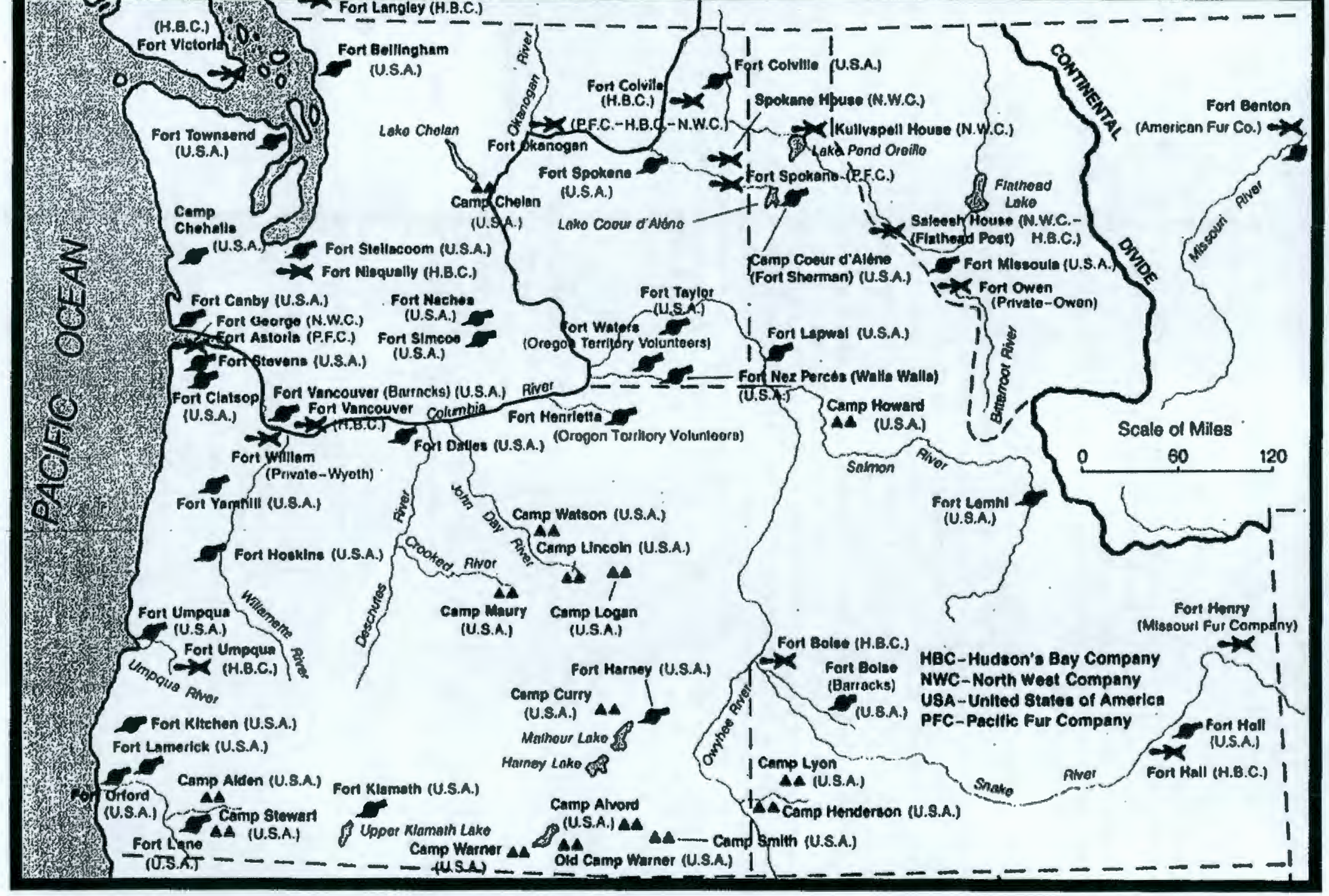

Figure 3.8. Fur and Military Posts and Camps (after Ruby and Brown 1988: 92).

The Astorians partly defined what subsequently became the Oregon Emigrant Trail when attempting to establish an overland link for rapid communication. The budding rivalry between Britons and Americans was cut short by the War of 1812. Astor, fearful of a British blockade, chose to sell his entire Columbia operation to his North West Company rivals. Many of Astor's employees stayed on to work for the North West Company (Alexander Ross, David Stuart, and Donald Mackenzie)(cf. Meinig 1968:48-95). The Columbia Department (of the North West Company) was a fairly disappointing operation since much of the territory supported relatively few fur bearers and the Indians were simply not interested in trapping furs for trade (Hunn 1990:36).

The Plateau, however, was strategically located in that furs from the more productive Fraser, Yukon, and Peace rivers and upper Snake River territories could be economically shipped down the Columbia to the sea and to market by ship. Following the 1818 agreement between Britain and the United States to share the Oregon country, the North West company embarked on a strategy to deny the furs from the Snake River to the Americans. Trappers were provisioned each summer at Astoria (renamed Fort George after the British takeover in 1813 and moved to Fort Vancouver in 1825 under Hudson's Bay Company control) and then traveled up the Columbia to the Walla Walla by canoe, then horsebacked their provisions for overland travel to the upper Snake where they trapped all winter long. The next June, they returned with their furs to Astoria (or Fort Vancouver). The Plateau Indians were essential providers of horses for overland brigades and were major providers of venison for the fur trappers who disdained fish and native roots (Hunn 1990:37). The Columbia River was the main commercial link and Fort Nez Perce was established in July 1818 at the mouth of the Walla Walla.

Indian-fur trader relations were relatively benign since the goal of the trade was to profit from furs. The Indians tolerated the trader's presence and were willing to assist by providing the trading posts with horses and venison (Hunn 1990:37). The Indians were otherwise free to pursue their seasonal rounds and traditional social relations. The fur traders discouraged intergroup warfare since such would impede free movement of the trapping parties. Lewis Saum (1965) skillfully debunked the image of the trader as an unconscionable degenerate or "mountain man" and also put to rest the stereotype of the Indians as either savage beasts or "noble savages." Unfortunately, the trading posts themselves had become a magnet for large crowds of poorly nourished Indians who caught influenza's and died in large numbers as they wintered next to the posts (Hunn 1990:37).

The first fur-trading post near the Hanford Site was Spokane House which was built by Finan McDonald and Jacques Finlay in the summer of 1810. Spokane House became a magnet for the local Indians and also more distant peoples who brought horses to trade there along with beaver, otter, and other skins. Very likely, the appearance of Sahaptians at this post prompted Thompson to extend his operations farther to the southwest (Ruby and Brown 1988:29) and Thompson's journal record provides a first glimpse of the peoples between Kettle Falls and the Columbia-Snake confluence - an area believed to have been untrammeled by white men before his arrival (Ruby and Brown 1988:31).

When Thompson reached the Columbia-Snake confluence, where Lewis and Clark had visited some years earlier, he found the Indians strongly interested in white men's goods. The women were especially interested in kettles, axes, awls and needles and the men were more concerned with securing firearms to defend themselves from the Paiutes who were denying them access to buffalo grounds in the lower Snake River country (Ruby and Brown 1988:32). But with greater exposure to white traders, the Indians below the confluence increased their wariness of whites and were especially wary of Astorians whom they thought were responsible for introducing small pox. At the confluence, the

Astorians were met by Wallawalla, Nez Perce, and Cayuse chief who cleverly worked the Astorians against their rival Thompson by telling them that Thompson had given them presents and that, if Stuart did likewise, he could travel wherever he wished. Ross believed that goods would never satisfy their desire nor bring them happiness (Ruby and Brown 1988:33). In return for horses, Thompson gave the Palouse a piece of paper worth ten beaver skins at any North West Company post. Unable to understand how a piece of paper could purchase goods, the Indians were filled with awe. The Indians were anxious to trade with anyone who provided them with guns - a good gun at that time went for no less than 20 beaver skins.

Indians at Astorian posts in late 1813 must have been confused when American flags were lowered and Union Jacks were hoisted in their place although the flag change meant less to the Indians than it did to the new owners. The economics and policies of trade had not changed, nor the attitudes of Indian traders (Ruby and Brown 1988:37). One particularly unfortunate incident occurred when Astor partner John Clarke came near the confluence of the Snake and Palouse rivers in late May, 1813 with 32 horses loaded with furs from the Spokane district. Some Indians stole the party's goods including Clarke's prized silver goblet. Normally unmoved by thefts of company property, he became enraged at the loss of his goblet. An Indian, thought to be Nez Perce, was soon caught and Clarke's men pinioned him and hung him on a makeshift gallows. To the Indians, this was a most frightful and despicable way to die. Stunned by Clarke's actions, they spread the word of the foul deed in all directions and gathered the tribes together for vengeance (Ruby and Brown 1988:40). A few days later at an Indian camp at the Columbia-Snake confluence, a Wallawalla chief, rode up to Clarke crying: "What have you done, my friends? You have spilt blood on our lands." Eventually, tempers settled down but the Indians did not soon forget the hanging. In the spring of 1814, at a populous root digging area in the upper Yakima or Kittitas valley, the Cayuse, Nez Perce, and others found Alexander Ross, now with the North West Company, trying to buy horses. The Indians told him that traders like him were the "men who kill our relations, the people who have caused us to mourn" (Ross 1855:7-8). Ross gave the Indians trade goods to "cover the dead." The Indians were angry at both the hanging but also the general failure of the North West Company traders to abide by the protocol requiring payment for passage through Indian country.

Word reached Fort George [Astoria] in March, 1814, that the Nez Perce and the Cayuse had destroyed a native village at The Dalles. Donald McTavish tracked down the perpetrators and had them executed - a move that did little to improve relationships between the Indians and the company. Petty wars along the lower Columbia continued to hamper the fur trade (Ruby and Brown 1988:41). Aware of difficulties experienced by Astorians in the beaver-rich Snake River country, the North West Company dispatched Donald McKenzie in 1817 to develop operations in this area. Laid out in 1818, Fort Nez Perce stood on the left bank of the Columbia, a half-mile upstream from the Columbia-Walla Walla confluence, which was below the confluence of the Columbia and Snake. This established a second, and much closer trading post in relation to the present-day Hanford Site (cf. Ruby and Brown 1988:42-43).

Conflict with the Indians had made the fur quest hazardous and resulted in the loss of human life and economic loss. In one year, such economic loss, according to Ross, amounted to 4000 beaver, worth 6000 Pounds Sterling. The greatest threat to the continued operation of the North West Company was competition from Hudson's Bay Company. Unless some peace was effected between the rival firms, the Indians stood to become casualties as well as customers (Ruby and Brown 1988:45). Once merged together in 1821 and operating under the Hudson's Bay name, the Indians found themselves dealing with a monopoly and relations between the Indians and people of the "Bay" proved friendlier than previous contacts between Indians and fur seekers.

George Simpson was the all-powerful administrator of the Hudson's Bay Company commercial empire (Drury 1986(I):30). Beginning in 1820 when he was only 33 years old, and continuing for nearly 40 years, Simpson wrought an economic overhaul of the Columbia Department starting in 1824 when he came west. He reached Fort Spokane to find that while the Indians came to trade, they also came to gamble and race horses. Within two years, the Spokane post fell victim to Simpson's economy axe and its operation was removed to near Kettle Falls and named Fort Colvile [Colville] (Ruby and Brown 1988:49). Simpson's economy moves consolidated trading at the newly built (1824-1825) Fort Vancouver with one result being that the Indians had less convenient access to trade goods. The Indians were probably unaware that Simpson's London superiors were being influenced by evangelical-humanitarian movements in Great Britain and wished to extend Christian probity and sobriety to the Indians (Ruby and Brown 1988:49). Simpson induced two Spokane chiefs to let their sons go with him to the Red River Mission. Kootaney Pelly and Spokane Garry were baptized at the Red River Mission on June 24, 1827 and were the first Indians from the entire Pacific Coast to receive baptism by a Protestant minister. After their return several years later, in early 1830, Spokane Garry and Kootenai Pelly went again to the Red River Mission school with the company's eastbound express, this time with five more Indian youth from four different tribes: the Nez Perce, Cayuse, San Poils, and Spokane (Drury 1986(I):35).

Simpson somewhat naively believed that his arrival had dried up the flow of liquor. He believed that liquor deprived the Indians of the will and wherewithal to sell their furs and garnish themselves with goods of British manufacture. Unfortunately, the Indians could easily obtain alcoholic beverages from British and American mariner-traders and in some areas along the Columbia, they received a bottle of rum for every ten skins brought in. Inspite of incidents where misunderstandings might have led to violence, the Indians of the Columbia were more dependent on white traders than ever before (Ruby and Brown 1988:51).

Company trading and posts disrupted native trading patterns. Its greatest impact was to bring fabricated goods to the Indians, goods the Indians wanted but were less inclined to gather furs to pay for them. The Indians had to reckon with Hudson's Bay Company until the coming of the Americans and the completion of international negotiations that curtailed the company's efforts in the area (Ruby and Brown 1988:57). As time went on, the Indians became more discriminating in their tastes for the goods the company supplied to them and soon discovered the difference between American and British goods. Guns were always a lively item in trade with the Indians. One gun went for as many skins as a fully loaded pack of other goods. Guns were almost a necessity since with their introduction they frightened animals, making it difficult for Indians to position themselves closely enough to kill with native weapons (Ruby and Brown 1988:59).

3.5.5 The Missionaries

It is not known where or when the Indians were introduced to Christianity. It might date back to when Spanish friars set up the colony at Neah Bay in 1792 or might have been introduced, at least symbolically, from crucifixes recovered from ship wrecked white men (Ruby and Brown 1988:67). In the late 18th and early 19th centuries, Indians of the Pacific Northwest received little more than an inkling of the faith from maritime traders, whose efforts were mercantilist, not missionary. Fur traders such as David Thompson, Alexander Ross, and Peter Skene Ogden saw the lands of their fur quests as a field, though a difficult one, for Christian missionary endeavor (Ruby and Brown 1988:67).

Ruby and Brown (1988:67) note that Yakama folklore has stories of the coming of white men who were to wrest the land from the Indians. After one of their prophets had "died" for three days, he returned to earth and predicted the coming not only of a black robe but also of other white peoples. The black robe of the prophecy and the three-day death possibly indicate a knowledge of Christian forms and traditions, perhaps acquired through direct or indirect association with Spaniards. The prophets believed that the coming of the whites boded ill for their people. One source of exposure to the Christian faith may have come from Iroquois in the employ of the North West Company who exerted considerable secular as well as religious influence on the Indians (Ruby and Brown 1988:68).

Although the Indians were aware of the competition among the fur traders in their lands, they were less aware of the competition that was developing among religious denominations for the salvation of their souls. Spokane Garry returned home armed with an Anglican Book of Common Prayer and a King James Bible and Coeur d'Alenes, Flatheads, middle and upper Columbia River peoples, and the Nez Perce heard his words (Ruby and Brown 1988:68). The fact that five more Indian youths accompanied Spokane Garry and Kootenay Pelly back to the Red River mission school in 1830 reflects the extent of their influence on their own and neighboring tribes since all of the boys were sons of chiefs (Drury 1986(I):47).

Plateau Indian religious beliefs and their manner of worship was markedly different from those of white men (cf. Trafzer and Scheuerman 1986:23). The Palouses, for example, believed that God had created all things - the earth, stars, animals, and plants and often thanked God for the roots, fish, game, and berries, and because the earth provided them with so much food, they did not cultivate the earth. The Indians held religious ceremonies in thanksgiving of their Creator and they revered the earth and its bounty. Before the arrival of whites, they shared common spiritual beliefs and ceremonies with their neighbors. However, their faith was not formalized or organized until the late 1850s, when the pressures of white expansion stimulated a renaissance of native religion and the creation of formal worship.

While Christian influence was growing, the Indians were still practicing their native religion which included sending out the young on lonely vigils to seek spiritual power. During such spirit quests, the novitiates received in dreams or trances special powers from birds and other beings. The powers gained were revealed later in winter dances. Growing contact with Christians is believed to be part of the reason that Northwest tribes experienced a resurgence of the Prophet Dance. The prophets' increased exposure to Christianity and increasing white encroachment gave impetus to their teachings which included the belief that the earth had to be wrested from the interlopers and returned to its aboriginal purity to its native inhabitants, living and dead (Ruby and Brown 1988:70). Although not viewed in this context by white Christian leaders, the Nez Perce delegation to St. Louis in 1831 was such a power or spirit quest.

The Indians appeared to be seeking the "white man's Book of Heaven", but as Ruby and Brown (1988:70) noted, the Indians spoke languages that were strange to the white men and their mission was not very clear. They did make the Roman Catholic sign of the cross and other signs relating to baptism. The Nez Perce delegation not only stimulated the Christian community to convert Indians but also stimulated other Indians to travel to St. Louis for missionary help. Protestant missionaries heeded the calls of the Nez Perces and Flatheads by sending missionaries to the Pacific Northwest. Before they arrived, however, the Indians continued Christian worship without benefit of clergy (Ruby and Brown 1988:70). As the fur-trade and missionary eras overlapped, it was common for Indians to gather around the company posts to conduct their devotionals and were often found speaking and singing prayers at Fort Walla Walla, at Flathead Post, and at Fort Colvile. At Fort Hall, Nez Perce and Cayuse Indians attended services with a Hudson's Bay Company brigade on Sunday, July 27, 1834, conducted by Methodist Jason Lee. The Indians welcomed Jason and Daniel Lee to remain in their land, possibly because they remembered Indian prophets telling that white men would come with powers even greater than those they had sought on vigils in their youths (Ruby and Brown 1988:71).

Of the Methodist Missions, Ruby and Brown (1988:72) noted that the mission near The Dalles attracted almost 1000 Indians in 1838 [Fig. 9]. But it did not take long for the missionaries to find that their work was going to be difficult at best. The Indians had abandoned the flesh cutting of earlier times but shocked the missionaries by rattling doors and windows for entry into the mission house. Especially shocking was the fate of the native healers: when they failed to cure the victims of disease, they became victims themselves of vengeance-minded relatives. The Methodists persisted in preaching and teaching about 2000 Wascos and other Chinooks, Wallawallas, Klickitats, and others. With abundant fish in the Columbia, the Indians could not be induced to become farmers, but they were content to consume produce from the missionaries' gardens. When the fish runs were over, they moved into the mountains to gather berries. While absent, marauding Indians entered their deserted villages and stole salmon that they had carefully cached, leaving them to starve by spring. After several complaints from church officials about Lee's spiritual and secular conduct, he returned east in 1843, never to return and the mission closed the next year.

By 1810 and 1811, plans had been formed in New England by the American Board of Commissioners for Foreign Missions (Congregationalist, Presbyterian, and Reformed churches) for a mission to the west coast, and by 1817 plans were made for such a mission "near the falls of the Columbia." On September 28, 1835, the Nez Perce on the Clearwater River welcomed a westward bound American Board missionary, Rev. Samuel Parker who was looking for mission sites. Dr. Marcus Whitman was a volunteer and accompanied Parker on this trip. Whitman returned in the fall of 1835 bringing with him two Nez Perce youths and some thrilling news - he and Parker had met a large party of Nez Perce at the Rendezvous in the Rockies and had found them eager for missionaries and that Jason Lee and his associates had by-passed that tribe and had settled in the Willamette Valley. Whitman had observed that it was possible to take women over the Rockies, hence he could return, be married to Narcissa Prentiss to whom he was engaged, and take her with him to Oregon (Drury 1986(I):59).

Meanwhile, Parker stayed over the winter months preaching to the Indians clustered at Fort Vancouver, The Dalles and up the Willamette above The Falls. In the spring of 1836, Parker finally returned to Fort Walla Walla and then to the mouth of the Snake. He did not stop at Waiilatpu which was 25 miles east of Fort Walla Walla, but later that year the American Board dispatched Dr. Marcus Whitman and his wife Narcissa to establish a mission there [Fig. 9]. Later in 1836, another American Board mission was established at Lapwai Creek near the confluence of the Snake and Clearwater rivers by the Rev. Henry H. Spalding and his wife Mary [Fig. 9]. Parkers lasting influence was probably his writings which provided an excellent description of the Northwest country. While his primary objective was to assess its native populations with a view toward establishment of missions, like Lewis and Clark, Parker exaggerated their numbers, especially those off the route of this travels. He also exaggerated mission possibilities in general (Ruby and Brown 1988:75).

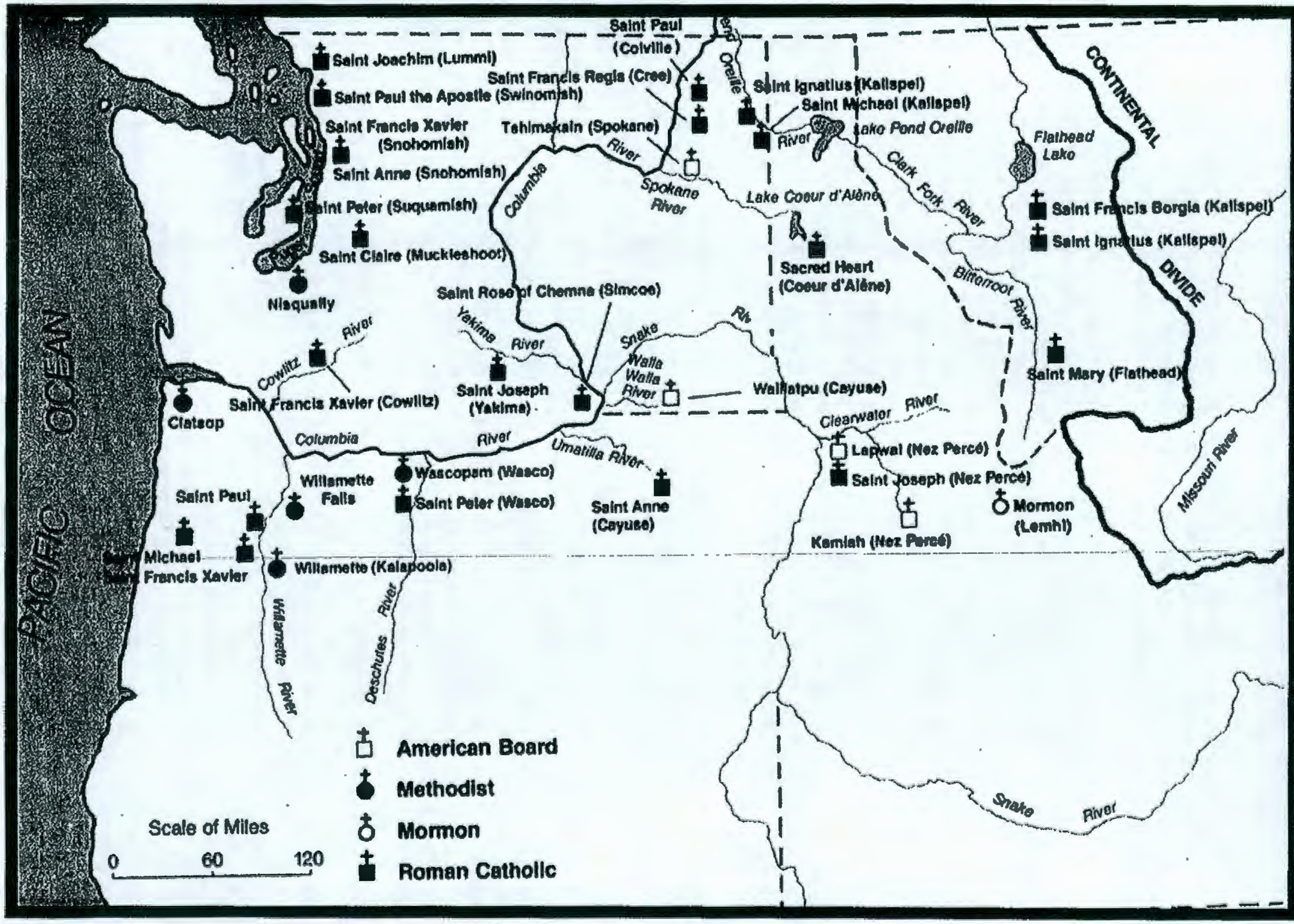

Figure 3.9. Indian Missions of the Pacific Northwest (after Ruby and Brown 1988: 69).

The location of the new missions caused some debate among the Nez Perce when they met the Whitmans and the Spaldings at Fort Hall [Fig. 8]. The Nez Perce urged that whites had fewer problems with them than with their Cayuse neighbors, which was perhaps a veiled intimation that misfortune might befall the missionaries who settled among the Cayuse. The Cayuse, like other Indians astride the more commonly traveled routes of the westward moving white men, had more opportunity for conflict with the whites than did the more peripheral Nez Perce, who were jealous of the Cayuse because their location gave them more opportunity to trade with whites (Ruby and Brown 1988:75). The Nez Perce and Cayuse settled for two missions, one at Waiilatpu among the Cayuse and the other at Lapwai among the Nez Perce.

One Nez Perce chief promised the Spaldings his people would give up their roving ways and receive all the help the missionaries could give in making the transition to farming but other chiefs made no similar commitment and came to Lapwai only for ministrations and "medicine" (Ruby and Brown 1988:75). Spaulding struggled with a difficult language but mastered their tongue sufficiently to print a translation of the Book of Saint Matthew on the first press in the Pacific Northwest, which he acquired in 1839. Spalding sought to prepare his charges not only for heaven but also for the white men, who were soon to become "as numerous as leaves on the trees." He believed the Indians should prepare for the whites' coming by accepting their God, obeying their laws, and practicing the whites' system of land. In contrast to Spalding's goal of saving Indians *for* white men, Roman Catholic missionaries tried to save them *from* white men (Ruby and Brown 1988:76). Unfortunately, a rift grew between the Christian Indians and those led by their traditional doctors, such as Looking Glass. As the century progressed, the rift between these two groups of Nez Perce widened (Ruby and Brown 1988:76).

At Waiilatpu, the Whitmans established the mission near Mill Creek (*Pasha* or *Paska*) which joined the Walla Walla. In their mutual exuberance, neither the missionaries or their parishioners paid any attention to the legalities of mission occupancy of the land. The Cayuse and other Indians had questioned the right of fur traders to build Fort Nez Perce but had learned to live and trade with it. Conditioned to think of white men primarily as traders, the Cayuse did not understand why the Whitmans did not trade their goods for pelts and at a better rate than they were getting at the nearby fort. The initial harmony at the mission began to break down. Like Spalding, Whitman hoped that the natives' tillage of the soil would make it unnecessary for them to migrate. More than Spalding's Nez Perce, the Cayuse disdained agriculture as a hindrance to their traditional means of subsistence. They wanted goods and power - "medicine." Thinking the missionaries' words could help them acquire "medicine," they asked for religious instruction. Whitman responded by teaching lessons and songs in church and school in the flexible Nez Perce language which the Cayuse adopted. Ruby and Brown (1988:77) noted that there were several instances of unpleasantness at the Waiilatpu mission.

The Indians wondered why Whitman went east in 1842-43. Was it to get soldiers to fight them? Their suspicions of Whitman's motives grew and also spread to some of the Nez Perce. Some Nez Perce dispatched one of their chiefs in the winter of 1842-43 to the Indians east of Fort Hall in order to encite them to cut off the party that Whitman was expected to bring with him. When Whitman returned to the mission in 1843 at the head of a large immigrant party, the Nez Perce and Cayuse questioned Whitman's motives all the more (Ruby and Brown 1988:77).

In the early years, the missions were very much dependent upon the Hudson's Bay Company's farms and facilities. In fact, prior to establishing Waiilatpu, Whitman journeyed to Fort Vancouver for supplies. The dependency on the Bay had to be lessened quickly, but that was only part of the reason why the missionaries hastened to cultivate the ground. If the mind and body were inseparable for the missionaries, so they were for the Indians if they were to embrace Christianity and live a settled "civilized" way of life. The Indians were to be brought to the teachers and anchored to the soil within the unbroken daily influence of school and church (i.e., they must be settled before they could be much enlightened)(Meinig 1968:133-134). But is was Spalding who was first able to grasp what was happening to the Indian subsistence regime as a result of the changes produced by the white influx. He reported that game had once been plentiful and furnished the Indians with a great amount of food and predicted that salmon would also become so scarce that the Indians would starve. Whitman believed it was equally important to save the famishing bodies of the Indians from an untimely grave at it was to save their souls (Meinig 1968:134). The actual results varied from mission to mission.

At The Dalles, wheat and potatoes thrived under irrigation and along with salmon and vegetables, provided an adequate subsistence for the white missionary families. The Indian program, however, was hopeless since the abundant salmon, sturgeon, and other game and gathered plant resources provided sufficient food (Meinig 1968:135). By 1840, a hundred families were cultivating the soil at Lapwai and by 1843, Lapwai was essentially self-supporting with sufficient crops and livestock, its own grist mill, and a sawmill (Meinig 1968:137). Whitman's operation at Waiilatpu was also successful. Under irrigation or on subirrigated land bordering the streams, the luxuriance of the crops at Waiilatpu never failed to impress immigrants and travelers who came through in increasing numbers in the 1840s. In 1843, a visitor found about 60 Cayuse cultivating small plots of a quarter to three acres each. But the Cayuse blended their agricultural tasks into their old migratory routine to a greater extent than did the Nez Perce at Lapwai.

The major difference between Waiilatpu and Lapwai was the increasing volume of emigrants passing through to the Willamette Valley. Many of the emigrants needed food, fresh cattle or horses, and wagon repairs and Waiilatpu became more oriented towards their needs. Whitman was warned by the Board headquarters that he might take special pains to ensure that his station did not assume the appearance of a farming and trading establishment. Whitman pleaded that it was his Christian duty to help and comfort any traveler in need. But Whitman himself was a key figure in the encouragement of the emigrants. There seemed to be a direct relationship between the steadily increasing number of Oregon immigrants and the growing restlessness of the Indians. The first Oregon immigrant family arrived in 1840; a few more came in 1841; still more in 1842; and then in 1843 the first wagon train crawled over the Blue Mountains bringing about 1000 people - a wagon train led by Whitman! Each year after that the number increased, and the Indians became fearful that the white man was engulfing their land, even though none of the immigrants up to 1847 had settled in the upper Columbia River Valley (Drury 1986(I):395).

Though Whitman was an energetic man, any greater attention to his countrymen meant less toward the Indians. Interestingly, some Indians shifted their attentions to the emigrants. Where Whitman saw the Christian necessity of succor, the Cayuse saw the "civilized" opportunity for trade (Meinig 1968:139). By 1845, the shortcut along the Umatilla River became popular and several Indians had a scattering of fields all along the valley and were prepared for business. Whitman was aware of these doings and in 1844 lamented that the Indians wanted settlers among them in hopes of trading with them - a desire that largely prompted their welcoming the missionaries several years earlier (Meinig 1968:139). Partly because of the strategic location of the mission, the Whitmans became the object of growing hostility on the part of a small band within the Cayuse nation (Drury 1986(I):395). As the growing volume of emigrants began to warp the program at Waiilatpu, Whitman sought to anticipate and adapt to the changes. As Meinig

(1968:140) wrote, even in spiritual matters there were divergent pressures and the material needs of the emigrants soon caused Whitman to reason that if Waiilatpu could not serve them adequately, enterprising squatters would soon set up businesses to do just that.

But Whitman also had no delusions about the inevitable result. He came to see himself in the path of one of the onward movements of the world and redirected his energies toward channeling the flow and softening the impact of change. He pleaded with the American Board to send some good Christian settlers to secure a good location, hold a good influence over the Indians, and sustain religious institutions as a nucleus for society. He was hoping to shape the colonization process by the orderly selection of sites and colonists to insure Christian social cohesion on the frontier (Meinig 1968:140).

Between 1836 and 1847, Whitman and Spalding worked very hard at their missions and Spalding was more successful than Whitman in dealing with the Indians, although he treated some Nez Perce most harshly (Trafzer and Scheuerman 1986:25). The Cayuses did not tolerate the Whitmans, who were never able to establish a working relationship with the Indians of the Walla Walla Valley. When Whitman failed to attract Indians to his cause, he turned his attentions to promoting white emigration and the economic development of the Northwest. The Palouses and their neighbors were concerned about Whitman's activities and were also alarmed that the Indians of the Willamette Valley had been ravaged by horrible illnesses. As the years passed, tensions grew to such a state that conflict was unavoidable. By the winter of 1846-1847, hostility toward whites became widespread (Trafzer and Scheuerman 1986:25). The Nez Perce ordered the Spaldings to leave Lapwai and destroyed his fences, the mill dam, and meeting hall windows. Whitman's situation was no better as several Cayuses and Walla Wallas had grown to hate them and blamed them for their troubles, particularly problems resulting from the migration of thousands of whites through their country. The Indians believed the whites depleted the game and destroyed their grazing lands. Small Cayuse, Walla Walla and Palouse war parties attacked a few wagon trains in the summer of 1847. The conflict intensified when Indians attacked the emigrants with increasing frequency hoping to scare them into turning away.

The Indians had good reason to fear the whites since the whites brought deadly illnesses. Smallpox struck the region in 1846 and in 1847 whites brought measles to the Northwest. Although the whites contracted measles, they rarely died of it but the Indians perished in large numbers since they lacked natural immunity. Mixed-blood Indians, embittered by poor treatment from whites, may have been active in circulating rumors that whites were poisoning the Indians. Whitman tried to help the Indians by giving them medicine but his efforts failed and Indians died in alarming numbers. The Cayuse, who lived close to the Whitmans, were especially hard hit (Trafzer and Scheuerman 1986:26). Interestingly, many Palouses believed that Whitman had maliciously murdered the Cayuses with his poison.

By 1846, the situation at Lapwai had changed from one of material prosperity to near ruin. Spalding reported that there was no longer a school and "not the least probability that there will ever be one here again" (Meinig 1968:141). The Indians had abandoned their fields, vandalized mission property, and made personal threats against their teachers. The reasons for failure were many and in retrospect, the simultaneous conversion of the Indians to Christianity and an agricultural life in such a short period of time would have required a highly improbable set of skills in the missionaries and an almost impossible adaptability on the part of the Indians. Meinig (1968:142) concluded that the above challenges, complicated as they were by internal dissension's among the missionaries and within the tribes, the sinister counterinfluences of a few individuals (white, half-breed, or

Indian) and the general disruptions and apprehensions of the Indians stemming from their contacts with the emigrants, makes the overall failure of the missions readily understandable.

The end of the fur trade and the missions came suddenly (Meinig 1968:150-151). The 1847 disaster at Waiilatpu was partly the result of the outbreak of scarlet fever among the Cayuse the previous winter and the summer/autumn outbreak of measles; as many as half the tribe died from these diseases which were introduced by emigrant parties. These sufferings and festering grievances culminated in the explosion of November 29, 1847 against the foreign doctor in their midst. Whitman and his wife were killed along with seven others, followed by four more killings that week. Forty-six women and children were held captive at the mission for a month until Peter Skene Ogden ransomed them at Fort Nez Perce for $500 worth of trade goods. While some missionary work continued for a while, most notably with the Yakama until the outbreak of the Yakima War in 1855, missionary work never recovered from the events at Waiilatpu in late 1847. In addition to helping draw the missionary period to a close, the Indian wrath expressed at Waiilatpu, while initially confined to the Cayuse tribe, was sufficiently ominous to cause an immediate shift in the Hudson's Bay Company's operations. As American squatters began to swarm in upon the company's lands on the lower Columbia, hope for a gradual, orderly withdrawal waned by 1850. The fur business had ended and the company was anxious to evacuate.

3.5.6 Armed Conflicts

Armed conflicts between the Indians and whites, up until the Whitman killings, had been relatively rare. From about 1847 onward, the number and intensity of conflicts between the Indians and whites rose dramatically. One important conflict arose out of the Whitman killings. After the killings, some Cayuses, particularly the younger men, remained hostile and tried to draw other tribes into a confederacy. The Palouses refused to join the war against the whites but remained neutral just as Kamiakin chose to do among his Yakama band. The Nez Perce were split on the issue and could not decide on a unified path of action while the Spokanes also refused to join the confederacy. Although most Cayuses did not seem to have supported the attackers, the white population perceived a great danger in the Whitman attack and would not allow the killings to go unanswered (Trafzer and Scheuerman 1986:27).

Unfortunately, the volunteer army from the Willamette Valley which was organized to avenge the Whitman deaths was led by Colonel Cornelius Gilliam, a veteran of two prior Indian wars. An avowed Indian hater bent on their extermination, Gilliam was a bigoted Baptist minister who had helped chase the Mormons from Missouri and blamed the Catholics for inciting the Cayuses. He had no interest in cooling the situation and deliberately hampered the peace commission authorized by the provisional Oregon government. The commissioners were prepared to assure the Indians that Gilliam's troops would leave as soon as the Cayuses surrendered the guilty parties. The whites drew the Palouses into the controversy after the peace commission failed in its intended mission. Gilliam's refusal to escort the commissioners to the Walla Walla River, where they hoped to negotiate a settlement, was an unfortunate turn of events for whites and Indians alike. Most of the Indian tribes had turned their backs on the hostile Cayuses and most would have preferred peace. Some of the racial tension that developed in the years that followed might have been avoided, but Gilliam's callous approach increased racial hatred and brought conflict to the Palouse Indians (Trafzer and Scheuerman 1986:27-28).

Skirmishes occurred as the troops moved up the Columbia on their way to Waiilatpu. Indian efforts to repulse the troops failed and the Americans reached Waiilatpu on March 2, 1848. Gilliam reburied the exposed corpses and was more determined than ever to punish the Indians and tried to prevent the peaceful settlement with the Nez Perce who had traveled to Waiilatpu to parley. Gilliam pressed his position to such a degree that after dealing with the Nez Perces, the peace commission withdrew and Gilliam and his troops marched north to pursue the Cayuses, who had escaped into the Palouse country. While trying to drive off Palouse horses and cattle, Gilliam and his men were surprised by 400 Palouse Indians. The whites were soundly defeated but would not soon forget the embarrassing defeat. Justifiably or not, the whites would remember the Palouses as the only tribe that had fought as an ally of the Cayuses and were thus branded as renegades, outlaws, and enemies of all Americans (Trafzer and Scheuerman 1986:28-29).

Interestingly, Gilliam accidentally shot and killed himself in a wagon accident when returning to The Dalles to resupply his troops back at Waiilatpu. Colonel James Waters took up the command and prepared for another campaign against the Cayuses. Waters believed that Gilliam had stirred up a full-scale war with all interior tribes by his reckless, unprovoked attack on the Palouses and Walla Wallas. It was the Cayuses themselves, encouraged by the Nez Perce, that secured the five men and turned them over the Americans. They were hanged on June 3, 1850 in Oregon City (Trafzer and Scheuerman 1986:30).

On March 2, 1853, President Millard Fillmore split Oregon into the Oregon and Washington Territories. Following the March inauguration of Franklin Pierce, the new president appointed Isaac Stevens the first governor of Washington Territory. By the mid 19th century, the United States was experienced in dealing with new territories and Indians and the policies followed in the Northwest were based on more than 50 years experience in the East, including liquidation of Indian land title, drafting Indian treaties, and removal and concentration of Indians onto reservations. American Indian policy was designed to benefit whites, not Indians, and was implemented by agents far more concerned with their professional duty and national destiny than they were with Indians.

The Indians witnessed many changes in their homelands and were aware of the California Gold Rush, the wave of white immigration to the Pacific Coast, and the influx of whites into the Far West. The movement of whites into new areas was facilitated by the Donation Land Act of 1850 which granted 320 acres to every white male (or half-blood) over 18 years of age. While the Indians may have been unfamiliar with the law, they felt its effects as increasing numbers of whites moved out of the Willamette Valley into the wooded regions north of the Columbia River. In 1849, some 300 whites lived north of the Columbia, but by 1853 when Washington became a territory, some 4000 whites lived between the Columbia and Puget Sound (Trafzer and Scheuerman 1986:32). The symbolism of a horde of white men marching through the territory was not lost on the Indians when Governor Stevens, Captain George McClellan and a party of 65 men surveyed routes for a railroad. Rumors spread quickly among the Indians that they would be banished or hemmed in by an enclosure and the Indians were suspicious of McClellan's large force, heavily armed but professing peace. The Indians remembered only too well the large body of Americans that arrived during the Cayuse War. Lieutenant Saxton led part of the survey party to Fort Walla Walla [Fig. 8] where they were generally well received by the Indians. Saxton failed, however, to inform the Indians that he was surveying for a railroad that would ultimately carry hundreds of whites to the Pacific Northwest. Indeed, when camped with the Palouse, Saxton urged the Indians to be ready to help Governor Stevens when he arrived and told them that the great chief in Washington was their friend and would protect them (Trafzer and Scheuerman 1986:36). Anxiety ran high among the various tribes and councils held between Saxton, McClellan, and the Indians did little to reassure the tribes that they had nothing to fear. Rather, the talks increased their fears. Stevens traveled about reassuring the Indians that he would protect them and their property while he was trying to implement his Indian policy - policies already adopted in other parts of the country. He urged the Indians to be peaceful, live like white people, and become civilized.

The Indians responded to these threats by trying to form an alliance. Kamiakin met with prominent chiefs and urged them to join him in a huge inter-tribal council. This council was supposedly held in a remote area along the Grande Ronde River in northeastern Oregon and the Indians agreed to meet Stevens, but refused to cede any of their land. The plan was for the Indians to mark the boundaries of the different tribes so that each chief could rise and claim his boundaries and ask that the land be made a reservation for his people. The Indians hoped that the council would fail since there would be no lands for sale (Trafzer and Scheuerman 1986:41). Kamiakin knew about the treaties Stevens concluded with the Puget Sound groups that forced them to accept the terms dictated by the U.S. government. Inexperienced in treaty making, Steven and his assistant George Gibbs, drafted documents based on previous treaties made with eastern tribes. The treaties drafted for Puget Sound and the tribes east of the Cascades were nearly identical; each calling for the end of tribal warfare, surrender of Indian lands, and establishment of reservations. The treaties recognized Indian rights to fish at common and accustomed places as well as their right to hunt and promised establishment of agencies, schools to learn farming and trades, and guaranteed medical care. While Stevens and his agents said the treaties would benefit Indians, the Indians were not fooled (Trafzer and Scheuerman 1986:43).

Kamiakin and many of the Palouse were not pleased with the Yakima Treaty and resented being spoken to as children by Stevens and his demands that they move off their homelands to reservations (Trafzer and Scheuerman 1986:60). Under the terms of the treaty, the Palouses were to move, but since most had not agreed to the treaty, they were unwilling to move and many preferred to fight to preserve their country, sovereignty, and freedom. Interestingly, even Steven's assistant, George Gibbs, felt that he had blundered by bringing together at one time the Nez Perce, Walla Wallas and Yakamas and cramming a treaty down their throats. Kamiakin reacted to the council by organizing his allies for a possible war.

During the summer of 1855, the Palouses became alarmed about gold seekers who were rushing to the diggings near Fort Colvile. The Indians were already aware of how gold seekers in California disregarded Indian rights and property. While Stevens promised to keep whites out of the region and that the Indians did not have to remove to reservations for two or three years, he betrayed his promise even before leaving the Walla Walla Council by sending dispatches to the coastal newspapers announcing the opening of the interior. When white miners invaded the Yakama Country, some stole horses and raped Indian women. There were attacks by miners to which the Indians retaliated. Called to investigate reports of killings, Andrew Jackson Bolon, Indian agent to the Yakamas, attempted to investigate. Bolon, an individual despised by Kamiakin and others, ran into a party of Yakamas, who later killed him. Like the Whitman killings, the death of Bolon may well have been the precipitating event that launched the northwestern Indian war that was fought intermittently between 1855 and 1858 (Trafzer and Scheuerman 1986:62). While not responsible for Bolon's death, the whites blamed Kamiakin.

The army dispatched a force of 50 men and the first confrontation was on October 5, 1855 near Toppenish Creek. While few died, the soldiers beat a hasty retreat to The Dalles. While the Indians were pleased with the outcome, the army, territorial officials, and white citizenry prepared for further retribution, and Kamiakin became a focal point for their anger. At the same time, conflicts with Indians around Puget Sound and the Rogue River in Oregon were erupting. Governor Curry of Oregon and Acting Governor Mason of Washington called for volunteers and large contingents of men were mobilized to fight the Indians. When troops arrived at St. Joseph Mission near Ahtanum Creek, some soldiers discovered buried gunpowder and erroneously concluded that the Catholic priests were secretly arming the Indians to help them exterminate whites. When the gunpowder was discovered, the volunteers made a mad dash to the mission, set the buildings ablaze, and plundered at will. Before the mission was burnt to the ground, a letter written by Father Pandosy as dictated by Kamiakin, revealed some of the causes of the ongoing conflict between the Indians and whites (Trafzer and Scheuerman 1986:65):

> **Write to the soldiers and tell them that we are quiet, friends to Americans, but the way in which the governor spoke to us among the Cayuses has provoked us and made us determined upon a general war which will end with the complete destruction of all the Indians or all the Americans.**

Kamiakin maintained that had the war not started, the Indians would have willingly given the whites some of their land and would have lived with all others [whites] as brothers." Kamiakin and the Indians were prevented from pursuing such a peaceful course since the governor had:

> **. . . taken us in numbers and thrown us out of our native country into a foreign land among a people who is our enemy, for, between us we are enemies...now we know perfectly the heart of the Americans, for a long time they hanged us without knowing if we are right or wrong . . . [we] never killed or hanged one single American, though there is no place where an American has not killed Indians. If the soldiers and the Americans after having read this letter and taken notice of the motives which induce us to fight, want to retire and treat us in a friendly manner, we will consent to put down our arms and to grant them a piece of land in every tribe.**

Kamiakin was so against the removal and reservation policies that he vowed to fight to the end but realized that war was futile and hoped to end the conflict. The whites refused to accept the olive branch and rumors continued to circulate that the Indians planned to unite and kill all whites. These rumors were far from the truth as the Indians were not united in a confederation. Many tribes openly blamed Kamiakin for their troubles and after 1857, Yakamas, Palouses and their allies considered Kamiakin to be a Palouse chief (Trafzer and Scheuerman 1986:67). The Oregon volunteers established a small post (Fort Henrietta) near the banks of the Umatilla River which was augmented by troops under the command of Colonel James K. Kelly. The Walla Wallas, Cayuses, Umatillas, and Palouses - all Indians otherwise uncommitted to the ongoing hostilities - were drawn into the war by Kelly's expedition. The Oregon volunteers had failed to find Kamiakin and decided to turn against Peopeo Moxmox and punish the Walla Wallas. Upon finding Peopeo Moxmox and about 60 warriors, Kelly demanded his surrender. Peopeo Moxmox surrendered to allow his people to escape and join the Palouses to the north. Eventually, Kelly caught up with the Indians and engaged in over four days of inconclusive fighting. The Indians eventually broke off the engagement.

Kelly ordered his men to hold Peopeo Moxmox and the others, but reportedly the prisoners attempted to escape. A soldier struck Peopeo Moxmox in the head and as he lay unconscious, the volunteers gathered around him and fired their weapons point blank into his body. General Wool was outraged by the conduct of the volunteers who murdered Peopeo Moxmox who had surrendered under a flag of truce. Conflict continued on. While it almost appeared that the war was over by July 1856, Wright ordered construction of two additional facilities, Fort Simcoe in the Yakima Valley and Fort Walla Walla in the Walla Walla Valley [Fig. 8]. The Walla Walla facility was to be headed up by Colonel Edward J. Steptoe with Washington volunteers under the command of Benjamin Franklin Shaw.

A Palouse camp consisting mostly of old men, women, and children was attacked, without provocation, by Shaw on July 18, 1856 and at least 40 Indians were slaughtered. Recorded by the Indians as the "Massacre of the Grande Rond," Shaw proclaimed his work to be a great victory. On August 28, over 100 Palouses, Cayuses, and Walla Wallas ambushed a large pack train. This event was humiliating to the soldiers because the fight occurred within sight of the volunteer headquarters. The loss of the pack train was also a setback for Governor Stevens who was then in the region to negotiate more treaties and reaffirm his "peaceful" intentions among the friendly Indians (Trafzer and Scheuerman 1986:74). An uneasy peace settled upon the area during the winter of 1856.

In the spring of 1857, Stevens won election to the Congress as Washington's territorial delegate and that summer, General John Wool, an ardent supporter of Indian rights, was relieved of his command of the Pacific Department and replaced by General Newman S. Clarke. General Clarke did not share Steven's views on how to resolve the "Indian problem." A new conflict started on April 12, 1858 when Palouse warriors swept down into the Walla Walla Valley and conducted a successful night raid on the government herd. The raid was led by Chief Tilcoax of the lower Snake, not Kamiakin, who was blamed for the raid. Shortly after, two miners were killed near present-day Colfax, Washington and Kamiakin and Tilcoax were blamed. Steptoe left Fort Walla Walla with over 150 miserably armed soldiers to pursue the Indians. Steptoe, who did not expect a fight, had his men leave their sabers at the fort. Unfortunately for Steptoe, he ran into the largest force ever assembled by hostile Plateau Indians (Trafzer and Scheuerman 1986:77-78). The Indians, about 1000 strong, taunted the soldiers but Steptoe ordered his troops not to engage them. Eventually, after some unsuccessful parleys, the Coeur d' Alenes attacked followed by the Palouses. Within a short time, Steptoe's inexperienced men ran short of munitions and started to suffer from thirst and fatigue. At night, Steptoe and his troops escaped from the battlefield. Trafzer and Scheuerman (1986:82) explained that the Palouses never intended to annihilate Steptoe's soldiers as such was not the way of Plateau Indian warfare - they allowed Steptoe to escape.

In June 1858, Steptoe, Wright, and Clarke met at Fort Vancouver where the officers gave Wright a free hand to deal severely with the Palouses and their allies. The Indians refused Clarke's proposal of an unconditional surrender since they were confident in their abilities to defeat the whites. Wright led a much larger army than Steptoe, numbering almost 700 troops and support personnel. The various battles were fought near Spokane and the Indians suffered significant losses. What most infuriated the Indians was the mass killing of their horses by the soldiers. Wright's campaign had a tremendous impact on the Palouses. They had been defeated militarily and driven from their homes. Known as the Battles of Four Lakes and Spokane Plains, the Wright campaign put an end to Indian rule and spawned a new era of white control in the Palouse Hills. A few years passed before whites moved north of the Snake River to farm and during this period, most of the Palouse bands returned to their homelands to begin life anew, digging roots, fishing salmon, and hunting game (Trafzer and Scheuerman 1986:93). It was only after the American Civil War that a new wave of settlers began claiming the rich lands of the Palouse.

With the coming of the railroads and increased white settlement, small scale conflict continued. Trafzer and Scheuerman (1986:100-102) reviewed a number of instances during the 1870s where conflicts arose between whites and Palouses as stockmen and farmers filled up the country between the Snake and Spokane Rivers. In 1877, Kamiakin died and his death marked the end of an era for the Palouse Indians of his band who went their separate directions and despite their best efforts, they all finally settled on one of the reservations. Some Palouses refused to move onto the reservations without a fight and their fate became intermingled with the non-treaty Nez Perce.

The last major armed conflict between the Indians and the whites was the Nez Perce war. In February 1858, Ellias Pierce found gold on the Clearwater River. Although Nez Perce agent A.J. Cain tried, he was unable to hold back the gold rush that followed. In August 1860, without the consent of the Nez Perce, or their agent, Pierce and ten miners made a rich gold discovery on a tributary of the Clearwater. The Nez Perce Treaty of 1855, one of several negotiated by Stevens, prohibited white intrusion onto the reservation without tribal permission. But lacking military support, Cain was powerless to stop the encroaching miners. George Wright recommended that the Indian Bureau renegotiate the Nez Perce Treaty to permit miners to dig for gold on the reservation. Communities of miners sprang up on the Nez Perce Reservation including Lewiston, Elk City, and Florence.

The Lapwai Council of 1863, where the Superintendent of Indian Affairs Calvin H. Hale tried to get the Nez Perce to agree to a smaller reservation, ended in failure. Hale assured the Indians that the government wished to reduce the Nez Perce Reservation for the good of the Indians reasoning that a smaller reservation would be easier for the army to defend. Only Chief Lawyer of the Nez Perce and 51 of his followers were willing to renegotiate the 1855 treaty. On June 9, 1863, Lawyer ceded 6,932,270 acres of land for less than eight cents an acre. None of the Palouses signed the new 1863 treaty, but the Office of Indian Affairs and the army ordered them to abide by its provisions, treating the Palouses as if they were bands of Nez Perces.

Removal of non-treaty Indians was sped up after the government decided to force Chief Joseph out of the Wallowa Valley. The Secretary of the Interior appointed a board of commissioners to settle the Palouse and Nez Perce question. Several Upper Palouses attended the first Lapwai council (which convened on November 13, 1876) where Chief Joseph was asked to give up the Wallowa Valley and move onto the Nez Perce Reservation. Chief Joseph told the commissioners that when the Creator made the earth, he made no marks or lines to divide it or separate it and that the Indians were of the earth and the earth was too sacred to be valued by or sold for silver or gold. Joseph's response angered General Howard (Trafzer and Scheuerman 1986:105). The commissioners requested the military occupation of the Wallowa Valley by Howard's troops and the forced resettlement of non-treaty Palouses and Nez Perces onto the reservation within a reasonable period of time. If they refused to move, the commissioners wanted sufficient force to bring them into subjection and to place them upon the Nez Perce reservation.

At the second Lapwai council which convened on May 3, 1877, some of the Nez Perce complained that they had not signed away their lands and would not abide by a treaty which they had not signed. Ultimately, the Palouses and Nez Perces agreed to move to the reservation but some defied the government altogether. Another council was held in May 1877 by General Howard near the ruins of old Fort Walla Walla. Lower Palouses, Cayuses, Walla Wallas and others attended, including Young Chief of the Cayuses, Homli of the Walla Wallas, and Smohalla of the Wanapums. Howard and Umatilla Agent W.A. Cornoyer explained the benefits of reservation life to the over 300 Indians assembled there (Trafzer and Scheuerman 1986:109-110). Thomash, a Washani holy man among the Lower Palouses, stormed out of the council and he and his people returned up the Snake River. Howard convened another council at Fort Simcoe on June

8, 1877. This council was widely attended by the local tribes, Moses, Smohalla, the Yakama, and even Thomash.

A depressed young man, Wahlitits, rode about the Upper Palouse camp enraged over his and the fate of future generations who would have to live on the reservation. Some of the Indians challenged him to avenge the death of Eagle Robe, a Palouse who was killed by a white settler named Larry Ott. Wahlitits along with two friends raided a white settlement along the Salmon River and killed three white men. As word of their deed spread, other Indians joined Wahlitits and the small force swept down on white settlements again, triggering the Nez Perce War. News of the Salmon River raids reached the Palouses as they resettled at Elposen and many were sympathetic to the Nez Perce cause. Unsubstantiated rumors about hostile Indians spread from Lewiston, Idaho to Dayton, Washington as white settlers sounded the alarm that the interior Indians had launched a general uprising. In fact, the whites reacted in full scale panic and rumors flew about for several weeks (Trafzer and Scheuerman 1986:111).

Many responsible whites, such as Father Cataldo of the Coeur d'Alene Mission worked to prevent peaceful Palouses, Spokanes, and Coeur d'Alenes from being drawn into a needless and bloody conflict. When news of the Salmon River raids reached the Nez Perce camp on the Camas Prairie, the Indians feared that war would result. Full scale war started on June 17, 1877 when troops under Captain David Perry engaged the Indians in the Battle of White Bird Canyon where the army suffered heavy losses and were driven from the field. Shortly thereafter, General Howard assumed field command and the war commenced in earnest (Trafzer and Scheuerman 1986:115). The Palouse who joined forces with the Nez Perces arrived in mid-July 1877 when the various bands met on Weippe Prairie. Looking Glass and others favored crossing the Bitterroot Mountains to live among the Crows in Montana. Joseph and Ollicot were reluctant to leave the Wallowa Mountains for Montana but decided to do so after the other chiefs favored the move. The tribes continued their journey until they reached the Big Hole River where they camped and celebrated. On June 9, 1877, soldiers under the command of Colonel John Gibbon attacked and killed 54 women and children and 33 warriors.

What happened next is a story retold many times. Lean Elk led his people on a trying journey through western Montana, eastern Idaho, and the Yellowstone National Park area to escape. They eluded Colonel Samuel D. Sturgis who was assigned to surprise the Indians along the Clark Fork River. The Crows rebuffed Looking Glass and would not assist or become involved in the war, so the Palouse and Nez Perce decided to escape to Canada. Sturgis sought the assistance of Nelson A. Miles to cut off the Indians from the east. Miles, with about 400 men including 30 Sioux and Cheyenne warriors, crossed the Missouri River racing toward the Canadian border to intercept the fleeing Nez Perces and Palouses. Thinking they were only being pursued by General Howard, the Indians rested short of the Canadian border. Meanwhile Miles and his soldiers were closing fast. Miles found their camp, attacked but was repulsed. On October 1, Miles raised a white flag in his camp and called out to Joseph for a parley. Looking Glass and White Bird, the surviving chiefs, were fearful that if they surrendered, Howard would hang them, just as Colonel Wright had done in 1858. Over 400 Indians surrendered to Miles thinking they would be allowed to return to their reservation in Idaho. Instead, General William Tecumseh Sherman ordered the Palouses and Nez Perces sent first to Fort Levenwoth, Kansas and then to the Quapaw Agency in the Indian Territory.

Twice Joseph and Yellow Bull traveled to Washington D.C. to plead their case to congressmen, senators, and the Commissioner of Indian Affairs. They were warmly received and their story was published in the newspapers. Unfortunately, resentment of the Nez Perce and Palouse in the Northwest was still strong and their pleas to be returned home were ignored. Finally after years of appeals and growing public pressure on American Indian policymakers, on April 29, 1885, Commissioner of Indian Affairs John D. Atkins ordered return of the Nez Perces and Palouses to the Pacific Northwest. The government split the returnees into two groups, one of which was sent to the Nez Perce Reservation in Idaho while Joseph and Yellow Bull took the remaining group to the Colville Reservation in Washington Territory. The Indians returned to the Northwest but were no longer free to live along the rivers, to hunt, or to gather camas root from prairies of their native lands.

3.5.7 The White Influx

> **Like an immense monster of desolation to these Indians the waves of civilization are fast approaching . . . (Lieutenant John Mullan)**

If it can be said that the period of the fur traders overlapped with the missionary period, the missionary period spawned the white influx. Drury (1986:18) wrote that Dr. Whitman made three notable contributions to the opening of the Oregon country for American settlement:

- He saw the feasibility of taking white American women over the Continental Divide while on an exploring tour to the Rockies in the summer of 1835. The successful crossing of the Rockies through South Pass by Mrs. Whitman and Mrs. Spalding on July 4, 1836, unlocked the mountain gateway for men who wanted to take their families with them to Oregon. Where women could go riding horseback on side-saddles, other women and children could follow in covered wagons;

- Whitman's stubborn persistence made it possible in 1836 to take the first wheeled vehicle across a long section of the Oregon Trail extending from the Green River Rendezvous in the Rockies to Fort Boise. Where one wagon had gone, others could follow;

- He was responsible in leading the first great Oregon emigration of about 1000 people in 1843 from Fort Hall into the Columbia River Valley. These three history-making achievements combined to encourage thousands of Americans to make the overland trek to Oregon after 1843. The decisive factor in the establishment of the boundary with Great Britain in 1846 at the 49° was the numerical superiority of American settlers in Old Oregon over those of British citizenship."

The Hudson's Bay Company diversified its activities and erected a sawmill at the Willamette Falls in 1831 and began shipping lumber. Farming at Vancouver continued to expand and in good years produced beyond company needs. Retired company servants and free trappers already had established a nucleus of British farms in the lower Willamette. But the British were not beating the Americans at their own game because all these British actions were company controlled and existed as mere adjuncts of the fur trade. Although for the moment, their agricultural development surpassed that of the Americans, it was neither initiated by farmer colonists nor could it draw upon a vast reservoir of land-seeking immigrants. Thus, the Columbia country was a "company frontier" for the British, but a "national frontier" for the Americans (Meinig 1968:115).

Ever since Jason Lee's visit to Waiilatpu and Lapwai in the early spring of 1838, at which time Whitman and Spalding sent in their amazing request for 220 additional missionaries, there is evidence of Whitman's growing interest in the political future of Old Oregon. His political interests centered on promoting Protestant Americans to emigrate to Oregon and to extend the jurisdiction of the United States over whatever part of the Oregon territory would be granted it by treaty with the British. Although the emigrants of 1841 and 1842 abandoned their wagons at Fort Hall, Whitman believed that the emigration of 1843 would take its wagons over the mountains into the Columbia River Valley (Drury 1986:467-468).

During the spring of 1843, an awakened interest in Old Oregon stirred throughout the United States (Drury 1986(II):61). The editor of the Boston Daily Evening Transcript declared on April 4, 1843, that "hundreds are already prepared to start thither with the Spring, while hundreds are anxiously awaiting the action of Congress in reference to that country as the signal for their departure." Since Whitman was in Boston at that time, the editorial might have been written at his instigation (Drury 1986(II):61). Whitman must have been delighted with "The Oregon Fever" that was literally sweeping the nation. With Whitman's help, a new era in Oregon's history began with the arrival of the large 1843 emigration and the wagon road from Fort Hall to the Columbia River was the key that unlocked Oregon's doors to the restless thousands on America's western frontiers. The successful 1843 emigration ensured that more emigration would follow and with larger numbers of Americans in Oregon, there would be greater pressure on the government to extend its jurisdiction over the territory. The 1843 emigration and those that followed precipitated cultural conflict with the Indians. Although none of the immigrants between 1843-1847 settled on land in the vicinity of Waiilatpu, social and economic changes were introduced among the Indians that threatened their way of life. Mission activities at Waiilatpu were no longer the same as they had been before Whitman left for Boston. The increasing attention the Whitmans gave to the immigrants aroused the suspicion and resentment of the Cayuse. It was only after the Whitman killings that whites began to settle the area, and even then, their numbers were few.

One of the principal threats of the white influx to Indian lifeways was competition for fish and game. After the introduction of the horse and a temporary population rebound from the epidemics of the previous century, there were probably as many Indians as the land could support given the technology employed by the Indians to wrest a living from the land. For those Indians who enjoyed an abundant subsistence base, the initial white impact on their subsistence was probably minimal, but for those who maintained a slimmer margin of subsistence, the presence of even a few whites probably reduced some of their food supply. During the severe winter of 1846-1847, when the salmon run was late and many Indian herds were destroyed, the impact of thousands of white immigrants hunting game and fishing the streams along the Oregon Trail was certainly felt by the Indians (cf. Martin 1969:7, 23).

In the wake of the Whitman killings, American settlers in the Willamette Valley called for immediate revenge upon the Cayuse and for reestablishing security along the Oregon Trail. It took a few weeks to form a volunteer militia, which arrived at The Dalles in January 1848. They erected a stockade, installed a small cannon, and proclaimed it Fort Lee (Meinig 1968:152). After several months, the militia failed to track down the Cayuse tribesmen who committed the killings. The volunteers were anxious to return home but to withdraw might leave the late-summer emigrant trains at the mercy of marauders. As an inducement for them to stay, the Territorial Superintendent of Indian Affairs gave authority to colonize the Walla Walla Valley - a move that contradicted assurances made to nonbelligerent Indians. The excuse given to the Indians was that the Cayuse refused to surrender the Whitman killers so it was proper that their lands be taken. About 60 men agreed to stay on and made arrangements to move their families that autumn. Whitman's grist mill was repaired, seed was made available, and confiscated Cayuse cattle and horses provided the beginnings of herds. While these citizen-soldiers did provide protection to the emigrant trains, the prospects of wintering in the interior caused many to reconsider their decision and only a dozen or so remained in the Walla Walla area. The next five years were free of conflict between the emigrants and the Indians. The wagon trains passed through Cayuse territory only to find tribal members selling potatoes from their scattered garden plots along the river, or ready to trade cattle and horses (Meinig 1968:154).

As the news of the Fort Colvile gold discovery spread, white traffic increased sharply. As the volume and variety of white/Indian contact increased, virtually every Indian group was directly touched and by the summer of 1855, the threshold of conflict was again reached. Most Indian chiefs saw that it would be impossible to seal off the whole Columbia basin and they were willing to allow emigrants and other transients to pass through their lands since there were good economic reasons for favoring such traffic. But fear of white settlement was intense (cf. Meinig 1968:156 and Suphan 1974:191).

Meanwhile, many in the Army blamed the whites for the mounting troubles. Meinig (1968:156-157) noted that the Columbia Plain was but one far corner of a vast area pockmarked with troubles and policed by limited forces of doubtful effectiveness. Maintenance costs were enormous and campaign logistics were often circumscribed by the enormous distances, inadequate equipment, and scarcity of supplies. Economy of action was a necessary principal but more importantly, most officers had little sympathy for the means or objectives of their fellow citizens. Experience had taught them that Americans often attacked and plundered the Indians for no proper reason and furthermore, with the Willamette open for settlement there was no reason to seize the whole barren interior country. The army viewed its role as peace keepers that stabilized relationships, patrolled the trafficways and protected the legitimate interests of Indian and white alike. Naturally, such army policies were anathema to American settlers who wanted freedom as well as security to settle, travel, and do as they pleased.

After the conclusion of the Yakima War and other Plateau conflicts between 1855 and 1858, white settlement was gradual. In the Palouse country, it only started in 1862 when George Pangburn squatted on unsurveyed land on lower Union Flat Creek (Trafzer and Scheuerman 1986:97). The Palouse Indians and the whites lived in peace with one another, in large measure because the whites wanted to live in peace with the Indians and their experiences had taught them the wisdom of being friendly. Initially, the white population treated the Palouses with respect, but relations later deteriorated when larger numbers of whites, some of whom disliked or feared Indians, moved into the region.

White settlement of the region was greatly stimulated by the growth of transportation systems in the inland Northwest. Prior to 1858, whites followed Indian trails, but after the Yakima War, Lieutenant John Mullan surveyed a road for the U.S. Army, linking Fort Walla Walla with Fort Benton, Montana. Shortly after the Mullan Road was completed, gold was discovered in Idaho and Montana. Whites established several ferries on the Snake River to accommodate the miners. The Homestead Act of 1862 offered adult citizens 160 acres of free land to those who settled on the public domain but prohibited any claims on land improved by Indians. Under the terms of the treaty, the Indians did not have to go to the reservations until the government paid them for their improvements. Many of the Palouse remained on their lands, refusing to go to the reservations until the 1870s and 1880s. In the latter part of the 19th century, white settlement of the Palouse Country accelerated as families and individuals from America, Asia, and Europe moved into the region (Trafzer and Scheuerman 1986:98).

3.5.8 Treaties Made/Treaties Broken

Beckham (1991:39) writes that the story of the United State's relationship with the Indians is a tragic chapter in American history. Fear, greed, cultural differences, exploitation, and racism shaped the relationships between the Indians and whites. The original federal intent was noble as laid out in the Northwest Ordinance of 1787, a philosophy of dealing with Indians that was later extended across the Trans-Mississippi West:

> **The utmost good faith shall always be observed toward the Indians; their lands and property shall never be taken from them without their consent; and in their property, rights, and liberty, they never shall be invaded or disturbed unless in just and lawful wars.**

Unfortunately, later lawmakers, government officials, and citizens did not live up to these assurances as the hunger for Indian land and resources proved too alluring. Thus, the pattern of exploitation and dislocation of the colonial period continued across the continent in the wake of pioneer settlement. The framework under which the government induced the Plateau Indians to cede their lands through treaties is best understood as an outgrowth of early federal laws. The source of Federal authority in Indian affairs stemmed from the Commerce Clause of the 1789 Constitution. Congress presumed to have complete authority to deal with American Indians, and it did so. The words "and with the Indian tribes" embedded in the Constitution was considered to give Congress "plenary authority" to ratify and abrogate treaties, create and disband reservations, recognize and terminate tribes, and take other actions. The Constitution did not lay out this authority, but over time, Indian affairs worked in this manner. Obviously, none of the Indians had any say in these matters.

In 1823, the Supreme Court affirmed the doctrine of the "right of discovery" in part by accepting the false notion that Indians were nomads and therefore had only "mere occupancy right" to the soil. Accordingly, the Indian's right was less than that of the Euro-Americans, who had "discovered" the lands in question (Beckham 1991:39). In 1831, the Court softened its attitude by ruling that tribes were "domestic dependent nations" and possessed some sovereignty or power subordinate to the United States. The Court also found the federal government had a "trust responsibility" for Indians and that the tribes stood as a "ward to his guardian." As guardian, the government had certain obligations in dealing with the Indians. As Beckham (1991:39) notes, the Court decided that in "Indian Country," tribal, not state, law prevailed; something the Indians had always assumed but a fact that distressed trespassing pioneers and other whites. The Indian Trade and Intercourse Act of 1834 defined all Indian lands not covered by a ratified treaty as "Indian Country."

The beginning of Federal dealings with the Indians took place in an atmosphere of quickly changing lifeways, population dislocation, fear, and confusion as thousands of whites poured into the Northwest on the Oregon Trail between 1843 and 1845, setting the stage for competition for resources and a scramble for Indian land (cf. Beckham 1991:40). Equipped only with stone-age technology, weakened by new diseases brought by the settlers, and forced to cope with a swift flood of cultural changes, the Indians needed special care and consideration. Only after the Whitman killings did the government act by passing the Organic Act on August 14, 1848 to create the Oregon Territory and to lay out new Federal policies for dealing with the Indians who lived there. The Organic Act recognized Indian land title and set forth a four-part strategy for dealing with the Indians in the Pacific Northwest:

- The federal government recognized Indian title to all of Oregon Territory.
- Indian affairs were to be administered in the field by a superintendent and such staff as he might need.
- Indians were to be treated with the 'utmost good faith;' protected in their lands, rights, and privileges; and not invaded unless in just and lawful wars.
- Congress from time to time would appropriate money to assist the Indians and to further peace and friendship.

As the white influx mounted, many whites in Oregon favored moving all Indians to the more arid lands on the Columbia Plateau or northern Great Basin. On June 5, 1850, Congress responded by appropriating funds for a treaty commission to negotiate with the Indians west of the Cascades and by passing a law that:

- called for the Indians to cede their lands and move east of the mountains,
- created the post of Superintendent of Indian Affairs separate from the office of governor,
- provided for three agents, and
- extended to Oregon the Indian Trade and Intercourse Act of 1834 - a measure that defined "Indian Country" as that region not ceded to the United States and under tribal law and custom.

Hence, Federal law in 1850 declared all of the Pacific Northwest to be "Indian Country" and stipulated that the Indians must sign treaties agreeing to abandon their homelands before the settlers could have title to their provisional land claims. But the Congress acted again on September 27, 1850 by passing the Oregon Donation Land Act that authorized the government to give away hundreds of thousands of acres of Indian land to settlers. The Act provided that white men and women, "American half-breed Indians included," and immigrants who had filed for naturalization were entitled to free lands. Before expiration in 1855, 7,437 settlers had filed on over 2.8 million acres in Oregon before any of the treaties had been ratified (Beckham 1991:41).

After passage of the Donation Land Act, the Oregon Treaty Commission left for Oregon, but before it even began its work, Congress revoked the commission's powers. Interestingly, Palmer opposed reserving rights for Indians and only the treaties negotiated with the Umatilla and the Warm Springs (with Governor Stevens) confirmed Indian fishing and gathering rights and only the Columbia Plateau treaties contained provisions of "reserved rights." The treaty era drove left many Oregon Indians almost landless but the tribes in the Columbia Plateau fared somewhat better.

Before the Walla Walla Treaty Council Indians were acutely aware their land was to be taken. The Oregon Legislature addressed a memorandum to Congress in which the main concern was to extinguish Indian title (Relander 1962:38). On September 3, 1852, L. Lea, Commissioner of Indian Affairs instructed Anson Dart, Superintendent in Oregon Territory, to only enter into treaties, as may be required, to suppress hosilities or to preserve peace. On November 28, 1852, Captain Benjamin Alvord of the 4th Infantry wrote from The Dalles to Dart asking for laws, rules and regulations relating to the Indian tribes, especially as pertains to the frontier. Alvord regretted to see the Senate reject Indian treaties since he believed it wise to make such treaties before the whites crowded into the area.

The Donation Land Act provided for the donation of land to actual settlers and for the survey and confirmation of their claim west of the Cascade Mountains. The 4th section of the act actually encouraged such settlement in the whole territory, but Congress made in this act no provision for surveying and conferring the claims except on the west side of the mountains. The pressures were so strong from land-seeking settlers that Alvord's concerns were ignored and individuals within the military that called attention to the illegal land-grab were relegated to oblivion and the Indians were aware that the whites were after their homeland (Relander 1962:38). When Captain George McClellan led a survey party into the Yakima Valley looking for a suitable railroad route through the Cascades, several chiefs met with McClellan and Kamiakin was among these. Kamiakin expressed his concern about negotiating with white men pretending to be chiefs and how they would give a few presents and then pretend they had purchased Indian land (Relander 1962:39).

In a letter of August 12, 1853, Commissioner George Manypenny wrote to Joel Palmer (Superintendent of Indian Affairs, stationed at Dayton, Oregon) instructing him to immediately negotiate with those tribes in the vicinity of white settlements with the principal aim extinguishing Indian claims to the land. Shortly after a treaty commission had been formed in December 1854, Palmer wrote from Dayton, Oregon informing Manypenny that the Indians would oppose any treaty that would remove them to a reservation where they could not fish (Relander 1962:40). When the Walla Walla Treaty Council convened on May 29, 1855, Kamiakin was quiet for several days and finally spoke:

> **I have something different to say. It is young men who have spoken. I have been afraid of the white men. Your chiefs are good; perhaps you have spoken straight that your children will do what is right. Let them do as they have promised. That is all I have to say.**

Kamiakin was addressing, in the same man, the territorial governor of Washington and the Superintendent of Indian Affairs, Isaac Stevens. For his part, Stevens was speaking and making promises not only for the United States but for the Territory of Washington. Legally and morally, his promises and actions were binding upon both the government and the territory (Relander 1962:41). On June 9, Kamiakin visited Governor Stevens and announced his determination to return home. The treaty was signed and on June 11, the goods and presents were portioned out but Kamiakin would not take any goods for himself. He wanted them only after the President had pronounced the Treaty was good. The Treaty was not made good until signed by President James Buchanan on April 18, 1859.

Stevens was appointed governor of Washington Territory by the newly elected President Franklin Pierce as a reward for his eager support. An officer in the Army Corps of Engineers and graduate of West Point, Stevens was asked to survey the northernmost possible transcontinental railway route and to serve as Superintendent of Indian Affairs (Cohen 1986:36). Josephy (1965:293) says of Stevens:

> **As a governor who would build up the population and prosperity of this territory, he was intent on winning Congressional approval for a railroad that would terminate at Puget Sound . . . He bore no ill will against Indians, and even fancied that he admired and respected them. But as an instrument of advancing American civilization, he had a job to carry out, and with a flair for publicity he expected to win notice in the East for what he would achieve. As Superintendent of Indian Affairs, he would try to treat the Indians justly and peaceably, but he was determined to bend them to his wishes.**

Scheuerman (1986:7) describes Stevens as being short-tempered, impatient, and demanding - qualities not ideally suited for diplomacy with the proud Plateau Indians.

Stevens, an engineer and officer, demonstrated little interest in understanding the Indian way of life. While his expedition ethnologist, George Gibbs, did compile considerable information on the Indians, Stevens did not seem to profit from it since his reservation plans ignored basic linguistic and cultural differences between the various tribal groups and ignored their extensive seasonal rounds (Scheuerman 1986:9-11). As Stevens began his negotiations with the tribes, their leaders were probably unaware of the contest being waged between civilian authorities under Stevens and the military under General Wool over the ultimate resolution of the Indian question. Stevens represented himself as a spokesman for the military at the Walla Walla Council although he had resigned his commission and never hinted that other government officials were in favor of other solutions to the Indian question (Scheuerman 1986:14). For his part, Wool believed that any treaties drafted by Stevens would touch off an unnecessary war. He refused Steven's request to have the treaty council grounds occupied by a cavalry unit from The Dalles. Nonetheless, the Indians were never able to capitalize on this rift between the white policy-makers.

Present at the treaty council was Army Lt. Lawrence Kip whose journal provides interesting eye-witness accounts of Steven's Treaty Council. Kip (1897:10-11) was most impressed by the arrival of the Nez Perce and the Cayuse and the council itself must have been a remarkable scene. With the fate of the tribes hanging in the balance as the onslaught of white immigration was about to sweep over the Indian land, the Indians and whites set down to business on May 30. Kip (1897:15) describes the scene:

> **Directly in front of Governor Stevens' tent, a small arbor had been erected, in which, at a table, sat several of his party taking notes of everything said. In front of the arbor on a bench sat Governor Stevens and General Palmer, and before them, in the open air, in concentric semi-circles, were ranged the Indians, the chiefs in the front ranks, in order of their dignity, while the background was filled with women and children. The Indians sat on the ground, (in their own words,) reposing on the bosom of their Great Mother.**

Even with good interpreters, language problems resulted since Stevens and Palmer could not speak with the Indians directly. Early on, Stevens revealed a paternalistic attitude, often referring to men much older than he as "children." As Trafzer and Scheuerman (1986:50) note, Stevens believed himself to be superior and assumed that whites had a right to direct Indian policy, regardless of what the Indians thought. All of the Plateau tribes had known Eastern Indians, many of whom had worked for Hudson's Bay and had married Plateau women. Thus, the Plateau tribes may not have been familiar with treaty making, but they understood the effects of American Indian policy, were not "foolish children", and did not believe that the white man had "been for many years caring for his red children across the mountains." The Indians knew that many treaties had been made and broken and that Eastern Indians were unhappy about their relocation to the Indian Territories west of the Mississippi. Stevens, being impatient, did not understand Indians and prematurely revealed his objective:

> **We want you and ourselves to agree upon tracts of land where you will live; in those tracts of land we want each man who will work to have his own land, his own horses, his own cattle, and his own home for himself and his children...to learn to make ploughs, to learn to make wagons, and everything which you need in your house...to spin, and to weave and to make clothes . . . Someday [you will] be farmers and mechanics, or you will be doctors and lawyers like white men** (Trafzer and Schuereman 1986:50-51).

Stevens promised to pay the Indians for the land which they were to give to the Great Father. Schuster (1975:214) observed that Stevens was pursuing a "containment" policy whereby, in return for ceded lands, Indians were to be removed to reservations. In return, Indians were to be compensated in cash, goods, instruction in farming, "white" education, and religious instruction. Setting aside reservations for Indians had the outward appearance of securing exclusive rights to a bounded territory, but actually, reservations segregated Indians, severed their traditional land ties, disrupted access to adequate subsistence resources, and confined them so they were less likely to interfere with white settlement.

Palmer promised to prevent white encroachment and hostilities and proposed boundary lines so that both the Indians and whites would know where their lands were. Palmer told the Indians that if there were no other whites coming into the country we might get along in peace but that nothing could stop the Columbia from flowing, the rain from falling, or the whites from coming (Trafzer and Scheuerman 1986:51).

On the third day, the Indians began to speak up when pent-up anger surfaced. On June 9th, Stevens explained again, this time for the benefit of Chief Looking Glass of the Nez Perce, the main points of the treaty and how there would be three reservations - one for the Cayuses, the Walla Wallas, the Umatillas, the Yakama, and the Nez Perce. He explained that the Indians were not to be removed to these reservations for two or three years. On June 9, the treaty between the government and the Yakamas was signed, first by Stevens, then by Kamiakin and the other Yakama chiefs. Thus, chiefs of the people who ranged over 10,828,800 acres or 16,920 square miles ceded their homeland. Eventually the Treaty deprived them of the things which made living possible and they would not be able to find substitutes since they could not yet compete in the white culture (Relander 1962:43). They retained a part of their homeland and were promised it for their exclusive use - the 1,875 square mile Yakama Reservation. They were promised $140,000 in annuities or goods for a 20 year period to be spent on improvements and they were promised their fisheries. Kamiakin spoke wisely, "Let them do as they have promised."

On June 11, Nez Perce Chief Lawyer met with Stevens and signed the Treaty. As Stevens reached out to the Cayuse to sign the Treaty, Young Chief spoke in opposition:

> **I wonder if the ground has anything to say? I wonder if the ground is listening to what is said? The ground says 'It is the Great Spirit that placed me here. The Great Spirit tells me to take care of the Indians, to feed them aright. The Great Spirit appointed the roots to feed the Indians on.' The weather says the same thing. 'The Great Spirit directs me. Feed the Indians well.' The grass says the same thing. 'Feed the horses and cattle.' The ground, water and grass say, 'the Great Spirit has given us our names'. We have these names and hold these names. Neither the Indians or whites have a right to change these names. The ground says, 'The Great Spirit has placed me here to produce all that grows on me, trees and fruit.' the same way the ground says, 'It was from me man was made.' The Great Spirit, in placing men on the earth desired them to take good care of the ground and to do each other no harm. The Great Spirit said, 'You Indians who take care of certain portions of the country should not trade it off except you get a fair price.**

Walla Walla Chief Five Crows agreed with Young Chief. General Palmer then said that he knew of no chief among the Walla Walla except Po-pe-mox-mox [Peopeo Moxmox]. Peopeo Moxmox got up and replied:

> **I do not know what is straight. I do not see the offer you have made to the Indians. I never saw these things which are offered by my Great Father. My heart cried when you first spoke to me. I felt as if I was blown away like a feather . . . . Stop the whites from coming up here until we have this talk. Let them not bring their axes**

with them. The whites may travel in all directions through out country, we will have nothing to say to them, provided they do not build houses on our lands.

Umatilla Chief Owhi rose to speak for his people:

> **We are together and the Great Spirit hears all that we say today. The Great Spirit gave us the land and measured the land to us, this is the reason I am afraid to say anything about the land. I am afraid of the laws of the Great Spirit. This is the reason of my heart being sad. This is the reason I cannot give you an answer. Shall I steal this land and sell it? or, what shall I do? This is the reason why my heart is sad. The Great Spirit made our friends, but the Great Spirit made our bodies from the earth, as if they were different from the whites. Shall I give the land which is a part of my body and leave myself poor and destitute? The reason why I do not give my land away is I am afraid I will be sent to hell.**

These speeches provide some understanding of the anguish felt at having to give up their sacred lands. While history records that the tribes accepted Steven's offers and signed the Treaties, did the Tribes have any choice? Already weakened by disease, much reduced in numbers, and fully aware that they could not prevail against an onslaught of whites, it is safe to say the Tribes were effectively coerced to the negotiating table and bargained from a position of weakness. Neither Stevens nor Palmer fully understood the words spoken about God and the earth since whites often viewed the land not as a spiritual partner, but as a wilderness to be tamed and manipulated (Trafzer and Scheuerman 1986:55). Stevens and Palmer were unsympathetic to the Indian world view and were angered by the chiefs' speeches. Their frustration can be heard in Palmer's final plea to the tribes - a plea that is both prophetic of the drastic changes about to be unleashed upon the Indians but also ironic for the promises made (and later not kept):

> **Can we bring these saw mills and these grist mills on our backs to show these people? Can we bring these blacksmith shops, these wagons and tents on our backs to show them at this time? Can we cause fields of wheat and corn to spring up in a day that we may see them? Can we build these school houses and these dwellings in a day? Can we bring all the money that these things will cost, that they may see it? It would be more than all the horses of any one of these tribes could carry. It takes time to do these things. We come first to see you and make a bargain. We brought but few goods with us. But whatever we promise to give you, you will get . . . We do not come to steal your land. We pay you more than it is worth. Why do we offer so much? Because our Great Father told us to take care of his red people.**

Late in the treaty negotiations, Looking Glass made a dramatic entrance into the American camp while the council was in session. From his horse he made a violent speech, looking defiantly down at Stevens and Palmer before turning to the Indians and addressing them with gravity:

> **My people, what have you done? While I was gone, you have sold my country. I have come home, and there is not left [for] me a place on which to pitch my lodge. Go home to your lodges. I will talk to you.** (Trafzer and Scheuerman 1986:56)

Kamiakin, who was opposed to the treaties, made a complete turn-around and signed the agreement. He assumed power over tribes he did not control, including the Palouses. Historians believe that his relatives (Skloom, Owhi, and Teias) prevailed upon him to sign. Also influential was Peopeo Moxmox who urged him to sign the treaty as an act of peace and friendship. Trafzer and Scheuerman (1986:58-59) noted that historians are unsure why Kamiakin changed his mind about the treaty, but the fact he did was of utmost importance to the Palouses. Under the terms of the treaty, the Palouses were to move from their homelands onto the Yakama Reservation. What really happened is that

Stevens employed an old trick of American Indian policy, one that had been used many times before. They simply assigned one leader to be "head chief" and placed several tribes under his control. Kamiakin was a victim of dishonest policy and the Palouses suffered as a result. They did not accept the treaty terms but most remained quiet until attacked.

The trouble with the treaties was that they required the Indians to give up their homes, to which they were attached not only by the associated memories of generations past, but by a deep seated religious view that the soil was their sacred mother. The treaties also stipulated that the Indians concentrat, irrespective of their wishes, within an area too small for their subsistence, except by agriculture (and tearing up the soil was abhorrent to them) (cf. Relander 1962:44).

Article II of the Yakima Treaty, after describing the physical territory to be encompassed by the reservation, reads:

> **All which tract shall be . . . for the exclusive use and benefit of said confederated tribes and bands of Indians, as an Indian reservation; nor shall any white man, excepting those in the employment of the Indian Department, be permitted to reside upon the said reservation without permission of the tribe and the Superintendent and agent.** [Article III reads, in part]: **The exclusive right of taking fish in all the streams, where running through or bordering said reservation, is further secured to said confederated tribes and bands of Indians, as also the right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing them; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land.**

A similar provision was made in the Treaty with the Confederated Tribes of the Umatilla Indian Reservation. The Indians most wanted, and believed they were getting, guaranteed fishing rights and the treaty negotiators knew how much Indians needed fish (cf. Gibbs 1854:326). In only a few years, Stevens negotiated treaties with more than 17,000 Indians and in so doing extinguished Indian title to more than 100,000 square miles (64 million acres) of the what is now Washington, Idaho, and Montana. The Indians gave up vast quantities of land, but they retained their key holding - their right to make a living by fishing. The treaties secured their rights not only on the rivers running through the reservations, but also to all other places at which they were accustomed to fish. Their only concession was that they would share these off-reservation fishing grounds with the white settlers (Cohen 1986:38).

One year prior to the ratification of the treaties, Gov. Stevens published a pamphlet encouraging and advising emigrants how to locate in Washington Territory. Washington Territory's Organic Act established important provisions:

> **. . . Nothing in this Title shall be construed to impair the rights of person or property pertaining to the Indians in any territory, so long as such rights remain unextinguished by Treaty between the United States and such Indians, or to include any territory which by Treaty with any Indian Tribe, is not without the consent of such tribes, embraced within the territorial limits or jurisdiction of any state or territory; but all such territory shall be excepted out of the boundaries, and constitute part of any territory now or hereafter organized until such tribe signifies its assent to the Present to be embraced within a particular territory.**

The main cause of the Yakima War of 1855-1856 was the failure of the U.S. Senate to make good the Yakima Treaty. The whites were overeager to possess land to which title had not been extinguished as a result of Stevens, prior to treaty ratification, advertising the land east of the Cascades as being open for settlement. Notices were placed in the Puget Sound Courier on July 12, 1855, in the Umpqua, Oregon Gazette on July 26, 1855 and in the Table Rock, Oregon Sentinel (Relander 1962:45). The Treaty was not validated by the U.S. Senate until March 8, 1859 and was not proclaimed by President Buchanan until April 18, 1859. Stevens promised that the tribes would not be removed to the reservations until the Treaty was ratified. Unfortunately, land improved by the Indians was taken by settlers, livestock belonging to the whites were grazing Indian lands, and settlers were cultivating land to which they held no title. Col. George Wright of the 9th Infantry wrote to James Nesmith (Superintendent of Indian Affairs at Salem, Oregon):

> **The Treaty made by Gov. Stevens and Gen. Palmer is null and void and our relations with the Indians are in status quo. The great misfortune was that the country was opened to settlement before the treaties were ratified.**

Col. Wright sent a copy of Brig. Gen. Newman Clarke's General Orders No. 87 to Nesmith:

> **. . . Until orders to the contrary are received from the War Department no white person will be permitted to settle in the Indian country east of the White Salmon River or north of the Columbia in Washington Territory or East of the river Des Chutes in Oregon...Commanders . . . will notify the Indians...and be at pains to explain to the Indians that they have the same rights to their country now as they had before . . .**

General Clarke notified Nesmith of a policy change on November 3, 1858:

> **. . . having made known on a former occasion my opposition to the treaties of Gov. Stevens with the Indians east of the Cascades I feel it incumbent on me to inform you that my views have changed.** [he was honest enough to add] **. . . the increasing inducement for emigrants to enter that region have led me to this change . . .**

Even after the treaties were ratified, funds to fulfill their terms were not appropriated. Acting territorial governor C.H. Mason realized that failure to ratify the treaties and hordes of miners overrunning Indian land was causing disturbances. Reflecting the growing desire of territorial residents for more land, Gov. William A. Newell told the Legislative Assembly on October 5, 1881 that:

> **The Indian question which so vexes the public mind and strains the entire public purse, is easy of solution in this Territory. Abolish the reservations . . .**

Relander (1962:47) noted that in the treaty making days, the Indian population was dominant in the Northwest but territorial governors did not seem to care about the future needs of the Indians. Their attitude was typical, "don't look at them, they'll go away." The 1850 non-Indian population in that part of Oregon Territory from which Washington Territory was created was 1,201 inhabitants. When Stevens met with the Indians in 1855, the non-Indian population in Washington Territory was 3,965 while the Indians numbered 15,000. In 1860, when Washington Territory included what is now Washington, Idaho and parts of Montana and Wyoming, the non-Indian population was 11,594. Since Indians were not represented in Congress, they were excluded from the 1860 census (e.g., "Indians not taxed."). By 1870, the non-Indian population had swelled to 23,955 in Washington Territory and reached 75,116 in 1880. In 1890, the first census after statehood, non-Indians numbered 357,232 while the Indians numbered 11,181. Their numbers dropped to 9,061 in 1920 and rose again to 11,253 in 1930. At the time of the Treaty, Stevens had estimated the Yakama population to be about 3,900.

Broken treaties were still an issue well into the 20th century as the conflict between non-Indian culture and the needs of both the salmon and the Indians came before the courts. So important did the Indians consider the salmon that in signing the treaties they knowingly ceded vast quantities of land but were determined not to give up their right to continue fishing (Cohen 1986:4). The white negotiators did not offer to exchange fishing rights for land since the whites were powerless to *grant* any such rights. The tribes possessed these rights already, just as they possessed the land they were handing over. What the negotiators signed was a guarantee to protect fishing rights and the treaties *reserved* and *secured* those rights for the tribes (Cohen 1986:5). As the newcomers demanded a share of the salmon harvest, more and more developers found competing and destructive uses for the salmon's freshwater nursery. Early explorers and immigrants characterized the salmon runs as astonishing, but overfishing and environmental damage worked together to decimate the fish runs (Cohen 1986:5). State agencies, pressed to divide the fish, pushed the tribes aside and Indians saw their fishing rights increasingly eroded. After much litigation, the Indians came before Judge Boldt for a definitive ruling on the substance and force of their treaty rights (Cohen 1986:5).

When Europeans invented the canning process in the early 19th century, the trade in Northwest salmon and Steelhead boomed. In 1866, salmon canning was introduced at Eagle Cliff on the Columbia by Hapgood, Hume and Company and by 1883 there were 55 canneries on the Columbia and its tributaries. Cannery production became increasingly efficient with the invention of a mechanical cutting machine and the sanitary tin can. After 30 years of canning on the Columbia, a salmon bound for its native stream was much more likely to end up packed in a can before it could reach its birthplace or Indian nets (Cohen 1986:40; see also Smith 1979). In some areas, the Indians fished for the canneries; in others, non-Indians caught the salmon with gill nets, purse seines, and fishwheels and traps (Cohen 1986:40-41). Competing fishing techniques soon became associated with ethnic and political competition for the fish. The losers were the Indians who were pushed aside by the traps, wheels, and immigrant white fishermen, and the fish, which were dangerously overharvested (Cohen 1986:41).

The depletion of salmon runs served to break up fishing villages on the reservation. The movement of families to their individually owned allotments fostered a new settlement pattern of isolated homesteads, occupied by extended families. Economic hardship brought about by deterioration of on-reservation fishing was somewhat mitigated as Yakama Indians continued to exercise their rights to fish at their aboriginal fishing stations at The Dalles and Celilo Falls (Schuster 1975:260-261). Even these measures were temporary as white homesteaders claiming lands adjoining the fisheries tried to block Indian access.

Beginning in the late 19th century and continuing ever since, dam-building, logging, farming, and industrial development have increased pressure on the salmon. By 1948, some 300 dams had been built in the Columbia Basin (Cohen 1986:45). Cohen (1986:45) citing anthropologist Courtland Smith, stated that between 1880 and 1930, before impact from the major dams, some 34 million pounds of fish were caught each year. As the effects of the dams were being felt between 1931 and 1948, only 24 million pounds were caught. Even counting genetically inferior hatchery fish, Northwest salmon today are about 13% of their numbers in the 1800s and wild stocks continue to decline rapidly (Winninghoff 1994:108). As the government was about to inundate Celilo Falls behind The Dalles Dam in 1956, the Indians held the last of their First Salmon ceremonies there. Although "compensated" for the loss of Celilo Falls and their 2 million pound/year catch there, Courtland Smith lamented that the Indians could never be properly compensated for the loss of a renewable resource so important to their culture (Cohen 1986:46).

The scramble to develop the Northwest severely affected both salmon and Indians. Difficult times for salmon were equally difficult for the Indians who depended upon them. State law forbade Indian fishing at almost all of their usual and accustomed areas and where they could fish, they were forbidden to use traditional gear. With respect to fishing rights, the treaties were broken as early as the 1880s when non-Indians claimed that Indian fishing interfered with the fishing of citizens with whom Indians held rights "in common" (Cohen 1986:52). In 1887, two years before the commissioner wrote to agent Simcoe, homesteader Frank Taylor fenced off his land near Tumwater, Washington and blocked access for Yakama fishermen who had always fished at that location. A court ruled for Taylor but the Yakama appealed to the territorial Supreme Court. The judges ruled in favor of the Indians and ordered Taylor to remove his fence since the treaty expressly protected the Yakama's right to fish at all usual and accustomed places (Cohen 1986:55).

In 1905, the Yakamas faced another challenge. Mr. Winans, a white citizen, owned land along the Columbia and operated a state-licensed fish wheel at one of the Yakama's usual and accustomed fishing places. Winan's attorney argued that the sophisticated fish wheel was superior to Indian techniques and that somehow conferred upon him superior rights. The Supreme Court Justices ruled that Winans had no such superior rights, the treaty was still binding and it had to be interpreted as Indians would have understood it, and clarified the treaty by putting forth the "reserved rights doctrine." This doctrine provides that the treaty was not a grant of rights *to* the Indians, but a grant of rights *from* them (Cohen 1986:56). While the Indians fared relatively well with the Supreme Court, they didn't fare so well with the state courts. In 1916, before the Washington State Supreme Court, the Indians were struck a blow. A Yakama Indian named Towessnute was arrested for fishing without a license, for snagging salmon with a gaff hook, and for catching fish without hook or line within a mile of a dam - all contrary to state regulation. That court ruled that the only treaty right held by the Indians was an easement over private land to reach a traditional fishing place. Washington State Supreme Court Justice Bausman wrote:

> **The premise of Indian sovereignty we reject. The treaty is not to be interpreted in that light. At no time did our ancestors in getting title to this continent ever regard the aborigines as other than mere occupants, and incompetent occupants, of the soil. Any title that could be had from them was always disdained . . . Only that title was esteemed which came from white men . . . The Indian was a child, and a dangerous child of nature, to be both protected and restrained. In his nomadic life, he was to be left, as long as civilization did not demand his region. When it did demand that region, he was to be allotted a more confined area with permanent subsistence . . . These arrangements were but the announcement of our benevolence which, notwithstanding our frequent frailties, had been continuously displayed. Neither Rome nor sagacious Britain ever dealt more liberally with their subject races than we with these savage tribes, whom it was generally tempting and always easy to destroy and whom we have so often permitted to squander vast areas of fertile land before our eyes.** (Cohen 1986:57)

If the states were busy breaking the spirit, intent, and word of the treaties, the federal government was taking no action to uphold Indian treaty rights either. The Commissioner of Indian Affairs wrote to the Secretary of the Interior seeking appeal of the Towessnute case but his request was not granted since the Interior Department believed such appeal held little promise (Cohen 1986:58). The U.S. Supreme Court had recently decided that New York state could regulate Seneca fishing and the predominant government policy was to promote assimilation through agriculture. To Indian agents closer to the scene, the effect of the Towessnute and other cases was that the state stepped up its enforcement against Indians who were fishing off-reservation in their usual and accustomed places contrary to state-set seasons or gear restrictions. Many Indians still recall how difficult it was to fish in the 1920s and 1930s. Lacking support from the BIA and threatened with arrest by state fisheries wardens, Indians could sell fish openly only when Washington's regular fishing seasons were open. Even during these difficult years, Indians refused to give up fishing altogether and would not sever their relationship with the salmon. Beginning in the 1920s and 1930s, new national policies were evolving that would encourage Indians to challenge the states once again (Cohen 1986:60).

After the first World War, the public become increasingly concerned about the conditions faced by Indians, who had neither vanished nor been assimilated. The Citizenship Act of 1924 conferred citizenship on all Indians who had not otherwise attained it by accepting an allotment of tribal land or serving in the Army. The act did not modify treaty rights nor tribal status and thus Indians became citizens of the United States and of a tribe at the same time (Cohen 1986:60). The 1928 Meriam Report found the Indians in a dismal state of affairs -- the overwhelming majority were extremely poor and had not adjusted to the economics and social system of the dominant white society. The report described rampant disease, inadequate living conditions, suffering and discontent. Clearly the assimilation policies had not accomplished their goals and individual ownership through allotment had not made farmers out of Indians accustomed to fishing or hunting. The report blasted the Indian Service for its practice of removing Indian children from their homes since it fostered disintegration of Indian families through its insensitivity to the fundamental importance of family life and community activities in the social and economic development of a people. Interestingly, the report did not call for an abandonment of the assimilation policy, rather, it suggested improvements to help those Indians willing to assimilate and assistance to those who preferred to retain the old ways (Cohen 1986:61).

The Great Depression and the sweeping social changes ushered in by the New Deal made the time ripe for changes to Indian policy. In 1934, Congress passed the Indian Reorganization Act (Wheeler-Howard Act) - the first major federal legislation in Indian affairs since the passage of the Dawes Allotment Act almost 50 years earlier. This act ended the allotting of Indian lands and set out procedures for regaining previously-held land and recognized tribal rights to formulate their own governments and set up tribal business organizations. Some tribes, such as the Yakama, had established fishing regulations well before passage of the reorganization act (Cohen 1986:62). Indian challenges to state regulations continued and in 1939, Sampson Tulee, who had been fishing under the same Yakima Treaty of 1855, enlisted federal support when he risked arrest for catching salmon with a dip net and selling it commercially without a state license. When his case reached the U.S. Supreme Court in 1942, the results were mixed.

Judge Boldt's ruling on February 12, 1974 in United States v. Washington affirmed the right of treaty tribes to fish at their usual and accustomed grounds and stations off the reservation and "in common with" the other citizens. He interpreted "in common with" to mean "sharing equally": 50-50 (Cohen 1986:83). He authorized the tribes to manage the fisheries in their traditional fishing sites and required the state to observe strict limitations on the extent to which it restricted treaty Indians' off-reservation harvests. He envisioned a system in which tribes, managing their own fishery, would work in close consultation with the state (Cohen 1986:83).

Much has been written on the subject of Indian-White relations and one of the most useful compendiums is Volume 4 of the Handbook of North American Indians (Washburn 1988). A history of the various policies of the United States with respect to the American Indians is presented by Horseman (1988:29-39) for the period 1776-1815, Purcha (1988:40-50) for the period 1815-1860, Hagan (1988:51-65) for 1860-1900, and

Kelly (1988:66-80) for 1900-1980. A review of military conflict between the Indians and the United States is presented by Utley (1988:163-184) while Kvasnicka (1988:195-201) reviews treaties and agreements between the Indians and the United States. The legal status of the American Indian has been reviewed by Baca (1988:230-237). Three useful studies of the fur trade include Ray (1988:335-350), Swagerty (1988:351-374) and Gibson (1988:375-390). The role of the missionaries has been explored by (Beaver 1988:430-458) and Burns (1988:494-500).

3.5.9 The Alienation of Indian Land

Tribes had retained their powers of self-government in internal affairs under the treaties, but they had difficulty exercising such power in the face of unremitting federal pressure to give up Indian ways and become assimilated into white culture. Nowhere was this policy used to assault tribal self-government more harshly than in the development of allotment programs, culminating in the Dawes Allotment Act of 1887, which eliminated the traditional practice of communal or tribal ownership (Cohen 1986:53).

The Allotment Act (or Dawes Severalty Act) passed on February 8, 1887 and was signed by President Chester Arthur and later amended in April 2, 1892. The act was conceived by pressures upon Congress to break up Indian land tenure, destroy tribal life built on the old foundations, and to assimilate Indians individually. The act was in effect 47 years during which time two-thirds of Indian land was alienated. The act provided granting of 80 acres of agricultural land or a double quantity of grazing land to each individual. By 1902, the Secretary of the Interior decided that children born of a white father and Indian mother follow the father's citizenship status and are not entitled to allotments on the public domain (Relander 1962:61). This legislation divided reservations into plots of limited size for distribution to individual Indians who would receive title and those holding allotments would become citizens. Act proponents argued that Indians would benefit from owning private property and the "civilizing" effects of the farming life. Once allotments had been assigned, all unallotted land parcels were to be declared "surplus" and could then be sold to whites. The act resulted in large tracts of land becoming available for white settlement and the loss of about 90 million acres of Indian land to whites and the creation of "checkerboard" ownership patterns within reservations.

When the rolls were closed in 1914, 440,000 acres of the Yakama Reservation had been allotted to 4,506 individuals leaving 700,000 acres of tribal property. Only with great difficulty did the Yakama Tribe resist pressures to open up the reservation. After the period of allotment, when scattered homesteads became the dominant residential pattern on the reservation, the tendency persisted for extended families to live together in a home territory (their allotment) and move as a residential unit to root digging or berry gathering grounds (Schuster 1975:49).

The North Yakima Land Office embraced Yakima, Kittitas and Benton counties and parts of Franklin and Douglas counties - an area consisting of 5,157,546 acres. In 1906, it was busy processing public domain land and homestead filings amounting to 89,891 acres (Relander 1962:65). Homestead fever ran high throughout the nation at this time and filings were being made at the rate of 4,000 a month. Meanwhile, pressures on the reservations continued. Senator Jones announced that the way was being cleared for settlement of the Yakama Reservation through the Wapato Irrigation Project. The project bill provided Indians could sell 60 acres of their 80 acre allotments to pay construction costs. This project produced an important protest writing by Lucullus V. McWhorter (1913) published as The Crime Against the Yakimas. That year, with 120,000 acres of irrigable land under the project, 10,000 acres had already passed from original Indian ownership. The conflict was growing more unequal with more than 500 non-Indian land owners on the Reservation (Relander 1962:66). William E. Johnson, a former Chief Special Officer of the United States Indian Service, writes in his introduction to McWhorter's book:

> **As an island is defined as a tract of land entirely surrounded by water, so may an Indian Reservation be described as a tract of land entirely surrounded by thieves. Too often the Indian Superintendent, or agent, becomes the agent and co-partner of those who would plunder the Indians rather than attend to his duties as administrator of the affairs of the Indians themselves. The blundering, wobbling, oftentimes treacherous, administration of Indian affairs, conducted from a seat of power three thousand miles away, is the most sickening, discouraging, disgusting failure in the history of American government. While the superb, natural sense of honor of the Indian has led him to scrupulously observe every treaty and obligation ever entered into, the Government has left a trail of broken treaties, broken promises, repudiated pledges - an hundred years record that would disgrace a king of the Cannibal Islands.**

Those were the days when the reservation people were compelled to constantly fight for their earthly inheritance against the land-hungry settlers. Most of the country suitable for farming had been claimed and the whites were turning toward the reservations, which they had earlier regarded as worthless. Newspapers all over the Northwest joined in the din, "open the reservations. There is more land than the Indians need" (Relander 1956:107). The Indians had to fight back in the way of the white man. Major Lee Moorhouse (Indian agent on the Umatilla Reservation between 1889-1893) was a friend who helped them withstand the concerted land raids on the Umatilla Reservation. McWhorter (known as Old Wolf among the Yakama) helped stem the tide on the Yakama Reservation. Some settlers, and cattlemen in particular, wanted more land for their herds and attempted to foment outbreaks of hostility since hostilities would destroy the Treaty and open the reservations.

As early as July 1867, the agent for the Umatilla Reservation reported that the Indians were fearful of losing their reservation which was completely surrounded by white settlements and "so anxious are the white people in the vicinity to possess this land, that threats to remove the Indians by violence are not infrequently heard" (Oliphant 1950:44). In 1872, the Umatilla agent reported that he was compelled to order the white men to remove their stock from the reservation and that in one or two instances he had to resort to court action to achieve eviction. Oliphant (1950:45) noted that only by "very hard work" could the agent, as late as the summer of 1890, keep outside stock off the Umatilla Reservation. The cattlemen in particular, were particularly problematic (Oliphant 1950:53).

The whites had their eyes on the Umatilla Reservation for other reasons than wanting to graze stock. Parts of the Reservation were fertile and by the late 1870s, most of the Umatilla Agency Indians were making impressive strides with farming (Martin 1969:150-151). Drought, on occasion, destroyed their crops and because they received no rations, were forced to return to their traditional ways of obtaining food. In 1878, raiding Snakes, Paiutes, and Bannocks destroyed many of their improvements, ran off stock, and burned crops. In 1880, unusually severe weather and hordes of grasshoppers and crickets reduced their crops yield by half. The fertility of the Reservation was obvious to whites who could not help but observe that by the 1880s, farming and stock grazing accounted for most of the Umatilla's subsistence and only a small part came from traditional means. Many whites just moved in and took Indian land. When attempts to provoke hostilities failed - the Indians were enduring and patient - the whites resorted to letters and petitions, thereby gaining the receptive ears of officials who ignored the promises so solemnly made on the nation's honor at the Treaty Council at Walla Walla (Relander 1956:109).

The Yakama Reservation covers over one million acres of diverse country including a vast body of fine desert lands susceptible to irrigation, which has been allotted in severalty to 3,046 Indians. McWhorter reported that about 42,000 acres was under irrigation. Crops were being produced on 10,000 additional acres by sub-irrigation, while perhaps 20,000 acres of the allotted lands had been purchased by whites. This irrigable region, fertile beyond conception when watered, had long been coveted by the whites. The first attempt at irrigation on the Reservation was in 1859 (when the Treaty was ratified).

McWhorter (1913:6) reported that in 1895, the Commercial Club of North Yakima (an early "chamber of commerce") petitioned Congress to sell the surplus lands of the Yakamas, and to open the reservation for settlement. Two years later, Commissioners were sent to negotiate with the tribe. They estimated that 200,000 acres of land would suffice for all allotments. For the residue, the Government offered "unusually liberal terms" - $1,400,000, deferred payments to bear 4% interest. The Yakamas spurned this offer. For years the Indian Office sold the lands of deceased Indians to speculators rather than home-seekerers (undivided allotments were offered to the highest sealed cash bidder, thus only those well equipped could compete). This resulted in vast and valuable holdings by a few at extremely low valuations. In 1909, McWhorter brought these conditions to the attention of the Indian Department and was promised that changes would be made. McWhorter pointed out that lands sold at higher values in small tracts and that all-cash sales were not helpful since in nearly every case the money was doled out to the beneficiary in meager monthly installments. The Indians lost thousands of dollars through the criminal stupidity of the Indian Department.

Several pieces of legislation were aimed at separating the Yakama from their land. The first Jones bill, signed on December 21, 1904, provided for the opening of the Yakama Reservation and the sale and settlement of unallotted tribal lands. Another, more notorious, Jones bill was signed on March 6, 1906. It provided that the irrigable lands of the Yakama Reservation be cared for by the United States Reclamation Service, and with the consent of the Indian, authorized the Secretary of the Interior to sell 60 acres of each 80 acre allotment (20 acres to be retained by the Indian who would be furnished with a water right) and the balance, if any, would be deposited in the U.S. Treasury to the credit of the individual Indian. This balance could be paid to any of them, if, in the opinion of the Secretary of the Interior such payments would tend to improve the condition and advance the progress of said Indian, but not otherwise. Under this act the Wapato Project, designed to irrigate about 120,000 acres, was launched (McWhorter 1913:6).

The true incentive of the Jones bill was that the Reclamation Service wanted a foothold in the Yakama Reservation, but the unsettled condition of the water rights of the Indians was a stumbling block. McWhorter (1913:9) blasts the Reclamation Service since the Treaty of 1855 secured "the exclusive right of taking fish in all the streams running through or bordering said Reservation" and the Service refused to recognize the priority right of the Yakamas to the streams referring to the Indians' contention for irrigation water as "vague claims." At this time, the Northern Pacific, Kittitas and Yakima Irrigation Company was constructing a dam across the Yakima River some three miles below Union Gap for the purpose of diverting water to a canal irrigating a large tract of land northeast of the stream.

McWhorter (1913:10-11) told of similar larceny with the Waneto Slough and "Gilbert's Canal" where the reorganized Washington Irrigation Company (formerly the Northern

Pacific, Kittitas and Yakima Irrigation Company) illegally diverted water. On the Ahtanum, a boundary stream tributary to the Yakima, the Indians were permitted to retain only a fourth of the low water flow, leaving the old Indian ditches constructed some thirty years earlier, entirely dry. Complaint to the Indian Department availed nothing and no justice was served in this dividing of the waters of the Yakima. Thus, the theft of Reservation waters, worth millions of dollars, was confirmed and this "adjustment" was regarded as final. The Interior Department could not, however, consider this purchase until a "clear slate" for the Reclamation Service on the Yakama Reservation was apparent. To this end the Jones bill of March 6, 1906 was formulated and passed.

After the Sunnyside canal was sold, the Reclamation Service entered the Reservation and mapped out the "Wapato Project." In the latter part of July, 1909, opposition of the allottees to the undertaking became so manifest that the chief clerk of the Indian Office visited the Yakama Reservation to ascertain the hindering cause. He soon came to believe that there was some outside influence at work among the Indians. The promoters of the Wapato canal were now in despair. Their pet scheme of "civilizing" the half-hunter, half-pastoral Yakama by confining him to a 20 acre garden among a dense population of "energetic and industrious" white farmers was failing. Something should be done for the "poor Indian"; so in July 1909, Mr. Gilbert, the Reservation real estate broker, under the auspices of the Commercial Club of Toppenish, advocated in the press and petitioned the Secretary of the Interior:

> **That is would be better to follow the advice of former Commissioner Leupp and give such Indians as do not want to take advantage of the Jones bill, patents in fee simple and treat the allotted Indians as they really are, American citizens.**

McWhorter (1913:16) added that the above should read: "Then the white man with much booze and very little money will speedily 'eliminate' the 'Indian factor' from the Yakima Valley forever." After several months of deliberation, a council meeting was held in September, 1909, at Fort Simcoe where Indian opposition was strongly manifested. Yakama chief Klah-toosh arose to speak:

> **Yes, my friend; I understand your talk. Do not bring any lies that you can manufacture. This country is ours. The water is ours. The law knows this. Who gave you the right to take from us our water which is life, and then offer it back to us in exchange for our land? Why should we pay for that which always belonged to us? You white people want to eat us up like hogs. Do not talk to us like fools.**

Lumni, a Yakama elder spoke out as well:

> **When Governor Stevens made treaty with our fathers in 1855, he said, 'So long as the sun shines, so long as Mt. Adams stands and so long as the water flows down to the ocean, will this reservation be yours.**

Wild rumors were current that the Reservation was to be thrown open, their lands sold or taken from them, and the streams confiscated by the Reclamation Service. Cattle thieves operated with impunity, and bootleggers plied their nefarious trade. One morning in 1908, Chief Yoom-tee-bee shared his feelings on the wrongs suffered by his people through the greed of the white man. He spoke of their treaty rights of 1855 and said:

> **Long time ago this government and Gov. Stevens made treaty and took all our land but this reservation. This, Gov. Stevens said, should be ours as long as the sun shines and the water flows; and no white man would be allowed to live on our reservation.** [Ascending a slight rise where the vision was unobstructed, he pointed tragically to the east, where in the distance could be seen the fringe of settlements marking the irrigated district, and exclaimed] **You see there the houses of the white**

man. They are built on the land of my people. The government has lied; the white man is fast owning our lands. If the Government must have my reservation, I will sell all under the ditch and keep all on this side. No white man must come here. The good Indians will move up here, and we will keep out all saloons. By and by the drunk Indians will all die, and there will be no more trouble.

The project was further discussed at a tribal council meeting on July 1, 1910. The discussions shed further light on the condition of the Yakama at this time. Louis Shuster, a Yakama elder, spoke:

> **This is the work of Me-yah-wah (God). Of course this God is above us and has great power. He hears us talk and knows if we are speaking the truth or telling lies. We rely on you to send a full report to the Department for us. We feel glad over this. When the whites were few our fathers gave them land. Today I see those few white people prosperous. For them I am glad. I feel well towards all, but I grieve to see my people broken and scattered by those whom we befriended. I, a red man, am in poverty and not prosperous. The government gave us breeches and blankets, but they are faded and gone. We do not ask that these be replaced. We want only our own and the right to live.**

In the following years, Senator Jones introduced other bills to build roads through the reservation and to construct storage reservoirs to impound flood waters of the Yakima River. It was only in 1934, with the passage of the Reorganization Act, that Indian tribes were able to revive their basic laws (Relander 1962:80). One purpose of the Indian Reorganization Act of 1934 was to establish self government by tribalism, thus restoring Indian leadership destroyed after the Treaty. On the Yakama Reservation a council call went out for the members of the confederated tribes to meet at White Swan. One of the results of the tribal reorganization was that development of the natural resources of the Reservation was made possible and with the gradual withdrawal of government services, the tribes became more self sufficient (Relander 1962:85).

In a letter from Yakama Agent James Wilbur to Acting Commissioner of Indian Affairs, E.J. Brooks, Wilbur noted that the Palouses had made improvements of considerable value as a result of their cultivating small tracts of land (e.g. the Indian homesteads). He recommended that the Indians be paid for their improvements and then removed to the reservation "where they belong" (Trafzer and Scheuerman 1986:127). Wilbur was referring to the Indian Homestead Act which permitted non-reservation Indians to file claim on the public domain, lands which had long belonged to the Indians but which had been ceded to the United States by various treaties. In order to file a claim, Indians had to relinquish their tribal status, although they retained their right to a share of tribal funds. Reform-mined whites looked at the act as a vehicle for civilizing the Indians and encouraging them to become prosperous, like the whites, by working a homestead. Wilbur lamented these developments because Indians were abandoning their tribal relations, leaving the reservation, and staking claims. He was also concerned that the non-reservation Palouses were too far removed from the protective oversight and supervision of the agent and the Indians were becoming victims of whites looking to take advantage of their ignorance of the law. At one point, Wilbur asserted to Special Indian Agent H. Clay Wood that over 1000 Indians belonging to the Yakama Reservation were widely scattered from the Palouse River to White Salmon and the Lewis [Snake] River (Trafzer and Scheuerman 1986:128). Wilbur urged Wood to force the Palouse Indians onto the reservation. Wilbur was joined in this crusade by Nez Perce Agent John B. Monteith who was also eager to move the Palouses to a reservation. R.H. Milroy, Wilbur's replacement as Yakama Agent was also against the Indian Homestead Act (Trafzer and Scheuerman 1986:129).

General Howard supported the Indian Homestead Act and a number of whites helped the Palouse file claims on the public domain. Howard, during his 1878 tour of the inland Northwest, became more convinced that non-reservation Indians like the Palouses, should file claim on their lands and live like white homesteaders. He believed the Indians could learn to farm and get social and economic benefit from private ownership. General Nelson Miles, who recently defeated the band of Nez Perce and Palouse who attempted to flee to Canada, dispatched Major J.W. MacMurray to assist the Indians to file claims. MacMurray spent months explaining the homestead law to various Indians, but his checkerboard land division concept was foreign to the Indians and if the Palouses were to remain off the reservation, they had to accept the white man's concept of private ownership in violation of God's law. Despite their religious beliefs, many Palouse filed homestead claims. Interestingly, MacMurray soon learned of Smohalla and his continued opposition to private ownership. While making no headway with the Wanapums, MacMurray did find an interested audience among the reservation Yakama, much to the chagrin of Yakama Agent Milroy! MacMurray and other whites were successful in registering several land claims for many Indians. Some of the land claims conflicted with titles granted by congress in 1870 to the Northern Pacific Railroad and in 1886, railroad officials appealed to the Secretary of the Interior but to no avail. The Secretary honored Indian land claims through the lower Palouse River Canyon (Trafzer and Scheuerman 1986:131-132).

But the land claims of the Indians on the public domain did not result in any permanent settlement and the process of alienation from the land continued. By the last decade of the 19th century, the Palouses still remaining in their homelands began moving onto the reservations, surrounded as they were by a sea of white settlers, most of whom favored Indian removal (Trafzer and Scheuerman 1986:134-135). The final blow came soon after 1897 when Yakama Agent Lewis T. Irwin reported that the Palouse were cultivating a small bit of land but lived primarily from their fishing. He observed that their root grounds had been destroyed by the plow and that they had difficulty eking out a living fishing due to intense salmon harvests at the mouth of the Columbia. He recommended that the Palouses be forcibly removed to either the Nez Perce, Umatilla, or Yakama Reservations. Eight years later, the Indian bureau acted on this recommendation. In the spring of 1905, a steamboat arrived at Palus loaded with American soldiers who ordered the Indians to gather their belongings and get aboard.

While the Palouse were removed from their ancestral homes, many Lower Yakama bands that agreed to move and resettle onto the reservation were not displaced from their ancestral homes. Families which had homesteaded and had been able to acquire allotments on lands which their ancestors customarily lived, tended to remain conservative and formed a cadre around which support for the perpetuation of traditional Indian customs, mores, and religion was mobilized. This continuity of residence is seen by Schuster (1975:224) as an important factor contributing to the persistence of traditional life ways and present-day Yakama conservatism. Schuster (1975:227) writes that an unconscionable price was paid by the Indians for the dubious privilege of receiving inadequate compensation and being assigned to a reservation. Not only were treaty provisions violated considerably prior to ratification, but the exclusive rights and privileges guaranteed to the reservation were also abrogated after ratification of the treaty provisions, as whites began to settle on reservation lands after the period of allotment.

3.5.10 The Alienation of Indian Culture

The Bureau of Indian Affairs (BIA) operated on several reservations and planned to transform Northwest Indians into sedentary, agricultural, English-speaking Christians. At first the BIA designated reservations as isolated places where cultural and linguistic change could be fostered, working on the assumption that farming was the highest "calling" and that Indians would benefit best if they mastered the techniques of crop production and livestock management (Beckham 1991:45). The Umatilla and Cayuse, which had great herds of horses and had acquired gardening skills from their contact with the Whitmans, received glowing marks in agent reports for their march toward a "civilized state." In Oregon especially, the Indians suffered from this brutal system of enforced civilization. Thousands died needlessly because of concentration of people, while others died of malnutrition because of crop failures. Many tribes received no annuities since the Senate failed to ratify their treaties while others suffered from agent malfeasance or corruption (Beckham 1991:48).

Coercion to abandon Indian ways and culture was further exacerbated by President Grant's "Peace Policy" which operated from 1870 to 1882. It was predicated on the principle that in the complex American society rapidly developing after the Civil War, Indians could be saved from extinction only through an enlightened church-oriented policy in the management of their affairs (Ruby and Brown 1988:228). The Indians were incapable of adjusting to American culture as rapidly as whites expected they would and the Indians themselves were aware, long before the whites, that it would be difficult to fuse the two cultures. Ruby and Brown (1988:229) noted that on the Siletz Reservation in coastal Oregon, the Indians had a saying, "It is your peace that is killing us."

As the pace of westward movement sped up after the Civil War, the reservation system, which had already begun before the war, was seen as the basis of the solution of the "Indian Problem" (Whitner 1959:135). Grant's Peace Policy was intended to be an improvement on the reservation system, calling generally for the use of peaceful means rather than force to locate all the tribes on reservations with eventual individual allotments, expanded educational programs and facilities, provision of food and clothing until the Indians could become self-sufficient, and improving the quality of the agents (Whitner 1959:135).

President Grant, from a Civil War surplus, appointed military officers as Indian agents and by 1869, all Indian agents in the Pacific Northwest were military men. The Quakers had sufficient political clout to cause the posts once again to be filled by nonmilitary men. Although administration shifts highlighted the pitfalls inherent in trying to assimilate Indians into mainstream American life, churchmen clung to hopes of such assimilation. As the Episcopal Church joined the Quakers in their concern for Indian welfare, Grant's Peace Policy can be seen as the culmination of these forces. Only two years into the new policy, the Military Division of the Pacific and its Department of the Columbia became instrumental in driving Plateau tribes to the reservations. As Ruby and Brown (1988:229) noted, the peace politicians were supported by the military and knew that the rifle had joined the Bible as adjuncts to the plow. Once on the reservation, the Indians found some of the missionary/agents were selfless but many others proved to be corrupt and bigoted (Beckham 1991:48).

The assigning of Indian agencies to various religious denominations was not only the policy's most unique characteristic but its most controversial. It angered churchmen even more than it bewildered Indians that the agencies were shuffled among the churches (Ruby and Brown 1988:230). This policy, in effect, parceled out the reservations among the Christian denominations which, through various sects, were to secure a monopoly for staffing and running them. If they had not known it before, the Indians soon learned that the Peace Policy contained as much rancor as it did religion. When asked if his people wanted churches in the Wallowa country, Young Chief Joseph replied that they did not since churches "would only teach them to quarrel about God like Catholics and

Protestants." Under the rule of churchmen, the traditional Plateau practice of polygamy was actively discouraged. To the Indians, it appeared that the Christian missionaries running the agencies were trying to destroy family life by stripping them of wives.

Under the Peace Policy, agents sought to mold their Indians into loyal subjects of God and country. Where they had once assembled at different places for their socioeconomic activities, the government sought to make them agrarians and discouraged or prohibited their traditional roamings and gatherings. Not only was forced agrarianism counter to their traditional subsistence and settlement pattern, it also interrupted their traditional gatherings with other bands and tribes. The Indians found in the raucous Fourth of July celebrations a reasonable substitute for government-banned traditional festivities (Ruby and Brown 1988:234).

On many reservations the civilization programs were driven by a desire to transform the children. While most reservations had day schools, boarding schools were particularly effective in isolating children from their parents and grandparents. With the isolation from family and enforcement of a strict "English Only" policy, Indian culture was being systematically suppressed. Unlike the informal instruction of earlier times, Indian children that were isolated from their elders were subjected to unfamiliar formalized education in coeducational classrooms. The curriculum was heavily oriented toward manual labor: carpentry, blacksmithing, shoemaking, and farming for boys; needlework or sewing, beadwork, house cleaning, washing, ironing, and cooking for girls. At best, the BIA saw the Indians becoming cheerful, thrifty, hardworking common laborers and did little to prepare them for leadership roles or for higher education (Beckham 1991:48). The BIA worked on the mistaken assumption that this system would produce a new generation of tribal leaders. Instead it often so transformed the students that many left tribal life and moved into the non-Indian community, never returning to the reservations where they no longer knew the language or recognized family members (Beckham 1991:48). The civilization programs largely succeeded in destroying many elements of Indian identity through the reservation system and the schools and boarding schools.

Especially opposed to sending children to government schools were officials of the Roman Catholic Church. The Catholic agents looked unfavorably on the growing secularization of education, which threatened their long-standing religious educational policies. Indeed, secularization was one of the many reasons that the Peace Policy failed for both the Catholics and Protestants (Ruby and Brown 1988:237). Other forces playing a part in the policy's demise were sectarianism, Americanism, and agrarianism. But even before it had a chance to succeed or fail, dissident Indians seeking to retain their traditional ways of life continued in the 1870s to fight against the government, which sought to regain its primacy in controlling Indians even if it meant killing them.

The allotment programs, which not only alienated Indian lands, helped also to alienate Indian culture. The Dawes Act sought to destroy tribes by dividing their communal land base. Individual Indians would receive acreage held in "trust" and when they had proven their "competency" or had waited for 25 years, the BIA would issue a deed for "fee-patent" for the land. Many reformers saw the Dawes Act as the culmination of a long struggle to place the Indian in a situation where he could successfully participate in the dominant white society (Martin 1969:179). To speed up this process, Congress passed the Burke Act in 1906 that eliminated the 25-year waiting period and permitted local agents to determine "competency." The disruptive effects on Indian social fabric is discussed by Beckham (1991:49). While allotment may have conferred citizenship, it also facilitated the destruction of tribalism and horribly complicated reservation administration. Decisions on rights-of-way, reforestation, and land-use planning became almost impossible as non-Indians acquired key properties (Beckham 1991:49). Some

Indians favored the allotment program since they gained land, citizenship, and were able to leave behind tribal life and move closer to the majority culture that surrounded them.

During this time, interest in reform swelled. In 1880, former Commissioner of Indian Affairs, George W. Manypenny, published Our Indian Wards which was followed the next year by Helen Hunt Jackson's A Century of Dishonor. Other similar publications followed (Martin 1969:180). Such reform was certainly needed as the government, in 1884, was spending less than two cents a day for the care of each reservation Indian and the BIA was being embarrassed by the lateness of appropriations and the consequent late delivery of goods to the Indians (Martin 1969:182). An important side effect of the passage of the Dawes Act was that membership in the national Indian organizations declined. Martin (1969:185) explains that as with other American reform movements, once the law they sought was enacted, reformers complacently felt that their work was complete. Apparently the average American believed it was now time for the Indian to help himself.

What anthropologists refer to as the process of acculturation can be also viewed as the process of deculturation. By the 20th century, the Indian world had been all but replaced by that of the white men, whose civilization, also changing rapidly, raced on at a quickening pace sweeping Indian traditionalists aside (Ruby and Brown 1988:271). In evocative terms, Ruby and Brown (1988:271) pictured the Indians, in huts or on street corners, sitting in sullen silence dreaming of the past as the white men rushing by them planned for the future. The once-proud horsemen of the interior, dreaming of their free-riding past, saw their horses rounded up and shipped off to canneries and the Indians saw road and town builders destroy the graves of their ancestors. An excellent example of the intentional destruction of Indian culture is the attitude of the Indian Office toward Smohalla. Martin (1969:182) writes:

> **A follower of this cult, whose most prominent visible characteristic was his long hair, believed that by doing a dance to honor the dead they would bring about the disappearance of the whites and the rebirth of the Indian dead. General O.O. Howard and other white officials had blamed the members of this cult for the 1877 Nez Perce War. The agent at the Nez Perce reservation in the early eighties made a practice of having each Nez Perce renegade who came to the reservation shorn of his long hair and issued citizen dress by the reservation police in an attempt to destroy his pride in being an Indian.**

The Indian reservation police and the Indian Courts of Offense were convenient weapons for the agent in his attack on traditional Indian ways. Stamping out Indian culture was not carried out by sadistic men, rather, the officials of the Indian Bureau were simply convinced that if the Indian were to survive, he had to adopt to the white ways as quickly as possible. Thus, the reservation was and had been regarded as a cultural decompression chamber. The idea was for the Indian to become completely adapted to his new way of life so he could leave the reservation as a white citizen. The toll of reservation life was heavy from both physical and psychological factors and few Indians made a smooth transition to white ways (Martin 1969:182). The Indian police, for their part, helped the agent break down the authority of powerful conservative chiefs who frequently fought the attempts of the agent to destroy their culture.

It is difficult to say if the Plateau Indians willingly embraced white culture or were simply overwhelmed by it. But by 1892, fifteen Nez Perces enlisted in the cavalry and in 1897, several Spokanes volunteered in the Spanish- American War. During World War I, Plateau Indians fought on the battlefields of France, where some Indian traditionalists believed they were being sacrificed by the same government that had fought their fathers.

In 1924, the government responded to the Indian's war service by extending citizenship to the Indian community. In a period when antidemocratic forces were soon to launch the world into another war, the government tried to live up to its own democratic principles and enacted the Indian Reorganization Act of 1934. Some Indian traditionalists were suspicious of this act which permitted Indian socioeconomic development programs that only meant further assimilation of white culture. By the outbreak of World War II, opposition of the Indian community to their young serving in the American armed forces had all but disappeared (Ruby and Brown 1988:271).

The greatest of all the Indian struggles was to adapt to a world not of their choosing. On some reservations the adaptation has only recently taken place, but in other cases, it has been so effective that Indians who were formerly encouraged to adopt the ways of the white man now fear that such acceptance will destroy the last vestiges of their culture. Around the turn of the century, physical survival of the Indians was assured with improved health programs. The turnaround vindicated some Indians whose prophets had predicted that Indians would one day reinherit the earth, but the struggle for Indian identity continues. And after 200 years of association, both Indian and white have misgivings about the liberties taken with science and technology - an untracked technology is man's greatest danger (Ruby and Brown 1988:272). At Hanford, the untracked technology of the white man contaminated vast portions of ceded Indian land and waters. While Indians have suffered from deculturation, there is much evidence that Indian culture survives. One thing we can be sure of is that the Indians still love the land and will not rest until the government restores the contaminated land for both Indians and whites.

3.5.11 Indian Response to White Pressure

As a result of greater and more sustained contact with Plains tribes and with whites, tribes in the eastern Plateau evidenced greater political unification (cf. Schuster 1975:202-203). While structural changes had not yet altered the political organization of the Yakama, bands were once again moving toward amalgamation in response to increasing encroachment by whites on Indian lands and pressures for land cessions. Extensive economic as well as political changes were also taking place. The Indians were acquiring cattle and beef was becoming a regular food staple. Several decades before the first white settlers arrived in the Yakima Valley in 1860, herds of livestock were well established. The Indians had also begun to cultivate gardens, acquiring seeds and plants from Hudson's Bay Company. By the middle of the 19th century, the Yakama were raising potatoes, melons, squashes, barley, and Indian corn. Gardens were fenced to protect them from livestock. Adaptation to this new subsistence economy suffered a setback in the winter of 1846-1847 when large numbers of livestock perished. To these economic challenges were added more personal losses sustained from outbreaks of disease.

Although whites had not yet settled on Yakama lands, Gibbs (1854:405) reported that the Indians were entirely familiar with technological conveniences introduced by whites such as utensils and firearms, but that they continued to make baskets, fishing equipment, and saddles. Gibbs also noted that the Yakama were beginning to enter the market economy. As the Oregon Trail bypassed Yakama country, the impact of white settlement was fairly late in reaching the Yakama as compared with the Nez Perce, Walla Walla, and Umatilla. It was not until 1853 that the first large wagon train passed through the Yakima Valley. Relatively speaking, prior to the 1850s, the Yakama enjoyed favorable relations with whites: they received help from Catholic priests and Hudson's Bay Company employees at Fort Vancouver when confronted with epidemics and their marginal location left them relatively isolated from the mainstream of white traffic moving westward on the Oregon Trail. This soon changed as contact with military and government agents accelerated during the first half of the 1850s and pressures mounted to negotiate treaties with the whites (Schuster 1975:209).

Towards the end of the 19th century and well into the 20th century, the essentials of Indian tribal and individual economy was virtually wiped out by the whites. Slowly, the Indian population was beginning to recover from the white man's diseases and armed conflicts with soldiers and settlers. As their numbers began to expand, they were being forced to make their living in unaccustomed ways. In the case of the Yakamas, before the inroads of the white settlements ate away at their economy, as late as 1875 they had about 15,000 horses and 3,000 cattle. Agent Wilbur's report for 1881 revealed the Yakama economy was breaking down. He noted that 647 Yakama made their living by farming or following "civilized" pursuits; 1,057 were farming but also went fishing during the fishing season; 472 Paiutes brought in from Oregon to the Yakama Reservation were noted as being "destitute"; 598 Indians were living off the reservation subsisting more or less in traditional ways (fishing, root gathering, and game hunting) but live on the reservation in the winter; 276 Indians classified as "disaffected" and 50 Palouse who were "settled and farming." The great livestock loss in the winter of 1880-1881 forced many who were farming to resume traditional ways of survival (Relander 1962:53).

Things promised in the Treaty were not delivered and the economy began to slip away, entirely or partially through white land settlemen, irrigation, commercial fishing, dam construction, sports fishing, hunting and livestock grazing. One by one the things promised, inherited, and God-given dwindled as one legislative bill after another drove wedges into the reservations. Promises were forgotten as one culture overran the other (Relander 1962:53). Indian religion forbade land ownership - a concept of the new culture the Indians became acquainted with only after white settlement began. It was brought more sharply into focus by the earliest agents and later by legislation, which ate deeply into the reservations through the Enrollment Act of 1887.

Rev. Wilbur was one of the pioneering agents. A Methodist missionary who came to Oregon in 1846-1847 by sailing ship, he was 12 years later appointed presiding elder of the newborn Walla Walla circuit in Eastern and Central Washington. He devoted the remainder of his life to the Yakamas after being appointed as their superintendent of teaching. Relander (1962:56) describes Wilbur as a terrible fighter of the demon rum, gambling, tobacco, plural marriages, Indian religion and Catholicism. He was not able, however, to successfully suppress the Dreamers, whose ancient rituals were being revived and practiced throughout the later half of the 20th century. Wilburs' report for 1865 provides insights as to how the Indians on the Yakama Reservation were responding to their changing world:

> **. . . They must have raised 10,000 bushels of wheat and corn, about 2,000 bushels of oats and 1,500 bushels of peas. Potatoes they raised all they could use . . . Their fisheries bordering upon and not far removed from the line of the reservation affords them an abundant supply of salmon . . . The stock upon the reservation is mostly horses; these are mostly small and not suitable for teams. I purchased last year four American stallions which will do something in changing the size and general character of their horses . . . They have about twelve hundred head of meat cattle. These are in small herds all over the reservation and owned by about two hundred different persons. Their stock is their wealth . . .**

By 1874, the Yakama had become the fourth richest tribal group in North American in terms of horse ownership. At that date, 3,500 Yakamas owned 13,000 horses - a number superseded only by horses held at the Umatilla Agency by Cayuse, Walla Walla, and Umatilla and at the Nez Perce Agency and Osage Agency (Schuster 1975:83-84).

All Yakama Indians are enrolled, but only those born before 1914 were assigned land. The unallotted portion of the Yakama Indian Reservation became tribal property and is held in trust for the Yakamas. The protection of this land for the benefit of living tribesmen, through development of its resources, and for Indians unborn, is an aim of tribal leaders. However, wherever there is Indian land, there are those working to obtain it or access to its riches (Relander 1962:29). The 440,000 acres allotted by 1914 had dwindled to 323,714 acres by 1962 through alienation or sale. Had the land been retained the owners would have received many times the price they received. Relander (1962:66-67) observed that the wise old chiefs at the beginning of the 20th century realized the value of the Yakama homeland and fought white pressure as best they could. As late as 1961, timberland owned by the Yakama Indian Nation was valued at $224,000,000 - a far cry from the $1,400,000 they were offered for it some years earlier.

Joe Leather, a Yakama who shared his life story with Click Relander, personified how the Indians struggled to hold onto their land in the face of harsh economic reality (Relander 1962:29-30). Joe's own words best convey the pressures and frustrations of trying to survive in the white world:

> **The only checks we ever get are sent out by the agency, our money, too from rents paid on our lands . . . that little $60 of mine I receive once a year, if my land is rented, is such a check . . . I wish we got checks like so many people . . . checks for not growing crops, imagine it . . . for not plowing, or not planting sugar beets or potatoes or wheat...you can eat potatoes and bread . . . They even send money to other countries, our money . . . if we could get a little bit of all the money the lawmakers are spending in the countries their grandfathers and other relatives came from we could make it work for us on the Reservation...my wife and I could make a living on our place and be happy . . . My people were happy . . . first the explorers came down the Chiawana [Columbia] . . . we welcomed and fed them . . . others came in big ships . . . they were welcomed and also given food, but they were all hungry for women...When the soldiers and miners came they were the worst of all . . . my people didn't know about liquor . . . the soldiers would bring whisky into the lodges where the women and daughters were hiding, fearful . . . like women are always fearful . . . If a soldier saw a girl he wanted he would take her away . . . if anyone objected the soldier shot him. (Relander 1962:33)**

Because of dam building, the Yakama had drifted away. Before they were herded onto the Reservation so the rest of their land could be settled or sold, their horses that were roaming free on the rangeland were rounded up by cattlemen to save the bunchgrass for the cows. After the cattle had grazed off the tall grass, the sheep came carrying cheat grass seeds in their thick wool. Once the bunchgrass was gone and cheat grass covered the hills, the land became dry and useless and the hills were unfit for grazing except for a short time in the spring when they were green. It was the same with the wild mustard that followed the Great Northern Railway spreading a seedbed of another stranger on Indian country. Since the Yakama could no longer catch fish to sell, nor enough for their worship on the seventh day, they went into the hopyards, orchards, and sugar beet fields, competing for jobs with migratory workers and Mexican Nationals who worked for low wages and sent their money home (Relander 1962:19).

Tribal elders warned that money would cause trouble, but the elders also realized that living Indians and future generations are entitled to economic benefits from development of the earth's resources (Relander 1962:91). The Indians are also entitled to protection of these resources from drifting away into other hands. Relander (1962:91) observed that the Yakamas adopted changes that were good for all and improved economic or living conditions, such as the horse. In pre-horse times the people walked to and from the fisheries, root digging grounds and berry patches. Horses became valuable possessions for transportation and later, as they increased in numbers, they represented wealth and were used extensively in trade. Hence, the Yakamas accepted elements of other cultures and did not isolate themselves from the world but sought to reject changes that were *not* good for the people (e.g., the chiefs forbid whites from bringing whisky into the country). Development of tribal resources can be viewed as a natural evolution and necessary to provide a living to replace the old three-way economy of fishing, horses, and trading which had been taken away (Relander 1962:91).

3.5.12 Smohalla and the Wanapums

The rising influence of Smohalla and other religious leaders in the late 19th century was in part precipitated by the cultural disruptions caused by white pressure. Smohalla was what the Wanapum called a *yantcha* (leader/spiritual advisor) and frequently preached about the destruction of his people and culture by white pressure. It was not until Relander published Drummers and Dreamers that the story of the Wanapum people, and their great prophet Smohalla was fully told. It is a story about a deeply spiritual people and their intimate connection with their Mother Earth and is also a story that epitomizes the struggle of the Indians of the Hanford Site as they were crushed down with the weight of white encroachment. The earliest accounts of Smohalla can be found in Mooney's (1896) study of the Ghost Dance - an account that relied upon Smohalla's meeting with Major MacMurray in 1884.

Smohalla and the Wanapums were much more isolated from white pressure than the Yakama and Umatilla. The head of Priest Rapids, an 11-mile stretch of the worst water on the Columbia, is the most desolate region along the entire course of the river. In such isolation, the Wanapums were left alone with nature and their religion (Relander 1956:31). The Wanapum fisheries were along the lower rapids, where, in places, rocks extended almost across the river. It was here that the Sacred Island, where much of the religion of the Wanapums had its genesis, was located. The Wanapums and the Palouse refused to recognize any treaty but family ties eventually drew them to reservations where most of them assimilated. South of the Wanapums ("River-People") were the Chamnapums ("Yakima River-People") and along the Walla Walla River to the south and on the east bank of the Columbia River were the Walla Wallas. It was over this territory and among many bands within it that Smohalla spread his Dreamer (*Washani*) faith, which was in later years contemporaneous with the Waptasi (Feather Cult). It penetrated southward into the Walpapai Snake Country and the territory of the Bannocks and northward to the Kawachkins, Spokanes, and beyond (Relander 1956:35).

The Dreamer faith was born in the era of white exploration, well before the whites poured westward. The faith will never die, Smohalla told the Wanapums, so long as there are men who refuse to cut their long braids, continue to eat the old Indian foods, and seek great truths in lonely places (Relander 1956:35). The Indians were well aware of the whites before they actually encountered them. At first, the news of the coming of whites was welcomed by many tribes since the Indian life, before it was overrun by white civilization, was not always easy. Although the whites (*suyapos*) brought evil, they also brought a manner of living that tempted the Indian with food, new weapons, and other luxuries he had never known.. Smohalla sensed the first fingers of civilization penetrating the wilderness. He foresaw the extinction of pure Indian blood and the conquest of Mother Earth. He fought to stem the onrush, not with warriors since he was a man of peace, but with his religion.

Smohalla and his people refused to recognize the Yakama war chief Kamiakin or the Walla Walla chief, Homli; or any who met in council with Stevens and signed away their vast lands for patches of land for shallow promises that had not been kept (Relander 1956:37). Inspite of Smohalla's feelings towards Homli, on the Umatilla Reservation near Thorn Hollow was a school of Dreamer religion where Homli of the Wallawalla and Talles of the Umatilla preached, and where the Nez Perces often came to hear their teachings (Ruby and Brown 1988:228-229).

Lewis and Clark crossed the lower stretches of the Wanapum country and David Thompson visited Priest Rapids in 1811 and wrote the first account of the village of P'na, which he found to have a population of 400. Later in his journeys, he planted a British flag in the midst of a Wanapum camp, attached a paper to the flag proclaiming the country north of the forks of the river as British territory. The flags of the British rivermen may have influenced Smohalla who introduced a flag into the Dreamer religion a quarter century later. Alexander Ross, traveling up the Columbia, reached Wallula and met the Walla Walla, Nez Perce, and Cayuse Indians. He found the flag planted by Thompson and the next night camped near a friendly village close to what is now White Bluffs. Upstream at the P'na village, the explorers met a tall, slightly built medicine man called Haquilaugh, after having watched him dancing on the river shore, they named the place "Priest's Rapid."

Sometime between 1813 and 1820, Smohalla, the Prophet of Priest Rapids, was born in the desolate country along the Columbia River, to preach the old Indian way and to found a new religion. It was the last pure faith to spring up in the Northwest and to be adopted by the Indians. Smohalla told the Wanapums that he arose from the dust of his Mother Earth. The powerful influence of Smohalla and the Washani religion among the Wanapums and others has been interpreted by Sharkey (1984:79-82) as a revitalization movement. Prior to white contact, the Wanapums enjoyed a well-established pattern of seasonal food-gathering and during this time, moderate change could be absorbed (smallpox epidemic of 1782, introduction of the horse, etc.). Euro-American material culture and views of land-holding seriously jeopardized the Indian lifeway wherever the two came into contact. Eventually the entire Indian culture became threatened from epidemics, warfare, removal from their homelands, diminishing natural food supplies, and fear of volcanism. At this point, successful prophets could rise to a position of importance and revitalization could begin. After revitalization came the cultural transformation stage for those who followed the Washani religion. During this stage, the Indians worked for a return to the former steady state which would include the reappearance of ancestors and an abundance of food. With time, the *Washat* dancing became routine and adaptation to the changing world began. Smohalla brought hope to his people at a time when it was desperately needed. With roots in traditional beliefs, Smohalla's Washani ceremonies provided a spiritual, sensual, and visual display of the life cycle.

During the weekly Washani ceremonies in the 1860s through 1880s, Smohalla and his followers preached about the sanctity of the earth and the right way to live. Indians throughout the Northwest learned of his visions and prophecies and many visited Priest Rapids to hear him speak. As the pressures of white encroachment, coupled with disease, closed in on the Indians of the Plateau, they needed something to give them hope for a better future as well as a focus on their heritage in a time of radical change (Sharkey 1984:83). Smohalla gave them both; with an emphasis on their ties to the land as a sacred trust bestowed on them by Nami Piap, Smohalla gave the Indians back their pride. Smohalla taught his people to expect the dawn of a new day, a resurrection leading to the overthrow of the Greedy Ones. "Hope is better than despair, and that is some comfort" Smohalla told his people.

But hope waned and the Catholic, Protestant, Shaker faiths fastened their holds on some of the Indians (Relander 1956:51). Smohalla's son, Yoyouni (Little Smohalla), took over the sacred flags and other symbols. When Yoyouni died, Smohalla's nephew, Puck Hyah Toot alone was left to carry on. Of the 2000-3000 Wanapums found by Lewis and Clark, a band of only five was left when Relander (1956) wrote his book, Drummers and Dreamers. As of 1956, they lived in the ancestral way, dancing the *Washat* in the tule-mat long house on the banks of the Columbia River at Priest Rapids. The rest of the people were long ago assimilated by the reservation. Of the last Wanapums, only one, Puck Hyah Toot, knew all the rituals of the old days having been trained by Smohalla for 12 years.

Relander (1956:62-65) explained the background from which Smohalla and his Dreamer faith took root. Smohalla's home village at Wallula was near the site of Fort Nez Perce which was built by the Northwest Company in 1818 (and became a Hudson's Bay Company fort in 1821). Later still, it became the old Fort Walla Walla trading post and then a steamboat landing and railroad center where it functioned as the transshipping point for freight transported by stern-wheelers from Portland and The Dalles. These boats were filled with gold-crazed passengers eager to get to the Idaho ore diggings. The Northwest Stage Company and other stage lines were part of life at Wallula. Teamsters, wood-cutters, cattlemen and others roamed the streets and saloons. The main settlement of the Dreamer's people was just across the Columbia from this bustling town. In desperation, Smohalla and his people left Wallula to head upstream to their fisheries at Priest Rapids. Back at Priest Rapids, Smohalla told his followers:

> **". . . we will find fish and firewood in abundance. In time to come the white men will build dams which will close the Chiawana to the salmon. In time the *suyapo* [whites] will ride in big canoes and the boats will make fire. In the seasons ahead the *Upsuch* [Greedy Ones] will ride over our land as wide as the sky, on strips of something harder than wood or rock. At Priest Rapids there is nothing the *suyapo* wants in our little life, and there we may live unmolested."**

Smohalla's predictions came true, except for his last. Priest Rapids was ultimately flooded by a dam in the later half of the 20th century. Smohalla lived to see the promises made by Stevens broken and looked upon each successive broken promise as fulfillment of his visions and every broken promise strengthened his follower's faith in his dreams (Relander 1956:68). After Smohalla had retreated to the seclusion of Priest Rapids, he died, dreamed another dream, and, returning to life, brought the *Washat* dance to his people.

Many Palouses followed Smohalla's teaching because they believed that he had undergone two afterlife experiences (Trafzer and Scheuerman 1986:24). When the Lower Palouses learned of Smohalla's experience and his apparent return from the "land in the sky," they gravitated to him and his conservative message. Smohalla's following among the Palouses grew dramatically after his second afterlife experience. On his journey to the "land in the sky," he visited the Creator, learned a special *washat* dance and over 120 religious songs to add to the old Washani repertoire. The Palouses danced, sang, and conducted the *washat* ceremony in the manner prescribed by God (Trafzer and Scheuerman 1986:24).

Relander (1956:74-77) describes in detail the nature of the Dreamer religion and how the Indians prepared for the ritual feasting. Part of this ritual included Smohalla retelling the

Wanapum creation story of creation on the life-giving island, the prophecy of the Earth Keeper, and then give thanks to the Power for the food. The thanksgiving song was chanted seven times and then Smohalla led his followers in ritual feasting of salmon, water, camas, *skolkol*, venison or elk, and huckleberries. Smohalla reminded his people of his prophecy, warning them that once again they were forgetting the ancient ways; that their blood was becoming impure, their medicine was growing weak, and that the *Upsuch* - the Greedy Ones - were coming. The penitent people resumed the old songs and dances, becoming followers of the Dreamer religion in their efforts to recoup the good graces of Nami Piap. Smohalla's priests, going into their villages to drum, chant, and teach them the *Washat*, found willing followers. But the people had resumed the old customs too late. When the Palouse nation was extinguished, Smohalla told his people that the prophecy had been fulfilled (Relander 1956:96).

The Palouse were regarded as renegades by the soldiers and had the misfortune to live along one of the earliest north-south overland routes leading from Fort Walla Walla to Fort Colville and the Kootenai. This southern fringe of the Palouse country was the stampede path to the Idaho gold mines. Its rolling hills were ideal for cattle grazing and wheat growing and their land was much coveted by whites. When settlements overspread their country, the Palouse nation became extinct - the last Palouse died and was buried on a lonely sand slope along the Snake River. Kamiakin, the Yakama chief whose father was a Palouse, was a believer of the Dreamer religion. He died in 1878 with no satisfaction except that time had validated his wisdom in opposing the Walla Walla Treaty, because even before his death, the sacred promises embodied in the treaty were being broken, one after another.

Smohalla and his followers epitomize the plight of the Indians caught in the onrush of white civilization. He was a scapegoat when soldiers came to clear the the Indians off the land by force of arms. Indian agents blamed him if things went awry. When the Indians persisted in their ancient customs, he was bitterly accused (Relander 1956:121). When the cattlemen and homesteaders roamed all over the West, they turned first toward the reservations. Lastly, the white intruders occupied the scurfy land along the Columbia where the nontreaty Wanapum lived. Smohalla's band at Priest Rapids, White Bluffs and other stretches of the Columbia, grew to 2000 Indians. Some had left the reservation to avoid starvation while other were small family groups that had been evicted from land on which they had settled, but without compliance with white title and homestead laws. Meanwhile the Army was intent upon preventing Smohalla from combining forces with Chief Moses or Chief Joseph, but their intentions were misplaced. Smohalla was a man of peace, not a warrior and he resisted all government efforts to confine his people on reservations. As the Civil War raged, the military's attentions were diverted and Smohalla and his people were left to die the slow death of oblivion at Priest Rapids. His faith, however, spread throughout the region and reservation peoples adopted the *Washat*, mixing it with their old beliefs and later-day Christian faiths (Relander 1956:122).

A. B. Meacham, Superintendent of Indian Affairs in Oregon, who was sympathetic to the Indians, visited Smowhalla and tried to get him to remove to a reservation. Similarly, in 1877, General O. O. Howard and Colonel E.C. Watkins (Inspector of Indian Affairs) summoned Smohalla and Chief Moses to a council at Fort Simcoe to persuade or compel them to bring their people to reservations. Smohalla clung even closer to the only home he had ever known, the *Chiawana*. He also knew that agent Wilbur's policies opposed traditional Indian religion and the Yakama reservation would not be a good home for his people. As Meacham labored sincerely for the Indians, he came to better understand the evils Smohalla was trying to shield his people from. John Smith, the Indian agent at Warm Springs wrote:

A more degraded set of beings I am sure did not exist on the earth. God's holy Sabbath was set apart as a day of licentiousness and debauchery. Drinking and gambling had become common. Their women were taught to believe that lewdness was commendable. The men had to tolerate it at the point of a bayonet. Some of the soldiers had built houses and were living with the Indian women. The consequence was the Indian has lost all confidence in the honesty and integrity of white men. (Relander 1956:128)

Relander (1956:129) writes "...small wonder Smohalla kept his band isolated at Priest Rapids, secluded from reservations where troops were garrisoned and where morals were washed up by the roots with whisky." Although Smohalla, in 1875, made his position clear that reservations were an evil influence on the Indians, the Department of Indian Affairs had other ideas. They were concerned not only with the 2000 followers of Smohalla at Priest Rapids but also his influence among the Colville. Indian agent N.A. Cornoyer at the Umatilla Reservation wrote in a government report:

The great difficulties under which we labor is in consequence of the large number of renegade Indians gathered on the Columbia River. They belong to different bands and are controlled by an Indian named Smohaller or "Big Talk." He has emissaries constantly traveling from one reservation to another trying to induce the Indians to abandon their homes and join his bands.

This same agent wrote of stockmen who were trespassing by ranging cattle and horses on Indian land and wrote that things were so bad that Lalse's band of Umatillas left to join the Indians on the Columbia, and Homli, the chief of the Walla Wallas, almost bolted to return to the Columbia. Cornoyer didn't place all the blame on Smohalla:

Many of the Indians, seeing that nothing is done by the government, constantly evince a desire to roam about and cannot be induced to settle down to their farms and adopt the habits of civilization.

The soldiers eventually moved in and the people at Priest Rapids were moved to the Yakama Reservation in 1879. The Wanapums were friendly to agent W.M. Turner, but they demanded the right to choose their own locations as the whites were doing. Turner recommended their removal to the reservation by force.

Major J.W. MacMurray was sent into the Columbia River Valley by General Nelson A. Miles to understand Indian grievances and to assist Indians to acquire permanent homes, under the Indian Homestead law, before settlers had taken over all the land (Relander 1956:135). At the same time, Indian agents, under instructions from the Department of the Interior, interfered and sent the Indian police - an armed body of Indian warriors - to arrest and confine those most active in Dreamer and polygamous practices, or who left the reservation to take up lands under the Indian Homestead law. MacMurray, however, represented the views of General Miles which later became the recognized policy of President Grover Cleveland covering allotment of land in severalty to the Indians. MacMurry spent about a year visiting various villages along the middle Columbia and on the Yakama Reservation, trying to understand their position and the nature of their dissatisfaction.

Schuster (1975:247) noted that many Yakama would not disavow their traditional life style but showed a continuing interest in ranching and farming. This continued in spite of Smohalla's growing popularity among the Wanapums, his injunctions against farming and land ownership, and his urgings to return solely to traditional customs. Smohalla asked MacMurray to explain the Indian Homestead law and tell how land was divided. MacMurray did this with a checkerboard showing railroad lands and lands open for homesteads by any color or man (Relander 1956:138). Smohalla responded as follows:

I do not like the new law. It is against nature . . . The lands were never to be marked off or divided. After a while, when God is ready, he will drive away all the people except those who have obeyed the laws. Those who cut up lands or sign papers for lands will be defrauded of their rights and will be punished by God's anger.

You ask me to plough the ground? Shall I take a knife and tear my mother's bosom? Then when I die, she will not take me to her bosom to rest. You ask me to dig for stone. Shall I dig under her skin for bones? Then when I die I cannot enter her body to be born again. You ask me to cut grass and make hay and sell it and be rich like white man, but how dare I cut off my Mother's hair? It is a bad law and my people cannot obey it. I want my people to stay with me here. All the dead men will come to life again; their spirits will come to their bodies again. We must wait here in the home of our fathers and be ready to meet them in the bosom of our mother.

Captain E.L. Huggins was encamped with the Yakama when Smohalla rode into camp. After introductions, Smohalla said to Huggins:

I and my people live on a little piece of bottom land at Priest Rapids and some white men want to take it from me. The white man has plenty of land . . . Yet white men come from these very countries and say the Indian must not keep his land because he hunts over it instead of plowing it. I will not plow my land; but if I did, it would not protect me. Joseph's people had good fields and gardens, but they were driven away. I have no pity for them. They had no business to plant fields like white men. Many Indians are trying to live like white men but it will do them no good. They cut off their hair and wear white men's clothes and some of them learn to sing out of book. No one has any respect for those book Indians. (Relander 1956:139-145)

Captain Huggins implored Smohalla that the country is filling up with white people and their herds and that the game is almost gone. Would it not be better for your young Indians to learn the white man's work asked Huggins?

My men shall never work . . . Men who work cannot dream and wisdom comes to us in dreams.

Huggins replied that white men work and know many things of which the Indian is ignorant. Smohalla replied:

His wisdom is that of his own mind and thoughts. Such wisdom is poor and weak. Each one must learn for himself the highest wisdom. It cannot be taught in words.... Much also may be learned by singing and dancing with the Dreamer at night. You have the wisdom of your race. Be content.

Huggins asked if Smohalla hated all white men. Smohalla replied:

It is not true. But the whites have caused us great suffering. Doctor Whitman, many years ago, made a long journey to the east to get a bottle of poison for us. Strong and terrible disease broke out among us. The Indians killed Doctor Whitman, but it was too late. He had uncorked his bottle and all the air was poisoned. Before that there was little sickness among us but since then many of us have died - even my child. I labored hard to save her but my medicine would not work as it used to . . . We are now so few and weak we can offer no resistance and the preachers have persuaded them to let a few of us live so as to claim credit with the Great Spirit for being generous. Yet they begrudge us what little grass our ponies eat.

Smohalla had a great influence on another spiritual leader, Wovoka, who is known for the rise of the Ghost Dance cult among Paiutes and other groups (Miller 1959:25-26). Other religions sprang up, partially in response to white pressure or influence. One of these was the Shaker faith. From the first, Smohalla detested the new Shaker religion, even before it worked its way out of its Puget Sound birthplace. Smohalla and his followers could barely show any tolerance for whites and the Shaker religion was a combination of their old medicine/doctor rituals and the religions of the despised whites (cf. Fitzpatrick 1968). Interestingly, the Shakers were at first strongly opposed by the reservation agents, who imprisoned their leaders, but this new faith was later approved by the Presbyterian Church. After a slow beginning, Slocum and his followers gained strength. The Shakers entered the Yakama country about 1886 and were called "Blowers" by the Wanapums. The first Shaker church east of the Cascades was not organized until August 1899 (Relander 1956:168). The three Shaker churches in the Yakama country were shunned by the River People and the followers of the Washani. The inimical beliefs have split families wide apart and made rivals of friends. Fitzpatrick (1968:86) noted that aside from the fact that the Shaker religion is Christian, it also supports ethnic notions about the cause and the cure of native diseases.

During this time, Chief Moses was trying to garner a reservation for himself and his people while Smohalla was asking only for his land along the Columbia (Relander 1956:182). Young Joseph's [Nez Perce] War, constant pressure by the government to corral nontreaty tribes (such as the Wanapum), and the murders of Lorenzo and Blanche Perkins, nearly brought on armed conflict. The Perkins were killed on or about July 10th, 1878 while camped between White Bluffs and Yakima City at or near Rattlesnake Spring and their bodies were found a short distance from Rattlesnake Spring, covered with stones in a ravine. The party of Indians believed responsible were said to be camped on the opposite side of the Columbia River above Priest Rapids below Moses' and Smohalla's camp. Chief Moses, who met General Howard at Priest Rapids, told the general that he and his people remained friends of the whites during the Nez Perce War and would remain at peace during the conflict between the whites and the Snake Indians (Relander 1956:191). Ultimately, Moses was granted a reservation, but Smohalla and his followers did not join him.. Smohalla's refusal to give up their lands and start living like the whites annoyed General Howard (Ruby and Brown 1989:78). The Bureau of Indian Affairs, then as in later years, refused to recognize the Wanapums and offered no help to ease their plight (Relander 1956:194). When gold was discovered on his reservation, Moses was called to Fort Spokane in 1881 to induce him to relinquish the upper ten-mile strip where gold was found. His reservation was opened to homesteaders and miners in 1886 and he died in 1899 on the Colville Reservation. During this time, the Yakama Agent Wilbur opposed Smohalla's religion and helped arrest its spread (Relander 1956:199).

Fort Simcoe, an old army post that was built in 1856-1859 on a former Indian camp site, was Wilbur's stronghold. The Wanapums visited Simcoe Valley to meet their Yakama neighbors and relatives, who repaid the calls when they went to the fishery at Priest Rapids. Fort Simcoe, built at a place called Mool Mool by the Yakamas and Wanapums, was a crossroads of Indian trails leading to the Celilo fishery and The Dalles, Ahtanum and the old St. Joseph's Catholic Mission, the Naches River and the Wenas Valley, the Kittitas Valley, and the Okanogan. Another trail went to the Yakima River where it joined a network of paths that connected the Yakama and Wanapum fisheries at Priest Rapids, White Bluffs, Pasco, and Wallula along the Columbia (Relander 1956:206-207). Wilbur used the Fort Simcoe guardhouse to imprison Indians that would not forsake the Dreamer faith and cut their braids.

Forts notwithstanding, after the outbreak of the Civil War, Northwestern military posts were so thinly manned that they could scarcely attend to their own affairs much less keep watch on Secession movements that were rampant in the back country where gold had been discovered (Relander 1956:219). Cattlemen and land seekers took advantage of the government's inability to provide ample military protection and overran the Indian lands in violation of treaties and other rights. Smohalla and his Wanapums were victims of the intrigues which prevailed throughout the new territory. When Wilbur took over as Indian agent, he went to work to gain the confidence of a people disillusioned by previous weak administrations. He found that the Indians had been issued annuity goods at exorbitant prices and had been paid in devalued work vouchers. Some of the goods were sold to whites who lived outside the reservation. According to Relander (1956:220), Wilbur struck first at undesirable whites and made it a matter of record:

> **When the Indians became intoxicated they** [the whites] **rob them of their property, ravish their women and contract a debt that the innocent whites must pay in fear, flight and blood. I verily believe ninety-nine hundredths of all the trouble and blood is traceable to the wrongs alluded to.**

Wilbur, over six feet two inches tall and weighing 300 pounds, smashed at gambling and drinking with effect and banned the stick and bone games - the traditional form of gambling. It was years before the game was revived on the reservation although it persisted at Priest Rapids (Relander 1956:221). Wilbur was his own law officer, arresting those who stole from the whites and requiring them to restore the goods twofold and to spend time with a ball and chain. Even after Wilbur was replaced in 1882, Smohalla found no sympathy for his Dreamer belief. He and his people were still shunned and victimized (Relander 1956:221). Wilbur's overall philosophy on how to civilize the Indians lead to significant changes in Indian life. By 1867, he was impressing the Indian Department that the plow and the Bible - and their companion influences - were more helpful toward securing a permanent peace than "a thousand soldiers and their glistening sabers and their prancing steeds." He practiced his belief by putting three large ox teams to work plowing new land. The Indians drove the oxen and held the plow and used the money they earned to develop their allotments (Relander 1956:223).

In 1869-1870, the military briefly took control over the reservations and upset Wilbur's program of plowing and preaching. Lieutenant James H. Smith, then placed in charge of the Yakama Reservation, tolerated the Wanapum stragglers and removed religious restrictions. By 1871, military control ended and Wilbur returned as agent. Wilbur's strong hand worked for some of the Indians, but many continued to rely upon the government - not because they wanted to but because they needed protection against land-hungry whites. The Wanapums had no other choice but to become self-supporting (Relander 1956:226). Wilbur's boarding school was well attended and his policy of Indian education was held up as an example for all the reservations. Eventually, the boarding school was closed and by the 1920s, Indian children were transferred to public schools.

Smohalla's death brought the people closer together for a time and there were larger gatherings attending the dances. But cattlemen and sheep raisers moved into the country; homesteaders closed in taking the few remaining patches of unclaimed land. At Priest Rapids, hungry cattle even tugged at the lodge mats, eating them when the Wanapums were absent on a root-digging trip. A cattle stampede through the village ended up scattering most of the band again, leaving less than 40 to keep the old customs, rebuild the houses and dance the *Washat* while they remembered Smohalla.

Even before Smohalla's death, some of the Wanapums slipped from his strict teachings and plowed and planted small fields, just like the settlers. They had to do this because game had become scarcé and the root-digging grounds had been destroyed. The elders reported that the last runs of the big red-fleshed salmon ended around 1905, when the fish wheels were dragging salmon out of the water by the hundreds of thousands and the commercial slaughter was at its height (Relander 1956:243). The fish, like the Wanapums, are a pitiful remnant of the days of Indian glory. Of the demise of the Wanapums, Relander (1956:250-251) wrote:

> **Finally, all the sagebrush plains and scabland, the sand flats, folded hills and basalt escarpments, and the few patches of good soil were occupied by the suyapo home stakers. Even the water rights to the Chiawana were claimed by the Greedy Ones. And the time came when the last Wanapums lived at Priest Rapids by sufferance only. The railroad, with its tightening bands of steel tracks, bringing more people into the Northwest, cut through the country. Fences, thrown up to shut in cattle, shut out the Wanapums. Plows ripped away the coarse mantle of the Mother Earth, exposing the rich soil in the small valleys. Irrigation water was turned onto the land that pumps or small diversion ditches could reach, and the Wanapums cried with anguish for the pain of their Mother Earth.**

Meanwhile, the Dreamer religion was being kept alive at Priest Rapids by Puck Hyah Toot. Young reservation people, growing older, began to look with respect on the traditions of the ancient ways being maintained at Priest Rapids (Relander 1956:251). Into the 20th century, the Wanapums looked to the hop yards for work but found increasing job competition from Mexican nationals. With imported farm labor, jobs became scarce for the Wanapums and other Indians and their pay checks were fewer and farther apart (Relander 1956:256). All other Indians had abandoned their tule mat lodges, even in the most remote hideaways on the reservations since all the very old people were too crippled to made them. But at Priest Rapids the last Wanapums continued to live in a mat houses during the long winters. Sometimes, when they had some money, they would buy food for a *Washat*, take out the rolled mats and hold the feasts of the pure Dreamer faith (Relander 1956:256). Although they struck back with their songs for weapons, the Wanapum could not survive the dawn of the atomic age. In 1942, the U.S. government, searching for a desolate and expansive area, selected the White-Bluffs-Hanford area and Wahluke Slope - the vast homeland once possessed by the Wanapums. Relander (1956:257) explained:

> **Colonel Franklin T. Matthias, of the Manhattan Engineering District, Corps of Engineers, reasoned with the white settlers, urging them to evacuate. He negotiated for the homesteaded land, and finally the government cleared the entire area by order of condemnation.** [see also Gerber 1992:23] **All the time the colonel worried that he would have difficulty with the Priest Rapids people. But he, like the soldiers who talked to Smohalla long ago, did not know their hearts. Never in their history had the Wanapums failed the government that first subdued and then ignored them. Puck Hyah Toot met with the colonel and heard his story that the government needed the land and that the people could roam at will over it no longer. He understood but fragments of the colonel's talk, realizing only that it meant another move and that all but the last old village site was lost like the tremulous flame of their religion. The last Wanapums, their hearts wavering, quietly surrendered their ancestral fishing ground and rifted canyon walls at White Bluffs, because the government said the land was needed. Later they tried to understand when the government was compelled to revoke, because of security reasons, the passes that permitted the men to visit the old fishery where occasionally they were able to catch a bewildered salmon. The last piece of ground left for them was the ancient village of P'na at Priest Rapids, and even then the *suyapos* were drawing blueprints of a dam to be built at that place.**

After the turn of the century, there were plans to construct a dam at Priest Rapids. It was to be constructed by the General Electric Co. which later had a wartime contract for operating the Hanford Engineer Works (HEW) downstream. The project would have resulted in an industrial city in the wilderness along the Columbia to process aluminum (Relander 1956:267). Henry J. Pierce started preparations in 1907 and after $6,000,000 had been spent on engineering, the Wall Street crash of 1929 intervened. The Wanapums said it was the will of the Creator and a warning (Relander 1956:267). The army engineer surveyors worried Puck Hyah Toot, who remembered Smohalla's prophecy that the water of the Chiawana would someday flow over the Sacred Island, *Chalwash Chilni*. When that day comes, Smohalla said a century ago, the Mother Earth will turn over and other disasters would ensue. Puck Hyah Toot tried to explain this to the army engineers but they could not fully understand him. He asked the Commissioner of Indian Affairs for help, but he, too, did not understand and replied that the government did not recognize the Wanapums (Relander 1956:268).

"Smohalla taught me how to live," said Puck Hyah Toot. "When I die the things he taught will be buried with me because there is no one among my people to carry on. The ghosts along the river will still speak, but there will be no one to hear them." The Wanapum visionaries taught and believed that the earth is their Mother and they cannot sell her; fight over her body, the soil; destroy her hair, the grass and trees; or obliterate the life that nature has placed upon her (Relander 1956:280).

3.5.13 The Dawn of the Atomic Age

The 1928 Meriam Survey pointed out policy shortcomings of the allotment era and subsequent federal administration of Indian affairs and recommended new guidelines to correct some of the erosive damage of the General Allotment Act. Meriam study recommendations were followed as a result of passage of the Indian Reorganization (Wheeler-Howard) Act in 1934. This act was the most important development for the Indians to occur before World War II and the establishment of the Hanford Site in the heart of their ceded lands. Schuster (1975:267) noted that the act was specifically legislated to restore a bilateral partnership between the Federal government and Indian tribes, to provide a basis for Federal assistance to Indians, to check further alienation of tribal lands, and to revitalize tribal organization and government. Tribal self-government was to provide a means to transfer many responsibilities from the Bureau of Indian Affairs to the Indians. The act prohibited further allotments, restored to tribal ownership Indian lands previously declared surplus, and funded tribal purchase of additional lands. Also passed in 1934 was the Johnson-O'Malley Act which authorized the BIA to contract with state, local, or private agencies in order to improve the quality of educational, heath, and welfare services to the Indians.

While the impact of the Indian Reorganization and Johnson-O'Malley Acts were beginning to be felt on the reservations, larger events were looming on the international scene that would eventually result in further alienation of the Indians from their ceded lands. When the Hanford Engineer Works (HEW) was created by the Manhattan Engineering District in 1943, white farmers and small-town residents, as well as the Wanapum, were evacuated from the area. Access by the public or local Indians to the lands or waters within the Hanford Site was eliminated overnight. Even during the rush to manufacture plutonium, the Indians whose home was once the Hanford Site were not completely forgotten. In the April 28, 1944 edition of The Sage Sentinel, a group of WACs, along with Colonel Matthias and Major Newcomb visited Priest Rapids to participate in the annual spring "Camus Festival" held at "The Long Hut". Though by this time much reduced in numbers, the few surviving Wanapums were still clinging to their culture at Priest Rapids.

Between 1939 and 1943, Lucullus McWhorter, the North Yakama cattleman, amateur historian, and humanitarian, gave much of his time to helping the Wanapums (Sharkey 1984:99). In 1937, the Wanapums were barred from their accustomed fishing grounds along the Columbia River between Priest Rapids and White Bluffs and at Wanawish on the Yakima River. With salmon being a large part of their diet and a major element in their religious observances, this posed a serious threat to their survival. McWhorter succeeded in pushing an act through the Washington State legislature reopening these fishing areas to the Indians for their personal use. Until 1942, the Wanapums were thus fishing as their ancestors had done, but once again had to give up their ancestral fishing grounds at White Bluffs to make way for the Hanford Atomic Works. In 1943, only Priest Rapids and Wanawish remained of their once vast holdings, but the Bonneville and Grand Coulee dams had cut down the supply of migrating fish, and after the construction of Hanford, only Wanawish located ten miles upstream from the confluence of the Yakima and Columbia rivers remained open to them as a productive fishing site. Even there, the fish were already decreasing as a result of the building of the Horn Rapids Irrigation Dam on the Yakima River in the early 1900s. At Priest Rapids, they caught only 28 salmon in 1939, a single fish in 1940, and 62 in 1942. Like the declining fish, the Wanapums decreased from 60 to 36 during the 1930s (Sharkey 1984:99).

While the Wanapums are depicted on picture postcards as a "vanishing" people, scattering and integrating would be more descriptive (Harris 1971). Puck Hyah Toot had 10 children, so there are lots of Wanapums said Rex Buck in an interview with Bill Harris in 1971. Traditional use of the Hanford Site was well documented by Harris as Rex Buck shared information about how the Wanapums were maintaining their traditional ways. When Rex Buck Jr. was married in 1976, traditional foods were eaten and traditional ceremonies conducted at the longhouse at Satus (Jacobson 1976). Interviewed in 1984, elder Delores Buck told of how the Wanapums moved to the mountains or to the prairie to dig roots or gather huckleberries (Lewis 1984).

The Yakamas too are still engaged in traditional use of the land. Schuster (1975:81) noted how difficult it is to estimate the importance of wild plants as a food staple but that some fifteen different roots are still being dug, some of them in quantities sufficient for daily use as well as for feasts and to give away as gifts or for trades. Chokecherries and huckleberries are also canned or frozen in large quantities. In addition to these, black pine moss is still dried into cakes and eaten and acorns are cooked as a mush when available. Hazel nuts, however, which used to be found in great numbers in the mountains, are no longer available.

Schuster (1975:87) also observed that the annual food cycle of the Yakama and others determined "temporal patterns of life, binding a people and a resource base, their land, with intimate ties of dependency and responsibility, expressed periodically in celebration of first foods' rites." The Yakama Tribal Council characterizes this traditional life way as being "in tune with nature and of deep significance because of the interweaving of spiritual with material values." While the Yakama try to hold on to their traditional use of the land, some are also trying to maintain traditional spiritual moorings. Schuster (1975:117-118) reported that several Yakama have lamented that fewer obtain spiritual power today. The reasons are varied but contact with the dominant white society and subsequent acculturation are principally blamed. Yakamas told Schuster (1975:118) that:

> **What spoils young people is being baptized. That chases Indian spirits away. Young folks can't get a spirit now.** [another stated] **These kids don't have a feeling for the woods and the mountains. They might inherit a power now, but they can't find one.** [another asserted] **It's eatin' that white food. It spoils them inside; then they can't get a power.** [still another responded] **School killed my power. Maybe if I don't talk white way, I'd** [have power to] **know things ahead.**

Some years after the Hanford Site was established, the Grant County Public Utility District constructed the Wanapum Dam at Priest Rapids but was able to preserve a small piece of the old village. Puck Hyah Toot, somewhat encouraged, said the following:

> **It has always been this way for the Wanapums. We move up and down the river where our people lived, but there was never a place we could really call home. Someone always comes along and we must leave and find a new camp. This is the last place. Everywhere else is closed. Everyone has been kind to us and said they will try and help, but still we have no home and still the bones of our fathers and mothers call loudly to us for help. The cattlemen let us live along the river awhile and then told us to move. The government came to build its big medicine plant at White Bluffs and again we had to move. The Army Firing Center closed in from where the sun sets. Then came the dam builders. Now there is no placed left where we may go if we are not permitted to remain close by our old village. It will make little difference to us few old men. Soon we will be in the only unoccupied place on the hill, and there, perhaps, our bones will also call out loudly. Now there is hope for these young people.**

In 1955, just one year prior to his death, Puck Hyah Toot spoke to the Grant County Public Utility District commissioners:

> **You know and I know that the white race, when they first came, looked upon the Indians as friends. We remember the first who came to the Northwest, where they met the Indians and found them friendly, and the Indians were respected. From White Bluffs to where the dam will be built, the soldiers respected those Indians and did them no harm. Their dealings were attended by friendliness. We have carried on tradition and live peacefully without being bothered or bothering anyone. Going back, before the earth was born, the Mighty Creator made this world. That part where we lived the Creator made. He made the earth. He spread upon the earth things for the Indian people so they could live. He gave them roots and berries. Salmon he put in their streams and he caused wild fowl and wild animals to come upon the land. These were the foods the Indian has enjoyed, the good food the Creator has given. When I think of losing these things I think of losing my life. I do not feel that I should get angry or say anything that a dam is to be built. I feel that somehow I and my people will get by as long as we have friends like are here. The Creator predicted and directed that the light shall fall upon the earth and give warming life to everything upon it. The sun will brighten and warm the body of the Indian and will preserve that body. You and I get this living under that light. (Johnson 1973)**

In a feature article on Robert Tomanawash, Blonk (1991) wrote that this last full-blooded Wanapum was working hard to retain the culture and heritage of the only tribe that refused to sign a treaty with the white man when the Army sought to move them elsewhere. Tomanawish presides over Sunday services of the tribe's Drummer religion in the long house and teaches children to carry on the ancestral ways by preserving the rituals of the *Washat* dance. His wife, Kiona, drives daily to Toppenish to help the Yakama Nation preserve its resources and culture and assists her husband in preserving the Wanapum rituals there. Tomanawash complained of restrictions imposed by state fisheries people and limitations in root-digging brought about because some of the Wanapum land is now within the Yakima Firing Range. Through the efforts of tribesmen like Tomanawash, Wanapum and other Indian traditional ways survived well past the 50 year anniversary of the founding of the Hanford Engineer Works.

Ruby and Brown (1989:102) observed that under the dominance of white culture, the Seven Drum practitioners, heirs to Smohalla's teachings, no longer seek to avoid or destroy Euro-American culture as they did in Smohalla's time. The surviving ceremonial activity now concentrates on first-food feasts. Ruby and Brown (1989:102) asked:

> **Do Smohalla's survivors sense a loss of control over their destiny? Or are they overwhelmed by the technology that created monolithic Columbia River dams in ironic fulfillment of Smohalla's prophecy of the flooding of the sacred island, Chalwash Chilni? Has the unlocking of atomic power at the Atomic Energy Reservation at Hanford, on what was once Wanapum land, superseded for them the quest for the powers with which he unlocked the spirit within the Washani? The greater question remains: Which triumphs in the world, the power of matter or the power of the spirit? In their rush to master the physical world, human beings may live to regret that they did not heed what spiritual leaders such as Smohalla, the Dreamer-Prophet Yantcha were saying.**

3.6 Associated Property Types

3.6.1 Introduction

Understanding the different world views of Indians and whites will help DOE-RL successfully comply with federal cultural resource laws and implementing regulations as they co-manage Hanford's cultural resources with the tribes. The greatest impediment to their doing so will be failure to understand Indian world view and failure to appreciate Indian concern for the land. DOE-RL should be mindful that the Indians lament the loss of their lands, not because they have been deprived of a piece of real estate or an investment, but because they have lost so much: a part of themselves and their people; a part of their culture, heritage, livelihood, and sense of place; and elements of their religion.

3.6.2 Indian Viewpoints

The first step is for DOE-RL to take the Indians seriously when confronted with Indian world view. The Indians will cherish many places within the Hanford Site, based in part on old stories. Trafzer (1994:474-475) writes that these Indian stories are not just superstitious myths. According to Indian elders, the ancient stories of the plants and animals, the rivers and rocks, are history in the native sense of the word. Indian elders say the stories are accurate representations of actual occurrences. They also represent:

> . . . historical actions that provide a creative spark in life, offering significant meanings and interpretations of human action with each other and with the natural environment. The stories offer a dualistic understanding of history, of the past and present, positive and negatives, and male and female. They provide knowledge and wisdom through the interaction of the first inhabitants on earth. The stories are meant for all time and for all generations, and each time they are told, they offer a creative force that links today with yesterday. Thus, they are not linear like other historical texts, particularly those of Euroamericans. They are circular, carrying the participants in the stories, the storyteller, and the listeners to a time when the first creative activities emerged on earth. (Trafzer 1994:475)

Indian stories link the people of the earth's surface with the plants, animals, rivers, rocks, and all things believed significant in the life of the Indians. Their stories tie them to the earth and its life through a spiritual kinship with the living and their dead relatives, the animal and plant people who were made by the Creator before the humans, and to whom the Indians are related. Indian elders will tell us that the historical interaction between the plants and animals has never ended. However, humans are less sensitive to their relationship with plants and animals and modern society does not recognize the Indian view that this relationship, over time, can be considered history. Trafzer (1994:476) notes that stories form a body of knowledge that is the first history of America, and there can be little understanding of Indian history, culture, or society without an appreciation of this viewpoint. To understand how the Yakama, Wanapums, and others view the Hanford Site an analogy can be drawn from the testimonies of Andrew George, a Palouse descendant.

Andrew George discussed his life in the Palouse country at the beginning of the 20th century, not with a discussion of his birth, parents, lineage, or childhood, but rather with that which ties his past with that of his people (Trafzer 1994:477-478). His story began with a geographical overview of the Palouse country that tied the ancient and recent dead of his people. He offered a unique creation story of the Palouse Hills that placed his life into a relationship with the earth and animals of the region and he explained his life in terms of the relationship of the Palouse Indians to the Animal People and Plant People who lived on the earth before humans. One of his stories addressed the delicate ecological balance between humans and fish - a story about a time when Indian people took too many salmon from the rivers as a way of emphasizing the intense struggle between Indians and white fishing interests in the region. His story is a historical text that refers to the issue to over-exploitation of salmon and the consequences of such. Trafzer (1994:478-479) paraphrases George's story as follows:

> **There was a time in the far distant Palouse past when the Indians took too many fish, thus depleting the salmon. With spears, nets, seines, dip nets, weirs, hooks, and spears, the people soon depleted one of their central food sources. Salmon had no power to prevent the humans, so Salmon Chief sought the help of Rattlesnake. Salmon Chief moved his body onto the banks of the river where Rattlesnake sunned himself. Salmon asked Snake for some of his power, but Rattlesnake refused. The Chief responded by using his strong tail and beating Rattlesnake on the head. "Brother," said Salmon Chief, "may I have some of your power to combat the humans who are catching too many of my tribe?" Again, Rattlesnake refused and again Salmon Chief beat the snake over the head. Five times Salmon asked the same question. Finally, on the fifth request, Rattlesnake grudgingly shared a portion of his power with Salmon Chief. The chief obtained some of the Rattlesnake's venom so that the fish could bite humans, infecting them but not killing them. More important, the gift of Rattlesnake helped reestablish the balance of power between humans and fish, a balance that must be maintained between two elements if they are to coexist over a period of time.**

Trafzer (1994:485) observes that non-Indian historians have often separated the first history of America from that of the "chosen" historical *truths* of Euroamericans. Some argue that Indian history taught by Indian elders is unimportant because it is not based on fact and that traditional Indian stories have little or no bearing on the course of the "real" history of the Americas. Many professional historians ignore or discount Indian oral history and sacred teachings claiming that oral history taught by Indian elders is mere myth or fairy tale. Some summarily dismiss the teaching of oral tradition not understanding that traditional historical teachings of Indians involves an interdisciplinary approach that encompasses literature, art, religion, government, society, medicine, history, and more. Stated another way, Trafzer and Scheuerman (1986:xiv) observed:

> **Some scholars may discredit oral histories, labeling them as "fish tales that grow with the telling." But like written documents, oral histories tell us a great deal about the American Indian communities and the people who made up those communities. Oral histories reveal internal matters within families, bands, and tribes that help explain the course of Indian events, decisions, and actions. Oral histories provide another dimension to a complicated past that should not - - indeed cannot - - be interpreted as good versus evil or civilized versus savage. Those who view the past using white documents alone, ignoring Indian sources, especially oral histories, fail in their tasks as scholars. Those who do not study the Indian cultures about whom they are writing cannot provide the thorough job required of them. For without an understanding of the Indians and their sources, scholars cannot presume to interpret the American Indian past.**

This discussion illustrates how the Indian claim to the land and reverence for certain locations (rivers, mountains, fishing spots, gathering grounds, etc.) are inextricably intertwined with their world view of the sacredness of mother earth. This reverence is truth for them and DOE-RL should view their truths as equal with the truths of non-Indians.

To facilitate identification of "associated property types" that relate to the historic context, we must further identify some of these truths for the Indians who once were the caretakers of the Hanford Site. Indians believe they have always lived in the land the Creator made for them and that all of nature is interconnected and humans are a part of nature. The Creator told the Indians how to survive on the natural resources entrusted to them and how to care for their mother earth. Indians thus feel a special mandate to protect the environment and will speak up for resource protection because plants, animals and fish cannot speak for themselves. Indians feel a duty to protect their cultural resource sites, however defined, and that means protecting the sites of their legends and their cemetery sites. Even though the Department of Energy currently administers the Hanford Site, Indians view their occupation of these lands as a continuation from the past, through the present, and into the future. They maintain their right to use the land for cultural or religious purposes and each place in their aboriginal territory has a special meaning.

White encroachment has brought tremendous upheaval to Indian life with few perceived benefits. They lost their ancestral village sites, fishing sites, and plant gathering areas as a result of white encroachment. Loss of usual and accustomed fishing spots to dam projects has been especially damaging. Indians view the white man's way of life as altering and destroying natural and cultural resources and impeding their ability to pass on traditional knowledge to the younger generation. Indians believe that the white man's culture is depleting natural resources and unbalancing the ecosystem to a point that it might not be able to recover - witness the near extinction of salmon runs in the Columbia River today. They blame whites for the depletion of natural resources and believe the land should be restored to the condition it had before white settlement - a particularly important view with respect to the Hanford Site.

Alteration of the environment and land access restrictions reduce opportunities for Indians to use the habitat and natural resources in traditional ways and impair their ability to practice elements of their traditional economy and also elements of their traditional society and religious life. They also have seen Hanford development or clean up projects threaten life forms to satisfy the white man's global geopolitical interests during war and peace. Indians traditionally view people as *belonging* to the environment and its resources and not the other way around. In many cases, mitigation associated with Hanford development or clean-up projects is simply not an option they can consider.

3.6.3 Concepts and Perspectives on Resource Protection

American Indians were legally incorporated into the environmental impact assessment process through the Council on Environmental Quality (CEQ) regulation updating the National Environmental Policy Act (NEPA) of 1969 that appeared on November 29, 1978 in the Federal Register (Vol. 43 No. 230:44978-56007). According to Section 55989, Indian Tribes (on reservations) should have early knowledge of projects, be invited to participate in the formulation of issues and in the research itself, and be invited to comment on drafts of reports before they become available during the public comment period (Stoffle and Evans 1990:93). The American Indian Religious Freedom Act of 1978 (92 Stat. 469; P.L. 95-341) defines the special status of sacred places, artifacts, plants, and animals of Indian peoples and guarantees access to sacred sites, including cemeteries, required in their religion and the freedom to use in the practice of their religion sacred natural species and resources, even though these resources may no longer be under their control.

As is explained in this section, it is crucial that Indians step forward and take a leadership role in the definition of property types associated with the historic context and help catalog their locations (even if such information is kept confidential). In the Section 106 or 110 process, an inventory of historic and archaeological resources and traditional cultural properties must be completed in order to identify potential historic properties. In fact, without Indian participation, an inventory of places of importance to the tribes can hardly be considered complete! At the time of this writing, only 10% of the Hanford Site has been systematically ground surveyed to identify *archaeological* sites. While several traditional cultural properties [TCPs] have been identified, evaluated, and nominated to or listed in the National Register of Historic Places (e.g., Gable Mountain), systematic survey to identify properties dating to the time period between contact with whites (1805) and the closure of the Hanford Site (1943) has not been accomplished. Active participation of the local tribes will be necessary if a complete inventory of properties dating to this ethnographic contact period (or context period) is to be compiled. Interviews, oral history, and additional research will be needed before all possible property types can be identified and before pertinent evaluation criteria can be developed to screen potential properties for their National Register eligibility.

Anyon (1991:215) notes that while protection of the past appears to be a simple concept, both the "past" and the nature of its "protection" are culturally defined. Anyon's (1991:215) analysis of archaeological sites applies to potential property types that can be defined from the context (ethnographic) period (1805-1943):

> **Many issues of critical relevance to American Indians are often ignored, or merely implied, in discussions about archaeological resources protection. To Indians, archaeological resources are only part of the realm of cultural resources for which protection and preservation is a serious concern; cultural resources represent not only the past but also the present; they are a legacy derived from hundreds of generations of ancestors. For a western-trained scientist, protection of the past is a difficult proposition. The material record created in the past is now transformed into the archaeological record. The archaeological record is an unbiased present-day phenomenon; it can be measured, observed, and analyzed. The past, on the other hand, is what we make it: it is our interpretation of the archaeological record. The crucial problem for scientific archaeology is to develop methods to evaluate interpretations of the past.**

The crucial problem here is similar - to develop methods to evaluate historic properties that derive their importance through the perspective of living Indian people. Anyon (1991:215) further observed that complete protection and preservation of cultural resources is a goal shared by Indians, archaeologists, legislators, and others. Nevertheless, non-Indians sometimes have difficulty understanding that while Indians share a common goal to protect and preserve cultural resources, their needs and objectives may differ. When laws and regulations to protect these resources were enacted, Indian perspectives were often overlooked.

Indians view preservation holistically and several Plateau tribes emphasize this holistic approach in their tribal law and codes. For example, the Warm Springs Tribal Code views cultural resources as invaluable, irreplaceable, and an endangered tribal resource needing protection and adequate management. They include sites that are ancient and contemporary cultural use sites and materials and/or those associated with traditional foods and other natural resources, other sacred sites as designated by the Tribes, habitations, and historical events and personalities (cf. Anyon 1991:216). Some of the property types identified here necessarily include archaeological sites (e.g., traditional fishing villages, vision quest sites, etc.). Indians wish to preserve archaeological sites as a part of their efforts to preserve cultural resources since these sites are integral to their cultural identify and their history as a people. Anyon (1991: 216) notes:

These resources are the heritage of Indians; with no written records of their past, these resources are their history to which they retain their links through legends and myths about the land and its people. Archaeologists and concerned non-Indians, on the other hand, wish to preserve and protect archaeological sites primarily to protect a nonrenewable data base that holds part of the record of human adaptive evolution. Indians are often dismayed at the restrictive values placed on definitions of cultural resources by non-Indians. It simply does not make sense to them that only a portion of their cultural history should warrant protection.

Even more important to the Indians is land ownership and protection. Non-Indian concepts of private property and individual property rights, as they extend to cultural resources, are foreign to most Indians. (Anyon 199: 216). Many Indians wonder why only the cultural resources that happen to lie on lands controlled and owned by federal, Indian, or state governments are protected under law? Many Indians believe that they did not give up ownership of cultural resources off the reservation and as a consequence, they expect that off-reservation cultural resources, under any land ownership, should be afforded equal protection as those resources on lands with protective legislation.

Winthrop's (1994) analysis of the conflicting perceptions between tribal and regulatory views of nature, risk, and change provides further insights into the situation at Hanford. Section 106 or 110 mandated activities are not at all dissimilar to the activities associated with the preparation of an Environmental Impact Statement (EIS) since both activities stem from a similar epistemology (assumptions regarding the basis of valid knowledge or practice). In an EIS, an agency conceptually divides a project into a "physical and biological environment" on the one hand and a "human environment" on the other (cf. Winthrop 1994:26). The physical/biological domain includes separate studies of geology, air quality, soils, hydrology and the like while the human domain includes separate studies of socioeconomics, transportation, energy, and "cultural resources." As Winthrop (1994:26) observed, cultural resources, as defined in federal environmental assessments, includes archaeological sites, historic sites, and TCPs. While agency acknowledgment of TCPs as a category of resource eligible for protection seems to be a culturally enlightened step:

. . . the value of this category is to a large degree vitiated, however, by the commodity metaphor inherent in all discussions of "cultural resources." By treating an Indian medicine area as analogous to an owl nesting site or a patch of wetlands, its *cultural* character is ignored. The significance of medicines (to continue that example) does not accrue simply from the existence of particular physical substances at particular sites alone; rather, it is inherent in the culturally patterned relationship between the substances, the pristine settings in which they occur, the traditional knowledge of their properties and modes of use held by particular individuals, and the appropriate actions and prayers with which they are collected. (Winthrop 1994:26-27)

The underlying conflict that will emerge at Hanford will stem from radically different views of nature. The most important difference between regulatory and tribal assumptions regarding the environment is that between an agency's image of nature as an alien and thus external, biotic realm and tribal views of nature as a shared life-world (Winthrop 1994:28). In environmental assessment, the environment affected by a proposed project is analyzed by reducing it to its constituent elements (wildlife, flora, etc.) and each is interpreted through technically appropriate studies. From the tribal perspective, this kind of assessment is arbitrary because it is imposed from above and sets limits to critical thought. This kind of assessment is analytic rather than synthetic (it breaks down rather than sums up) and leads to abstraction. Finally, this kind of assessment envisions a world which is culturally vacant. That is, "culture" enter into the analysis only in highly circumscribed and reified fashion (e.g., as a "site" or a "resource") to compete for preservation with other resources. As Winthrop (1994:28) notes, the Indian perspective on nature is vastly different:

- Indians see nature as local and their knowledge of the environment pertains to very specific locales that are usually known in considerable detail

- To the Indians, nature is personal and responsive and their interactions with the natural environment may take the form of personified spirits or forces

- To the Indians, knowledge of the environment is gained through experience which alone can reveal its relevant properties and powers

- Indians evaluate environmental change (that would result from a project) more in relation to their conception of collective good and collective identity. Continuity of their identity or ethnicity may depend in rather subtle was upon a continuity of the environment

- To the Indians, environmental effects are viewed in relation to a time frame extending indefinitely into the past and future. Both the dead and those yet to be born may exert moral force as the living struggle to evaluate proposed environmental change to result from projects

Following Winthrop (1994:28), it is safe to say that environmental protection activities in the United States today is undergoing an important paradigm shift. At Hanford, a key challenge is to reshape Indian participation in the environmental decision making from the extremely formal and artificial approaches personified by the EIS or even the Section 106 or 110 processes, to ones that more adequately allow the Indians to express their conceptions of nature, risk, and change.

3.6.4 Operating Concept: Traditional Cultural Properties (Cultural Landscapes)

Government, Indians, and researchers alike are aware that piggy-backing ethnography onto environmental and/or archaeological assessments does not adequately address the cultural significance of all places that might be important to Indian people. Understanding the Indian conception of the physical environment is limited by framing significance assessments in terms of archaeological site definition and spot development. Many places of importance to Indian peoples are not archaeological sites. This creates an ambiguous area within cultural resource management (Kennedy et al., 1993:5-6).

Heritage legislators and historic preservation offices throughout the United States have recently acknowledged that "ethnic significance" is a valid form of meaning attached to the landscape that requires seriously considered revisions to heritage policy. The United States is now in the forefront in implementing culturally-sensitive legislation designed to preserve places of traditional cultural significance (Kennedy et al., 1993: 7) and the National Park Service, in particular, has shown strong leadership through the promulgation of various guidance documents (e.g., National Register Bulletins, CRM, Federal Archaeology Reports).

In 1990, the National Park Service developed the concept of **traditional cultural property** as a means to identify and protect places and objects that have special cultural significance to American Indians and other ethnic groups and published National Register Bulletin 38 - Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King 1990). Stoffle (1995:1) believes that the TCP concept is a logical extension of the National Historic Preservation Act, which was initially designed to protect individual buildings and historic objects. Although the TCP concept has been effective in protecting small places of extreme cultural significance, Stoffle (1995:1-2) suggests that it may not be the best way to conceptualize and protect Indian cultural resources and that the concept of **cultural landscapes** more accurately reflects how Indians organize cultural resources and how land managers should protect such resources.

Bulletin 38 provides a mechanism for recognizing and evaluating TCPs and defines "traditional" as referring to "beliefs, customs and practices of a living community of people that have been passed down through the generations, usually orally or through practice." Thus, a TCP is a property with significance to a community derived from "the role the property plays in a community's historically rooted beliefs, customs and practices" (Parker and King 1990:1). Since 1990, awareness of TCPs has grown and land managers and agency officials have experienced difficulties evaluating the National Register eligibility of TCPs. This helped prompt the National Park Service to issue further guidance through publication of a Special Issue of CRM - Traditional Cultural Properties, What You Do and How We Think (Parker 1993). In Parker's (1993:1-5) explanation of TCPs, she emphasizes the important role to be played by the Indians in evaluating significance:

> **A Traditional Cultural Property [TCP] is a property or a place that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community's traditional beliefs and practices. One fundamental difference between TCPs and other kinds of historic properties is that their significance cannot be determined solely by historians, ethnographers, ethnohistorians, ethnobotanists, and other professionals. Determination of significance of TCPs must be based on the perceptions of the community that values them.**

Properties that are deemed to qualify as TCPs can be listed in the National Register and accorded protection equivalent to that given archaeological and historic structures. Properties thought or alleged to have traditional cultural significance and that might be affected by federally funded, licensed, or regulated activities are subject to a review process prescribed by the Advisory Council on Historic Preservation (ACHP) under authority of Section 106 of the National Historic Preservation Act (NHPA). Amendments to this Act made in 1980, especially Section 502, recommended that traditional cultural resources, both tangible and without specific property referents, be considered by national and state preservation programs (Parker and King 1990:2).

The October 1992 amendments to the NHPA increased the role of Indians in the national program. The ACHP's regulations implementing Section 106 of the NHPA also provide for Indian participation in decisions regarding the identification and treatment of TCPs. Specifically, Congress added Section 101(d)(6)(A), specifying that "properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization may be determined to be eligible for inclusion on the National Register." Congress also added Section 101(d)(6)(B) directing federal agencies in carrying out their responsibilities under Section 106 of the Act, to "consult with any Indian tribe or Native

Hawaiian organization that attaches religious and cultural significance to properties described in subparagraph (A)." The following policy statement was issued by the ACHP on June 11, 1993:

> **Historic properties with traditional religious and cultural importance ("traditional cultural properties") are essential to maintaining the cultural integrity of Indian tribes and Native Hawaiian organizations. Such properties are critical to the cultural lives of many Native American communities. To preserve the character of such properties in the context of Federal agency planning requires that all participants in Section 106 review carry out the requirements of the Council's regulations in ways that respectfully balance Native American cultural values with other public interests. The Council will, and other participants in Section 106 review should, interpret and use the Section 106 review process in a flexible manner that advances the goals of maintaining traditional cultural values and specific historic properties ascribed such values as "a living part of our community life" (16 U.S.C. 470(b)(2)), and fully take into account the effects of undertakings on such properties.**

The ACHP will (and other participants in the Section 106 review process should) be guided by the following principals in applying the policy set forth above:

- **Procedural flexibility**

  The principals of regulatory flexibility set forth in Section 800.3(b) should be employed by the participants in the Section 106 process. TCPs are an integral part of living communities and must be viewed in a culturally sensitive manner throughout the Section 106 process. Rigid adherence to the precise procedures in the regulations may be detrimental to the values that give a TCP its significance. Agencies should not require Native Americans to conform rigidly to procedures that may be alien to them, even though administrative procedures must be followed. For example, requiring Native American religious practitioners to fully disclose their beliefs about a traditional place may, from their perspective, require them to violate tradition in a manner that they believe to be destructive to the place, their culture, and themselves. Strict adherence to regulatory procedures must not be allowed to take precedence over respect for the rights and beliefs of Native Americans.

- **Earliest Reasonable Involvement**

  Communication with Native Americans should be initiated at the earliest stages of the Section 106 process. Native American groups who ascribe cultural values to a property or an area should be identified by culturally appropriate methods. Agencies should identify specific individuals and/or groups through discussions with tribal councils, other official points of contact, knowledgeable outside parties, and known or likely authorities on cultural matters within each potentially concerned group. Agencies should understand that Native American groups not identified during the initial stages of the Section 106 process may legitimately request to participate in consultation later in the process.

- **Meaningful Consultation**

It should be understood that the purpose of consultation is to elicit the concerns of groups, ensure full consideration of those concerns, and, if possible, arrive at decisions that respect those concerns and take them into account. In this respect, the ACHP regards the consultation process as an effective means for reconciling the interests of the consulting parties (36 CFR § 800.1(b)). However, the requirement to consult with Native Americans is not a requirement that the agency always accede to their views. Recognizing the interest of a Native American group in a traditional cultural property does not confer right of ownership in the property.

- **Early Planning Consideration**

Agencies should determine how to consult in a manner that will be effective, given the cultural values of the participating Native Americans. The consultation process must be conducted in a realistic manner that is cognizant of the cultural values, socioeconomic factors, and administrative structure of the group(s). Participants in the Section 106 process should learn how to approach Native Americans in culturally informed ways. Specific steps should be taken to address such factors as language differences, economic circumstances, seasonal availability, or other constraints that may limit the ability of individuals and groups to participate and to respond in a timely manner.

Agencies should consider the potential for effect on traditional cultural properties in determining whether an action is an undertaking, and again in establishing an undertaking's area of potential effect. Actions that may have no potential for effect on other kinds of historic properties may have effects on TCPs. Moreover, such properties may be subject to a wide range of effects that must be considered in establishing the area of potential effect.

For example, the spraying of pesticides, which may not have the potential to affect other kinds of historic properties, can affect the ability of Native American basketmakers to use historic resource areas needed to continue their traditional work. Similarly, more distant undertakings that occur within the vicinity of a mountaintop on which Native American religious practitioners seek visions "may introduce audible, visual, or atmospheric elements that are out of character with the property or alter its setting" (36 CFR §800.9(b)(3)), thus affecting the ability of practitioners to use the mountaintop for its historic, traditional use.

- **Respect for Religious and Other Cultural Beliefs**

Where the interests of a Native American group in a TCP are religious in nature, such as the need to perform ceremonies at a traditional cultural property, or the belief that the property played a role in the traditional creation of the group, participants in Section 106 review must respect such interests in accordance with the First Amendment to the U.S. Constitution and the American Indian Religious Freedom Act (42 U.S.C. §1996), while avoiding actions that could be taken to constitute the establishment of religion in contravention of the First Amendment. The ACHP will, and other participants in Section 106 review should, interpret and use the Section 106 review process to advance the purpose of maintaining TCPs as "a living part of our community life" (16 U.S.C. 470(b)(2)).

- **Legitimacy of Confidentiality**

Participants in Section 106 review should seek only the information necessary for planning in a manner that respects the Native American group's need for confidentiality. The cultural values of many groups require that information on traditional cultural properties be kept secret or shared only with selected parties. As a result, it may be both ineffective and offensive to ask a Native American group to assist in identification of such properties. For example, it may be unnecessary to define the precise boundaries of a TCP, or to describe in detail what uses of the property give it significance, as long as enough information is obtained to take into account effects on the property.

Tribal Perspectives on Traditional Cultural Properties

The Confederated Tribes of the Umatilla Indian Reservation seek to preserve through management, research, interpretation, protection and development the integrity of their cultures. To the Indians, historic preservation or cultural resource management involves integrated efforts to: preserve and transmit language and oral tradition, arts and crafts, and traditional uses of plants and land; maintain and practice traditional religion and culture; preserve sacred places; record and retain oral history; communicate aspects of tribal culture to others; and use cultural resources to maintain the integrity of communities and advance social and economic development (Burney et al. 1993:1). Burney (1992:3) notes that while the Indians are certainly concerned about preserving historic properties and other cultural resources on reservation lands, they are often equally or even more concerned about preserving ancestral sites and traditional use areas on lands that they no longer control, whether these lands are now under Federal, State, or local control or in private ownership.

Indian world view, in which cultural resources are a part, includes: themselves and their treaty rights, religious beliefs, their communities, and their way of life; Indian elders with their unique information regarding their personal histories as well as tribal histories; clean air; clean water for the salmon and other varieties of fish, eels, and riverine resources; and the root grounds and berry patches scattered throughout the mountains (Burney et al. 1993:2). The Umatilla ascribe to the concept of "subsistence magic" - the hunting, fishing, and gathering of roots and berries traditional to the Indian way of life. Subsistence magic is associated with specific geographic locations (property types) as part of the Indian's larger world view of "sacred geography" - sacred sites, religious areas, prehistoric and historic sites, areas for gathering traditional foods (fish, animals, roots, and berries), and medicines for secular and non-secular use (Burney et al. 1993:2). As Burney et al. (1993:2) observed:

> **Sacred geography has been recognized by the Advisory Council on Historic Preservation (n.d.:8-9) as well: Native American religions . . . tend not to involve the use of major physical constructions: places of worship and veneration instead are in effect cultural landscapes: mountains, lakes, rocks, trees, and other natural features. Likewise, the U.S. Commission on Civil Rights (1983:30) has noted, Rivers, mountains, deserts, fields, stones, and running water, as well as plants and animals,**

are endowed with protective power in Native American religious belief. The National Park Service notes, "A Site (Footnote 4) may be a natural landmark strongly associated with significant prehistoric or historic events or patterns of events, if the significance of the natural feature is well documented through scholarly research" (National Park Service 1991c; Walker 1985b).

A good example of how the Indians look at sacred geography can be seen in a study of the Yakama (cf. Uebelacker 1984:104-105). To the Yakama, canyons are resource strips that lace together the desert landscape with water, trees, shrubs, and grasses providing shade in summer and protection from icy winds in winter. Canyons bring things together - a marriage of desert roots, ocean fishes, forest, and shrub. It is small wonder that the Yakama made these places their homes and work places. Similiarly, breaks, slopes, and bottoms bring together deer, elk, bear, sagehen, birds, oak, serviceberry, chokecherry, elderberry, currant, desert roots, and man. Canyon bottoms are major connecting points in the lives of animals as different as Steelhead and badger, eagle and freshwater mussel. It is a connection the Yakama knew well, since in canyon bottoms we find evidence of their houses, tools, and features used for catching, processing, storing, and consuming animals and plants, places of spiritual importance, and the remains of the Indians themselves. Canyon slopes are places where fish and aquatic animals were taken and contain springs, focal points of camping and working, and resources such as sagehens, horses, deer, rabbit, currents, serviceberry, elderberry, chokecherry and other foods and medicines. Springs were used by the Yakama and water from the earth's breast is essential to traditional Indian heritage (Uebelacker 1984:105).

On talus slopes are rock features, including small depressions, or stone pits, and rock walls. Yakama elders know about the stone pits - - recalling their use as storage places, as ambush places for animals and enemies, and as windbreaks while watching for animals or travelers. On steep colluvial slopes are plants like bitterroot, Lomatium, arrowleaf balsamroot, currants, and a variety of traditional foods and medicines. Discarded tools left on these slopes attest to Yakama use of these plants. Quarries where stone tool materials could be sought are common in Canyon-Plateau and Canyon-Ridge landform regions. Rock shelters were used by the Indians to camp, store food and valuables, and bury their dead. Some are covered with paintings and carvings. Rock shelters are centers for spiritual activity, containing power and meaning for future generations. (Uebelacker 1984:105). These examples can help non-Indians better understand why Indians venerate their land as sacred geography.

The Confederated Tribes of the Umatilla Indian Reservation have adopted the following definitions to deal with TCPs. Their definitions in large part follow definitions provided by the National Park Service or the Advisory Council on Historic Preservation with certain words given special emphasis in bold face (cf. Burney et al. 1993:Attachment 4).

Traditional

Traditional applies to beliefs and behaviors that have been transmitted across generations, and are identified by their Native American practitioners to be necessary for the perpetuation of their cultures. Characteristically, cultural practices are so interrelated that religious activities are not totally separable from subsistence, family life or other feature. Traditional also applies to the sites, objects, or **places** intimately associated with those beliefs or behaviors.

Ethnographic Resources

Ethnographic resources refer to those resources with traditional subsistence, sacred ceremonial or religious or other cultural meaning for contemporary Native Americans.

Sacred Resources

Sacred resources are those resources that apply to traditional sites, **places** or objects that Native American tribes of groups or their members perceive as having religious significance.

Traditional Cultural Value

A traditional cultural value means the contribution made by an historical property to an ongoing society or cultural value that has historical depth; a non-traditional cultural value is a cultural value that lacks such depth. There are several kinds of historic values including architectural, associative, use, information, and cultural. Associative value is the importance of a property as a reminder of an event, person, process or trend affecting the history of the world, the nation, or a region, community, or group. Cultural value is the contribution made by an historic property to an ongoing society or cultural system.

Traditional Cultural Significance

Traditional cultural significance is one kind of cultural significance that may make a property eligible for inclusion in the National Register of Historic Places. Traditional refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include:

- a **location** associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
- a **location** where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice.

3.6.5 Consideration of TCPs at Hanford

A significant TCP, according to Bulletin 38, is one that is associated with "cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." Bulletin 38 acknowledges that TCPs "are often hard to recognize" and encourages researchers to "address the intangible cultural values that may make a property significant," and do so without "ethnocentric bias." It is important to remember that the line between cultural practice and religious practice is often difficult to distinguish. In many Indian cultures, subsistence pursuits, family life, dreaming, sweat bathing, and other aspects of daily life are based in a spiritual understanding of the world. Euro-Americans, on the other hand, tend to separate the secular from the sacred.

Many Indians know of general areas where their ancestors or spirits stay and think of these areas as general locations, not specific "places" that can be bounded on maps. The boundaries of a mountain top on which religious practitioners seek visions can be drawn around the toes of a person sitting on it, the area of potential effect could include everything within that person's viewshed (Parker 1993:4). That is why it may often be quite difficult for the participating tribes to reveal specific places where hunting, plant gathering, or large social gatherings took place, much less to accurately circumscribe on a map where these activities took place. Parker's (1993:4-5) thoughts are particularly useful here. She notes that many, if not most, TCPs:

> **. . . were and are simply not meant to have lines drawn around them marking where they begin and where they end. For example, with vision quest sites, what is eligible for the National Register? The place where an individual sat or stood? That area and the path the individual took to get to the quest site? Those areas and everywhere the individual gazed while seeking a vision?**

Since the release of Bulletin 38 in 1990, interested parties have met to grapple with the challenges inherent in dealing with TCPs (e.g., liaison with Indian groups, evaluation of significance, confidentiality, and contemporary use). With respect to liaison with Indian groups (Kennedy et al., 1993:20-29) assert that the key questions that arise in TCP studies are *who* should be consulted and *how* should this be done? Unfortunately, there are no easy answers. What is known is that archaeological studies alone are not sufficient to determine the significance of TCPs and that ethnographic research is needed to document not just site-specific information but also the system of values of the participating Indian groups. If nothing else, it is desirable that the tribes assist in the identification of individuals who they consider to be tradition-bearers.

The issue of confidentiality is difficult to resolve. Often, the location or nature of, as well as the use of, some specific sites cannot be divulged without intruding upon the integrity of a TCP. Some Indians will indicate that practices of a religious nature cannot be discussed or documented at all, let alone be registered. Others believe that areas of sacred significance can be registered if the National Register can guarantee confidentiality (Kennedy et al., 1993:26). The Keeper of the National Register does have the authority to prevent disclosure of information under the Freedom of Information Act. In one case, Indians working with a consulting archaeologist released information classified into only two categories: ancestral ruins and "sacred sites." The government agencies were able to make decisions based on this limited amount of information. In that case, the approach resolved the conflict between confidentiality and the release of sufficient information to accord recognition and protection, providing there was no controversy regarding the integrity of the withheld data.

Some tribes have turned to the courts to have TCPs recognized but are then faced with the task of balancing secrecy with the demands of evidence. Hence, it is not surprising that land rights claims and cultural survival issues are phrased in terms of sacredness and veiled in secrecy to impart certain solemnity (Kennedy et al., 1993:26). Some tribes are opposed to all impact on culturally significant places, while others are willing to accept monetary compensation for loss of such places. Fortunately, many knowledgeable Native people are anxious to share their perception of the world around them, including place names and the traditional history associated with the landscape, with the hope of preserving this information and fostering cross-cultural understanding and appreciation for their perspective.

Bulletin 38 restricts TCPs eligible for nomination to those older than 50 years, except for places of sufficient historical importance that will likely be retained in the future. When applied to Indian sites, this can be problematic. As mentioned earlier, Bulletin 38 provides an example of a mountain peak that is now used by a tribe for religious activities, but is an area without a known historical antecedent. Places where such activities are known to have once occurred but went unused for many years before a renaissance of the practice are eligible.

Mt. Shasta, California - A Lesson in the Politics of TCPs

This document will be used by DOE-RL to comply with the National Historic Preservation Act and confront TCP issues head-on. The example of Mt. Shasta, California, is a valuable lesson from which all well-meaning managers can profit. Ted Rieger, writing in a recent issue of Historic Preservation News, notes that in one of the most controversial National Register status determinations to date, federal and state historic officials now agree that 19,040 acres of California's Mount Shasta are eligible for listing in the National Register of Historic Places. The determination resulted from several years of Section 106 compliance work initiated by the Shasta-Trinity National Forest as it considered federal impacts to historic properties in connection with a proposed ski area on Mt. Shasta (Rieger 1995:12).

Mt. Shasta is a dominant landscape feature, not unlike Gable Mountain in the middle of the Hanford Site, and it has been important historically and is still important in the traditions, cultures, and myths of the Shasta, Wintu, Pit River, and Karok Indians. In 1978, an avalanche, viewed by some of the Indians as a sign from the mountain, destroyed the Mt. Shasta Ski Bowl, which had operated since 1957. A proposal to build a new ski facility in a safer location - Panther Meadow - triggered Indian opposition since they used the area for ceremonial purposes. The Section 106 process began.

Although the Forest Service was aware of Indian use of the mountain, they found almost no archaeological evidence of such and informed the California SHPO that no National Register properties would be affected. In 1990, as requested by California Indian Legal Services, the Forest Service raised the issue of Mt. Shasta's importance to the Indians. Tribal interviews resulted in a finding that Mt. Shasta, in its entirety, is considered sacred and historically important by the local tribes:

> **Mount Shasta is the most sacred area to our people. Our creator lives there, and that's where our spiritual leader receives her power.** (Gloria Gomes - Wintu Tribe)

The Wintu elders still conduct ceremonies at Panther Meadow, a site of healing power from the springs in the area. The Forest Service and SHPO considered several approaches for defining an area of historic eligibility including the entire mountain (150,000 acres of federal and private lands), individual properties, or an in-between approach. They decided on a multiple-property approach they call "Mount Shasta in Native American Culture and History" - a 40 acre site at Panther Meadow and a 19,000 acre "Native American Cosmological District on Mount Shasta" that consists of the mountain above the timber line (Rieger 1995:14). Dwight Dutschke, the Native American coordinator in the SHPO's office observed:

> **The National Register is a property-oriented designation, and what we're dealing with in the case of Mount Shasta is not conducive to making clear boundary delineation's. But under the eligibility criteria, we're required to do so.** (Rieger 1995:14)

While the Forest Service concurred, Indian groups and individuals ("Save Mount Shasta") believed a larger area should be designated and the Advisory Council on Historic Preservation reviewed the case and finally the Keeper of the National Register was also consulted. On March 11, 1994, the Keeper issued a determination of eligibility for the Mount Shasta Historic District that overruled the Forest Service and state findings to encompass 150,000 acres (including 50,000 acres of private land - some of which is developed or proposed for development). As Forest Archaeologist Winfield Henn explained:

> **There's very little difference between a determination and a nomination for the purposes of Forest Service management. But when a nomination is done, private landowners must be informed.** (Rieger 1995:14)

The Keeper issued its determination without informing the landholders, leading to a public uproar. In a situation not unlike that in the state of Washington, the 1992 California state legislature created the California Register of Historical Resources. Any National Register property, including those determined eligible for the Register, automatically became part of the California Register and such properties then come under the California Environmental Quality Act which requires an environmental review of uses that may affect historic values of the property. Some private landholders on the mountain became concerned that the eligibility determination would affect their ability to use or develop their land (Rieger 1995:14). As a result of the public uproar, the Keeper received over 2,500 letters opposing the designation. The Keeper then issued a redetermination to agree with the Forest Service's original boundary of eligibility, based largely on his personal observations of Mount Shasta. Neither side was totally satisfied with the redetermination.

Although there was no question that Mt. Shasta held Indian historical significance, historical integrity proved to be the deciding factor. The Keeper said that for purposes of Register eligibility:

> **We focus on the aspects of traditional Native American historical and cultural significance rather than on the sacred values, to make a secular decision rather than one that ties in religion.** [and that designating areas for such reasons, even when little or no physical evidence is present] **. . . is not a new concept but one we've only begun to fill out more through listings in the last few years.** (Rieger 1995:14)

The Keeper expressed concerns that the Mt. Shasta controversy was inflamed by misperceptions among the public and news articles that misinterpreted what a National Register designation really means in terms of its effects on private property and land-use issues. The National Trust for Historic Preservation's associate general counsel Elizabeth Merritt explained:

> **We didn't want the redetermination perceived as being a response to a property-rights backlash, or to let such groups as those affiliated with the wise-use movement get the idea they could kick and scream to get a political change. We wanted to be sure that specific reasons related to eligibility were pointed out to justify a redetermination.** (Rieger 1995:14)

The Yakama "Time Ball" Study - A Lesson in Successful Indian Participation in Cultural Resource Management

The broad purpose in preparing Time Ball: A Story of the Yakama People and the Land (Uebelacker 1984) was to prepare a cultural resource overview so that the Yakama Indian Nations' prehistoric and historic resources can exist in productive harmony and fulfill the cultural, social, and economic needs of present and future generations of the Yakama Indian Nation. To realize such a broad purpose required achievement of four basic goals: locating, evaluating, preserving, and enhancing these resources. These goals are very similar to the management objectives of this context statement (e.g., location/identification, evaluation, preservation, and enhancement of Indian TCPs at the Hanford Site).

As Uebelacker (1984:5) noted, the Time Ball cultural resource overview project was initiated by the Branch of Forestry of the Yakama Indian Agency as part of the overall Forest Management Plan. A broader approach was necessary because the lifeways of the Yakama people -- past, present, and future -- encompasses the entire landscape from forested lands to the arid steppe in an interconnected mosaic of land and life. In what now might be referred to as a GIS (geographic information system) approach, the Time Ball study established a spatial system for organizing information on the lifeways of living Indians and Indians that lived in the past ("Ancestors"). Drainage basins provided the basic unit of analysis while landform regions provided units which cross-cut and tied drainage basins together.

Landform regions were studied in terms of seasonal aspect, physiographic expression, geological foundations, and further divided into landform components. Resources known to be important to past, present, and future Yakama Indians were evaluated by broad class, season, and landform association. A preliminary (and confidential) list of resources was compiled from existing literature and interviews with tribal elders. The study defined types of places in reference to landform regions, resources and season, and field observations. One of the more important elements of the study was its definition of cultural resources, from the Yakama perspective. Uebelacker (1985:6) writes:

> **What is a cultural resource? Resources are cultural appraisals! This is a key point - culture defines what constitutes a resource and what does not. Culture sets the values of resources relative to one another and since culture changes so too do resources change. What is perceived as a resource today may not have been a resource fifty years ago, or it might not be a resource tomorrow. In this sense all things a culture recognizes as useful economically, socially, and spiritually, are cultural resources . . . A vista of uncut and roadless forest may be a cultural resource, or a small meadow, or a basalt outcropping, or an owl, or a crane, or a million other things.**

The Yakama are concerned with not only the material evidence of their ancestors' land use but with the objects and meanings of culture and nature which are necessary for the continued preservation, protection, and enhancement of a living culture. They cannot ignore the traditional foods and medicines or vision quest sites that are present on the landscape, nor can they ignore the places which have no material objects yet hold special meaning to the culture. Uebelacker (1984:7) opines that cultural resource management is the attempt to locate, preserve, protect, rejuvenate, and enhance the relationship of culture and place. Place is the ceded lands of the Yakamas and culture includes the chronology, lifeways, and cultural processes of their ancestors' lives and the lives of present and future Indians. Thus:

> **. . . cultural resources involve not only the sites, buildings, structures, or objects . . . but also involves the maintenance and rejuvenation of cultural places like camas meadows, huckleberry fields, hunting areas and camps, and bitterroot grounds. It involves knowing the places the culture uses today are the historic places of tomorrow and by use become "significant" or meaningful parts of peoples lives. It involves helping a culture locate, preserve, protect, and establish a meaningful relationship with land and life. It most obviously involves traditions, customs, and modern life styles."** (Uebelacker 1984:7)

Uebelacker (1984:179-200) defined types of places in relation to landforms and seasons and developed a predictive model of prehistoric or ethnographic Yakama Indian land use patterns. Types of places include base camps, work camps (processing and storage places, collecting camps, hunting camps, fishing camps, special resource camps), transient camps, interaction camps, and extractive locales. When landform regions and seasonal resource patterns are considered, the types of places include winter villages (base camps), cemeteries, winter hunting camps, rockshelters, animal traps, and hunting places. Other places include spring hunting sites, fishing sites, and root collecting areas; summer fishing camps; and fall hunting and berry gathering camps, and fall fishing sites.

The Time Ball study would not have been possible without the active participation of the Yakama Tribe and several elders and tribal officials. The approach used in the Time Ball study is directly applicable to the Hanford Site. Not only were the Yakama once the caretakers of portions of the Hanford Site, but the types of places and many of the landforms and seasonal resource patterns that apply to the Yakama Indian Reservation also apply to the lands to the east -- the Hanford Site. The Time Ball study was prepared prior to the formal recognition of TCPs as being eligible for listing in the National Register. If Time Ball had been prepared in 1994 instead of 1984, the types of places described by Uebelacker (1984) would be good candidates for consideration as TCPs. Having been prepared prior to the publication of Bulletin 38 and other federal guidance pertaining to TCPs, Time Ball does not provide any guidance as to evaluating the types of places for National Register eligibility. Nevertheless, Time Ball can serve as a framework by which Hanford decision-makers and participating Indian tribes can identify potential TCPs at the Hanford Site. The integration of types of places, landforms, and seasonal resource patterns in the Time Ball study provides an effective point of departure for those looking to understand how the Indians used the land and how the locations of TCPs can be reasonably predicted.

TCPs or Cultural Landscapes - A Framework for Property Types

As noted earlier, Stoffle (1995:1-2) argues that cultural landscapes rather than TCPs should be the operating concept when dealing with natural and cultural resources of value to American Indians. For one, the term cultural landscape has official standing in a number of federal laws, regulations, and guidelines. Secondly, Stoffle (1995:4) observes that it is places that are managed by land management agencies and sometimes the place is the cultural resource (and termed a TCP). In most instances, however, a place is set aside to protect the cultural resources it contains. Given the reality of land management practice in the United States, ultimately cultural resources must be studied and managed as geographically coherent units. The key question is how large must these geographically based units be in order to provide acceptable protection to the cultural resources they contain?

In 1994, the National Park Service issued Cultural Resource Management Guidelines (National Park Service 1994) wherein cultural landscapes are defined as a geographic area, including both natural and cultural resources, associated with an historic event, activity or person (National Park Service 1994:94). Using these criteria, the National Park Service recognizes four cultural landscape categories: historic designated landscapes, historic vernacular landscapes, historic sites, and ethnographic landscapes. Ethnographic landscapes are associated with contemporary groups (Indians) and typically are used or valued in traditional ways (cf. Stoffle 1995:5).

Stoffle (1995:5) argues:

The NPS definition of cultural landscapes is both similar and dissimilar to those often expressed by Native Americans. Both definitions include the land, its natural components, places touched by pre-human spiritual beings, and objects left there by Indian people as these are conceived within the cultural system of the people. Both conceptualizations of cultural landscapes reflect the full range of human activities, all of which are perceived of as being a part of life and thus culturally significant. Native American landscapes, however, are much larger in geographic space than are those considered by the NPS guidelines. The latter suggests that tracts of several thousand acres are the upper size limit for cultural landscapes (National Park Service 1994:94). However, by simply broadening the spatial parameters of cultural landscapes, the NPS and Native American conceptualizations of these cultural resource units can be united.

Cultural landscapes can be divided into three types: (1) holy landscapes, (2) regional landscapes, and (3) landmarks. Regional landscapes are further divided into ecoscapes and storyscapes.

Holy land is a term that seeks a common land perception in order to convey to non-Indians the cultural significance of Indian land perceptions. At Hanford, for example, a holy land is created by the Creator who established a birthright relationship between the Indians and that portion of the earth where they were created. This relationship provides the Indians with special rights to use and obligations to protect resources on this portion of the earth. The relationship between the Indians and their holy land cannot be broken by the fact that the government controls the Hanford Site and the Indians are not permitted to live therein. Forced relocation by others (e.g., removal of the Indians to reservations) does not break a relationship created by the Creator, so hold land ties tend to be viewed similarly by contemporary occupants and those who have moved away (cf. Stoffle 1995:6).

Regional landscapes are components of holy lands and are defined in terms of both geography and culture. Typically, regional landscapes are spatially expansive involving hundreds, perhaps thousands, of square miles (e.g., the Black Hills of South Dakota, the Grand Canyon, the Columbia River). Two major subcomponents of regional landscapes are ecological landscapes (ecoscapes) and story landscapes (storyscapes). Ecoscape refers to a portion of a regional landscape that is clearly defined by an unusual or distinct local geography and its unique cultural relationship to the Indians. Examples at the Hanford Site might include Rattlesnake Mountain, Gable Mountain/Butte, the Columbia River, and White Bluffs. Indians ultimately define an ecoscape when its local geography is specially incorporated into their culture. Storyscape refers to a portion of a regional landscape or parts of a number of regional landscapes that are delineated by an Indian story or song (Stoffle 1995:7-8).

Landmarks are discrete physical places within a cultural landscape and tend to be small parts of the local geography that are topographically and culturally unique (White Bluffs, Priest Rapids). Landmarks are easily defined both in terms of their physical boundaries and the reasons why they are culturally important. A landmark can be a power rock that will heal sick people if they can talk to it in an Indian language and perform a proper ceremony (cf. Stoffle 1995:8).

Stoffle (1995:13) concludes that Indian cultural resources are better protected as cultural landscapes than as TCPs because:

- **The meaning and cultural significance of plants, animals, archaeological sites, mineral deposits, and water derive as much from their relationship to one another as it does from their independent values.**

- **The various cultural landscape concepts closely reflect how Indians perceive how their cultural resources fit together.**

- **The concept of TCPs has generally been restricted to areas the size of landmarks and always limited to geographic areas smaller than ecoscapes, thus eliminating from protection or management regional landscapes and holy lands.**

- **Land management agencies are currently using the concept of ecosystem to frame their studies and management practices. The concept of TCPs has neither the spatial scope nor the explanatory power to make significant contributions to ecosystem studies and management. In contrast, the concept of cultural landscape attempts to explain the relationships between cultural resources and ties these to a protectable environment.**

- **Technology exists in the form of GIS and multimedia data integration systems so that scientific studies and informed management plans can finally begin to reflect the holistic cultural visions of the Indian people.**

Stoffle (1995:13) further asserts that the TCP concept is too restricted by the laws and regulations that created it to be used to protect larger, multiple component Indian cultural resource areas. Although Stoffle's arguments have great merit, particularly in reference to geographically expansive TCPs at the Hanford Site (Gable Mountain/Butte, the Columbia River, etc.), Hanford decision-makers must always act in reference to current law, regulation, and federally promulgated guideance. Agency policy regarding the management of Indian cultural resources has advanced rapidly between 1990 and 1995, and it is reasonable to assume that the operating concept advanced here (TCPs) will evolve in the coming years - quite likely in the direction advocated by Stoffle (1995). This evolution can be seen in the lead article of the Thematic Issue on Landscape Interpretation published by the National Park Service in CRM (Birnbaum and Page 1994:3):

> **Until recently, historic preservation and, in turn, interpretation primarily focused on structures. Buildings were often viewed in isolation, instead of within their cultural landscape context. Interpretation of the landscape focused at best on the historic scene or site associated with a building. However, during the past 20 years cultural landscapes have become an integral component in historic preservation both in the U.S. and abroad. We now recognize the importance of the landscape to an understanding of the cultural value and significance of a particular place. Additionally, there has been a growing awareness that cultural landscape preservation encourages a holistic approach to resource management by engendering an increased understanding of the inter-relationships between cultural and natural resources within a property. Based on this increased recognition and understanding, the story being told at many properties is expanding and includes myriad landscapes, designed, vernacular, and ethnographic.**

3.6.6 Property Types - Definitions

Although several property types are defined below, and methodologies to evaluate historic properties are suggested as well, it is essential that the Indian tribes become actively involved in the identification of TCPs (or cultural landscapes). Tribal involvement can be initiated through an intensive oral history program conducted with tribal elders. An oral history program can be used to both identify property types and impart tribal knowledge as to the location and significance of TCPs. Tribal involvement can also be initiated through an intensive survey program that includes knowledgeable tribal members who can identify important hunting, gathering, and medicine areas within the Hanford Site. Tribal involvement can also include tribal participation in the management of identified resources such that National Register eligibility evaluations are conducted with tribal participation. Traditional cultural contexts and associated property types for the ethnographic contact period at Hanford are summarized in Table 3.1 on the following page.

TABLE 3.1

TRADITIONAL CULTURAL CONTEXTS AND ASSOCIATED PROPERTIES FOR THE ETHNOGRAPHIC CONTACT PERIOD AT HANFORD: 1805/1806 - 1943

THEME OR PROPERTY TYPES	CRITERIA OR REQUIRED CONDITIONS AND CHARACTER	IDENTIFIED PROPERTIES OR PROPERTY TYPES	IMPORTANCE	NATIONAL REGISTER LISTED OR DETERMINED ELIGIBLE PROPERTIES
Archaeological Sites	Information developed from reconnaissance surveys	Several hundred archaeological sites have been recorded to date. See Hanford Cultural Resource Laboratory Site Files	Importance of archaeological sites to the tribes is to be determined by tribal elders or representatives based on their criteria	Coyote Rapids, Rattlesnake Springs, Wahluke, Locke Island and other designated/listed archaeological districts
Cemeteries	Identified by Wanapum leader	Five cemeteries between the south end of Hanford Townsite and the 100K Area. Specific locations confidential	Relatives of living people are buried in these locations	One such site is in a registered Archaeological District
	Located during archaeological surveys	Four additional cemeteries, on islands and river terraces, locations confidential	Ancestors of the Tribes are buried here, remains are sacred	none
Trails and Pathways	Located during archaeological surveys or identified by Tribal elders			
Camp Sites and Villages (Residence Areas)	Identified by Wanapum and Palouse elders	A location near the Hanford townsite	Wanapum winter village	none
		A location between White Bluffs townsite and the 100D Area	Wanapum winter village, visited by Walla Walla, Palouse and Yakima in fishing season	included in Locke Island and Wahluke Archaeological Districts
		A village site at Coyote Rapids	Small winter village, location of Smohalla's first *Washat* Ceremony	Located in Coyote Rapids Archaeological District

TABLE 3.1 Cont.

TRADITIONAL CULTURAL CONTEXTS AND ASSOCIATED PROPERTIES FOR THE ETHNOGRAPHIC CONTACT PERIOD AT HANFORD: 1805/1806 - 1943

THEME OR PROPERTY TYPES	CRITERIA OR REQUIRED CONDITIONS AND CHARACTER	IDENTIFIED PROPERTIES OR PROPERTY TYPES	IMPORTANCE	NATIONAL REGISTER LISTED OR DETERMINED ELIGIBLE PROPERTIES
		A location between Highway 240 and Jaeger Island	Major winter village, the late Wanapum leader Frank Buck was born here; home of Puck Hyah Toot, former *Washat* and Wanapum leader	Location of the Vernita Site, which meets criteria for listing in the National Register
Fisheries (Fishing Sites)	Identified by Wanapum elders	A place for gathering spawned-out fish located 8 miles north of Richland, west bank of the Columbia River	Indian people may seek to reestablish fishing activity here	none
	Identified by Wanapum and Palouse elders	Banks, islands and channel, Columbia River between the White Bluffs Ferry Landing and the 100D Area	Indian people may seek to reestablish fishing activity here; used the area until 1943	fishing stations and camps are included in Locke Island and Wahluke Archaeological Districts
		Moolimooli at 100N Area was an important dog salmon fishing place	Indian people may seek to reestablish fishing activity here; used the area until 1943	none
		Ahnukwhum to Mookmookhah, located from Jaeger Island to the upper end of China Bar	Wanapum fish this reach today	none
Hunting Grounds	No information obtained			
Plant Gathering Areas (Food, Fiber, Medicine)	Information elicited from Wanapum and Palouse elders	None identified; area not known for plant food production		

TABLE 3.1 Cont.

TRADITIONAL CULTURAL CONTEXTS AND ASSOCIATED PROPERTIES FOR THE ETHNOGRAPHIC CONTACT PERIOD AT HANFORD: 1805/1806 - 1943

THEME OR PROPERTY TYPES	CRITERIA OR REQUIRED CONDITIONS AND CHARACTER	IDENTIFIED PROPERTIES OR PROPERTY TYPES	IMPORTANCE	NATIONAL REGISTER LISTED OR DETERMINED ELIGIBLE PROPERTIES
Traditional Holy Lands (see subsets below)	Information supplied by Tribal elders			
	Information from Indian leaders, elders	The Columbia River	Water is sacred, brings food (salmon)	Being considered for Wild and Scenic River designation
{Dwelling Places of the Spirits}	Information supplied by Tribal elders	Gable Mountain	Plays part in origin myth, and one of principal spirit quest places	Listed as the Gable Mountain/Gable Butte Cultural District
	Information from Wanapum and Yakima informants	Goose Egg Hill	Plays central role in origin myth	none
{Vision Quest Sites}	Information supplied by Tribal elders	Gable Butte, including all outcrops	Formerly a spirit quest place	Listed as the Gable Mountain/Gable Butte Cultural District
	Information from Wanapum leader	Rattlesnake Mountain, particularly the ridge crest	Plays central role in origin myth, important spirit quest place where the *Washat* prophet Smohalla received the songs of the seven drums religion	none
		Saddle Mountain, crest and rocky outcrops	one of principal spirit quest places	none
{Washat Dance Sites}	Information supplied by Tribal elders	The location, with evidence for structures where rituals took place; site and natural setting		Coyote Rapids Archaeological District (first *Washat*)
{First Salmon or First Foods Ceremonial Sites}	Information supplied by Tribal elders			

TABLE 3.1 Cont. 3.1 TRADITIONAL CULTURAL CONTEXTS AND ASSOCIATED PROPERTIES FOR THE ETHNOGRAPHIC CONTACT PERIOD AT HANFORD: 1805/1806 - 1943				
THEME OR PROPERTY TYPES	**CRITERIA OR REQUIRED CONDITIONS AND CHARACTER**	**IDENTIFIED PROPERTIES OR PROPERTY TYPES**	**IMPORTANCE**	**NATIONAL REGISTER LISTED OR DETERMINED ELIGIBLE PROPERTIES**
{other ritual or ceremonial locations}	Places where rituals first performed, information supplied by Tribal elders	The location, with evidence for structures where rituals took place; site and natural setting		
Landmarks and Important Places - Indian History/Culture	Information supplied by Tribal elders			
Places of Adaptation and Accommodation (Indian-White Relations)	Treaty Sites	not locally applicable		none identified
	Camps of non-treaty Indians	Localities where those who opposed submission to white resided; location with natural setting		
Places of Persistence and Resistance	Skirmish Sites	Locations where fighting or ambush took place; location with natural setting		Rattlesnake Springs Archaeological District
Landscapes of the Heart	Information supplied by Tribal elders			
Others to be Defined by Tribes	Information supplied by Tribal elders			

The major challenge will be to overcome any Indian perceptions that Bulletin 38 and/or any other current federal regulation represents "business as usual" that only allows tribal participation within the confines of federal criteria (e.g., as commentors). As much as Bulletin 38 attempts to correct certain non-Indian biases in the federal review process by explicitly recognizing the eligibility of Native American TCPs, Indians and non-Indians must work together to create functional methodologies to identify resources and evaluate their eligibility. The existing federal criteria (36 CFR 60) is still a part of a non-Indian process designed to meet the land management needs of non-Indians who have a non-Indian world view or perspective. Creation of evaluation criteria that are responsive to the Indian perspective is allowed under federal regulation and in fact is being actively encouraged at this time.

Archaeological Sites

The first associated property type defined here is the archaeological site. As is suggested here, the line between archaeological sites and ethnographic sites is less than precise. A multiple property nomination requires identification of historic contexts and associated property types. From the Indian point of view, the past, the present, and the future are all part of a continuum and each is interrelated with the others. Thus, the regulatory requirements force the imposition of secured calendrical dates that are more closely linked to white history than Indian history. The first encounter between the Indians and Lewis and Clark in 1805/1806 is used here to define the beginning of the contact period, or "ethnographic present."

Anthropologists usually consider ethnographic sites to be those sites which were occupied or used during the contact period while archaeological sites are considered to be those sites which have been abandoned in the past or were only used prior to the contact period. The complicating factor is that during the early portion of the contact period, the Indians continued to inhabit the same camps and villages and fished, hunted, and gathered in the same places as before. Once the original Indian lifeway was destroyed through white pressure, the camps and villages, and fishing, hunting, and gathering places were finally abandoned and have become both archaeological sites that can also be considered to be ethnographic sites. Clearly, there is continuity between the archaeological and ethnographic periods and the dichotomy is one that is set forth by the white mind. Interestingly, where archaeological sites are present in a given landscape that Indians identify as a TCP, the archaeological sites are often viewed as evidence of "continuity of use" of the TCP from the past into the present. Obviously, though, not all archaeological sites are viewed by Indians as TCPs and many TCPs have no archaeological remains present within them to provide physical evidence of past or continuing use.

This overlap between archaeological and ethnographic sites has important management implications since the significance evaluation criteria for archaeological properties is wholly different than the significance evaluation criteria for TCPs. Where significance evaluation of archaeological properties is a well understood process that uses familiar criteria, formal guidance for the application of significance evaluation criteria to TCPs was only recently published (cf. Parker and King 1990). Since potential TCPs must be evaluated in terms of the importance given them by the people who care about them (the Indians), the eligibility of certain archaeological sites as TCPs must be demonstrated by the Indians. The way in which the Indians can demonstrate their importance is to define the properties, set forth standards or criteria to measure the significance of the properties, and then apply these standards or criteria to evaluate properties.

Archaeological sites that might be ineligible on their own merits might be eligible properties when viewed by Indians as TCPs. Nowhere is this a more thorny issue than with Indian cemetery sites.

Cemeteries

Another associated property type is Indian cemeteries or places where the Indian dead were buried by their loved ones. Along the Columbia are numerous sites which functioned primarily as cemeteries, but, there are several instances where large village sites might also have a cemetery area. As noted above, birthplaces and graves are normally only eligible if their significance is for reasons that go beyond their association with a famous person. Bulletin 38 shows how a burial site of a famous folk healer was eligible once the site was related to the intangible belief held by the healer's followers that his spirit was stronger at this particular site than any other. Similarly, cemeteries are ineligible unless, as is stated in Bulletin 15, they derive their primary significance from graves of persons of transcendent importance, from age, from distinctive design values, or from association with historical events (National Park Service 1991c:34-35). Sites that contain cemeteries are not necessarily ineligible because of their presence, and the graves may in fact be an intrinsic component of the overall cultural significance.

Given the Indian viewpoints presented throughout the context statement, Indian cemeteries or burial sites at Hanford would be eligible given their overwhelming cultural importance and association with the timeless sweep of Indian history. Certainly Euro-Americans venerate their dead and consider cemeteries to be hallowed ground, the key difference is that Indians, unlike most whites, consider the land itself to be sacred and their cemeteries are places where their dead are returned to mother earth. It would be difficult for either the Indians or anthropologists to determine if any of the cemetery sites at Hanford have graves of persons of transcendent importance. Such a concept is foreign to the Indians. All Indians arose from mother earth and are returned to her at death. Design values or association with historic events would also be difficult to prove. Given Indian belief systems and the interrelationship of Indian religion and Indian culture, graves and cemeteries do form an intrinsic component of overall cultural significance and should be almost always eligible. At the Hanford Site, Indian cemetery sites are protected under the Native American Graves Protection and Repatriation Act.

Camp Sites and Villages

As noted earlier, civilians were removed from the Hanford Site in 1943 and Indian use of the area was halted. Although Indian habitation of the Hanford Reach had declined precipitously in the early 20th century, several sites were used at least seasonally for various purposes (e.g., fishing). Since it has been over 50 years since the Hanford Site was closed to civilian use, all former Indian camp sites, village sites, and seasonal use areas that may have been in continuous or semi-continuous use between 1805 and 1943 are now, at least from a regulatory point of view, "archaeological" sites. Federal regulations now enable Indian groups to claim continuity of traditional use in situations, like Hanford, where their continuing use of an area is artificially blocked. Camp sites and villages that might not otherwise be eligible as archaeological sites might be eligible when viewed by Indians as TCPs. Because Indians view their cultural resources from a holistic framework, many of their former camp sites and villages may be eligible TCPs if the tribes demonstrate that, as historical properties, the sites have traditional cultural value as reminders of events, persons, processes or trends affecting their history and/or have traditional cultural significance as places where their beliefs, customs, and practices were passed down through the generations.

Trails and Pathways

Trails and pathways that lead to and from villages, camp sites, fishing, hunting, and/or gathering places, or spiritual places might be viewed as the Indians as eligible TCPs. A trail leading to a location where Indian religious events (*Washat* dances) had historically taken place, or a place where ceremonial activities (first salmon ceremony) are carried out in accordance with traditional cultural rules of practice, might be an eligible TCP.

Fisheries

The treaty-guaranteed fisheries have been found by the courts to be indispensable for preserving the Indian way of life and as such, the fisheries are a cultural resource as well as a natural resource (Rogers 1991:13). An obvious approach to identifying traditional fisheries as an associated property type is to assume that any village or camp site along the Hanford Reach of the Columbia River was a fishing spot or a potential fishing spot. Since fishing tends to be underrepresented in the archaeological record, a one-to-one correlation between archaeological sites situated along the river and traditional fisheries may not be valid (cf. Gard 1992:33). As Gard (1992:33) observed, research into prehistoric fishing practices and locations has taken on increased importance as native salmon runs decrease and modern fisheries management becomes subject to litigation as Indians assert their treaty rights to fish in "usual and accustomed places." To find the usual and accustomed places, Gard (1992:33) proposed looking through the fishes' eyes with a view toward building a model from the bottom up. That is, examine how fish use the river and extrapolate where the Indians went to exploit them.

Anadromous fish require well delineated channels of fast water for travel, sheltered pools or eddies for resting, and expanses of well-aerated gravel that remains inundated, silt free and oxygenated year-round for spawning. Gard (1992:36) assumed that the Indians were intimately familiar with fish behavior and that migration channels, resting pools, and spawning areas would have been known and exploited with equipment and techniques for each. Gard (1992:36) explained that the restrictive shape of migration channels and the speed with which fish travel through them, suggests these areas were conducive to fishing with drift nets, weirs, traps, and possibly seines. Resting pools, which are occupied by stationary individuals, would have lent themselves to fishing from platforms or canoes with leisters, dipnets, and harpoons, or, possibly with hook and line. In spawning areas, where fish congregate in large numbers, canoe fishing by torchlight, seining, or even drives into weirs or drift nets may have been used.

Gard (1992:36-37) correlated known archaeological sites with known migration channels, resting pools, and spawning areas and found that net fishing sites seem to be found consistently in areas with well delineated, fast water channels. House pit sites appear to correlate with the distribution of spawning areas. Additional research is needed to correlate fish resting pools with archaeological sites. Gard (1992:37) concluded that:

> **. . . the method, which entails looking at the requirements of the biotic resource and how it uses its habitat, and from this information inferring the most likely settings for extraction locations appears to be a promising tool for deciphering prehistoric land use patterns.**

It is important to note that salmon fisheries may not have been the most important factor in village site selection. Ames and Marshall (1980) suggest that plant resources and overall resource availability mayhave been the determining factor. Greengo (1982) states that historically, salmon were so abundant that they could be easily taken at any point along the river. His study of the Priest Rapids and Wanapum dam areas indicated that two thirds of the village sites were located on the more sheltered western shore, indicating that wind and other environmental factors may have played a role in village site location.

Hunting Grounds

The approach used by Gard (1992) worked well using salmon behavior to predict archaeological (fishing) site locations. This approach can be applied to the prediction of other important resource exploitation areas and TCPs. The locations of traditional hunting grounds, as an associated property type, might be identified if the behavior or habitat requirements of the sought prey is considered. Traditional or accustomed hunting grounds might be found in lowland areas where deer or antelope are known to spend the winter months or where migratory birds are known to nest. Certain habitats where burrowing mammals such as rodents and lagomorphs are known to den might also be places where hunting was practiced. Technological innovations such as the shift from atlatl to bow and arrow may have changed hunting strategies, logistics, and success rates. While this method is surely a useful tool to decipher prehistoric land use patterns, it might be applicable to the ethnographic contact period as well. For example, areas where wild horses congregated or pastured might have been important locations where Indians acquired their horses. Mounted on horses and armed with rifles, Indians probably altered the logistics of hunting as hot pursuit of certain game animals become possible, or necessary.

The Indians who occupied the Hanford Site did not have ready access to abundant big game. No herds of bison or caribou grazed in the area, although the range of the bison did extend into the Columbia Plateau between 1500 and 500 years ago (Hunn 1990:138). Pronghorn antelope were hunted on the plains within the "big bend" of the Columbia until shortly after contact, but were not abundant. Hunting was pursued year-round and men who accompanied root and berry gathering parties stayed alert to any game they might encounter (Hunn 1990:138). The fall was the most productive hunting season and where rutting deer and elk gathered, so too did the Indians to pick berries. The mule deer or black-tailed deer were the most common ungulates hunted.

While "big game" is often associated with hunting, the Indians also exploited smaller mammals, mostly rodents and rabbits. These mammals were most valuable as food sources when they were concentrated in a small area and had put on fat for their seasonal nap. The yellow-bellied marmot (groundhog or rockchuck) emerges from hibernation in March and warms on rocks in his low elevation habitat. They are readily hunted and found in good numbers close to the summer fishing camps. The Townsend's (and Washington) ground squirrel (prairie dog) sleeps most of the year underground but in the spring emerges to put on fat. Congregating in large colonies in sandy soils of the plains and foothills, they can be easily caught by flooding their burrows and clubbing or shooting them as they emerge. In certain years of abundance, an area of sagebrush flat could be so infested with jackrabbits as to make communal hunting worthwhile. Rabbit nets several hundred feet long were strung from bush to bush. The Indians would drive the stampeding rabbits into the net where they could be clubbed.

In the grasslands, Lewis and Clark observed hordes of sharp-tailed grouse (prairie chickens) and sage grouse on the sagebrush steppes. They were easily shot with a bow and arrow. Duck and Canada goose were shot or netted on the islands in the Columbia River. Many other birds were hunted for feathers rather than for food.

Plant Gathering Areas

TCPs at the Hanford Site will necessarily include important plant gathering areas. Plants were placed on the earth by the Creator for the Indians to use and the Indians used plants in manifold ways for food, fiber, and medicine. Understanding which plants were used and where these plants could be found can help identify the locations of plant gathering areas as an associated property type. Some of the more important plants and their uses are as follows.

Food Plants

Indian celerys that are sought in the spring include sprouts of *Lomatium grayi* and later in the season, *Lomatium nudicaule*. When the lomatiums dry out by mid-May, the Indians would find substitutes that grow higher in the mountains such as balsamroot "sunflowers" (*Balsamorhiza careyana/B. sagitatta*), mule's ear (*Wyethia amplexicaulis*), and cow's parsnip (*Heracleum lanatum*) (Hunn 1990:170). Plants whose harvesting required use of a digging stick include bitterroot, camas, cous, *Lomatium canbyi*, Indian carrot (*Perideridia gairdneri*), Indian pototo (*Claytonia lanceolata*), *Lomatium piperi*, *Lomatium grayi*, *Brodiaea hyacinthina*, Yellowbell (*Fritillaria pudica*), *Lomatium canbyi*, *Tauschia hooveri*, *Lomatium hambleniae*, *Calochortus macrocarpus*, and *Lomatium minus* (Hunn 1990:171-172). While spring was the time of root digging, summer and fall were organized around the activity of "picking" plant foods, fruits, berries, nuts, and tree lichen. The harvests begin with sweet golden currants and bitter white dogwood fruits that ripen by the end of June at low elevations along the major rivers (Hunn 1990:178). Between late June and mid-August the Indians harvested lowland and foothill species such as chokecherries (*Prunus virginiana*), and serviceberries (*Amelanchier alnifolia*). The important black mountain huckleberry (*Vaccinium membranaceaum*) was harvested along with Grouseberries (*V. scoparium*), blue huckleberries (*V. ovalifolium*), red huckleberries (*V. parvifolium*), and low mountain blueberries (*V. deliciosum*).

Plants Used for Fiber

Various trees were used to fabricate tools such as maple for dip net hoops and ocean spray (*Holodiscus discolor*) for dip net hoop crosspieces. Oak (*Quercus garryana*) was favored for making digging sticks. Of great importance were Indian hemp (*Apocynum cannabinum*) and tule or bulrush (*Scirpus acutus/S. validus*). Hemp was used for making twine for knotting nets and root digging bags. Tule was used to weave mats that covered the winter longhouses or to cover summer teepees. When a rigid open-work mat was needed to support drying salmon, the stiff culms of common reed (*Phragmites communis*) was employed. Large, soft containers were fabricated from cattail (*Typha latifolia*). Grasses, such as giant wild rye (*Elymus cinereus*) had many uses. Cedar root was used to weave berry collecting baskets.

Medicinal Plants

Over 75 species of plants were used for medicinal purposes (Hunn 1990:193, Appendix 3). Lomatium had a wide range of uses including as a fish poison, an edible spring vegetable, and for a host of medicinal purposes. Its root was used to make a hair rinse for itching scalp, its root pulp was used to make a poultice for infected wounds and boils, while internal uses included a dilute infusion for upper respiratory infections.

A study by Cheryl Mack provides some useful concepts that can help in the delineation of important plant gathering areas at Hanford. Mack (1992:3) identified a number of sites in the Gifford Pinchot National Forest which contain the remains of huckleberry processing features. The features represent aboriginal efforts at drying huckleberries through the use of reflected heat from a log fire and are often associated with other features representing generalized camp activities. Mack (1992:5) writes that Colonel

George Wright who was commander of the Ninth Infantry during the Yakima Wars in 1856, wrote to the assistant Adjutant General of the Department of the Pacific:

> **The whole country should be given to the Indians. They require it; they cannot live at any one point for the whole year. The Roots, the Berries, and the fish, make up their principal subsistence: these are all obtained at different places, and different seasons of the year: hence they are frequently changing their abodes.**

Mack's (1992:6) ethnographic review confirms the importance of Huckleberries. Curtis (1911a:5-6) observed that no fewer than 18 different kinds of berries were used as food by the Yakama. While eaten fresh, vast quantities of berries were dried for later consumption. Schuster's (1975:79) Yakama informants told her that they would dry the berries using the heat of a smoldering log. Mack (1992:6) reports one observer seeing the Indians excavate a trench along the base of a down log and building up a sloping mound along the edge of the trench opposite the log. Then, tule mats were placed along the mound, held in place by a row of rocks lining the base of the trench. The log was then set on fire, and berries distributed over the mats. They were stirred with a paddle until dry, which took an entire day. Mack (1992:8) reports 11 sites in and near the Indian Heaven Wilderness Area as representing huckleberry processing sites and each of these sites contains anywhere from one to over 20 log-fire drying trench features visible on the surface.

Huckleberries grow best at elevations over 914 meters (3000 feet) in the Cascades and it is assumed here that the Hanford Site was environmentally unsuitable for huckleberries. Nevertheless, the concept advanced here is that if the physical remains of plant processing features can still be found in the Cascades, the remains of plant processing features have probably survived at the Hanford Site. Mack's research demonstrates that physical evidence can be used to document the location of former plant gathering areas. In the case of the huckleberry, Mack (1992:13) suggests that Sahaptin Indians probably used fire as a tool for enhancing huckleberry production and that it is likely that the locations of huckleberry fields would simply shift as naturally-occurring fires opened up new areas, and older burns reforested. At Hanford, prior to the government take-over in 1943, Euro-American agricultural land use practices have undoubtedly obscured many important native plant gathering areas. Destruction of native root gathering locales by grazing livestock is well documented. Through additional ethnographic research, tribal oral histories, and archaeological survey, it should be possible to identify important plant gathering areas within the Hanford Site.

Traditional Holy Lands

The Hanford Site is an important region to members of the present-day Yakama, Umatilla, Nez Perce, and Wanapum tribal groups because their ancestors resided here for thousands of years before Euro-American occupation. During these thousands of years, the Indians utilized the land and its resources and built these into a cultural definition of themselves as a people. Most of the Indians who traditionally lived at Hanford perceive that they were created there and, that in so doing, the Creator gave them a special supernatural responsibility to protect and manage the land and its resources. In western terminology, the Hanford Site and surrounding areas is their Holy Land (cf. Stoffle and Evans 1988:754). Associated property types might include dwelling places of the spirits, vision quest sites, *Washat* dance sites, and ceremonial sites where first salmon or first food rites took place, among others

Dwelling Places of the Spirits

Places where the Spirits dwell can only be identified through oral interviews with knowledgeable tribal elders. As an associated property type, dwelling places of the Spirits that would have a physical presence within the Hanford Site might include mountain tops or peaks, prominent geographic or small rock outcrops; streams, ponds, or rivers; groves of trees, fields or meadows; and rockshelters, caves or crevices among others.

Vision Quest Sites

Vision quest and/or spirit quest sites are likely to be eligible TCPs. These may consist of rock cairns located in isolated places or quest sites may have left no physical traces on the landscape. One example might be the place on or near Rattlesnake Mountain where Smohalla conducted a vision quest and subsequently received from the Creator the elements of the Washani religion. Because the Hanford Site had been closed off to Indian use for several decades, areas traditionally used for spirit quests could not be accessed. Interviews with tribal elders are essential if quest site areas are to be identified and preserved.

***Washat* Dance Sites**

Washat dance sites would be eligible TCPs for their association with Indian religious activity. Some dance sites are located outside the Hanford Site (e.g., Priest Rapids) but others might be present anywhere within the Hanford Site. Tribal elders or modern day Washani practitioners would know of such former locations.

First Salmon or First Foods Ceremonial Sites

An important element of the Washani religion and traditional Indian culture of the region is the giving of thanks to the Creator for food. In the early spring, first salmon, or first food ceremonies were held by the Indians either at the places where the first edible roots could be gathered in the early spring or where the first migrating salmon were caught. Often the first foods ceremony incorporated a thanksgiving for both the first salmon and first roots. Such places in the region include the site of the former Celilo Falls located along the Columbia River near The Dalles. At the Hanford Site, first salmon or first foods ceremonial places were surely present at certain spots along the Hanford Reach of the Columbia River and at certain places along the Yakima River (e.g., Horn Rapids). Tribal elders and/or Washani practitioners are likely to know where such sites are located.

Landmarks and Important Places of Indian History or Culture

Indian history of the Hanford Site and surrounding areas is largely preserved as oral history passed down from generation to generation. With some exceptions, little of this rich oral history has been shared with anthropologists and as a result, landmarks and important places of Indian history or culture are unknown to Hanford decision-makers. Such important places might include spots where the animal or plant people lived or did important things that influenced how Indian cultures and traditions developed. Important places might include spots where important events took place. Such events might include important battles between the animal people or battles between the spirit forces. Other events might include the creation of mountains or rivers, the creation of animals and plants, the places where the ancestors were first created, etc.

Places of Adaptation and Accommodation

While Indian life on the Plateau was changing in response to the introduction of the horse, guns, new diseases, and the presence of fur traders, Indian life in the Hanford area was relatively unaffected in the years immediately after contact with Lewis and Clark. With the influx of whites associated with the Oregon Trail and more particularly with the opening of the territories for white settlement after the 1855 treaty councils, Indian life started to undergo rapid change. For many of the Indians who lived within the Hanford Site or who used the Hanford Site for various purposes, white pressure resulted in their withdrawal from their traditional villages and camps and decreasing access to and use of their traditional hunting, gathering, and fishing areas. Disruption of their traditional subsistence and settlement patterns during these turbulent years undoubtedly resulted in their occupation and use of the Hanford Site in different ways, using different technologies, and at different times and seasons. For lack of a better term, the places where the Indians engaged in non-traditional subsistence and settlement practices are referred to here as places of adaptation and accommodation to the advancing white world.

Some of these places are coterminous with places where traditional activities were once carried out. For example, a fishing village occupied for the last several hundred years may have been used during these turbulent years, but with changing technologies (with boats, fishing gear, and other implements of Euro-American manufacture). In this example, the place of adaptation and accommodation would have an archaeological component (e.g., the ethnographic occupation overlain upon a prehistoric fishing village). Another example would be sites or areas along streams and rivers where several Umatilla and Cayuse Indians were reported to be successfully farming during the middle decades of the 19^{th} century. Physical remains might reflect a mix of Indian and Euro-American material culture where these Indian homesteads were once present. During the late 19th and early 20th centuries when Euro-Americans actively dry-land farmed inland portions of the Hanford Site, places of adaptation and accommodation might include the living quarters areas where Indians lived with or adjacent to Euro-American farmsteads as they provided their labor to the whites for wages.

Places of Persistence and Resistance

The Indians may revere special places where they formerly (or currently) gathered to resist white culture and its disruptive pressures on Indian life and/or places where they gathered to reify their traditional cultural practices. Such spots might include longhouses where *Washat* dances took place, council grounds where tribal leaders met with their counterparts from other tribes, battle or skirmish sites, and remote hiding places among others.

Landscapes of the Heart

The National Park Service has been pioneering the concept of "landscapes of the heart" (Rogers 1991:16). In the Columbia River Gorge National Scenic Area, several candidates for this designation have emerged including favorite old eating or drinking haunts, community gathering spots, parade routes, and traditional teenage parking spots (Tad's Chicken & Dumpling road sign, cherry festival activities in The Dalles, the Hood River brewery deck, and the Bridal Veil post office). Certain locations or larger geographic expanses at Hanford may be of equal importance to the Indians as some of these early 20^{th} century landmarks are for the white community. These landscapes of the heart could also be referred to as Indian Cultural Landscapes.

Landscapes of the heart may emerge as one of the most important property types from the ethnographic context period at Hanford. Within the memory of living descendants may be several places within the Hanford Site which may qualify as landscapes of the heart. These places may or may not be congruent with other property types such as fishing stations, burial grounds, and village sites, etc. and/or recognized TCPs such as Gable Mountain/Gable Butte. Following Stoffle's (1995) suggestions, these landscapes of the heart could be ecoscapes or storyscapes. Landscapes of the heart may also include special places where Indians gathered to pray, feast, or dance. They may be places where individuals, as opposed to groups, engaged in contemplative meditation or prayer consistent with the practice of traditional Indian religion (e.g. holy lands). Since Indians view the land as a sacred gift from the Creator, landscapes of the heart legitimately dovetail with places associated with individual or group religious activity.

3.6.7 Methods to Evaluate Cultural Significance

Assuming that the DOE-RL and local Indian tribes work together to identify TCPs at the Hanford Site, it should be possible to devise a culturally sensitive, and operationally effective, methodology to identify and evaluate the cultural significance of Indian TCPs. While it would be desirable to preserve all identified TCPs at Hanford, there will be instances where this is not possible - particularly in those areas where human heath and safety concerns necessitate a clean-up. The current regulatory framework requires mitigative measures be considered only for those properties that are eligible for listing in the National Register. The burden to evaluate the cultural significance of TCPs must fall upon the DOE-RL and cooperating tribes.

As Stoffle, et al. (1990:420) observed, agencies involved in implementing development projects that potentially affect Indian cultural resources generally provide Indians with the opportunity to recommend actions for mitigating or avoiding adverse impacts on those resources. For their part, Indians now regularly participate in the assessment of how proposed development projects can affect their TCPs. Indians and anthropologists are still seeking ways to adapt traditional cultural perceptions and ethnographic research methods to the policy requirements of the environmental impact assessment process. While most agencies are willing and able to take alternative courses of action when ground-disturbing operations threaten burials and other physical remains, plants present problems. Plants are ubiquitous features of the landscape and some species are encouraged by ground disturbing activities while others can be destroyed by such disturbance. Rare and endangered plants are protected by the Endangered Species Act of 1973 (PL 93-205) and are therefore likely to be mitigated and other plants are protected by local or state regulations. Unfortunately, there are no guidelines for protecting plants or plant gathering areas of special importance to Indians or other ethnic groups save for whatever protective measures can be developed as a result of the successful identification and evaluation of plant gathering as TCPs eligible for listing in the National Register.

Western Shoshone, Southern Paiute, and Owens Valley Paiute became directly involved in the evaluation of cultural resources potentially impacted by a proposal to place national high-level radioactive waste at Yucca Mountain, Nevada. Sixteen tribal groups participated in an ethnobotany study that resulted in substantial refinements to a quantitative plant evaluation model that can be adapted to the Hanford Site. The Yucca Mountain study provides a useful model for similar studies that can be conducted at the Hanford Site and the theoretical assumptions used to guide the Yucca Mountain study can guide such studies at Hanford. Stoffle, et al. (1990:417) assumed:

- **Ethnic groups differ in how they use and assign value to plants**

- **Although plant experts from the same ethnic group may vary in their knowledge about plants, the responses of tribal plant experts can be assumed to be representative of those of the ethnic group**
- **Plant experts would be more knowledgeable about plants from the area where they were raised, and**
- **The use and significance of specific plants will not vary from one portion of the study area to another**

The first phase of the Yucca Mountain ethnobotanical study consisted of on-site visits in the study area. An ethnobotanical survey instrument was developed so that identical questions could be asked about each plant identified by an Indian plant expert. Stoffle, et al. (1990:420-421) explained the available options considered at Yucca Mountain.

Holistic Conservation

As Stoffle, et al. (1990:420) explain, development projects that potentially affect Indian cultural resources present Indians with a culturally specific ethical dilemma. Projects often force them to shift from a traditional position of favoring protection to a position of resource prioritization. The traditional Indian position can be termed "holistic conservation" - a term that refers to the common, initial response of Indian people to questions regarding the importance of plants and other cultural resources. Indians will tend to identify all plants as important since they were put on the earth for a purpose by the Creator. The holistic conservation position would state that all resources should be left alone or avoided. Thus, when all plants, or other cultural resources, are equally important, there are only two options for their protection: (1) no project or (2) limit earth-disturbing operations to areas without plants. The first option rarely occurs unless the plants are extremely rare and cannot be mitigated and the second is almost impossible since plants grow everywhere.

Cultural Triage

If all plants cannot be protected, there must be a basis for selecting those species to be protected. Criteria for prioritizing plants or the areas where they grow must be set forth. When Indians prioritize equally important cultural resources, they engage in what can be termed cultural triage (cf. Stoffle and Evans 1990). Cultural triage can be defined as a forced-choice situation in which Indians must rank in importance those cultural resources threatened by impending development. Like battlefield triage where some soldiers are saved and other left to die, when Indians engage in cultural triage in order to have some effect on projects, they often experience ethical conflicts, emotional stress, and even fear of reprisal (Stoffle, et al. 1990:421).

Egalitarian triage is one approach to mitigating plants where all plants are identified as being equally significant and assigned an identical value. Since plants are given the same value, they cannot be prioritized. However, the areas where they grow become the criteria for setting priorities and areas with higher scores would be defined as more significant and prioritized for protection from ground-disturbing operations (Stoffle, et al. 1990:421). The advantage of egalitarian triage is the ease with which areas can be evaluated. Once Indians have identified plants of cultural significance, botanists can map the distribution of those plants in order to produce a prioritized list of significant areas. Egalitarian triage also reflects the holistic conservation principle of most Indians. A drawback of the procedure is that it cannot protect individual plant species and does not take into account real ethnic differences in the cultural significance of plants.

Weighted triage is another procedure where plants are assigned a value based on such factors as the number of uses, the number of different plant parts used, the number of Indian ethnic groups who used the plant, and whether of not the plant is currently used. Through this procedure, individual plant species as well as the areas where they grow can be prioritized for protection. Weighted triage reflects the fact that plants traditionally made and still make differing types of contributions to Indians and illustrates that some elements of a cultural system can be more central to the cultural, social, or biological survival than others. As Stoffle, et al. (1990:421) observed, because Indians have special needs for different plants, they will often recommend providing special protection for individual plant species. While weighted triage more accurately reflects indigenous knowledge systems, it is complex to calculate and difficult to explain to both Indians and policymakers. Nevertheless, Stoffle, et al. (1990:421) adopted a weighted triage model first developed by Turner (1988).

The Turner model is based on calculation of a score produced by assigning values to several factors that contribute to a plant's significance. Combined scores produce an Index of Cultural Significance (ICS) for a given plant species and the ICS formula is calculated using three criteria: quality, intensity, and exclusivity of use. Turner (1988:275) defines cultural significance as the importance of the role a plant plays within a particular culture. The cultural significance of a given plant can be determined by a number of ecological and cultural factors regarding the frequency of occurrence or distribution of a certain species in a spatial area, the physical characteristics of a plant that cause it to be recognized as distinctive by people who use it, and the plant's potential utility as a food, medicine, or utilitarian item.

Stoffle, et al. (1990:423), after applying and improving upon the Turner model, suggested that plants should not be ranked by the quality of their use unless the Indians themselves make the ranking, or unless such ranking can be clearly derived from the ethnographic literature. In the absence of such data, all plants should be assigned an equal quality-of-use value. The Yucca Mountain data suggested that the number of different uses was a good indicator or cultural significance and that the parts of a plant used for specific purposes should be part of the calculation of the plant's cultural significance. In addition, plant storage emerged as a critical variable in both the cultural significance of plants and the intensity of their use. Stoffle, et al. (1990:424) further suggest that in cases where plant species have been managed or intentionally maintained through habitat modification (cultivation, burning, transplanting seeds and cuttings), intensity of use and cultural significance are elevated. Finally, at Yucca Mountain, the investigators found that it was important to take into account the contemporary significance of plants in determining the ICS. That is, the Yucca Mountain researchers elicited the contemporary significance of traditional plants as a means to determine if traditional knowledge was being transmitted from one generation to the next. They concluded that plants currently being used and taught about to younger generations are more significant than those plants that are no longer used and no longer the subject of teaching.

Stoffle, et al. (1990:428) note that a common first step in the assessment process is to evaluate the significance of individual sites using ethnobotanical data on each site's plant clusters. They observed, however, that Indians tend to interpret sites not as individual units but as related components of larger areas and plants are seen as part of local use areas that are larger spatial units of occupation than "sites" - a smaller unit conceptualized by archaeologists. Thus, identification of local use areas should consider the indigenous cultural logic of the Indians as they perceive an area consisting of natural, archaeological, and botanical resources. Stoffle, et al. (1990:429) conclude:

It is difficult to combine both Western scientific and Native American cognitive reasoning into one model of cultural significance. This adaptation of Turner's model and application to the Yucca Mountain data set is an attempt to incorporate Western scientific and Native American perspectives in order to mitigate the potential adverse effects of ground-disturbing activities on culturally significant plants. We conclude that from both resource policy and ethnographic standpoints, the cultural significance of plants can be evaluated by including the perspectives of American Indian people.

The same challenge will continue to face DOE-RL as they attempt to meet the spirit and intent of the federal cultural resource regulations. These regulations require identification and evaluation of cultural resources of importance to the Indians (e.g., TCPs). The regulations that require National Register eligibility determinations of TCPs were drafted from mostly a Western scientific or administrative/managerial perspective. These regulations do not, *per se*, incorporate Indian cognitive reasoning, although Bulletin 38 provides useful guidance. Bulletin 38 does go a long way toward sensitizing federal agencies to the fact that Indians and other ethnic groups view the world much differently than does the dominant Euro-American culture and society. The model tested at Yucca Mountain concentrated on plants and plant gathering areas. Similar models must be developed for calculating the significance of other TCPs. Stoffle, et al. (1990:429) captured the essence of the issue and the fundamental collaborative role of Indians in the regulatory process:

New collaborative models need to be developed to measure the importance of places and areas where events have occurred that are of religious or historic importance to Indian people as well as to the dominant society. These models, like Turner's ethnobotanical model, can be refined to reflect the concerns of Indian people and eventually integrated to produce a holistic model for calculating the cultural significance of all American Indian cultural resources.

Eligibility Criteria

The four evaluation criteria outlined in National Register Bulletin 15 (e.g., Criteria A, B, C, and D - cf. 36 CFR 60), reflect a Euro-American cognitive system. Indians are likely to prefer an approach discussed earlier as "holistic conservation" and linking TCP eligibility only to Bulletins 15 or 38, may well pressure the participating Indian tribes to engage in some form of cultural triage to secure a voice in the decision-making process. Unfortunately, any form of cultural triage fosters further alienation of Indian culture or cultural values. Thus, it is essential that Indians participate in the identification and evaluation of TCPs and should play a major role in defining the specific criteria by which their TCPs can be evaluated for National Register eligibility.

It is not being suggested that all of the four Bulletin 15 eligibility criteria be discarded when it comes to assessing National Register eligibility of potential TCPs. Rather, it is acknowledged that some of the four Bulletin 15 criteria may not work well since the Indian cognitive approach and/or world view is so different. Therefore, Indians can greatly assist DOE-RL by providing specific eligibility criteria that would supplement, or replace, the four Bulletin 15 criteria. As important would be for Indians, from their unique perspective, to demonstrate how TCP integrity can be measured. For example, does the presence of radio/meteorological towers result in a loss of integrity of Rattlesnake Mountain as a potential TCP? Does the presence of large reactor buildings along the Columbia River in the 100 Areas result in loss of integrity of river-side occupation or fishing sites as TCPs? Bulletin 15 states that a property that possesses integrity will possess several or all of the following aspects of integrity: **location,**

design, setting, materials, workmanship, feelings, and association. Design, materials and workmanship will, in most cases, have little bearing on TCPs such as usual and accustomed fishing sites or plant gathering areas. Location, setting, feeling and association will probably be the more relevant aspects of integrity when it comes to such TCPs.

As pointed out in Bulletin 38 (Parker and King 1990:2), TCPs are often difficult to recognize and that their identification may not emerge from archaeological, historical, or architectural studies, but require the application of ethnographic methodology. Since it is often difficult to distinguish those places having considerable cultural significance from those whose significance is spurious, the authors of Bulletin 38 compiled guidelines for evaluation of TCPs that were meant to be used in conjunction with Bulletin 15, which provides evaluation guidelines for historic places. Bulletin 38 also responds to the American Indian Religious Freedom Act (1978), which requires Federal agencies to reconcile their procedures in accordance with this legislation (Parker and King 1990:2).

Qualities that give significance to places are often intangible and thus their evaluation must reflect the community's opinion of these sites within their own cultural framework. A rigorous evaluation procedure considers foremost the assertions of the community, but is complemented with critical analysis of supporting documentation (Kennedy et al., 1993:8). Places considered eligible for the National Register are those that have **integrity of location, design, setting, materials, workmanship, feelings, and association** and meet one or more of the four evaluation criteria: **(a)** association with a significant event, **(b)** association with a significant person, **(c)** embodiment of the distinctive characteristics of a type, period, or method of construction, or **(d)** potential to yield information important to our history or prehistory. (The evaluation criteria in its entirety is listed in the MPD introduction.)

Several kinds of properties are not commonly considered eligible for listing in the Register: religious properties, moved properties, birthplaces and graves, cemeteries, reconstructed properties, commemorative properties, and properties achieving significance within the past 50 years. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within certain Criteria Considerations. Considerations applicable for TCP's and ethnographic/contact period properties are explained below: (The complete listing of Criteria Considerations is found in the MPD introduction.)

Consideration A: Ownership by a religious institution or use for religious purposes. This criterion requires additional justification beyond religious grounds due to the necessity of the U.S. government to avoid any appearance of favoring a particular religious doctrine. Sites of a religious significance to Native Americans may be eligible if the activities associated with a specific place are expressions of traditional beliefs that may be implicit in the continuation of the cultural practices. Parker and King (1990:13) stress that properties can be listed if they possess "scholarly secular recognition" (e.g., if a traditional history and culture may be discussed in religious terms, it does not follow that it is less historical or less significant to culture, nor does it make properties associated with traditional history and culture ineligible for inclusion in the National Register).

Consideration C: Birthplaces and graves. Such sites are eligible only if their significance is for reasons that go beyond their association with a famous person. Bulletin 38 shows how a burial site of a famous folk healer was eligible once the site was related to the intangible belief held by the healer's followers that his spirit was stronger at this particular site than any other.

Consideration D: Cemeteries. These sites are ineligible unless, as is stated in Bulletin 15, they derive their primary significance from graves of persons of transcendent importance, from age, from distinctive design values, or from association with historical events. Sites that contain cemeteries are not necessarily ineligible because of their presence, and the graves may in fact be an intrinsic component of the overall cultural significance. Given the Indian viewpoints discussed throughout the context statement, Indian cemeteries at Hanford would be eligible given their overwhelming cultural importance and association with the timeless sweep of Indian history.

Consideration G: Significance achieved within the past 50 years. Cultural beliefs and practices that are associated with a property must be older than 50 years, unless "sufficient historical perspective exists to determine that the property is exceptionally important and will continue to retain that distinction in the future" (Parker and King 1990:15). Bulletin 38 provides an example of a mountain peak that is now used by a tribe for religious activities, but is an area without a known historical antecedent. Places where such activities are known to have once occurred but went unused for many years before a renaissance of the practice are eligible.

TCPs that are thought to be eligible require thorough documentation, which is submitted to the SHPO with a request for their comments on the property's eligibility for inclusion in the National Register. This evaluation includes substantiation of the TCP application's conformity with the above-noted criteria of eligibility, and must include definition of the site's boundaries.

For each property type, then, a set of criteria must be developed that will enable DOE-RL (including the tribes who are co-managing Hanford's cultural resources) to assess integrity (or lack thereof) and to evaluate National Register eligibility. One possible approach to develop criteria by which integrity and eligibility can be assessed is to follow a cultural resource study methodology shown to be sensitive to the culture of Indian people. This study methodology, described by Stoffle and Evans (1990:96-97) is as follows:

Consultation

The first step is to contact the tribal governments to discuss the upcoming Hanford project and establish a consultation and research relationship. Fortunately, through the Co-Management Agreement with the tribes, the necessary linkages with the tribes has been established. The project is presented to tribal officials who then can determine how the tribe will participate.

OTCR Training

Once the tribal governments agree to participate, it is important to establish a point of contact between them and the project officials. This person can be referred to as the Official Tribal Contact Representative (OTCR) who is trusted to follow the day-to-day progress of a project, to review technical reports, and to summarize findings for the tribal government. All OTCRs should be trained together to facilitate inter-tribal interactions and consensus on cultural resource eligibility and/or mitigation options. Again, the Co-Management Agreement has already set up a framework for designation of OTCRs.

Key Cultural Expert Interviews

Key cultural experts, identified by the tribal government, should be interviewed. These individuals should be asked to speak for the cultural resources of the tribe and they will likely repeat holistic conservation statements made earlier by the tribal government. Key cultural experts, however, can move beyond expressing general concerns for cultural resources by specifying what types of cultural resources (property types) are potentially impacted by a Hanford project. These experts can define the variables that should be assessed (e.g., they can help define evaluation criteria).

Archival Research

At Hanford, with the availability of this context statement document, it is already known which Indian groups were associated with the Hanford Site and therefore which groups should be participating in the process. Since this context statement is intended to be dynamic document that is constantly improved as new information becomes available, additional archival research conducted for specific Hanford projects can contribute to the a deeper understanding of the ethnohistory of the Hanford Site. This deeper understanding will in turn help all parties better frame the cultural and historical context for understanding contemporary Indian concerns.

On-Site Visits

On-site visits with tribal members should be conducted. The tribal governments should be asked to specify a cultural resource expert or experts who would visit a project site or study area to provide project or site-specific identification and interpretation of cultural resources. During on-site visits, the cultural resource experts may make holistic conservation statements, especially if they had not been contacted during previous research tasks. Usually, however, these experts will focus on prioritizing cultural resources which helps direct the process in the direction of making determinations of eligibility.

Mail Survey

This is appropriate in situations where the study or project area is very large or there are many tribal members. A mail survey can measure variables defined by previous interviews with tribal members and issues that emerge from the ethnographic and social impact literature. Mail surveys must be developed in cooperation with tribal government representatives. Mail surveys are especially important for reaching group members who live off the reservation. Surveys can be designed to allow the Indians to scale their concerns for cultural resources and when the numeric scores agree with the judgment of tribal elders, tribal governments would be confident in passing resolutions regarding how to triage cultural resources (e.g., evaluate resources for eligibility).

Tribal Review

Two types of tribal review can occur. A preliminary draft of findings should be sent to the OTCR who reads the document for accuracy and suggests changes. A revised preliminary draft can then be sent to the tribal council for an official response. Tribal responses should then be incorporated at the end of the draft report.

Mitigation

A set of mitigation recommendations can be developed and enacted only if all cultural resources have been identified and cultural triage has occurred during the previous steps. At this stage, the process which has relied on the close cooperation and participation of the tribes, will have resulted in the identification of TCPs that are eligible for listing in the National Register. Implicit in this process is the concept that the Indian people have practiced cultural triage, as needed, to effectuate protection of those cultural resources that are most important to them.

This proposed methodology should be effective if four guiding principles are followed (cf. Stoffle and Evans 1990: 96):

- **Trust**
- **Opportunity**
- **Knowledge**
- **Validity**

First, the Indian people must believe that their participation in consultation and identification of cultural resources is more likely to protect these resources than would be the case if they did not participate. Indian people must have the opportunity to discuss among themselves whether or not to participate before they are asked to proceed with the identification and triage of cultural resources. The research should be phased to allow tribal discussions to occur. Indian people must fully understand how the Hanford project(s) could impact cultural resources. A tribal representative should view firsthand the study area and existing analogous projects. Videotape, photographs, background readings, and face-to-face orientation are all useful if they present both positive and negative project impacts. Finally, the research findings must be accepted by scientists, regulatory agencies, and the Indians if the study is to be valid. Participation in the research process is perhaps the best means to assure mutual validity of the findings.

Conclusion

This document emphasizes that Indian participation is crucial if TCPs pertaining to the ethnographic contact period (1805-1943) are to be recognized, evaluated for their eligibility, and ultimately protected. As noted by Stapp and Jones (1995: 2), tribal representatives have discussed important issues with the Department of Energy for generations and they are tremendously frustrated over the lack of progress in some areas. From their perspective, they have given concessions to the Federal government time and again only to be asked to make further compromises. The tribes ask "when will it end?" And DOE-RL will continue to ask the Indians to step forward and participate in a regulatory process which may result in cultural triage. The 1989 Hanford Cultural Resources Management Plan described how the Department of Energy is responsible for providing leadership in the preservation of prehistoric, historical, and cultural resources on lands it administers, to manage these lands in a spirit of stewardship for future generations, and to protect and preserve the rights of Indians to religious freedom. Recent meetings between the Tribes, the Department of Energy, and cultural resources staffs of the Hanford Site contractors served to:

> **. . . shed some valuable light onto the historical and current state of cultural resource management at Hanford and revealed [to us] many of the great challenges that DOE-RL will need to face in the coming years . . . As partners in our effort to improve cultural resource management and protection at Hanford, Tribal government representatives worked with us to identify shortcomings of past practices and to suggest means of improving the record (Stapp and Jones 1995: 1).**

The meetings also revealed tribal frustration with the piecemeal approach to cultural resource management at Hanford. The Tribes see less value in attempting to designate specific locations as worthy of special protection and more value in viewing the Hanford Site as an integrated and interdependent community. As stated elsewhere, the Tribes include the plants, animals, and other resources on the land as cultural resources. To this end, the Tribes are interested in protection of resources, access to sacred sites, and rights to bounty as well (e.g., rights to use resources). To the Tribes, cultural resources encompass not just archaeological and sacred sites, but traditional use areas, landforms, animals, fish, and vegetation among others and proper management of cultural resources needs to integrate all these disciplines (Stapp and Jones 1995:3).

The meetings also revealed that the Tribes consider cultural resource protection to be sacred and/or spiritual work. This can be particularly problematic to DOE-RL since the Indians believe that knowledge verbally passed between generations is to be respected and cannot be openly shared with others. The Indians believe that it is not necessary to go to a place to make it sacred since the feelings of sacredness are present even when these places are seen. The Tribes believe that all along the Columbia River and the mountains themselves are sacred. They also assert that what is of value to the scientific community and to archaeological and anthropological scholars is not necessarily what is of value to Tribal representatives, their children, future generations, and other members of the extended Tribal community (Stapp and Jones 1995:4).

The Tribes are concerned that access to the Hanford Site has been and may continue to be difficult for Indians. As a result, many members of the Tribal community can no longer visit traditional and sacred land when they want to. Access limitations restrict what otherwise would be continuous of use of TCPs.
Although Site access is still rather limited, massive reductions in Site security have occurred. As a result, Tribal officials are increasingly concerned that TCPs along the Columbia River may be subject to increased incidents of looting. Looking ahead, Tribal officials are concerned that lands under the jurisdiction of the Department of Energy may fall into private ownership. Since deed restrictions and other forms of protection do not always work effectively, the Tribes are concerned that cultural resource protection on lands reverting back to private ownership will be difficult at best. New land use decisions, such as designating the Columbia as a Wild and Scenic River would adversely affect archaeological and cultural sites resulting from increased recreation on the river (Stapp and Jones 1995:6).

The meetings also revealed tribal concerns that cultural resource protection work at Hanford is still too compliance driven, responding to specific projects of limited scope or impact while ignoring holistic approaches to resource protection. The Tribes expressed keen interest in seeing DOE-RL implement long-range cultural resource planning and protection. In fact, tribal representatives believe that the Department of Energy's financial committment to a long-term cultural resource program plan would be a wise investment in strong working relationships with the Tribes and could be a national model for other Federal agencies. A plan might include the following elements (Stapp and Jones 1995:7):

- **Cooperatively manage Hanford's cultural resources by the Department of Energy and the Tribes.**

- **Resurvey all lands and re-recorded sites (as needed) over a 10-year period (10%/year). Collect data on archaeological sites, sacred areas, and traditional use areas (TCPs) as well as oral historical, biological, wildlife, fisheries, and geomorphological data.**

- **Identify and analyze significant areas on an ongoing basis.**

- **Prepare special management plans for areas already known to be significant (Gable Mountain, Rattlesnake Mountain, the Columbia River shoreline, and the Columbia River islands).**

- **Educate the public on cultural resource issues and implement a strong enforcement program.**

- **Prepare, and revise annually, a Cultural Resources Preservation Plan to cover the entire Hanford Site.**

- **Maintain ongoing programs to promote legislative compliance.**

Identification, evaluation, and protection of TCPs can be better accomplished within the context of a plan as outlined above than undertaken independently. Tribal participation is crucial in the identification of TCPs and in setting criteria by which their eligibility for listing in the National Register can be evaluated. Co-management of Hanford's cultural resources affords a convenient, and hopefully effective, avenue of tribal participation. Re-survey of all Hanford lands provide opportunities for tribal participation on field crews as archaeological and other kinds of data are acquired. Identification and analysis of significant areas on an ongoing basis facilitates identification and evaluation of TCPs. Preparation and implementation of special management plans for significant areas would help protect TCPs. Public education is essential if TCPs and other cultural resources are to be protected from looting, vandalism, or inadvertent disturbance. Annual revision of a Cultural Resources Preservation Plan will afford the Tribes with yearly opportunities to include additional TCPs in the roster of sites and places to be protected. Maintaining legislative compliance will ensure that TCPs continue to be considered during project review and environmental permitting.

With regard to evaluation of significance, TCPs at Hanford must be submitted through the Washington SHPO and nominations to the National Register will require documentation conforming to acceptable scholarly standards common to the field of anthropology, and fused with the cultural insights of the tribal tradition-bearers. Even if DOE-RL can adhere to these ideals, problems can and will arise. For example, at a Seattle workshop on TCPs in December 1992, a number of these problems were discussed (cf. Kennedy et al., 1993:24-25). In one case, the issue was not whether a place was significant to the Indians, but how big the significant section of the site actually is. The Indians asserted that only the entire site, as they defined it on the nomination form, could retain the integrity of cultural significance. In another case, a question of a TCP's boundaries was debated between a SHPO and the Bureau of Land Management. The cases discussed at the workshop illustrated that a mechanism for conflict resolution reflecting the interests of all concerned parties is pivotal to the unprejudiced evaluation of cultural significance. ACHP regulations (36 CFR §800.4c) provide for a determination from the Secretary of the Interior in the event of disagreement between a federal agency official and the SHPO regarding National Register eligibility (ACHP 1986:6-7).

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4.0 EURO-AMERICAN RESETTLEMENT OF THE HANFORD SITE, (Lewis and Clark 1805 - Hanford Engineer Works 1943) WASHINGTON

By

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CH2M HILL

Richland, Washington

4.1 Statement of Purpose

This is a historic context statement for the Euro-American resettlement of the U.S. Department of Energy's 560 square-mile Hanford Site in southeastern Washington. It is a narrative of the themes, trends, and patterns of history for the time period beginning with the Lewis and Clark expedition (1805) and ending with the creation of the Hanford Engineer Works (HEW) in 1943.

Although the Hanford Site area lagged behind other areas of the Pacific Northwest in terms of the timing and magnitude of Euro-American settlement, the coalescence of transportation links (railroads), government and private incentives to promote land settlement, and both private and government sponsored reclamation projects culminated in a small-scale homesteading "boom" in the Hanford Site locality in the late 19th and early 20th centuries. Once established, the small agricultural communities of Hanford, White Bluffs, Richland, and others continued their development until the establishment of HEW in 1943.

This context statement emphasizes the homestead/farming period since most of the historic archaeological remains at Hanford pertain to agricultural development and related activities in the overall resettlement of the Hanford Site. This context statement should facilitate the determination of significance and National Register eligibility of historic properties dating from 1805 to the creation of the Hanford Engineer Works in 1943. This context statement is intended to be a dynamic document that can and will be changed to reflect new knowledge or understandings.

4.2 Introduction

This context statement is about how non-Indian peoples, primarily Euro-Americans, resettled the Hanford region after the Indian occupants were dispossessed of their land and how these new settlers managed to impose Euro-American land use systems on this arid region. The Euro-American resettlement of the Hanford Site transformed the area into an agriculturally-oriented region, dependent on irrigation made possible by well-funded organizations and/or government, characterized by both widely scattered farmsteads and small thriving towns whose economies served the rural, agrarian population.

The Hanford Site was occupied by Indians for several thousand years and the local Indians, particularly Smohalla and the Wanapums, clung tenaciously to their land and native economy throughout the late 19th century and resisted white culture. The arrival of white explorers and fur trappers, and the later arrival of Euro-American settlers (ranchers, farmers, etc.) can be viewed in terms of resettlement of an already occupied and settled land.

Explorations were designed to identify resources to be exploited, transportation routes to link the United States with Oregon, and to find a railroad route to Puget Sound and to identify potential farm or grazing lands. At the Hanford Site, the period of initial contact did not result in any significant settlement. In fact, with the exception of some exploration (Lewis and Clark and fur traders), trading posts, missions, and related developments occurred outside the boundaries of the Hanford Site. The fur traders and their sponsoring companies reluctantly contributed to regional exploration but their main focus was to keep out competitors.

Explorers noted Hanford's extreme aridity in comparison to other more favorable areas and the fur trappers likewise appreciated how local aridity provided poor habitat for fur-bearing animals. Stockmen concentrated on areas peripheral to the Hanford Site where more moisture and better soil conditions provided better bunch-grass grazing opportunities. Similarly, farmers migrating west to find suitable land bypassed Hanford for better watered locales such as the Walla Walla and Yakima River valleys. Only large, well-financed entities such as the Federal government and railroads provided the high levels of technological innovation, transportation and irrigation systems infrastructure, required to open up Hanford to agricultural development.

Resettlement of the Columbia Plateau began slowly, prior to the Civil War, within the larger context of the territorial expansion of the United States. While the Indians were intensively using the Columbia River's fish resources as a mainstay of their economy, Euro-American explorers were searching for lands capable of providing a variety of resources that could be developed for grazing, farming, and mining. Through time, Euro-American resettlement at Hanford was characterized by intensification of resource exploitation coupled with high levels of technological input. The indigenous peoples of the Hanford area did little to modify the environment in which they lived. Euro-American resettlement was characterized by deliberate environmental modification through the construction of dams, irrigation works, and the introduction of and large scale cultivation of non-native species.

Euro-Americans brought with them their own concepts of land ownership which were quite different than the native conceptions. Division of land and individual ownership were hallmarks of Euro-American settlement that redefined the landscape to fit their ideals and needs. The farmers and later, the railroads, were responsible for massive land reorganization and ownership patterns.

While most of the Euro-American settlers came to Hanford to pursue their individual or family goals, their movement into the Hanford area reflected the broad pattern of national expansion that was underpinned by such dominant cultural precepts as manifest destiny and the "right" to extinguish Indian title and transform the land. The Indians, whose land they were resettling, were seen as an impediment to such development.

The livestock industry was stimulated by mining booms in nearby areas and evolved from raising horses to beef cattle and eventually to sheep grazing. Later, stock raising was more diversified and meat and wool products were exported to a broader customer base. The decline of the livestock industry was partially fostered by the railroad companies who promoted and sold lands to farmers/settlers, thereby hastening the end of the open range. Stimulated by the railroad companies that promoted "good" land at reasonable prices and efficient transportation of goods to market, various agricultural endeavors could be undertaken in the Hanford area. It was also the railroads that had the money and organizational power to develop irrigation ventures that enhanced their ability to sell land to farmers and to ensure those farmers would succeed (and become good paying customers of the railroad). The legislative backdrop that stimulated agricultural development (e.g., various Federal land use laws, homesteading acts, and reclamation acts) is interlinked with the availability of transportation (railroads) and technological mastery of regional aridity (irrigation systems).

It was not until about 1900 that the necessary transportation and water management infrastructure and enabling legislation coalesced to the point that Euro-American resettlement of the Hanford Site could begin in earnest. These same Euro-Americans who took over control of the former Indian lands, were themselves displaced by the same government that displaced the Indians. The ranches and farms were seized by the Federal government in 1943 to create a reservation for the production of plutonium (the HEW) and the residents were bought out by the government and evacuated from the area.

4.3 The Setting

4.3.1 The Natural Setting

The Hanford Site is located in the Great Columbia Plain which is an open, semi-arid sagebrush country whose shrub-steppe landscape is the result of the interaction of climate with geology and physiography. Meinig (1968: 16) noted that the chief characteristic of the climate is its relatively low precipitation; the seasonal cycle is one of cool, moderately rainy and snowy winters, wet springs, hot, dry summers, and predominantly dry autumns. The demography and economy of this area has always been profoundly effected by topography, climate and drainage (cf. Nelson 1973: 372) and the seasonally and geographically restricted supply of surface water. In some areas it is possible to travel from a semiarid biotic community subsisting on less than 10 inches of rainfall to pine/fir forests subsisting on more than 30 inches of rainfall over a distance of 10 miles or less. Low temperatures and snow severely limited the distribution of Indian populations during the winter months from October to March and although most of the Columbia Plateau lies only between 1000 and 1500 feet above sea level, winters are severe with temperatures dropping below freezing in all but the most sheltered areas. The regions general aridity and climatic conditions played a large role in the resettlement of the Hanford Site by Euro-Americans.

4.3.2 The Human Setting

As explained in the Contact Period context statement, the Hanford Site was home to several Indian groups. Primarily as a result of disease, their numbers were increasingly reduced through the early decades of the 19th century and by the time they ceded their lands to the government at the Treaty Council of 1855, the Indians were well aware of the coming onslaught of white settlement. Although the early waves of settlers were primarily bound for Oregon's Willamette Valley, in the later decades of the 19th century, cattlemen, sheepherders, and dryland farmers overran their lands and effectively marginalized those Indians still not taking refuge on the reservations. For their part, the Euro-Americans were motivated by a desire to improve their economic future. They traveled through the area on their way to the Willamette Valley to claim agricultural land and enjoy a healthier (non-malarial) climate than that being left behind in the Mississippi and Missouri river basins.

Once the Hanford Site area was resettled by Euro-Americans, it became quickly apparent that the natural environment provided ongoing challenges to agricultural development. Farmers were bothered particularly by animals who preyed upon their crops and poultry. Local farmers organized community drives to kill jackrabbits, rattlesnakes, crows, hawks, magpies, coyotes, and pocket gophers (Parker 1979: 178). It was not unusual for several thousand rabbits or birds to be killed in a single drive. In the 1940s, however, the large influx of population to the Hanford neighborhood brought so many sport hunters that the numbers of troublesome animals was kept down, and the need for drives ended (Parker 1979: 183, 260; Harris 1972: 145-46; Parker 1986: 160-61). Another natural challenge was the fierce dust storms that affected all residents. Perhaps the worst wind and dust storm in local memories occurred in June 1937, when packing sheds blew down and electrical wires became tangled from Yakima to Pendleton, Oregon (Parker 1986: 322-28). The greatest challenge, of course, was water. It was not until large-scale irrigation (reclamation) efforts were mobilized that the Euro-American settlers and farmers could successfully transform the land into an agriculturally productive area.

4.4 Statement of Historic Context

4.4.1 Introduction

The resettlement of the Hanford Site area occurred slowly at first. Non-Indian activities in the vicinity consisted primarily of exploration efforts, fur trapping and trading, missionary work among the Indians, and emigrants pushing through the region on their way to Oregon. Stimulated in part by gold rushes to the north, the Hanford Site vicinity began to be transformed by cattle ranching and later by the arrival of the railroad.

Although a small stream of settlers were entering the area and attempting to farm along the banks of the rivers and streams, it was railroad companies that promoted land sales and helped organize large-scale irrigation programs that greatly facilitated permanent resettlement by Euro-American farmers and homesteaders. Thus, while settlers were attracted to the Willamette Valley where fertile land and a temperate climate combined with generous homesteading act provisions awaited those willing to make the journey, the relatively arid land and dry climate of the Hanford Site vicinity could not readily support Euro-American resettlement without large inputs of technology - transportation and irrigation. By 1943, the Hanford Site was home to several hundred people who were primarily engaged in agricultural pursuits that were made possible by the coalescence of a number of factors including mainly enabling legislation that favored homesteading and reclamation/irrigation projects, adequate transportation (river barges, improved roads and rail lines), and the availability of capital (from the railroads and irrigation ventures) necessary to provide the irrigation and transportation infrastructure.

4.4.2 Exploration

Beginning in 1805-1806, when Lewis and Clark became the first non-Indians known to visit the vicinity of the Hanford Site, several parties of explorers, fur traders, missionaries, travelers, and soldiers passed through the area and recorded descriptions of it. The ceded lands within and surrounding the Hanford Site area did not experience permanent non-Indian settlement until after 1858, when the Yakama, Wanapum and other local Indian tribes were subjugated and when military orders closing large areas east of the Cascade Mountains to settlement were rescinded. After Lewis and Clark but before the outbreak of the post-treaty hostilities between the Indians and the Oregon volunteers, traders and agents of the Pacific Fur Company, the North West Company, and the Hudson's Bay Company often traveled along the major arteries of the Columbia and Snake Rivers and along smaller streams.

During the 1830s, Benjamin Bonneville and Samuel Parker came west on privately financed exploring trips, and Dr. and Mrs. Marcus Whitman established the first religious mission in the region near Walla Walla in 1836. The first United States Naval Exploring Expedition, under Lt. Charles Wilkes, examined the Columbia River as far upstream as The Dalles, and sent an overland party which traversed the Hanford region in 1841. In 1843, Marcus Whitman accompanied a large wagon train of settlers destined for Oregon's Willamette Valley, and ten years later the Longmire party crossed the locality and became the first emigrant group to scale the Cascades with wagons. Captain John Mullan investigated the region in 1853 and 1854, as part of a group appointed to survey a northern railroad route, and returned to the area to survey and build the Mullan Road between 1858 and 1863.

Military personnel and at least one wagon train (the 1853 Longmire party) did go through the area and leave written impressions as they traveled from Indiana to Puget Sound, becoming the first wagon train to cross the Cascades. Naval Lieutenant Charles Wilkes, as a part of his four-year mission to explore the Pacific Ocean from Antarctica to the Oregon Coast, sent an overland party to examine the interior of present-day Washington State. In the summer of 1841 this party, under Robert Johnson, became the first American group to cross the Cascade Mountains and they traveled through the Hanford Reach area to the Hudson's Bay Company posts at Fort Okanogan and Fort Colville.

White settlement of the region was greatly stimulated by the growth of transportation systems in the inland Northwest. Prior to 1858, whites followed Indian trails, but after the Yakima War, Lieutenant John Mullan surveyed a road for the U.S. Army, linking Fort Walla Walla with Fort Benton, Montana. Mullan, an assistant to Washington Territorial Governor Isaac Stevens, ventured in and out of the Hanford region several times in his survey of a northern railroad route in 1853. In 1858, he joined Colonel George Wright's punitive expedition against the Indians. Advancing from the southeast in midsummer of 1858, he wrote his first description of the Hanford vicinity and touted its rolling prairie, mild and generous climate, rich soil, and its great navigable river.

Between the years 1859 and 1863, Mullan realized his dream of building a wagon road between Fort Walla Walla and Fort Benton. This road, constructed and funded by the War Department, provided the essential overland link for thousands of immigrants coming to Washington Territory via the Mississippi and Missouri River route. Once the road was finished, immigrants were able to ship their belongings up the two rivers, then unload their animals and wagons and trek over the northern Rocky and Bitterroot Mountains, enter Washington just south of present-day Spokane, follow the road southwest to the junction of the Walla Walla and Columbia Rivers, and continue their westward journey as far as desired by water. The road was begun at Wallula on June 25, 1858, from whence it proceeded northeast and crossed the Snake River at the mouth of the Palouse River. Lyon's ferry began to operate at this crossing, and served for over a century until it was replaced by a bridge in 1968.

Mullan was anxious for white settlement and cultivation to come to Washington. While Mullan might have had more favorable areas in mind as he boosted the white resettlement of Washington, his enthusiasm for the region was taken up by others in the coming years - particularly such boosters as well-financed railroads that would help transform the area of the Hanford Site into a land of ranchers and farmers. Shortly after the Mullan Road was completed, gold was discovered in Idaho and Montana and whites established several ferries on the Snake River to accommodate the miners.

4.4.3 Missionary Period

If it can be said that the period of the explorers and fur traders overlapped with the missionary period, key figures of the missionary period helped spawn the white influx and the eventual resettlement of the Hanford Site vicinity. Dr. Whitman was interested in promoting Protestant Americans emigration to Oregon in order to extend the jurisdiction of the United States over whatever part of the Oregon territory would be granted it by treaty with the British. Although the emigrants of 1841 and 1842 abandoned their wagons at Fort Hall, Whitman believed that the emigration of 1843 would take its wagons over the mountains into the Columbia River Valley (Drury 1986: 467-468). Drury (1986: 18) wrote that Dr. Whitman made three notable contributions to the opening of the Oregon country for American settlement:

- **He saw the feasibility of taking white American women over the Continental Divide while on an exploring tour to the Rockies in the summer of 1835. The successful crossing of the Rockies through South Pass by Mrs. Whitman and Mrs. Spalding on July 4, 1836, unlocked the mountain gateway for men who wanted to take their families with them to Oregon. Where women could go riding horseback on side-saddles, other women and children could follow in covered wagons;**

- **Whitman's stubborn persistence made it possible in 1836 to take the first wheeled vehicle across a long section of the Oregon Trail extending from the Green River Rendezvous in the Rockies to Fort Boise. Where one wagon had gone, others could follow;**

- **He was responsible in leading the first great Oregon emigration of about 1000 people in 1843 from Fort Hall into the Columbia River Valley. These three history-making achievements combined to encourage thousands of Americans to make the overland trek to Oregon after 1843. The decisive factor in the establishment of the boundary with Great Britain in 1846 at 49° was the numerical superiority of American settlers in Oregon over those of British citizenship.**

The successful 1843 emigration was followed by larger migrations of Americans to Oregon, which put greater pressure on the government to extend its jurisdiction over the territory. However, none of the emigrants moving westward between 1843-1847 actually settled in the vicinity of the Hanford Site.

4.4.4 Mining and Ranching

The gold rush of the late 1850s in British Columbia provided the impetus for non-Indian settlement in the Hanford area. The resulting rush was reminiscent of the early days in California with herds of cattle and strings of pack horses moving north to supply the mushrooming camps (Johansen 1967: 265). Miners spread over the region with subsequent strikes occurring in present day British Columbia, Idaho, and Montana, continuing the rush through the middle 1860s. Meinig (1968: 221) described the Columbia Basin's position:

> **Such a series of sensational discoveries made the mountainous interior Northwest the first great successor to California as the pre-eminent locality of far western mining . . . Unlike California, mining was dispersed among a dozen important districts spread over a huge area, but Portland (like San Francisco) became the great entrepôt, and the Columbia Plain (like the Sacramento Valley) lay between the mines and the sea, and thus became directly bound up in the whole maelstrom of development.**

By early 1859, steamboats were operating on the Columbia as far as White Bluffs, one of the first permanent settlements in the Hanford area. In addition to White Bluffs, Walla Walla, Wallula, The Dalles, and Umatilla became important points for the transfer of goods from the steamboats to pack strings. The initial White Bluffs settlement (the townsite was moved twice before it was demolished in the 1940s) was located on the east bank of the Columbia River at the base of the bluffs for which it is named.

By 1860, Thomas Howe was operating a ferry across the Columbia River at White Bluffs and a trading post was established three years later by A. R. Booth who had earlier taken over the ferry operation. The importance of White Bluffs as a transportation junction decreased in the late 1860s when the British Columbia mining boom subsided. At this time, the Mullen Road, which avoided sandy stretches north and east of White Bluffs, rose in popularity causing a sharp decline in the ferry traffic at White Bluffs. The decade of the 1870s witnessed shifts in the ownership of the White Bluffs ferry and landing site, but it remained significant for several more years. In fact, in 1876, 20 soldiers were briefly stationed there to protect travelers and ranchers because Smowhala the Dreamer, chief and priest of the Wanapums, was thought to be inciting trouble. When Fort Chelan was completed the next year, the soldiers left White Bluffs.

The gold rush also attracted Chinese miners into the area. As in other western mining areas, they were relegated to working abandoned claims and areas not deemed worthy of attention by white miners. By the mid- 1860s, Chinese miners were reported to be working gravel bars along much of the upper Columbia River and one author noted that there were over 1000 Chinese miners between Priest Rapids and Colville, especially along the east bank of the river below Wanapum Dam (cf. Hildebrand 1977 and Schalk, et al. 1982: 118). A subsequent influx of Chinese laborers occurred during construction of the railroads in the area. However, anti-Chinese sentiments (expressed in a 1923 promotional brochure for the state-sponsored White Bluffs-Hanford Land Settlement Project) suggests they did not remain to participate in the irrigation agriculture boom (Parker 1986: 242).

The influx of thousands of miners led to rapid development of ranching across the Columbia Plateau. Hundreds of stockmen spread across the region, taking advantage of the abundant grasslands. Meinig (1968: 222) characterized livestock as "the one great product of the Columbia Plain in early 1860s." While cattle were extremely important in the early regional livestock industry, sheep, hogs, horses, mules, and burros (usually called "Mexican mules" or "pack mules") were also of some importance. The Walla Walla newspaper reported in 1866 that 6000 mules were in use and 1500 horses had been sold to persons en route to the mines (Meinig 1968: 222).

The sheep industry grew alongside that of cattle. The first large flock of 4500 head was driven into the Yakima region in late 1861 and by March 1862, only 45 were left. However, one terrible winter was not a major deterrent, and numerous flocks were imported over the next few years.

The earliest and most successful cattleman in the Hanford vicinity was Benjamin Snipes who wintered a herd in the Yakima Valley in 1855-56 before driving them to the mines in British Columbia. When he learned of the meat shortage in the British Columbia mining districts, Snipes examined the Hanford region for its suitability for raising cattle and during his reconnaissance, forded the river at White Bluffs, crossed the Hanford Site diagonally to the southwest, traversed the Rattlesnake Hills, and returned to the Yakima Valley (Sheller 1957: 35-38). Snipes' first cattle drive through the Hanford area required nearly two years of effort, but it yielded him enough profit to establish himself firmly in the cattle business in the Yakima Valley. During his cattle drive, he crossed the Columbia a few miles below Priest Rapids, enlisting experienced Wanapum men to assist them.

The market for beef in the British Columbia gold-mining district continued to be lucrative for ranchers in the Hanford region until the mid-1860s, and it was the factor most responsible for the earliest permanent non-Indian settlement of the area. Other ranchers and traders who settled in the Hanford vicinity in the early 1860s were also drawn to the unpopulated district by the lure of supplying the mining districts. Jordan Williams located a herd of cattle on the first White Bluffs townsite (on the east bank of the Columbia) in 1861, attracted to the location as a "noted range with its sandgrass and white sage. We could gather fat cattle in winter and spring when they were poor in every other place" (Parker 1979: 15).

The cattle business around the Hanford Site remained important during the 1860s but was a volatile undertaking due to shifting demand and rough winters. The British Columbia mines, the primary market for Hanford area cattle, tapered off rapidly by the end of the decade. In 1868, desperate for new markets, Hanford cattlemen drove stock over Naches Pass and later over Snoqualmie Pass seeking to supply the Puget Sound. But, Puget Sound consumers could absorb only a small portion of the beef available, and meat prices paid to ranchers dropped considerably (Sheller 1957: 200-210).

Although severe winter weather caused periodic decimation of cattle herds in the region, cattle ranching continued in the Hanford area during the 1870s. In fact, Hanford cattle were used to re-supply weather decimated herds in Montana and Wyoming. For the most part, large cattle drives out of the Hanford vicinity were finished by the early 1870s. Also, by the mid-1870s, the sheep business had expanded so rapidly in the Columbia Basin that conflicts arose between cattlemen and sheepherders (Oliphant 1968: 338). However, the sheep business declined as sharply as it had arisen, and by 1890 there was less than one-third the number of sheep in the vicinity as there had been 10 years previously. All types of stockmen near the Hanford Site were affected by the same historical forces, leading to an overall slump in their business (Oliphant 1968: 341-345).

Ranching declined in the early 1880s in the Hanford vicinity and across the Columbia Plain due to the coming of the railroad, extensive farming and fencing, and overgrazing and subsequent range depletion. Primary factors relating to the decline of the cattle industry were the construction of a railroad link to the eastern United States and the expansion of farming. The Northern Pacific Railroad was completed to Ainsworth, near the confluence of the Snake and Columbia Rivers, in 1883. The establishment of that connection with the eastern United States accelerated the settlement of the area by wheat farmers which in turn led to extensive fencing and closing of the open ranges on which the cattlemen depended. But without irrigation, the lands around the Hanford Site could not be cultivated and thus the cattle ranching period appears to have lasted somewhat longer in the Hanford area than in the rest of the Columbia Plateau. That is, the slower shift from ranching to farming in the Hanford area was probably due in large part to the relative aridity of the Hanford site. In the uplands east of the Columbia, the conversion to agriculture occurred earlier since that area receives enough rainfall to allow dryland farming. But, agricultural development of much of the Hanford site was simply impossible without irrigation.

According to Meinig (1968: 267), the area west of the Columbia River remained largely cattle and sheep country into the 1880s. In her history of the early communities of the Hanford Reservation, Parker (1986: 33) states that the Hanford area continued to be used for grazing into the 1890s when "thousands of horses and cattle grazed from the Yakima far to the south, to the Columbia, all through the land now under the Hanford Atomic Reservation".

4.4.5 Farming and Railroads

Farming on the Columbia Plateau began in the 1860s in the Walla Walla Valley east of the Hanford site. Initial agricultural settlement focused on the scattering of low, level ground nestled in the steep, wooded hills on the eastern margins of the plateau. Here they were able to find flat land, water, timber, and hay. Farming expanded across the eastern plateau with the pace of settlement increasing in the 1870s as farmers realized that the rolling, grassy hills covering much of the region could be successfully farmed. This opened vast areas for agricultural settlement that had been previously avoided. By the 1880s, expansion of agriculture in the area east of the Columbia River brought an end to open-range cattle ranching there (Meinig 1968: 284).

As noted above, the more arid conditions in the Hanford area prevented the spread of dryland farming into the area and agricultural development lagged. Some small scale irrigation occurred around the Hanford Site, but this was primarily in support of the still dominant ranching activities. Agriculture at Hanford did not begin in earnest until the development of irrigation projects. Construction of these works began along the Yakima River in the 1890s but large scale irrigation projects on the Hanford site were not successfully undertaken until the early 1900s.

One of the primary impulses for agriculture in the region was the development of adequate transportation facilities. Riverboats had been operating on the Columbia River since the mining booms of the 1860s but the few that continued in operation into the 1870s were unable to handle the wheat produced in the Walla Walla area during that period. Railroads were needed to transport the huge volumes of grain produced in the rapidly expanding region.

The first railroad constructed on the Columbia Plateau was the Walla Walla and Columbia River Railroad (WW&C). It was completed in 1875 by local interests, connecting Walla Walla with river boats landing at Wallula by following a 25-mile route along the Walla Walla River. The WW&C was purchased the following year by the Oregon Railway and Navigation Company (OR&N) which controlled the riverboat traffic on the Columbia. The OR&N completed a rail line from Wallula to Portland in 1882, thereby providing direct access to a deep water port for the growing grain area of the Columbia Plateau. The following year, 1883, the transcontinental Northern Pacific Railroad was completed to Ainsworth, a new railroad settlement located at the confluence of the Snake and Columbia Rivers (Meinig 1968: 258). The establishment of a transcontinental railroad through the district surrounding the Hanford Site delivered the most telling blow to the ranching business of the area. The railroad brought large numbers of settlers interested in farming and fencing, and the railroad companies had the money to finance irrigation projects to make the land productive and saleable.

The completion of these rail lines affected the development of agriculture in the inland Pacific Northwest in two important ways. First, they provided efficient access to markets in the eastern United States and around the Pacific Rim. In addition, the railroads improved access to the region for settlers and manufactured goods entering the area. Both of these had the effect of spurring growth across the region. Initially, the Northern Pacific used the OR&N tracks down the Columbia to Portland while at the same time building west through the Yakima Valley and across Stampede Pass to the Puget Sound. The towns of Pasco and Kennewick were founded by the company in 1884 with the bridge crossing the Snake River between Pasco and Ainsworth completed that year. The bridge across the Columbia, joining Kennewick and Pasco, was completed in 1888. Prior to completion of these bridges, railroad cars were ferried across the two rivers. Construction of the Northern Pacific brought additional Chinese laborers into the Hanford area who had originally entered the region during the gold rush era when they worked gravel bars along much of the upper Columbia River.

A second major rail line, the Spokane, Portland, and Seattle (SP&S), was built through the southern Hanford area between 1904-08. The SP&S ran southwest from Spokane to the Snake River which it followed to Ainsworth, which, having been largely abandoned following completion of the Northern Pacific's Snake River Bridge, saw a brief period of revival. The new line crossed the Columbia at Pasco and followed the north bank of the Columbia River to Vancouver, Washington.

At the same time the SP&S was being built south of the Hanford Site, the transcontinental Chicago, Milwaukee and St. Paul was under construction to the north. This line had a greater impact on the Hanford Site through the construction of its Priest Rapids Spur Line in 1913. The spur left the main line near Beverly and followed the west bank of the Columbia southward and eastward through Vernita and White Bluffs to the town of Hanford.

Several unsuccessful attempts were made to develop additional rail service on what later became the Hanford Reservation. In 1907 the Hanford Irrigation, Power, and Priest Rapids Railway Company announced it would build a rail line to Hanford to be powered by electricity but it was never built (Parker 1986: 55). Additional efforts were also proposed but never realized. Parker (1986: 55) characterized the desire for the development of this important infrastructure:

> **The coming of the railroad was an event that was fought over and fought for all the remaining years until the government take-over in 1943. Richland spent many dollars and much time trying to get a spur into town and in later years an incorporation of local men was formed to join Kennewick and Hanford by rail. It was never to be, until the Army COE needed the railroad to receive supplies . . .**

Richland's efforts to develop rail connections with Kennewick and the Hanford/White Bluffs area were, no doubt, based in a desire to become the main shipping point for agricultural products of the surrounding area.

4.4.6 Farming and Irrigation

Agricultural development in the Hanford Site area could not succeed without artificial irrigation. Although irrigation projects were being developed along the Yakima River in the 1890s, large scale irrigation projects at the Hanford Site were not successfully undertaken until after the turn of the century. The first attempt by Euro-Americans to artificially irrigate the arid lands of the Columbia Basin was the small-scale irrigation system developed by Dr. Whitman in the late 1830s/early 1840s to facilitate subsistence farming at the mission. The results were so encouraging that Dr. Whitman widely touted the area and its agricultural potential to possible emigrants.

Early Efforts

As early as 1870, some settlers in the Yakima and Wenatchee valleys had diverted water to reclaim arid lands. Early farmers in the Yakima Valley completed the Ahtanum Canal in 1874 and an even more ambitious project was constructed near Yakima - the seven mile long Union Gap ditch (Dryden 1968: 202-203).

Interestingly, it was cattlemen who helped foster the advent of irrigation in the region. As a result of the disastrous losses in livestock due to the severe winter weather conditions in 1880-1881 and again in 1886-1887, stockmen began constructing small dams and gravity flow irrigation systems in the Lower Yakima valley in an effort to grow alfalfa and rye grass. Each farm or ranch had its own system and Ben Rosencrance, who settled in what is now Richland, was among the first settlers to build such systems (Parker 1986: 170).

Most immigrants to the Hanford vicinity initially planned to grow wheat, hops, and/or alfalfa, but they soon found that they could grow almost anything if they could get water. Experimental crops of melons, vegetables, berries, sugar cane, peanuts, maize, flowers and fruit trees all thrived (Harris 1972: 50). An additional incentive for attempting crop irrigation came from the Desert Land Act, passed by Congress in 1877, which allotted 640 acres of land to a homesteader if he irrigated at least 80 of those acres (Lavender 1958: 434-39).

A number of farmers in the White Bluffs-Priest Rapids area used a sort of water elevator, which consisted of an endless chain of buckets powered by a horse (Harris 1972: 63). Other small irrigation devices such as individual windmills, water wheels, or makeshift dams diverted water from nearby rivers and creeks into wooden ditches or flumes to gravity flow into nearby fields. By 1890, many small steam vacuum pumps, which were placed directly over wells or streams, were in use. These were often weak and the related piping systems were often inadequate. On the peninsula between the Yakima and Columbia Rivers, Nelson Rich dug a private canal about one and one-half miles long, headed on the Yakima River several miles below the Horn, and grew two successive crops of alfalfa, barley, hops, cabbages, onions, and potatoes on former sagebrush land. (Van Arsdol 1972b: 24, 38-39; Parker 1979: 19, 43).

At first, the early settlers, such as Rosencrance, kept close to the rivers or the perennial creeks flowing from the mountains and such was the case in the drier areas such as the Yakima Valley. This conservative strategy generally worked well, though, on occasion, some unlucky pioneer who was located away from a stream might find that he had misjudged the availability of water on his land and was forced to haul water from a neighbor's well or creek (cf. Meinig 1968: 301). But as settlement pressures increased and colonization began to push in toward the more arid center of the Columbia Basin, domestic water supply became a more serious difficulty and impediment to agricultural development. By about 1888, some settlers were drilling wells with some success, but a general deficiency of water afflicted the area for many more years (cf. Meinig 1968: 301).

The Beginnings of Organized Irrigation Schemes

In the decade of the 1890s, the Yakima Irrigation and Improvement Company [YI & IC] built the first major irrigation canal on or near the Hanford Site area. Starting in January 1892, the company began canal construction commencing at the headgates at the Horn of the Yakima (Horn Rapids), then proceeding along the west side of the river to Kennewick. The Kennewick townsite was platted and during periods of favorable economic conditions, increasing numbers of people came to make their homes there.

The YI & IC took control of the odd numbered land sections in the lower Yakima Valley, totally almost 40,000 acres. The even number sections were owned by the Northern Pacific Railroad. The YI & IC planned to begin construction, in the spring months, of a large canal which was to head at a point several miles above Kiona, go around the foot of Rattlesnake Mountain, and continue northeast to Sharkey's landing on the Columbia. Another branch of the canal was to cross the Yakima and continue to a point opposite Wallula (Parker 1986: 17-18).

The land to be watered by this YI & IC canal ranged between 340 and 390 feet above sea level and was considered to be the "earliest [ripening/harvestable] of any of the agricultural land north of California" and would supply the coastal cities which otherwise received their produce by boat from San Francisco. It is not, therefore, hard to imagine the excitement and enthusiasm felt by the residents of this sparsely populated area on the lower Yakima as they envisioned the benefits of the apparent coming of water to their desert lands. In fact, there was a great rush to file (claims) on the land along the projected irrigation ditches. Thousands of acres were entered at the Walla Walla land offices under the Homestead and Desert Land laws in the winter of 1888-1889 (Parker 1986: 17-18).

Unfortunately, the national financial panic of 1893 through 1896 caused the YI & IC to fall into financial ruin and a large "break" in the ditch pretty much sealed the fate of this company. The failure of the YI & IC was, for a time, a major set-back for regional agricultural development and many farms were subsequently deserted and many settlers moved away (Parker 1986: 32). Even though the company went into receivership and the ditch enterprise should have been terminated, too much money had been invested in large tracts of land (that had been purchased from the Northern Pacific Railroad) to permit the scheme to lie dormant. On the west side of the Columbia, this project was resumed in 1902 when the Northern Pacific Railroad formed a subsidiary to complete that undertaking. This new railroad company subsidiary also laid out the townsite of Kennewick once again, and several hundred residents were on hand to celebrate the arrival of the first water in the ditch in 1903. Two years later the Richland canal was constructed to serve the peninsula between the Yakima and Columbia (Meinig 1968: 301).

Parker (1986: 18) also commented:

> **The first Yakima Irrigation and Improvement Company scheme to irrigate the east slope of Rattlesnake Mountain sounds remarkably like Ledbetter's plan, which Mrs. Harris describes thusly:** ***As early as 1893, a private plan for irrigating the land in the southern White Bluffs area was started, but it proved to be a big task. About ten years later, government engineers reported that the Ledbetter scheme was one of the most attractive in the whole area. Ledbetter, an eastern promoter, tried to irrigate over 200,000 acres by diverting water from the Yakima River near Prosser Falls. Traces of the ditch are still visible. Part of the land was Rattlesnake Flat, to the east of Rattlesnake Mountain, where there was very fertile soil. The project extended from Gable Mountain on the north to the Columbia on the east.*** **The project collapsed because of the Panic of 1893.**

Not only was the decade of the 1890s an important one in terms of these regionally and locally important irrigation schemes, some of which ultimately succeeded (see above), but it was also the time when the first "irrigation districts" were organized. In 1890, the Washington state legislature passed a law authorizing irrigation districts to issue bonds to pay for operating costs but the state clearly lagged behind other states in irrigation development and at that time, had the smallest acreage under irrigation. By 1900, the effects of this law were finally being felt as individuals and small irrigation companies were digging ditches and bringing water to a very limited acreage, principally in Yakima County (The Hanford Site area was part of Yakima County until Benton County was created in 1905.) (Dryden 1968: 243).

The importance of these organized irrigation efforts cannot be over emphasized. With the help of this state legislation and better organized irrigation efforts, by 1910 there was a string of bustling towns winding through the narrow corridors of irrigated farmland on either side of the Yakima River (Meinig 1968: 448). Further, it was the emergence of irrigation agriculture that helped usher in the boom years of the early 20th century (Meinig 1968: 301).

The Newlands Reclamation Act and its Impact on Regional Irrigation Projects

The most important irrigation development in the opening years of the 20th century was passage of the Newlands Reclamation Act of June 17, 1902. Its passage marked the beginning of planned, coordinated survey and development of the irrigation potentialities of the entire Columbia Basin. It also provided the financial and organizational muscle needed to bring the more remote districts, such as parts of the

Hanford area, under an effective program of irrigation. One of the first fruits of the Reclamation Act was the assumption of federal control of local irrigation projects.

In the time period immediately following passage of the Reclamation Act, however, many small-scale, large-dream plans for pumping or diverting water from the Columbia and its tributaries were born and died and a few survived somewhat longer by desperate persistence. For a time, only small canals were being proposed, such as the one from Priest Rapids on the Columbia to White Bluffs, some 20 miles away, to irrigate 5,000 acres (cf. Relander 1961: 146). Johansen (1967: 393) commented about the situation in eastern Washington just at the time the Reclamation Act was passed. She noted that in the Palouse Valley and the Big Bend of the Columbia there were large areas suitable for irrigation but costs were prohibitive and remained so for some years.

The importance of the Reclamation Act cannot be underestimated. Passage of the act inspired local confidence, settlement and investment (Edwards 1981: 113). President Theodore Roosevelt visited North Yakima on May 25, 1903 and pointed to the Reclamation Act as marking the beginning of "a policy more important to this country's internal development than any since the Homestead Law of Lincoln's time."

Three key goals guided the reclamation program under the Act: (1) to plan and construct major improvements by means of a federal agency; (2) to design and carry out each project so as to provide maximum benefits for the entire area in which it was located; and (3) to make federally financed projects self-liquidating. The last goal was to be accomplished by charging costs against the lands they served and eventually by transferring ownership and management of the canals (though not the dams and reservoirs) to associations of water users (Johansen 1967: 392). Thus, under the Reclamation Act, the burden of watering the land came to fall on the shoulders of the federal government.

Meinig (1968: 381) observed that the total area that could be irrigated under these projects was only a small part of the agricultural acreage of the region, and the total acreage actually in production was an even smaller fraction since it took time to complete the full network of facilities. But these figures provide no measure of the importance of irrigation to the development of the region. Once in full production, these lands would yield high returns and support relatively dense rural populations. Moreover, together these various irrigation projects represented an important phase in the elaboration of the geographic patterns of regional development. The areas developed for irrigation were arid and had not been farmed before. Further, the spread of irrigation agriculture was complementary rather than competitive with the advance of the dryland farming. By 1905, at least a beginning had been made in nearly all of the agricultural districts which could feasibly be developed on the basis of local water supplies. Closely associated with the irrigation projects was the establishment of many new towns in the region, most of which were platted and promoted by the irrigation companies themselves. In addition, as these farm and town developments grew, the settlers and residents often agitated for construction of new railroads lines.

Local Irrigation Efforts after the Newlands Reclamation Act

The first YI & IC and Ledbetter ditches were planned to irrigate the east slope of Rattlesnake Mountain and were partly built; traces of them can still be found today. The second YI & IC ditch headed at the Horn of the Yakima and is still in use on the north and east side of Yakima River.

A YI & IC ditch that was important to the development of the early town of Richland was one that was under the ownership of Nelson Rich. It headed at the Yakima River several miles below the Horn and was the same ditch purchased by Howard S. and W. R. Amon that stimulated the growth of Richland in 1905. Even as these land-owners began to realize the benefits of the YI & IC, more ambitious plans were being conceived for areas to the north of the newly burgeoning town of Richland. Today, all but the faintest traces of the ditch are gone (Parker 1986: 19).

In December 1905, the Priest Rapids Irrigation and Power Company was organized in Seattle for the purpose of reclaiming 32,000 acres of arid land along the Columbia River 30 miles above Richland. This scheme was the forerunner of the Hanford Irrigation and Power Company (Parker 1986: 46-47). Before the ditch associated with this scheme was constructed, local farmers used gasoline pumps and water wheels to irrigate their land (Parker 1986: 37). Only one year after its conception, the Hanford Irrigation Company ditch was under construction by December 1906 (Parker 1986: 48). By March 1907, C. S. Hanford reported that about fifteen miles of canal had been completed, using 150 teams and 250 men. The power intake canal was completed in March 1908 and was reportedly 76 feet wide at the bottom, 140 feet wide at the top and 25 feet deep (Parker 1986: 58-59). Hanford's "low line" ditch was finished and the power plant was built during the winter when the water was low. This low line ditch was to water 20,000 acres and the later planned high line ditch would bring the total acreage to 32,000.

By 1908, the White Bluffs Irrigation Company had started work on its system, stimulated by completion of the (Howard Amon and Lee Amsbury) ditch in 1905 (Parker 1986: 59). Both pumping plants for the White Bluffs irrigation project were operational by the end of 1908 (Parker 1986: 59). Nearby, the irrigation of the Priest Rapids Valley began with the construction of a power plant at the foot of Priest Rapids. Lands south and west of the river came under irrigation as a result (Schalk et al. 1982: 120).

Irrigation development in the Cold Creek Valley (NW area of Hanford Site) differed from other parts of the Hanford Site in two important ways. First, unlike the rest of the Hanford Site which relied on water from the Yakima and Columbia Rivers for irrigation, water for irritation in Cold Creek Valley was obtained from artesian wells which were dug in the late 1910s and 1920s. Second, individual farmers could drill a well and construct their own irrigation systems. On the remainder of the Hanford Site, irrigation was developed by large organizations because of the need to provide high volumes of water to thousands of acres of land.

In the Cold Creek Valley, water from the artesian wells was carried to cultivated fields by gravity systems consisting of shallow ditches, pipe (wood, concrete, ceramic, and metal) and small cedar board flumes. The artesian systems remained in operation until the establishment of the Hanford Engineering Works in 1943, although the water output of many of the earlier wells was substantially reduced when the McGee Ranch well was dug in 1928.

4.4.7 Resettlement - Growth of Local Communities

Various federal land and water programs played an important role in the Euro-American resettlement and development of the Hanford Site area. Once the lands on what was to become the Hanford Site were ceded to the U.S. government by the tribes, the most important way in which these lands were transferred into the private ownership of settlers was the Homestead Act of 1862. Under that act, any citizen who was the head of a family or a single man over the age of 21 years could obtain 160 acres free by residing on the claim for five years and making certain minimal improvements. Ben Rosencrance filed a homestead claim as part of the original holdings of his large cattle operation centered around the mouth of the Yakima River in the 1880s (Parker 1986: 16). By the early 1890s, settlers in the White Bluffs area had filed homestead claims along both sides of the Columbia River. Another important law used by settlers in the Hanford Site area was the Desert Land Act of 1877. Under this act, 640 acres could be purchased at $1.25 per acre upon proof it had been placed under irrigation within three years. As in other regions, settlers at Hanford sometimes filed under more than one land act. But probably the most common way that settlers acquired government lands in the Hanford Site area was through the railroads, who themselves had been granted odd-numbered sections of land by the government. For example, part of the original charter of the Northern Pacific Railroad included the government grant of the odd-number sections, on either side of the line, for a distance of 20 miles. As heavy promoters of land development and settlement, and key players in the organization of irrigation schemes, the railroads eagerly sold these government granted lands to the willing settlers.

White Bluffs, Hanford, Richland

As noted earlier, the first Euro-American community on the Hanford Site was White Bluffs. The original townsite was established in the early 1860s on the east bank of the Columbia River. The ferry and river boat landing made the town an important point on the route to the mines in British Columbia. Much was expected of the new community. The Portland *Oregonian* for March 1, 1866, reported:

> **A second Sacramento; We are informed that a company has been formed at the Dalles who intended putting 25 heavy freight trams on the portage from White Bluffs to Pend Oreille at once and increase the number as required. These teams will start form White Bluffs by March 10. Thus we see another very important link in the communications with Montana supplies. We have ever looked upon White Bluffs as a starting point in this great trade, and we have no doubt that, relying on the merits of the route above, will continue to prosper, and it may become in time the Sacramento of the Columbia Valley. Already a hotel and several stores have been established there. The pioneers of the town, Booth and Nevison, have already purchased a very extensive stock of goods. The town is to be properly surveyed, now that permanency is no longer a matter of doubt.**

However, traffic through White Bluffs dropped sharply following the precipitous decrease in mining activity in British Columbia that occurred after 1865. However, the site continued to be an important river crossing, much as it had been for the local Indians and early travelers.

Settlement in the White Bluffs area was stimulated again in the early 1890s with the completion of the Northern Pacific Railroad bridge across the Columbia in 1888. The narrow band of land between the river and the base of the bluffs was unable to accommodate all of the land seekers and some settled on the west bank of the river across from White Bluffs.

Further development of the area west of the river awaited irrigation. In 1896, the Northern Pacific Railroad studied the White Bluffs area for the potential development of an irrigation project and the Northwestern Improvement Company made a similar study in 1904. Both companies concluded that the project would be too expensive and did not pursue it. But, in 1905 the Priest Rapids Irrigation and Power Company announced plans to develop an irrigation system to water 32,000 acres using water pumped from the Columbia. The company bought land in the White Bluffs area (now located on the west bank of the river) and at what was to become the Hanford townsite. The Hanford townsite was platted in 1907 and the second White Bluffs townsite was platted a year later.

Even though the enterprise was faced with numerous problems (including the split of the original company into separate Hanford and White Bluffs companies, only to merge again in 1910, and the delay in delivery of water until 1909), settlement of the Hanford/White Bluffs area proceeded rapidly. This development was part of a general pattern across the Columbia Plateau which Edwards (1981: 112-113) described:

> **. . . [between 1906 and 1911] the Yakima, Columbia, and Snake River valleys . . . enjoyed a boom: new towns appeared and old ones expanded, railroads offered improved service, more irrigation canals were dug through the sage lands, and newcomers, especially middle-class farmers, moved onto and improved the lands. Between 1900 and 1910, the population burgeoned, in North Yakima from 3,200 to 14,000, in Ellensburg from 1,700 to 4,200, and in Prosser from 200 to 1,300. New incorporated towns like Sunnyside, Granger, Kennewick, and Clarkston were a further indication of prosperity. Those years saw a 118 percent increase in the number of irrigated farms, an extension of main irrigation ditches from 806 to 2,594 miles, and a jump in acreage irrigated from 135,500 to 334,400 - - a rise of 147 percent.**

So many settlers came to take up homestead claims in the White Bluffs area between 1892 and 1894 that there was little room for them on the east bank of the Columbia between the river and the bluffs, and most settled on the west bank opposite the original White Bluffs townsite.

Settlement of Richland was boosted as a result of the Northern Pacific's promotions of the Kennewick neighborhood in the late 1880s/early 1890s and the coming of the Northern Pacific Railroad to the area surrounding the Hanford Site. The majority of new settlers were interested in farming, and their arrival hastened the transition of the regional economy to agriculture.

During the years from 1906 to 1910, when Richland, White Bluffs, and Hanford were experiencing their greatest irrigation booms, promotions of the region were lavish. Photographer Asahel Curtis was hired by land companies, railroads, and commercial clubs during the height of the promotional boom in Eastern Washington, and his work illustrated many of the advertising brochures of the Hanford vicinity between 1906 - 1910. Curtis captured some of the most diverse and unique pictures of the irrigation and development boom in the Hanford Site area. Brochures and flyers were printed in the thousands and widely distributed. A 36-page booklet produced by the Richland Land Company (ca. 1909) described the area in glowing terms and stated that "a man can, upon a ten-acre tract in this country, under irrigation, make a more independent living, and build up a better bank account, than upon a 160-acre farm in either the East or West, without irrigation" (Parker 1986: 91). A similar brochure produced around the same time by the Columbia River Land Company characterized White Bluffs as "The California of the Northwest" (Parker 1986: 124).

As the irrigation projects were being built in the middle years of the first decade of the 20th century, farmers in the White Bluffs and Hanford areas were making major investments in their lands. With the promise of ample water, large orchards of apples, pears, and plums were planted. Since these young trees would require several years to grow into mature fruit-bearing production, the farmers often planted other cash crops (such as strawberries or alfalfa) between the rows of tree saplings. Unfortunately, when some of these irrigation projects failed to deliver the promised water on time, or in the quantities promised, many farmers experienced significant loss to their young orchards and sued the irrigation companies for damages.

Railroads and Community Growth

With the passage of the Newlands Reclamation Act, the heavy promotion of the area by railroad and irrigation interests, and the successful implementation of irrigation projects, the small towns within the Hanford Site experienced boom-time conditions through much of the first and second decades of the 20th century. The major event of the decade was the completion of the Chicago, Milwaukee and St. Paul Railroad to Hanford in May of 1913 providing a transcontinental rail link for the White Bluffs-Hanford area (e.g., the Priest Rapids Line). With the arrival of the Priest Rapids Line into the White Bluffs and Hanford area, the farmers were better able to ship large quantities of fruit from their maturing orchards. Not only were produce prices up as a result of war-time demand, but with the arrival of this rail link, transportation costs to ship produce eased.

As noted above, local farmers, who faced the twin problems of expensive water and transportation costs, frequently turned to the courts. Numerous law suits were filed against irrigation companies that failed to provide promised water supplies. Undoubtedly, these problems contributed to the establishment of several grower associations during the early years of the second decade of the 20th century. Local farmers did persevere and during the World War I years, they found a ready market for their agricultural products.

Soldier Settlement Project

As the pace of development slowed after World War I, in an effort to further stimulate development in the Hanford-White Bluffs area, the state supported a "soldier-settlement" project that got underway in the early 1920s. The project was intended to establish World War I veterans on 20-acre plots of land containing a house, barn, poultry house, and a well. The initial project included 58 plots which was later expanded to 90 (e.g., 1800 acres). Soldiers could purchase a plot for about $5,000 with $600 down payment. At least initially, the project was a success in that soldiers and their families began arriving at the settlement areas in 1922. However, problems including drought, low crop prices, and difficulties with farming the light soils of the Hanford Site area caused many of the soldier-settlers to default on payments and move away. In 1926, the state declared the settlement a failure. Deeds were given to 50 soldiers who had made partial payment for their properties and the remainder of the plots were sold at auction (Parker 1986: 259).

The Great Depression

The experience of the local soldier-settlers at the Hanford Site mirrored tough conditions throughout the region. In the 1920s, the Columbia Basin was experiencing depressed economic conditions typical of the many rural areas in the country that went into economic decline five to ten years before the nationwide depression. The rural community was no longer receiving a high return on their produce as they had experienced during World War I. Years of poor agricultural practices, especially on submarginal lands like those found in the Columbia Basin, resulted in the "dust bowl" conditions. Thus, power development projects of the 1930s, like Grand Coulee Dam, were geared towards supplying energy to the expanding urban centers. Similarly, initiation of the Columbia Basin Reclamation Project was intended to reclaim marginal lands that could only be cultivated with irrigation (Harvey 1982: 200).

The Great Depression of the 1930s inflicted severe suffering in the Hanford area. Crop prices fell in the postwar contraction of the early 1920s, and did not recover until World War II. The Hanford Site area, which was agriculturally based, did not experience the speculative, inflationary boom that occurred in the industrialized portions of the nation in the late 1920s. Thus, it was spared an economic "crash" in late 1929 or 1930. In fact, the Great Depression was slow to reach the Hanford vicinity and farm prices rose slightly in 1929. This rise, combined with railroad competition which lowered freight rates in 1930 and 1931, brightened the area's agricultural picture a bit. However, the impact of the Great Depression, after 1931, was devastating.

When the Great Depression reached the Hanford Site in 1932, farm product values had slid by 30 percent from the levels of 1930. By 1934, all Washington farm goods except potatoes and wool were selling at prices below those of 1917. Local newspapers carried stories of tight money and business closures, as retail stores, banks, insurors, and others dependent on sales to Hanford Site area farmers found themselves without paying customers. In 1932, local railroad employees received a 10-percent pay cut and many lost their jobs entirely and waited several years to be recalled. In 1932, a cattle drive, reminiscent of a bygone era, was made by Yakima Valley ranchers as a way to save shipping costs and realize a profit. Five hundred head of Herefords from Toppenish were driven to the Rattlesnake Hills and across the Hanford Site where they swam the Columbia River at White Bluffs, and then northward along Benjamin Snipes' route to British Columbia (Parker 1979: 295-98, 315).

Despite local and state government efforts, it was several federal projects that sustained the Hanford Site area and prevented much more severe, regional financial collapse. The Agricultural Adjustment Act of 1933, Reconstruction Finance Corporation (RFC) loans, and the 1936 Soil Conservation and Domestic Allotment Act were helpful. The Federal Surplus Commodity Corporation purchased millions of pounds of surplus food in Washington in 1936 which was given to relief agencies for distribution. In 1935, less than one-tenth of Hanford area farms were served by electricity. That year, the national Rural Electrification Administration (REA) was created to promote the formation of non-profit farm cooperatives to bring electric power to rural homes. Low interest federal loans were made available to fund installation of the power lines.

Although the Hanford region realized many advantages from the national programs of the Depression era, the most reaching impacts were produced by construction of Grand Coulee Dam. It provided enormous electrical power generation and fostered reclamation efforts such as the Columbia Basin Irrigation Project just after World War II. Its first benefits to the Hanford Site area were jobs. Water began to be retained in the partially completed reservoir (Lake Roosevelt) behind Grand Coulee Dam in 1939, and the first power was delivered out of the huge generators in October 1941. Bonneville Dam was completed and started electrical generation in 1938. In 1940, the Midway Substation, located just upstream from Vernita on the northwest edge of the Hanford Site, was built for the mammoth Bonneville-Grand Coulee power lines (Parker 1979: 350-51; Lavender 1958: 443).

At the same time that the Grand Coulee Dam was being built, Hanford residents pushed for the development of a port system and the construction of additional dams in their area. When the federal government failed to step in and establish a Columbia River Authority, similar to the Tennessee Valley Authority, local communities formed the Inland Waterways Association and leaders in the Hanford Site area pushed for construction of a dam at Umatilla Rapids. The Army Corps of Engineers surveyed the site in July 1938 but funds already had been committed to the John Day Dam and Congress denied funding for the Umatilla Rapids Dam (Parker 1986: 302-03, 320-34; Parker 1979: 321, 341).

Although agriculture dominated the Hanford Site area in the years prior to the creation of the Hanford Engineer Works, the discovery of natural gas underneath the Rattlesnake Hills resulted in much drilling activity. By 1930, four companies were still actively searching for gas, and a small settlement known as Gas Wells was in place. Rumors of big oil discoveries abounded, especially in 1930 when Shell Oil Company sent representatives to lease land and investigate the Rattlesnake Hills (Harris 1972: 277).

The Northern Pacific Railroad continued to boost settlement and "homesteading" in the Hanford Site area throughout the 1930s and held festive promotional picnics in Pasco and other locations. Between 1931 and 1937, about 488 midwest farm families and others bought irrigated farms through the railway's land agent (Van Arsdol 1958: 31-36; Oberst and Smith 1983: 59-64). Land colonizers also came as part of the overall migration out of the midwestern "dustbowl," in response to advertising and personal initiative. In 1939, after two years of extensive investigation of irrigated farmlands from Texas to the Pacific Northwest, a group of Mormon families chose the Hanford-White Bluffs district for permanent settlement (Parker 1979: 352). There was still abundant non-irrigated land in the Hanford Site area and in 1938, some 20,000 sheep from Kittitas and Yakima Counties wintered either on or near the Hanford Site at Gable Mountain, near Priest Rapids, and between Vernita and White Bluffs (Parker 1979: 276, 341). Between the World Wars, there were few changes made to the reclamation systems in the Hanford Site area and no new major irrigation projects were constructed.

4.4.8 Summary

The first Euro-Americans who came into the Hanford region were Lewis and Clark who were soon followed by fur trappers, military units, and miners passing through on river passageways on their way to more productive lands and across the Columbia Basin. It was not until the 1860s that merchants set up stores, a freight depot, and the ferry at White Bluffs on the Hanford Reach. Chinese miners began to work the gravel bars for gold, cattle ranches were established in the 1880s, and farmers, the railroads, and extensive irrigation followed soon after. Several small, thriving towns, including Hanford, White Bluffs, and Richland, grew up along the riverbanks in the early 20th century. Other ferries were established at Wahluke and Richmond. The towns and almost all the other structures were razed after the government acquired the land for the Hanford Engineer Works in 1943 (cf. Chatters 1989, ERTEC 1981, Rice 1980, and Cushing 1995). Thus, much of the pre-Hanford historic record is archaeological in nature.

4.5 Associated Property Types

4.5.1 Introduction

As with the Indians who lived alongside the life-giving Columbia and Yakima Rivers, the recently-arrived Euro-Americans settlers located their ranches and farms adjacent to these important water ways and harnessed their flows to irrigate the arid soils to grow a wide variety of cash crops. Like the Indians whose occupation left behind a rich array of physical remains that attest to their occupation and use of the Hanford Site for thousands of years, the Euro-Americans, in a relatively few decades, left behind ample physical evidence of their activities (farms, ranches, towns, roads, canals, fields, etc.). With the evacuation of all civilians (Indians and whites) from the area in 1943, and the subsequent removal of much of the standing structures erected by the Euro-Americans, the Hanford Site became, almost overnight, a large archaeological district. This section describes the physical remains (e.g., "property types") that pertain to Euro-American resettlement of the Hanford Site area.

Archaeological resources from the pre-Hanford Site period are scattered over the entire Hanford Site and include numerous areas of gold mine tailings along riverbanks of the Columbia and the remains of homesteads, agricultural fields, ranches, and irrigation-related features. At present, 224 historic archaeological sites and numerous historic properties have been recorded which are associated with the pre-Hanford Site era (Cushing 1995).

Properties from the pre-Hanford Site era include semi-subterranean structures near McGee Ranch, the Hanford Irrigation and Power Company's pumping plant at Coyote Rapids, the Hanford Irrigation Ditch, the Hanford town site, pumping plant and high school, Wahluke Ferry, the White Bluffs town site and bank, the Richmond Ferry, Arrowsmith town site, a cabin at East White Bluffs ferry landing, the White Bluffs road, the Chicago, Milwaukee, St. Paul & Pacific Railroad (Priest Rapids-Hanford Line) and associated whistle stops, and Bruggeman's fruit warehouse (Rice 1980). Historic archaeological sites including an assortment of farmsteads, corrals, and dumps, have been recorded by the Hanford Cultural Resource Laboratory (HCRL) since 1987. In 1995, large-scale surveys of the 100 and 200 Areas by crews from Washington State University, under contract to HCRL, has resulted in the recordation of many more historic archaeological sites. ERTEC Northwest conducted some minor test excavations at some of the historic sites, including the Hanford town site (Cushing 1995).

In the 100 B and 100 C Areas, the remains of Haven Station, a small stop on the former Chicago, Milwaukee and St. Paul Railroad line is located west of the reactor compound. The remains of the small community of Haven lie on the opposite bank of the Columbia River. In the 100 D and 100 DR Areas, there are many sites representing Euro-American settlement activities. The former community of Wahluke, which was at the landing of a ferry of the same name, is also situated on the river's north bank. In the 100 F Area, four historic period sites were discovered during surveys in 1991. The principal historic archaeological site in the vicinity is the East White Bluffs ferry landing and former townsite.

The East White Bluffs ferry landing is located on the east bank of the Columbia River and was formerly the upriver terminus of shipping during the early and mid-19th century. It was at this point that supplies for trappers, traders, and miners were off-loaded, and commodities from the interior were transferred from pack trains and wagons to river boats. The first store and ferry of the mid-Columbia were located there. A log cabin, thought by some to have been a blacksmith shop in the mid-19th century, still stands there. Test excavations were conducted at the cabin by the University of Idaho and the structure has been recorded to Historic American Buildings Survey standards (Rice 1976). The only remaining structure associated with the White Bluffs townsite (near the railroad) is the White Bluffs Bank (Cushing 1995).

In the 100 H Area are 14 historic sites that were recorded during 1992 and 1993 and include 20th century farmsteads, household dumps, and military encampments. Littering the area around the 100 K Area are historic sites containing the remains of farms. Four historic sites and three isolated finds have been recorded as of 1994. Two important linear features, the Hanford Irrigation Ditch and the former Chicago, Milwaukee, and St. Paul railroad, are also present in the 100 K Area. Remnants of the Allard whistle stop and the Allard Pumphouse at Coyote Rapids are located west of the K reactor compound. The most common evidence of historic activities now found near the 100 N Area consists of gold mine tailings on riverbanks and historic archaeological sites where farmsteads once stood.

In the 200 Areas, the only evaluated historic site is the former White Bluffs freight road that crosses diagonally through the 200 West Area. The road, which was formerly an Indian trail, has been in continuous use since antiquity and has played a role in Euro-American immigration, development, agriculture, and the Hanford Site operations. This property has been determined to be eligible for listing in the National Register although a segment passing through the 200 West Area is a non-contributing element.

Only one historic site, a trash scatter, has been recorded in the 300 Area, but within 2 km (1.2 miles) of the 300 Area fence are nine historic sites. They consists mostly of debris scatters and road beds associated with farmsteads. Several more historic sites may be expected in this outlying area (Cushing 1995). Historic cultural resources have been identified in or near the 1100 Area and these consist mostly of farmsteads, homesteads, and agricultural structures predating the Hanford Site. No pre-Hanford Site historic properties have been recorded in the 3000 Area but farmsteads and remnants of the former North Richland town site may be found there (Cushing 1995).

4.5.2 Property Types - Definitions

Hardesty (1982: 209-210) proposed that the expected archaeological sites resulting from farming or ranching activities would fall into five general classes of features: management, manufacturing, environmental impact, domestic, and logistic.

Management features are those originating in the human activities used to create and maintain farming/ranching ecosystems. These include water management (irrigation canals, reservoirs, dams, and other works to control/distribute water to farm/ranch ecosystems), animal husbandry (barns, corrals, branding stations, fences and other sites directly related to the management of cattle, sheep, horses, and other animals), and managed habitats (cultivated fields or other archaeologically visible effects of farming/ranching activities).

Manufacturing features are those originating in the human activities used to supply materials and energy to farming/ranching operations. These include blacksmithing sites and kilns (brick, lime, and other kiln sites used in the manufacture of construction or fertilizer materials).

Environmental impact features are those originating in environmental responses to farming/ranching operations. These include erosion (gullies), salt deposits (areas of salt buildup in soils caused by irrigation with poor drainage - not a problem at Hanford), and habitats with vegetation shifts (areas where native vegetation has been changed due to farming/ranching activities).

Domestic features are those originating in domestic activities and include permanent habitation (household dwellings, fruit cellars, outhouses, and other archaeologically visible evidence of year-round domestic activities) and temporary habitation (camp sites associated with cattle drives, sheep herding, and other temporary farming/ranching activities).

Logistic features originate from human activities used for importing and exporting materials, energy, and information. These include transportation corridors (railroads, overland trails, waterways, and other routes used to transport goods and services), shipping stations (stockyards, grain elevators, and other sites on transportation corridors used to receive and ship ranching and farming products; also includes telegraph stations as points to receive and send information), and maintenance (railroad yards, toll stations, and other sites used to maintain transportation routes).

In a later study, Hardesty (1986: 20-23) explored the historical development of farming and ranching in Nevada, an arid landscape like Hanford that challenged Euro-American settlement. At first, small farmers sold hay, meat, and butter to passing emigrants in the 1850s. Later, a "hay culture" (cf. Townley 1983: 115) emerged in places to cater to the mining boomtowns or pivotal positions in the transportation network. Farmers cut wild stands of grass on the valley floors and sold it to the teamsters supplying large towns as feed for oxen, mules, horses and other animals. Once the railroads ended some of the demand for animal power, the hay culture continued to thrive by focusing on the feedlot industry. Later, introduction of alfalfa, land reclamation techniques, fertilization, and irrigation created a new foundation. Ranching was another farming pattern that boomed with the arrival of the transcontinental railroad (Hardesty 1986: 22). Cattle and sheep were raised to a marketable age on the range, driven to railheads for feedlot fattening, and shipped by boxcar to market. By the 1890s, severe winters, overgrazing, and market saturation forced many ranchers out of business. In the early 20th century, a new ranching pattern emerged, dominated by a few very large operations. Shepherding had a similar parallel history where herders, like cattlemen, followed a transhumance pattern as they moved their stock from winter to summer ranges. Herders also took advantage of the railheads to ship their stock to market.

Hardesty (1986) listed several themes (Transportation, Farming, and Settlement) and associated property types relevant to the historical development of farming and ranching in Nevada; several of which may be applicable to the Hanford Site.

MAJOR THEME: TRANSPORTATION

<u>**Property Types**</u>

Railway Systems

Subtypes

Grades	Rails/ties
Trestles/bridges	Section houses
Roundhouses	Rolling stock
Rock oven features (Wegars 1991)	Warehouses
Water tanks	Platforms

Trail Systems

Subtypes

- Trails
- Feed storage
- Animal tack
- Corrals/barns
- Way stations
- Rolling stock

Air Systems

Subtypes

- Landing strips
- Hangers
- Terminals
- Beacons

Water Systems

Subtypes

- Ferry landings/docks
- Warehouses
- Watercraft
- Cable supports

MAJOR THEME: FARMING

Property Types

Haying Systems

Subtypes

- Storage buildings
- Transportation vehicles (wagons)
- Fences
- Harvesting tools
- Fields
- Hay forks

Irrigation systems

Subtypes

- Dams/reservoirs
- Fields/fences
- Erosion features
- Flumes
- Pipe (wood, metal, concrete)
- Pumphouses
- Salt deposits
- Ditches/gates
- Siphons

Domestic animal husbandry systems

Subtypes

- Corrals/fences
- Feed storage
- Barns
- Stables
- Faunal remains
- Slaughter house

MAJOR THEME: SETTLEMENT

Property Types

Isolated house systems

Subtypes	
Building features	Disposal features
Water supply features	Storage features
Heating features	
Ranching systems	
Subtypes	
Household features	Animal management features
Water supply features	Food storage features

Another useful model of potential property types at the Hanford Site is the Agricultural Study Unit prepared by Lindeman and Williams (1985) as part of the Resource Protection Planning Process (RP3) conducted by the Office of Archaeology and Historic Preservation for the State of Washington. Lindeman and Williams' (1985) study unit was designed to help better identify, evaluate, and protect agricultural resources within the state of Washington. They outlined several main themes (General Farming, Livestock, Crops, and Ethnic Properties) and subthemes with associated resource types.

Under their theme of General Farming, the subtheme of Diversified Farm-Pioneer Subsistence may be applicable to the Hanford Site. As Lindeman and Williams (1985: 16) observed, frontier farmsteads were the typical residences of Washington's early pioneers. The first settlers raised grain, fruit, vegetables, hay, and livestock primarily for home provisioning and personal consumption. Markets for cash crops were extremely limited or nonexistent. Frontier subsistence farming prevailed only until the 1870s and early 1880s in most of Washington but lingered on into the 20th century in certain rugged or isolated localities.

The following subtheme is Diversified Farm-Market Production. As Lindeman and Williams (1985: 17) pointed out, it was not until the 1880s and the coming of the transcontinental railroads that the Pacific Northwest was finally, and effectively, linked into the vast national and international agricultural market. As a result, all types of agriculture in Washington developed and expanded at a tremendous rate. Thousands of individual farmers, many of whom were foreign immigrants, produced a combination of salable agricultural products on their farms (grains, vegetables, fruits, livestock, and dairy products). In one respect, this farming style continued the earlier pattern. This great expansion of agriculture caused a corresponding increase in the types, numbers, and sizes of structures found on the farm, and encouraged the adoption of technologically advanced materials, equipment, and machines. Rustic frontier architecture was quickly replaced by modern board and frame styles. The diversified farm, producing several kinds of agricultural products, remained common into the early decades of the 20th century. By the 1940s, however, such farms had all but disappeared in that form, largely due to modern marketplace pressures which forced farmers to specialize in just one kind of agricultural activity. The 1943 government takeover effectively erased diversified farming from the Hanford Site and its immediate vicinity. Property types associated with General Farming are presented below.

MAJOR THEME: GENERAL FARMING

Subthemes

Diversified Farm - Pioneer Subsistence (1792-1870s/1880s)			
Resource Types			
Farmstead (Homesteads)	Ranch	House	Cabin
Small Barn	Garden	Granary	
Root Cellar			

Diversified Farm, Market Production (1880s-1940s)			
Resource Types			
Homestead or Farm	Garage	Ranch	Livery Stable
Round-Polygonal Barn	Icehouse	Garden	Milk House
Chicken Coop & Brooder House	Windmill	Barn	Pumphouse
Ramp and Chute	Granary	Grain Crib	Orchard
Machine Shed	Shop	Root Cellar	Outhouse
Bee Hives and Platform	Stock Trough	Fuel Tank	Smokehouse
Portable Colony Pig House	Hay Derrick	Woodshed	Utility Building
Livestock Shed	Silo	Scale House	
Tank for Chemical Fertilizers	Cistern	House	

Under their theme of Livestock, the subtheme of Commercial Dairying may be applicable to the Hanford Site. As Lindeman and Williams (1985: 20) observed, a dairy farm is where retail or wholesale milk and other milk products are derived from a herd of dairy cattle, which are segregated from other livestock. Traditionally, the commercial dairy operation had some 30-80 cows and might have had breeding stock as well. Dairying occupied an important role in Washington's agricultural history since the late 19th century.

The subthemes Cattle Ranching-Open Range Phase and Cattle Ranching-Enclosed Grazing are applicable to the Hanford Site. In the mid-19th century, the open range cattle industry quickly shifted to, and greatly expanded in, central and eastern Washington, particularly after the conclusion of hostilities with the local Indian tribes in 1858 (Lindeman and Williams 1985: 21). After the close of most of the open range in the mid to late 1880s, cattle ranching remained an extensive, but largely sedentary pursuit. As pasturage shrank and was fenced in, ranchers increasingly had to rely on grain to feed stock instead of depending solely on natural grass as formerly. Consequently, larger and more numerous structures were required on cattle ranches. Modern frame buildings supplanted rustic log cabins and outbuildings of earlier times (Lindeman and Williams 1985: 22).

Horse Raising (theme) properties are relatively rare (cf. Lindeman and Williams 1985: 23). Indians and white frontiersmen bred and traded horses early in the 19th century. Later, commercial horse ranching developed alongside the open range cattle industry, particularly in central and eastern Washington from the late 1850s to 1880s. The expansion of large-scale farming in the mid to late 1880s eventually eliminated most of the open range. Some horse herds continued to run free in marginal or nonarable localities of central Washington such as the Horse Heaven Hills and on the expansive Yakama Indian Reservation. Some horse ranches did not depend on the open range but instead had permanent fenced enclosures.

Sheep Raising, by the mid-19th century, shifted from western Washington to the channeled scablands, sagebrush plains, canyon, plateaus, and mountains of central and eastern Washington. This industry thrived for many decades but by the 1940s, a world-wide drop in demand for wool had greatly reduced the number of herds. Structures built at a sheep ranch headquarters typically were of a functional and low-cost design. Sheep ranches are not exceptionally numerous and sheep driveways and camps often are ephemeral features. Only one to two hundred properties in Washington might be classified in this subtheme (Lindeman and Williams 1985: 23).

Small Animal Husbandry (theme) properties include buildings standing on poultry or swine farms that were simply constructed and strictly functional in design. Occasionally, however, poultry and swine houses did exhibit some decorative styling such as ornamental cupola ventilators, rows of windows, shingled siding, and boxed cornices. Property types associated with Livestock are presented below.

MAJOR THEME: LIVESTOCK

Subthemes

Commercial Dairying (1880s - 1943)

Resource Types

Homestead or Farm	Fence	Dairy Barn	Silo
Milk Cooling Tank	Milk House	Open Shed	House
Refrigeration Equipment	Corral		

Cattle Ranching, Open Range Phase (1850s - 1880s)

Resource Types

Homestead or Farm	Shed	Ranch	Cattle Trail
Spring or Cistern	Cabin	Corral	Cow Camp

Cattle Ranching, Enclosed Grazing (1880s - 1943)

Resource Types

Homestead or Farm	Cistern	Ranch	Water Trough
Cattle Barn	Bullpen	Ranch House	Open Shed
Corral and Fencing	Calving Shed	Feed Storage	Windmill
Loading Ramp and Chute	Pole Barn	Feed Lot	

Horse Raising (early 1800s - 1943)

Resource Types

Homestead or Farm	Windmill	Ranch	Cistern
Horse Barn	Hay Derrick	Livery Stable	Fencing
Blacksmith Shop	Camp	Shed	Cabin
Loading Ramp	Spring	Corral	House

Sheep Raising (1850s - 1943)

Resource Types

Sheep Barn	Cistern	Lambing Shed	Water Trough
Open Shearing Shed	Dipping Vat	Cookhouse	Corral
Bunkhouse	Sheep Camp	Feed Lot	Windmill

Small Animal Husbandry (early 1800s - 1943)

Resource Types

Poultry House	Pen	Swine House	Bee Hive
Portable Colony Hog House	Granary	House	Farm
Farrowing Barn	Grain Crib/Bin	Shed	

Under their theme of Crops, some of Lindeman and Williams' (1985) subthemes are applicable to the Hanford Site. Grain Production has always been important in Washington and wheat production increased dramatically east of the Cascades during the late 1870s when farmers learned that steep and neglected hillsides could be farmed using dryland cultivation techniques. Previous efforts to grow grain were restricted to moist bottomlands. The new dryland farming methods entailed deep initial plowing, followed by frequent cultivation to retard moisture loss by capillary action. The inception of dryland farming, which was associated with the coming of the railroads and the opening of new markets, was a catalyst for the tremendous growth of Washington's grain industry (Lindeman and Williams 1985: 25).

Wheat farming was popular since it required little manpower to operate a wheat ranch, except at harvest time when large numbers of men and animals were needed. Wheat was durable and of relatively low bulk, which made for cost-effective handling, shipping, and storage. It was also in wide demand throughout national and world markets. In the early 1800s, the flail and other premechanized techniques were used by early settlers to harvest wheat. Hence, commercial grain production in Washington has nearly always been mechanized (Lindeman and Williams 1985: 25). Prior to 1890, Washington farmers used horses and mules to pull reapers, binders, and headers, which cut the grain; horse- or steam-powered stationary threshers were used to separate the grain kernels from the chaff and stalks. By the turn of the century, new mobile horse- and mule-drawn combine harvesters were extensively used to cut and thresh the crop, though some farmers still used binders, headers, and stationary threshers. Harvesting was labor intensive - the operation of a single combine required 24 to 36 horses or mules and three to five men, not including support animals and men in auxiliary positions. Up until the 1930s, wheat was stored and transported in gunnysacks. By the 1930s, low wheat prices and the high cost of labor led to the bulk handling of grain (Lindeman and Williams 1985: 26).

Toward the end of the historic context period - the 1930s and early 1940s, the development of tractor-drawn equipment was associated with a shift from bagged to bulk handling of grain. This development revolutionized the wheat industry by speeding up the harvesting process and cutting down on labor. It also dramatically changed the appearance of the farmstead. Large horse and mule barns were no longer needed, and consequently, many were torn down or altered into machine sheds or shops. Corrals and fences likewise disappeared and other outbuildings used by livestock were eliminated or rebuilt for other use. Metal-sided pole barns, open sheds, and other modern prefabricated structures were erected for the new machinery. Acreage per farm increased since farmers could now cultivate more land with less effort. Ranches expanded and absorbed other farmsteads and consolidated them into larger entities (and removed excess structures).

Horticulture involves the cultivation and management of fruit and nut orchards, vineyards, cranberry bogs, and gardens on a small or large scale, and usually for commercial purposes. Lindeman and Williams (1985: 28) noted that fur traders, missionaries, Indians, and frontiersmen planted Washington's first fruit trees, grapevines, and vegetables during the early decades of the 19th century and American settlers further developed and expanded horticultural operations in the mid-1800s. The fruit industry did not become truly important until late in the 19th century, when all agricultural activity in the state was expanding at a tremendous rate. Large-scale irrigation projects and a progressive marketing network were developed in central/southcentral Washington (and the Hanford Site) that eventually made eastern Washington the leader in fruit production.

Irrigation is an important subtheme for the Hanford Site. Irrigation works consist of dams of all sizes constructed of earth, stone, or concrete; and the smallest dams/headgates were often of wood. Box-like pumping stations were located along earthen or concrete canals to distribute water to fields or other canals. Pumping stations often consisted of concrete and had electrically operated pumps. Siphons were composed of metal pipes or iron-banded wooden pipelines (penstock) were used to distribute water. Small ditches, flumes, and sometimes waterwheels were the last links to a farmer's field in any irrigation system, regardless of size (Lindeman and Williams 1985: 30). Property types associated with Crops are presented below.

MAJOR THEME: CROPS

Subthemes

Grain Production (early 1880s - 1943)

Resource Types

Homestead or Farm	House	Ranch	Pole Barn
Grain Dryer	Windmill	Cistern	Shop
Barn (Horse and Mule Barn)	Machine Shed	Tank House	Granary
Grain Elevator	Fuel Tank	Grain Chute	Pipeline
Icehouse	Tramway	Smokehouse	Garage

Horticulture (early 1880s - 1943)

Resource Types

House	Machine Shed	Orchard	Storage Building
Prune Dryer	Icehouse	Vineyard	Irrigation Works
Grapevine	Garage	Cranberry Bog	Shop
Tram Railway	Barn	Farmstead	Vegetable Field
Refrigeration Facility	Berry Field		

Irrigation and Reclamation (1880s-1943)

Resource Types

Power Station	Dam	Headworks	Tank House
Pumping Station	Siphon	Waterwheel	Windmill
Flume	Dike	Raceway	Tunnel
Canal	Ditch	Farm	Drainage Ditch

Migrant camps were located in areas where seasonal, labor-intensive fruit and vegetable crops were harvested (i.e., apples, hops, asparagus, cherries, etc.). Thus, most migrant camps were common in the irrigated central part of Washington, particularly in the Yakima Valley. Migrant housing typically was functional, low-cost, and had little, if any decorative styling. The camps usually consisted of small, one or two room cabins, or long single-story apartment-like structures, chiefly of board and frame or concrete block construction. Outbuildings associated with the camps were few but there may have been outhouses and storage sheds. Older buildings may not have had plumbing. Migrant camps were often quickly dismantled when no longer needed.

Truck farming cannot be specifically tied to any one ethnic group. Nevertheless, Italian or Japanese descendants operated small, intensively-managed vegetable farms in Washington (Lindeman and Williams 1985: 32). Commercial truck gardens were most often located near large urban centers which provided both a local market and shipping outlets. Houses, barns, and other outbuildings on truck farms generally were nondescript and showed little, if any, ethnic influence. Japanese and Italian truck farms usually appeared to be identical to those operated by other Americans. Barns, if present, are often small and served to shelter farm implements and two or three work animals. Garages for delivery trucks became common in the 20th century. The most common feature of a truck garden was its small size (usually less than 100 acres). They had few outbuildings and the fields were intensively cultivated which gave the farms a well-manicured appearance. Equipment sheds were common, but storage buildings were less common because fresh produce had to hauled to market as quickly as possible (Lindeman and Williams 1985: 32). Property types associated with Ethnic Properties are presented below.

MAJOR THEME: ETHNIC PROPERTIES
(late 1800s-1943)

Subthemes

Migrant Camps

Resource Types			
Cabin (Housing)	Outbuilding		

Truck Farming

Resource Types			
Truck Garden	Garage	Field	Tank House
House	Barn	Site	Fuel Tank
Irrigation System	Machine Shed	Storage Shed	

Buildings associated with ranching and farming can be quite variable. Although ranching operations predominated in the Hanford vicinity prior to the arrival of farmers, once the era of the "open range" had ended, farming became the predominant economic activity in the area, particularly once irrigation systems were developed. Ranchsteads and farmsteads generally include a large number of building types that reflect the fundamental differences between an economy focused on large-scale animal husbandry and one based on either large or small scale plant cultivation. Many farmers, though, practiced animal husbandry on some scale. While most farmers did not own large herds of cattle that grazed large land tracts, they often did own some "barnyard animals" (dairy cows, chickens, goats, etc.) and horses (prior to the widespread use of modern mechanized equipment). Thus, there can be and often are, striking similarities between ranchsteads and farmsteads in terms of the basic building types likely to be encountered. For example, both properties would have a main house or residence, perhaps a barn or two for draft animals, a tack shed, a corral, a well or pump house, and a root cellar. What is problematic at the Hanford Site is that the former ranchsteads and farmsteads were reduced to the status of archaeological sites over 50 years ago through deliberate razing by the Hanford Engineer Works in 1943 and by later Site-wide "clean-up" programs.

Brooks and Jacon (1994: 47-48) discussed the relative differences between farms and ranches. They suggest that the key difference between the farm and ranch property types is what the site produces. Farms typically produce row crops supplemented by limited livestock production, predominantly swine and poultry. Stock raising, primarily beef cattle and sheep, characterizes ranching. Farms and ranches possess physical features indicating permanence. Improvements can include additions to a claim era resource (see below), a permanent dwelling, individual outbuildings, fencing, shelterbelts, and irrigation evidence. Brooks and Jacon (1994: 47) noted that a farm or ranch is a unit which should be evaluated as such. Its overall site and yard arrangement are important, as are outbuildings and landscape features such as fences or orchards that contain valuable information about a site. One typical farm/ranch yard arrangement places the main house in the foreground with the outbuildings forming a courtyard toward the side and rear. Livestock operations would often be farther removed to reduce odor and contamination of ground water. Early 20^{th} century agricultural experiment station bulletins advocated placement of barns 100-150 feet away from the main dwelling and "placing the main buildings, particularly the dwelling and the barn, so that the prevailing winds blow at right angles to a line connecting these buildings (Brooks and Jacon 1994: 47). The rise of agricultural experimentation stations had much to do with repetition in farm/ranch yard arrangement and farm/ranch house architectural style and outbuilding design.

The following descriptions, adapted from Rowley (n.d.), Brooks and Jacon (1994), and Lindeman and Williams (1985) are useful for anticipating possible property types that would be associated with ranching and farming activities from the pre-Hanford era. These description can relate to both ranching or farming and are loosely organized as buildings associated with human habitations, animal husbandry, food production and storage, machinery and equipment, water management, power generation, and landscape features.

Buildings Associated with Human Habitation

Claim Era buildings, structures, and landscape features - In general, claim era resources are smaller and contain less detail and decorative finishes than more permanent residences (see Ranch House - below). A variety of inexpensive, locally available materials were often used for both construction (native stone, logs) and interior coverings/decoration (newspaper, whitewash). These were usually intended to be temporary structures until the settler possessed the materials and financial means to construct a more permanent dwelling. A claim era structure might contain physical evidence of the type of homestead method/legislation used in establishing the claim (cf. Panelli 1990: 7). For example, a shelter belt could represent a claim filed under the Timber Culture Act. Claim era buildings and structures might also include associated features (privy holes, root cellar remains/depression, wells, dumps, clustered settlement, evidence of plow animals and evidence of cultivated fields such as rock piles, non-native surface coverage, and machinery remains.

Dugouts - These are usually built into the side of a hill above the high water mark of any nearby water source and featured either a sod, stone or wooden facade. As a claim era property type, a dugout was probably a relatively inexpensive improvement.

Sodhouse - These claim era structures are not anticipated at Hanford since local soils were sandy and lacked the necessary clay component necessary to create adobe or sod like bricks.

Log Shack - These claim era structures were often made from notched logs. Since standing timber, such as cottonwood trees, were scarce in the vicinity of the Hanford Site, log shacks are not anticipated.

Stone House - These claim era structures were a more permanent alternative to sod where wood was not available or cost prohibitive. Window and door frames were often made of wood, however. As seen with Bruggerman's Fruit Warehouse, construction with stone was carried out at the Hanford Site. Structural remains of other stone house structures might be anticipated at other locations within the Hanford Site.

Woodframe Shack - These claim era structures were at least 10 x 12 feet in size, as required by Federal legislation and tar paper was often used as an exterior covering (cf. Brooks and Jacon 1994: 46).

Ranch House/Farm House - This is the main dwelling within a ranch or farmstead where the ranch or farm-owning family generally resides. In terms of architectural style, this building would likely follow the general tastes of the period, in contrast to most other ranch-related building types that are more utilitarian in nature and therefore generally less "stylish." The degree of success the ranch or farm had might very well be read in the quality of "stylishness" the main house displayed. Popular styles from the first quarter of the 20th century include the two story Foursquare with a hip or pyramid roof and the Bungalow. One typical vernacular form is an L shape building with the 1 1/2 or 2 story main block connected to a one story kitchen with the main entrance often through the kitchen rather than a formal front door. Farmhouses may contain a variety of additions built to house two and three generations of the same family, or a separate, second farmhouse may have been built to solve the space problem.

Ranch or farm houses were often added onto and modernized over time and will often consist of a series of additions that accumulate over time, with each section likely displaying its own period style. As a ranch or farm family grew, a second (or third) house might be constructed for later generations of the ranching family.

The work portions of a ranch or farm house (i.e., the kitchen, laundry room, etc.) were often so arranged that the wife could observe the farmyard, driveway, and nearby road or highway. Washing facilities frequently were situated inside the back entrance, since that doorway led to the barnyard and was most often used.

Bunkhouse - This is a common dwelling for a varying number of ranch hands and laborers. The structure would contain one or more rooms with some space normally provided for cooking, eating, sleeping and storing horsegear and equipment. Bunkhouses can be distinguished from non-residences from the inclusion of a wood stove and flue. Three main types are found across North America. The first is a "single-pen" type which is square or rectangular in plan with a gable roof and the entry in the long side. The second type is a variant of the single-pen with the plan turned. Both consist most often of a single-open room, although sometimes divided in two, and often utilizing single-wall construction (e.g., the walls are made rigid by the roof system and without vertical bracing). The third type is generally a 1 1/2 to 2 story structure built of stone. The first floor is often partially underground and used as a root cellar or meat room (commissary).

Commissary - This is a storehouse or a room within a large structure, devoted to the storage of equipment and/or supplies (in most cases, foodstuffs and sundries).

Cook House - The cook was often raised above the status of the general worker and as such was often assigned a separate residence; generally a one-room structure with no separate plumbing or kitchen facilities.

Summer Kitchens - Most summer kitchens are one story, rectangular plan structures attached to the rear or located a short distance from the farmhouse. Summer kitchens prevented the heat associated with cooking from entering the main house (Brooks and Jacon 1994: 70).

Foreman's House - The foreman was often pre-eminent among workers and as such was almost always given a residence of his own that might include plumbing, if available.

Line Camp Cabin - "Line Camp" refers both to the site and the central structure dominating the site. Line camps were strategically located at long distances from the "home ranch." Ranch hands bunked there for short periods while tending cattle. Small, often temporary, self-contained cabins or "shacks" were located somewhere on the open range to shelter the cowboys who "rode the line" in their journeys following or rounding up herds of cattle. These might consist of only a canvas tent, while more permanent examples could be built of masonry or wood.

Privy/Outhouse - This was an outdoor toilet that might stand independently or be attached to the side of a larger structure, such as a barn.

Schoolhouse - In many cases, a room in the main ranch house sufficed, but in other cases, a separate structure was built for the exclusive use of the rancher's children and perhaps some of the neighboring children.

Buildings and Structures Associated with Animal Husbandry

Barn - Although intended to serve a wide array of functions, barns generally shelter livestock and feed and are almost always the largest and most impressive structure of any ranchstead in terms of scale and size. The plan and arrangement of space within a barn can generally be associated with the cultural background of those who built it or had it built. Traditional barn-building methods usually survive much longer than methods associated with other property types. Like ranch houses, barns are often added onto a section at a time and become, over time, a whole series of connected structures. Bank barns are those built into a side of a hill. Catalog barns are those affordable and readily available after 1900 from such suppliers as Sears, Roebuck and Company of Chicago ("Honor-Bilt"), Crane-Johnson Company; Gordon VanTine Company; Rilco Laminated Products Company of St. Paul and the Radford Company (Brooks and Jacon 1994: 50). Several different barns might have been present in the area including such popular types as the Wisconsin Dairy Barn, the English/Three Bay Barn, gambrel barns, Gothic Arch barns, loafing barns, Transverse Frame Barn, and round or polygonal barns.

The General Purpose Barn is the most common kind found in Washington and all of the barn requirements of diversified farming could be met by this principal structure, which frequently was the most prominent and architecturally significant building on the farm. It usually housed grain, equipment, wagons or trucks, as well as stanchions and stalls for calves, sheep, hogs, or other animals. Horse stalls were usually half again as wide as cow stalls. Some barns might have had a harness room or workshop and a loft or mow for hay storage. These barns could be of varying size, usually 30' to 40' wide and 40' to 80' feet long, and of board and stud construction with dirt, board, or concrete floors. Sometimes they had stone foundations; masonry being more common in central and eastern Washington than west of the Cascades. Gambrel, high gable, and round or arch roofs were favored since they allowed storage of more hay (Lindeman and Williams 1985: 18).

The round or polygonal barn is extremely rare in Washington and if one ever existed within the Hanford Site, its archaeological remains would be important. Although no more than two or three dozen such barns exist in the state, they are of interest due to their unique architectural styling. Most were built in the 1910s when round and polygonal barns were widely touted in farm publications (Lindeman and Williams 1985: 18).

Farrowing Barn - In the wintertime, swine require warm, well-insulated housing. Swine houses and barns normally were of board and stud construction, stood one-story high, and had either a monitor, shed, half-monitor, combination, or low gable roof (Lindeman and Williams 1985: 25). Honor-Bilt and other manufacturers sold farrowing barns that were ideally suited to the needs of the brood sow. Early versions, around 1905, were often small teepee or A-frame shaped moveable structures. Slanting walls above an eight-foot square base afforded space to the newborn pigs but prevented the sow from accidentally rolling over them. Sometime during the late 1920s or early 1930s, an innovative designer created a structure which combined the advantages of the individual hog house with space for multiple brooders - the polygonal farrowing barn (cf. Brooks and Jacon 1994: 61).

Horse Barn - While not characterized by a specific style, barns designed exclusively for horses can be expected to be found on larger, relatively successful farms and ranches. These barns often contain more detail than other outbuildings and are the large "showpiece" of the farm or ranch yard. Since horses were the most expensive farm animals and the most susceptible to disease, they required clean, dry, well-ventilated, and relatively dust free quarters. On the outside, horse barns did not appear any different from many other barns. On the interior, however, the fixtures were rather unique. Horses are powerful, active, and restless animals that can cause much damage with kicks, gnawing, stomping, and pawing. Hence, all interior facilities had to be especially stout and solidly constructed with heavier gauge materials and no sharp edges to cause injury. Stalls were usually constructed along the outside walls, leaving the middle of the barn open for exercising the animals. Wood or concrete floors were considered to be more healthful than dirt floors. The horse barn also could contain brood mare stalls, isolated stalls for stallions, standing stalls for harness horses, and a carriage room. If it were a particularly large structure, it might have living quarters for grooms and stablemen (Lindeman and Williams 1985: 24).

Sheep Barn - Sheep are hardy animals with thick woolly hides, and, in the wintertime, only require to be kept dry and out of the wind to thrive. Thus, sheep barns were of light construction, strictly functional, and had a minimum of specialized features or equipment. They tended to be long, low structures, with shed, monitor, low gable, or combination roof lines. Less feed storage was required for sheep than other livestock; thus, lofts were usually smaller. Interior ceilings were frequently low for added warmth and the floors were earthen and/or concrete. A good sheep barn was well-lighted and ventilated with windows. Often, sheep barns included large pens, long feed boxes, smaller lambing pens or rooms, and doors to the loft (Lindeman and Williams 1985: 24).

Dairy Barn - Dairy barns usually contained two rows of cattle stalls with mangers and milking was done by hand. When large-scale rural electrification began in the 1930s, automatic milking machines became common and the stalls and mangers in many older barns were removed and replaced by modern run-through stanchions that stood at either side of newly dug pits in the barn floor (Lindeman and Williams 1985: 21). Electrification encouraged the acquisition of refrigeration equipment and modern cooling tanks. The dairy barn was often a massive structure that enclosed stalls, mangers, calf pens, grain bins, bull pens, and a feed room.

Cattle Barn - From the outside, a cattle barn often appeared little different from a dairy, or horse and mule barn. Inside however, cattle barns frequently were more open and did not have rows of stalls or stanchions, nor as many pens, as other types of barns (Lindeman and Williams 1985: 23).

Chicken/Turkey Houses/Pens - Lambing/Calving Sheds - These are structures built to shelter the seasonal birthing of livestock, particularly cattle and sheep. Brooder barns (for chickens) may have a rectangular, circular, or polygonal plan. Chicken coops are usually relatively small, one or one and a half story, rectangular wood frame buildings. Half monitor roofs were often used to increase sun exposure and air ventilation and air movement. Windows and doors are on the south side for maximum sun exposure. Floors were of either earth, wood, or concrete. Compared to other buildings, chicken coops have more openings for light and ventilation.

Silos - These are tall cylindrical structures built for the storage of fodder for livestock. Starting in the early 20th century, wood frame and wood stave silos came to be replaced by rot resistant hollow tile, steel, concrete, and concrete stave silos with conical, gambrel or domed roofs. Staves were usually bound with round steel hoops, steel bands or cable (Brooks and Jacon 1994: 68). These tower-like structures were common throughout Washington. Ideally, a silo was an airtight, watertight tank where green succulent herbage (silage) or grain or corn was stored. Silos stood above the ground or were partially or even totally buried underground. A pit silo was a hole in the earth in which silage was stored. Standing or above the ground silos were developed around 1875 and were first constructed in Washington at, or shortly after, the turn of the century (Lindeman and Williams 1985: 19). They ranged in size from about 8 feet in diameter (and less than 30 feet high) to 20 feet in diameter (60 feet high or taller). Round-shaped silos were stronger and required less material to construct. Silo foundations usually extended four to five feet below the surface.

Slaughter House - This is a building and/or structure for the slaughtering and processing of livestock. Although sited on a particular ranch, a single slaughter house might serve as a regional facility for a number of nearby ranches.

Fencing, Corralling, Loading/Squeeze Chutes - These are structures for confining livestock. Squeeze chutes are used for dehorning, branding, and other cattle treatment. Loading chutes will be located to facilitate easy pickup/delivery of livestock to the farm or ranch.

Livestock Dip - Livestock passed through deep, narrow tanks, often constructed of poured concrete for sanitary reasons, for cleaning and delousing purposes. A dip tank had to be sufficiently narrow so the animal could not turn around and deep enough so the animal would be force to swim, insuring the greatest degree of safe submersion. These structures were often located near a loading or squeeze entry chute (Brooks and Jacon 1994: 64-65).

Practice Bull - These structures are used to practice roping and may be constructed of a variety of materials and are usually located in or near the ranch yard.

Ranch Gates/Overthrows - Most of these structures are of simple wood construction consisting of two uprights and a cross piece. The name of the ranch or an object such as a horseshoe or skull may be displayed on the cross piece.

Temporary Houses/Seasonal Structures - Examples of this resource type may originally have been associated with early ranching operations that were largely mobile operations often headquartered in an established town. A variety of seasonal structures were used on large ranches and these structures should be expected in remote areas and many were used for housing purposes. Pioneer stockmen established small and widely scattered "cow camps" at convenient locations next to streams or springs. A typical open-range cow camp had a small cabin, a crude wood or stone corral, an outbuilding or shed, and little else. The cabin consisted of logs or hewn timbers, or perhaps was of board and batten construction. Cottonwoods or other riparian trees were the source of building materials. Cow camp structures were often covered with simple shed or gable roofs, composed of poles and boards, and perhaps sod, canvas, or split shingles (Lindeman and Williams 1985: 22).

Cattle Trails - Thousands of head of cattle roamed the bunchgrass-covered valleys and prairies of the Columbia Plateau and cattle trails were soon developed to drive herds to mining camps in the northern Rockies and British Columbia and by the late 1870s, cattle were headed eastward to stock the newly opened ranges of Montana, Wyoming, and the Dakotas (Lindeman and Williams 1985: 22). A major cattle trail ran through the Hanford Site and terminated at the White Bluffs Ferry location where herds crossed and were driven to the gold fields of British Columbia.

<u>Buildings and Structures Associated with Food Production and Storage</u>

Apple House - For those ranches that included a sizable orchard, a structure devoted to housing equipment necessary for their care, harvest and processing might be built.

Cellar or Root Cellar - This is a storage facility for perishable food-stuffs (i.e., potatoes); sometimes built as a self-standing structure near the main house, other times directly underneath the main residence or bunkhouse. In either case, a substantial portion of the structure is generally subterranean or built into a hillside and commonly constructed of some sort of masonry (stone, brick or adobe) in order to provide maximum insulation. They often include only a single entry and in some cases a window. The interiors might include built-in wooden cabinetry and electrical lighting.

Granary/Grain Bin - This is a framed storehouse for threshed grain, in many cases with the framing exposed and the interior finished with horizontal boards (i.e., tongue and groove). The shape of a granary structure depends on how the grain is loaded into the structure. Although wood frame is the common building method, cribbed or stacked lumber is also used. Common features are a cube or rectangular plan, gable roof, double/single storage cribs, no windows and interior sheathing. Granaries are usually elevated on piers of stone or wood to protect the grain from vermin and moisture. Some early granaries feature steps on the gable end so grain sacks could be carried up and dumped; grain was removed through small chutes. Early granaries with a top load system that used a portable elevator had a small trap door just below the peak of the gable. Later examples were akin to grain elevators and may have an elevator leg and a conveyor belt with scoops - the elevator was often located near the center of the structure and a movable chute guided the grain to different bins when it reached the top of the conveyor. Other precursors to modern, true round, prefabricated examples are polygonal, wood-frame prefabricated models (Brooks and Jacon 1994: 63).

Granaries were subjected to tremendous strain, especially at the floor and near the bottom of the walls, thus, they were strongly built. The height of older granaries was seldom more than 12 feet, which was as high as a man could scoop grain, or dump it into a bin from wagons driven up on a rampway standing on posts. Modern conveyors, elevators, and other equipment, have made it possible to use bins standing 20, 30, or more feet high (Lindeman and Williams 1985: 26).

Grain Chutes, Pipelines, and Tramways - Wheat farmers on the Columbia Plateau utilized these ingenious devices to move grain down the steep, 2000-foot-deep walls of the Snake and Columbia rivers to steamboat landings and railroad sidings. With the exception of the White Bluffs themselves, the terrain adjacent to the Columbia River, within the Hanford Site, is much flatter. Nevertheless, these features might have been present somewhere within the Hanford Site at one time. Pipelines and wooden grain chutes, which could be thousands of feet long, were developed after 1879. More efficient devices, known as bucket trams and railway trams, soon were built. These allowed wheat to be transported in bags. Bucket trams were gravity-powered mechanisms consisting of sack-carrying buckets attached to long, steel cable suspended on poles or towers. A railway tram was a complicated cable and tram car system which rode on rails extended down steeply inclined canyon walls. In both cases, there generally was a flathouse and cabin for the workers at the top of the tram, and a warehouse, wharfboat, or railroad siding at the bottom. Trams were used until the early 1940s.

Milk House/Dairy - This is a structure devoted to the milking of cows and for the storage and processing of milk and milk products. Milkhouses are small, shed or gable roofed, one-story, rectangular plan structures located adjacent to or attached to a dairy barn. Early milkhouses were made of wood, but concrete and tile were used in later versions because of their ability to withstand the high moisture content of this building type. The interior of a milkhouse, most often featured a poured concrete floor and usually had areas for the cooling, storage, and washing of milk containers. Milkhouses may contain a raised door on an exterior wall for loading milk containers into a truck (Brooks and Jacon 1994: 65-66).

Smokehouse - This is a small building used to smoke/cure meat, meat products, and sometimes fruit and vegetables. They are usually one story, rectangular in plan, gable or semicircular roofed, windowless, masonry (or wood) structures with a door in the gable end and some vent openings in the masonry.

Icehouse - Some farms had icehouses to preserve dairy products, fruits, vegetables, and other produce. Icehouses were usually small structures constructed in a variety of styles and frequently had a simple gable or hip roof topped by a ventilator cupola. A large doorway facilitated movement of ice or produce in and out of the structure. These structures were often built of wood, with horizontal board or shingle siding, but brick, stone, or concrete also was used. These structures were often built aboveground, or partially or wholly underground. Aboveground structures were the most common since no excavation was required in their construction and drainage and insulation was more efficient. Sawdust was often used as floor and/or wall insulation and icehouses were usually constructed in shady locations with a northern exposure (Lindeman and Williams 1985: 20). While natural ice from rivers, lakes, and streams could be gathered and stored, in locations such as the Hanford Site, commercially produced ice was used. A ton of ice occupied 35 cubic feet and four or five tons was adequate to supply the needs of a typical farm family.

Buildings and Structures Associated with Machinery and Equipment

Garage/Carriage Houses - These can be small individual structures built to house an automobile or truck or might be barns converted to garages. In some instances it might include a work area for vehicle maintenance.

Sheds/Storage Buildings - These are structures built in a variety of forms, primarily intended to serve as storage or shelter for machinery and/or livestock or feed. These structures typically housed a grain grinder, wagon, buggy, binder, mower, plow, harrow, rake, drill, cultivator, combine, or other horse-or tractor-drawn equipment. The machine shed usually was of simple board frame construction, stood one-story high, had a gable or shed roof, and possibly included a small shop at one end. Doorways and openings were sufficiently wide to allow the removal and return of implements, and the interior was clear of vertical posts. Gradually inclining ramps leading to the main doors facilitated machinery movement (Lindeman and Williams 1985: 27).

Smithy - This is a structure that is sometimes enclosed or open-air that included a furnace and work area for the smithing and repair of metal ranch equipment.

Shops - Expect these buildings to be simple, rectangular plan, one or one and a half story buildings located close to the main machinery storage building or main barn. Shops are usually of simple design, one-story high, and built to retain heat for use in the wintertime, but with sufficient windows for proper lighting. Often, the original farmstead building (possibly a claim-era structure), a former stable, or some other older structure was converted into a shop. Farm buildings consistently have been readapted to one use or another. A shop might have contained metal working equipment, a grinder, emery wheel, and wood working tools, etc. (Lindeman and Williams 1985: 20).

Power/Battery Plant House - These are small buildings located a short distance from the main house in the farm or ranch yard. The generator or battery plant may be located on a raised platform to protect it from moisture.

<u>Buildings and Structures Associated with Water Management</u>

Dams, Pumping Stations, Ditches, and Flumes - Irrigation works, whether large or small, public or private, or developed by an individual or large organization, were many and varied (Lindeman and Williams 1985: 30). Dams of all sizes were built of earth, stone, or concrete. The smallest dams and headgates also might consist of wood. Box-like pumping stations were located along earthen or concrete canals to distribute water to fields or other canals. These pumping stations often consisted of concrete and had electrical equipment to operate pumps. Siphons were composed of metal pipes or iron-banded wooden pipelines and were used to distribute water. Small ditches, flumes, and waterwheels were the last links to a farmer's field.

Pumphouse - This is often a small structure meant to house the machinery involved with delivering water to other areas of a ranch or farm. They are frequently located at the base of a windmill and housed the pump and associated windmill machinery. Pumphouses are usually small, one story, square or rectangular plan buildings. The windmill may rise directly over the pumphouse and pumphouse floors are usually poured concrete so the pump can be bolted firmly into place. The floor slopes away from the raised platform upon which the pump rests to promote drainage. Pumphouses containing power pumps will be insulated and may contain heating equipment to prevent freezing (Brooks and Jacon 1994: 66). When the pump was used for irrigation, the pump was often located at the highest point of the land from which water may be conveyed economically through ditches to all parts of a field, unless conveyed through pipelines.

Spring or Well House - Springhouses are usually small, rectangular or square plan gable roof buildings to keep animals and plants away from the water and to provide a cool place to store foodstuff, especially dairy products. Stone or brick construction provided the coolest environment. The springhouse was generally located at the base of the slope where the spring issued from the ground. In order to capture the flow of water, the building often was excavated into the hillside. Many of these buildings contained troughs or berms to create pools for the water to collect in. Some springhouses may also have been used as wash houses. Springboxes are smaller, primarily underground structures for collecting and protecting springwater. They are usually made of concrete and extend 4 feet deep, 3 feet wide, and about 1 foot above the ground surface (Brooks and Jacon 1994: 69-70).

Water Tank/Tankhouse - This is usually a two-story tall structure designed to store water. The domestic tankhouse is tied to the evolution of the American farm windmill since the most natural and logical extension of the farm windmill was an elevated storage tank to hold the water pumped by the windmill. Development of the suction and force pump (a positive force plunger pump capable of pumping water above the level of the pump) and the railroad practice of storing water in elevated tanks are factors that contributed to the rise of the tankhouse as a common farm feature in the late 19th and early 20th centuries (Brooks and Jacon 1994: 71).

Cistern - These are circular or rectangular underground structures designed to screen and store water runoff from building roofs or wells. Cisterns usually have concrete or stone walls that may angle inward at the top to form a bottle neck and a wooden or concrete lid. They can be built in the top of a hill near the buildings or beside the house to catch water from the roof. Late 19th and early 20th century houses may have cisterns located in the cellar with an eave and gutter downspout collection system.

Well/Well Pit - Well types vary based on equipment and peoplepower available at the time of construction, subsurface composition (rock, soil, sand) and the watertable depth. Ideally, wells are located uphill and far away from potential sources of contamination such as cesspools and privies. Earliest wells and wells associated with claim era resources were often hand dug and have a bucket or hand pump since hand digging was the least expensive and simplest method available. These wells are usually lined or "cased" with brick, stone, tile, or concrete. Other methods of constructing a well are boring, driving, jetting and drilling (cf. Brooks and Jacon 1994: 72). With the exception of artesian wells, all wells require a pump to raise water. A power pump may be located above ground in a pumphouse or below ground in a well pit to prevent freezing. Well pits are underground structures usually lined with concrete and may contain a pressure tank unit in addition to the pump.

Windmills - Windmills were originally used to pump water and later to generate electricity. Wooden windmills typically predate metal models and different manufacturers used different forms and styles.

<u>Landscape Features</u>

Canals and Irrigation Ditches - A series or network of channels that carry water from a reservoir, natural watercourse (river/stream), or from an artesian well; sometimes concrete lined, sometimes simply dug out from the ground.

Cemeteries - Often, ranch or farm families would establish a family plot, generally not far from the main house.

Corral - This is a circular open-air structure, consisting primarily of fencing, to confine livestock (cattle and horses). The structure can vary in materials from easily-found tree trunks to dimensioned lumber.

Headgate - An in-water structure for controlling the flow of water at the head of a canal or ditch.

Fencing - Fencing that defines the perimeter of a main house is generally more ornate and decorative than the fencing that defines the outer borders of the ranch itself. Fencing other than that immediately surrounding a main house would most likely be one of several varieties of barbed wire, in areas where such manufactured materials are available. In many areas, further from an immediate source of supply, locally found materials were used (stone, willow branches, greasewood, etc.).

Hay Derrick - This is a wooden structure used to lift loose or baled hay into piles.

Gazebo - This is an open-air frame structure, often six- or eight-sided, placed in a landscaped setting or garden, meant to shelter out-door recreational activities.

Grape Arbors - These are stakes or lattice structures designed to control the growth of grape vines.

Orchard - This is a grouping of fruit and nut trees, generally planted near the main ranch house. Some might have been commercial in nature while others might have been only to supply the needs of those on the ranch.

Ovens - These were built of masonry and served as outdoor baking ovens. They were situated outdoors to prevent the house from overheating.

Overthrow - This is a simple trabeated or arched structure spanning the main entrance road to a ranch. Built of either wood or masonry, the name of the ranch is often boldly included in an arch or lintel that carries over the roadway.

Windbreaks - Tall deciduous trees planted along the windward side of a ranchstead in order to break and divert the prevailing winds before reaching the ranch's dwellings and thereby helping protect its residents. A great many windbreaks were the result of a New Deal program in the 1930s that specifically subsidized tree-planting for just such a purpose.

Several property types are defined below, and methodologies to evaluate historic properties are suggested as well. Time periods, historic themes, associated property types, required condition or character and eligible properties are summarized below (in Table 4.1).

TABLE 4.1

INVENTORY OF EURO-AMERICAN PERIOD HISTORIC CONTEXTS, PROPERTY TYPES AND NATIONAL REGISTER ELIGIBLE PROPERTIES AT HANFORD: 1805/1806-1943

TIME PERIOD	THEME	PROPERTY TYPE	REQUIRED CONDITION AND CHARACTER	ELIGIBLE PROPERTIES
1805-1855	*Exploration*	None expected		None expected
	Fur Trade	Overnight camps	Small clusters of fur trade era artifacts in the absence of Indian artifacts	None determined
	Missions	Temporary camps		None expected
	Immigration	Wagon roads	Ruts following historically reported immigrant routes; must be perceptible	White Bluffs Road
1855-1860's	*Indian-White Relations*	Treaty sites		None expected
		Skirmish sites	Locations where fighting or ambush took place	Rattlesnake Springs Archaeological District
1860's-1880's	*Gold Mining*	Mines or "gleanings"	Pits or piles of mine tailings, traces of sluicing operations along rivers/streams	None determined
		Mining camps, Chinese	Domestic sites with food debris, artifacts made by Chinese, dwelling remains; archaeological, separable as distinct component	None determined
		Mining camps, Whites	Same as above, but including predominantly Euro-American artifacts	None determined

TABLE 4.1 cont.

INVENTORY OF EURO-AMERICAN PERIOD HISTORIC CONTEXTS, PROPERTY TYPES AND NATIONAL REGISTER ELIGIBLE PROPERTIES AT HANFORD: 1805/1806-1943

TIME PERIOD	THEME	PROPERTY TYPE	REQUIRED CONDITION AND CHARACTER	ELIGIBLE PROPERTIES
1860's-1900	*Cattle Business*	Ranches	Sites with standing structures dating to this period, separated from mines, and lacking farm equipment; structure condition not critical; possibly ruins	None determined
		Cow camps (seasonal camps or overnight camps)	Small scatters of food cans and other artifacts distant from river	None determined
		Cattle drive routes	Routes distinguishable from maps or descriptions; some routes still visible	White Bluffs Road
	Sheep Business	Seasonal camps or temporary camps	Small scatters of food cans and other artifacts distant from river in steppe lands	None determined
	Land Surveying	Overnight camps	Small scatters of food cans and other artifacts	None determined
		Survey markers	Rock cairns; sometimes with milled timber posts; lack lichen or evidence of extensive age	None determined
1880's-1943	*Transportation*	Wagon roads; Railroad lines & spurs	Routes on early maps, roads/grade still visible, may/may not be in use; original surface preferred	White Bluffs Road Priest Rapids (Hanford) Railroad Line
		Horse (or foot) trails	Routes distinguishable on early maps	None determined

TABLE 4.1 cont.

INVENTORY OF EURO-AMERICAN PERIOD HISTORIC CONTEXTS, PROPERTY TYPES AND NATIONAL REGISTER ELIGIBLE PROPERTIES AT HANFORD: 1805/1806-1943

TIME PERIOD	THEME	PROPERTY TYPE	REQUIRED CONDITION AND CHARACTER	ELIGIBLE PROPERTIES
		Ferry/Steamboats & landings	Landing and grade; intact but not sub-stantially modified by modern activity; shipping and passenger use, ruins but not modernized	White Bluffs and Vernita Ferry Landings
		Freight landings	Location where trade goods were unloaded from boats to pack trains or wagons; loading slips and associated structures minimally remodeled or intact	East White Bluffs Landing
		Automobile roads	Intact macadam or gravel surfacing	None determined
		Service stations and repair shops	Shop with gasoline pumps and/or lift/ grease pit and associated auto-related debris; original design of structure intact	None determined

TABLE 4.1 cont.

INVENTORY OF EURO-AMERICAN PERIOD HISTORIC CONTEXTS, PROPERTY TYPES AND NATIONAL REGISTER ELIGIBLE PROPERTIES AT HANFORD: 1805/1806-1943

TIME PERIOD	THEME	PROPERTY TYPE	REQUIRED CONDITION AND CHARACTER	ELIGIBLE PROPERTIES
	Resettlement	Homesteads Farmsteads Ranches	Foundations, cellars, privies, debris scatters, gardens, fields, orchards, irrigation features (private endeavors, ditches, flumes), livestock enclosures, fences, equipment, outbuildings; intact or high archaeological integrity	McGee Ranch/Cold Creek Valley Dist.
	Agriculture	Warehouses Barns	Same as above	None determined
		Orchards	Intact related-structures or high archaeological integrity; orchard rows still visible	McGee Ranch/Cold Creek Valley Dist
		Field systems	Fenced fields, previously plowed	None determined
		Equipment	Farm machinery; corroded, but all parts present	None determined
	Water Control (Irrigation)	Private artesian wells	Intact structures or high archaeological integrity	McGee Ranch/Cold Creek Valley Dist.
		Pumping plants	Concrete structures that house electric or diesel pumps associated with irrigation lines; intact, unchanged exterior	Allard Pumping Plant

TABLE 4.1 cont.

INVENTORY OF EURO-AMERICAN PERIOD HISTORIC CONTEXTS, PROPERTY TYPES AND NATIONAL REGISTER ELIGIBLE PROPERTIES AT HANFORD: 1805/1806-1943

TIME PERIOD	THEME	PROPERTY TYPE	REQUIRED CONDITION AND CHARACTER	ELIGIBLE PROPERTIES
		Water distribution systems	Earth, concrete or wood-lined ditches; shown on maps of period	Hanford Ditch (45- BN-309H), Yakima Irrigation Ditch System
		Same as above	Flumes, wooden, tile, or concrete pipes; form intact	McGee Ranch/Cold Creek Valley Dist.
	Religion	Churches	First church buildings; if no longer in use for original purpose, integrity of design	None determined
	Education	Schools, libraries	Intact structures built for purpose; not subsequently modified for a different purpose	None determined
	Townsites and Railroad Whistlestops	House sites, outbuildings, commercial/ industrial facilities; roads, trails, schools	High archaeological integrity; integrity of original townsite or whistlestop layout or plan	White Bluffs, Hanford townsites
	Energy: natural gas exploration	Well sites	Mud pit, drill pad, & associated debris, support settlements or temporary camps	None determined
		Gas lines	Pipelines; not converted to other uses	None determined
	Utilities (Rural electrification)	Power lines, telephone lines	Structures intact	None determined

4.5.3 Perspectives on Cultural Significance

Lees and Noble (1990: 10) noted that in the 1980s, the language set forth in the National Register of Historic Places had become the standard against which archaeological significance was measured in cultural resource management and, by extension, American archaeology. Yet the National Register criteria, as most would agree, are woefully inadequate for providing a workable definition of site significance that can be employed by those charged with federally mandated review and compliance. As preservationists have sought to resolve questions of eligibility to the National Register, the concept of "context" has proved increasingly useful. Indeed, this very document attempts to provide a context for the pre-Hanford resettlement era. Lees and Noble (1990: 10-11) outlined the causes of the problem:

> **In their attempts to grapple with assessing the significance of historic sites, archaeologists and cultural resource managers have faced, and continue to face, a number of important problems. These problems stem from diverse factors, including the differences between data bases representing the historic and prehistoric periods, long-standing biases in American archaeology, the numbers and seeming redundancy of many types of historic sites, the recent age and closeness of many sites to modern-day culture, and the fact that sites of the historic period may be studied by archaeologists, architectural historians, and historians, among others.**

They also pointed out that investigation of 19th and 20th century historic sites is a relatively recent interest and there is lacking both a large amount of research data against which new information can be measured and clearly articulated central research themes in the archaeological literature. Late 19th and early 20th century farmsteads provide a good case in point. In certain parts of the country, such relatively recent farmsteads are extremely plentiful, are in varying states of preservation (e.g., with or without standing structures, abandoned or inhabited), and may still be a functioning part of current cultural and economic systems (Lees and Noble 1990: 11). While some sites may be more than 50 years old, there is widespread inconsistency in the way such resources are inventoried and evaluated as part of the preservation process. At the level of significance evaluation, inconsistency is manifest by such variables as whether an archaeologist, historian, or architectural historian, or any combination thereof, argues or judges the merits of a particular site, or what suppositions for evaluating site significance is being used. Lees and Noble (1990: 12) lamented:

> **The upshot, when considered across the board, is an indefensible approach to the assessment of archaeological significance for historic resources. Although it is heartening that historic sites are now explicitly considered worthy of the same protection accorded to prehistoric sites, where once they tacitly were not, the reality of dealing with such resources falls far short of the ideal. This sad state of affairs, in effect, has served to diminish the credibility of historical archaeology and those who practice it in the eyes of the paying public.**

As representatives of the paying public, a question often posed by federal land managers, SHPOs, and certainly many well-meaning cultural resource specialists about 19th and 20th century farmsteads is: **We've got thousands of these! What's so great about *this* one?** This is a fair question considering the fact that farmstead sites are among the most ubiquitous historic period sites on the North American continent, and more are identified daily in cultural resource management studies (Wilson 1990: 23). In 1995, dozens of farmstead sites were recorded at the Hanford Site by crews from Washington State University engaged in "block surveys" of the 100 Areas and other Areas. Granted that the small "single family" farm is extremely common archaeological site type in America, today, over 25 years after passage of the National Historic Preservation Act, farmsteads across the country are frequently determined either eligible for the National Register simply because they "may contain data on 19th-century lifeways" or ineligible because they are "typical of thousands of 19th century farm sites" (cf. Wilson 1990: 23). There have been some recent attempts to compare farmsteads within a broader geographic or temporal context (e.g., Brooks and Jacon

1994; McManamon 1985).

Wilson (1990) devised an approach to determine National Register significance that involves screening large numbers of farmsteads within a given study area during early stages of CRM surveys in a manner which directs further efforts at individual sites toward supporting site eligibility under Criterion D ("likely to yield information important in history"). His approach could be especially useful for district or multiple property nominations, where the time and expense of examining primary documents for each site (e.g., deeds, probate records, daybooks, etc.) can be prohibitive and often poorly rewarded. The key feature of his approach is to extensively exploit readily available secondary sources such as county atlases and maps, town and country histories, and USDA soil surveys to obtain comparable data for large numbers of sites in a manner that facilitates placement of sites in a broader geographic and socio-economic context.

Wilson (1990: 24) warned that this may sound "old hat" since these very sources are already routinely used in CRM work at the reconnaissance level of study. But, the use of these sources has generally been rather unsophisticated. For example, secondary documentation has been almost exclusively used to enable field crews to find sites and roughly outline broad culture-historical patterns. Soil surveys are almost always used by CRM practitioners to predict or model prehistoric site location, rather than as a tool to study historic land use. Wilson (1990: 24) advocated a synthetic approach, using these sources as a "data package" that can substantially assist in the placement of historic farmsteads in national, regional, and local contexts for the purpose of significance assessment. His approach facilitates generation of testable hypotheses appropriate to archaeological significance statements.

Wilson (1990: 29-30) suggested that the eligibility of single-occupation farmsteads with 20 years or less of occupation can be easily evaluated. As short-term, single household occupations, these (single component) sites offer analytical clarity for the potential excavator. As such, they have potential to address historical and theoretical questions at the local, regional, and national levels. Wilson cautions that these sites may be exceedingly fragile, with few obvious features and low artifact content. Extensive subsurface testing to determine their eligibility could result in major damage to such sites if performed without an exceptionally well-designed strategy and a researcher acquainted with only materially "richer" sites could be easily disappointed into considering them too ephemeral to contain significant information.

Wilson (1990: 30) suggested that sites representing single household occupations spanning 21-60 years have even greater archaeological potential. Similar in most respects to the above group, these sites may be expected to contain somewhat more material, and may be more likely to reflect economic and social change during their longer periods of occupation. At the Hanford Site, many of the farmsteads will fall into either of these two groups. Fewer will fall into farmsteads representing multi-household occupations of over 20 years' duration. Wilson (1990: 30) posed three questions that help differentiate multi-household farmsteads into those that are eligible, not eligible, or possibly eligible:

- **Are features and archaeological deposits temporally and spatially distinct? This concern relates to the National Register question of integrity, both in terms of modern disturbance and sequential historic occupation.**
- **Was destruction of superstructure catastrophic (as opposed to deliberate)? This is another integrity question, concerned with demolition practices and effects of natural disasters on site data classes. Generally, superstructure demolition (e.g., during a Hanford "clean-up") or deliberate burning will leave a more distorted artifact and feature record than will such catastrophic events as natural fires and floods.**

- **Is there a good record of successive occupations, relative to the record for similar sites in the study area? A sense of the extent and reliability of the archival record within the area is necessary to answer this question.**

An example of an eligible multi-household farmstead site would be one where successive dwellings and outbuildings are located in different areas of the farmyard, there is a complete record of owners and tenants, and the whole complex burns down accidentally on a known date. Obviously, such situations are pretty rare, though, the sudden eviction in 1943 and subsequent razing of structures presents a similar situation. An example of an ineligible multi-household farmstead would be one with a minimal record of occupation, evidence of major rebuilding episodes involving a thorough "housecleaning" coupled with removal of intact superstructures to other sites. Unfortunately, this scenario is more common. The most frequent situation is multi-household farmstead sites where eligibility is uncertain. These are the sites that are most subject to the politics of CRM; being preserved, excavated, or destroyed almost capriciously depending largely upon the perceptions and background of contractors and agency personnel.

Wilson (1990: 32) concluded that at least 10 percent of towns in a county would have good secondary data and that expanding the data base might rest on treating such towns as pilot study areas, employing analytical techniques similar to those presented in his case study, and then comparing the results between pilot areas, and with less well documented communities of similar broad historic and ecomomic settings. The Hanford Site, with its former townsites, might be amenable to this approach. The relatively better documented White Bluffs townsite(s) could be the pilot study and then compared to lesser known spots (Ringold, Wahluke, etc.). As Wilson (1990: 32) observed, a pilot study approach provides a relatively quick and low cost means of initially identifying and classifying the bulk of farmsteads within a town, county, state, or large CRM study area with improved resolution as the data-base expands. This approach, in turn, can provide sharper analytical focus for field examination during National Register assessment to separate the eligible from the ineligible or possibly eligible.

For evaluating the significance of farming or ranching sites in Nevada, Hardesty (1982: 214) suggested several criteria:

- **Does the site satisfy criteria for nomination to the National Register of Historic Places?**
- **Are site features archaeologically visible and reasonably undisturbed?**
- **Does historic research on the site suggest:**
  - **a) specialized use of site features that will give a clear archaeological picture?**
  - **b) relatively long, continuous occupation of domestic structures that can provide archaeological data about household processes over time? Especially important are historical data about changes in household composition, house rebuilding, subsistence/wage patterns, and the like.**
  - **c) the archaeological record of the site may consist of more than one type - for example, both trash disposal and fire.**
- **Does the site provide archaeological information about a poorly documented event or statistical population, such as the post-WWI "veterans bonus" homesteading population?**
- **Are the site features vertically or horizontally stratified so that studies of culture or ecological change can take place?**
- **Does the site contain features that can be dated rather precisely?**

- **Is the site unique or a member of a statistical population? If the latter, what new information about the population will the site contribute?**
- **Does the site have a multi-ethnic occupation? If so, does it potentially provide new information about ethnic interaction?**
- **Does the site have features that can be used for the study of environmental change?**
- **Does the site have features that can be used to study multiple ranching/farming activities? For example, does the site include only a residential structure or does it include a residential structure, a variety of specialized outbuildings, line shacks in a variety of ecological zones, and so forth?**
- **Does the site have interpretive potential?**
- **Does the site potentially provide information about changes in ranching or farming patterns over time?**

Hardesty (1982: 216-217) also proposed several key research questions that can be addressed for farming or ranching sites. One of these is building and testing models of change in agricultural societies (appropriate technology vs. industrialization, farming/ranching as support systems for mining operations or local markets, the role of large landholding companies (railroads) in regional development, the role of water control technology, general ecological models, and "ideal" vs. "real" geographical and economic patterns of ranching and farming). Other key questions pertain to frontier studies (e.g., archaeological data from the farming/ranching to build and test competing models of the frontier or testing and modifying general ecological models of colonization) and environmental studies (e.g., environmental responses to "managed" ecosystems using both documentary and archaeological data and farming/ranching "management" solutions to environmental responses). Key questions might also include ethnicity and ethnic relations (Indian responses to farming/ranching operations, urban vs. rural patterns of ethnicity and ethnic relations - Basque, Chinese, Italian, etc.), predictive models of site location variability, and site formation process on farms and ranches.

Recently, Hardesty (1991) proposed several interpretive themes that might provide a regional framework for the entire Intermountain West. These interpretive themes are roughly applicable to the Hanford Site and provide fruitful raw material from which cogent research questions can be developed. Hardesty (1991: 29) relies on Patricia Limerick's (1987) ***Legacy of Conquest*** to develop these few essential regional themes. Limerick argued that the regional culture of the American West is dominated by an ideology of innocence, property for profit, the problems of living in an arid environment, a social structure and cultural ideology imposed by Anglo-American conquest, resentment of but dependency upon the federal government, and an economy based upon high risk and uncertain enterprises such as mining and ranching. Hardesty (1991: 30) suggested that the best approach to building an interpretive framework for a regional historical archaeology is to consider the American West both as a persisting regional culture and as the periphery or "frontier" of an evolving American world system with all that that implies for dynamic interaction and change. He further suggested that the evolution of the regional culture can be tracked through several "evolutionary pathways" including the evolution of hydraulic societies, uncertain enterprises and boom-bust cycles, dependency upon the federal government, the evolution of conquest society, and frontier urbanism. He concluded that a "cultural matrix" is needed to understand the evolution of the Intermountain West.

For the Hanford Site, such a cultural matrix would surely include the evolution of hydraulic societies (irrigation programs), uncertain enterprises (ranching), boom-bust cycles, dependency upon the federal government (especially at the end of the context period when the Hanford Engineer Works was formed), and the evolution of the conquest society (as the

Hanford Site was resettled by Euro-Americans). Each of these regional themes is explored below.

Hardesty (1991: 30) remarked that if the Intermountain West, as a place, holds anything in common, it is aridity. Coping with the scarcity of water, therefore, is likely to be an important process in the evolution of regional social and cultural patterns. Both the archaeological and documentary records suggest that a common coping strategy in arid environments is the formation of hydraulic societies organized around the control of water. At the Hanford Site, the irrigation schemes of the railroads and other organizations to harness the waters of the Columbia has been discussed earlier (see Section 5.00). Hardesty (1991: 30) commented that in ***Rivers of Empire***, the historian Donald Worster (1985: 7) argued that the 20th century American West has been transformed into an "hydraulic society" in which, after 1940, a working partnership between the Bureau of Reclamation and agribusiness has formed "a coercive, monolithic, and hierarchical system, ruled by a power elite based on the ownership of capital and expertise." The role of the American world system in creating hydraulic society in the Intermountain West is exemplified by federal reclamation projects in the early 20th century (e.g., the Newlands Reclamation Act of 1902 that authorized large-scale water projects).

Mining and ranching are prime examples of the "uncertain enterprises" responsible for boom-bust cycles. Both are modern capitalistic structures associated with 19th century expansion of the American nation-state into the American West (Hardesty 1991: 31). Often, boom-bust cycles are linked to market price fluctuations in a capitalistic world system framework, but weather can have an impact upon ranching cycles. Earlier discussions reviewed the rise and fall of ranching enterprises within or near the Hanford Site and the disastrous winters of the early 1880s that destroyed vast herds of livestock. Mining, which played a minor role at the Hanford Site, was mainly carried out on a small scale by Chinese subsistence miners who were locally oriented, cash-poor, and had few ties to the large world system. In contrast to the capitalistic pattern, the material culture of subsistence mining is expected to vary considerably from one locale to another, but the individual artifact assemblage is less diverse (Hardesty 1991: 31).

Limerick (1987: 26) characterized the West as a place undergoing conquest - a region tied together by its common experience with conquest by an invading people (Euro-Americans). It is an important meeting ground for diverse peoples and cultures; a kaleidoscope of constantly evolving social and cultural patterns created by the process and ideology of conquest. The conquest resulted both in a "land grab" (away from the Indians) and cultural dominance by the invaders with the emergence of an appropriate social and cultural context to support such a system. Hardesty (1991: 32) observed that the formation of conquest culture can be tracked through the social and cultural transformation of the principal players, including the indigenous Indians and historic Anglo-American migrants. Other migrants to the region (and the Hanford Site area) such as Asian-Americans also provide evolutionary "tracks" for interpreting the emerging conquest culture. Documenting the impact of this transformation upon material culture including artifact assemblages, subsistence, and settlement systems is one of the key roles that should be played by historical archaeology in the Intermountain West.

Hardesty (1991: 33) suggested that there is no better illustration of the linkage of the Intermountain West to the American world system than its great dependency upon the federal government for economic support (Limerick 1987). Without question, federal involvement in the economic development, colonization, and land management of the region has been a persistent cultural theme throughout the 19th and 20th centuries. A large number of archaeological sites are related in one way or another to the evolution of federal dependency in the region and the archaeological record should be a good source of information about the evolution of settlement systems associated with large-scale federal projects.

A timely article by Susan Henry (1995) puts the problem into a broader perspective. The historic farmsteads at the Hanford Site are now well over 50 years old (e.g., 53 years have passed since the Hanford Site was established in 1943 and historic occupation of the area was terminated by the government). Henry (1995:10) noted that federal agency staff are often hesitant to evaluate 20th century sites as significant because the extensive historical knowledge that allows for effective site evaluation does not exist for the 20th century. That is, we don't know enough about how archaeology can contribute to our understanding of the 20th century, so we can't tell how valuable any one site will be in helping us learn. Henry (1995: 10) concluded from her review that 20th century archaeological sites are being neglected from consideration and that personal views of the past (e.g., *our* time vs. *archaeological* time) are intruding into our professional decisions about what is a valid period of study.

Henry (1995: 10) asks what is it about archaeology that suggests 20th century sites are not legitimate subjects of study when many historians have no problem studying 20th century topics and architectural historians are not reluctant to nominate 20th century structures to the National Register? She suggests that some may view the 20th century as not old enough for meaningful archaeological study and that archaeology is supposed to be about digging up old, buried things. For the most part, the 20th century isn't really buried or that old. It *is* old enough to have acquired some negative connotations, especially in regards to physical objects. Poured concrete and cinder block foundations are seen only as dilapidated ruins. Ceramics, glass, and metal are seen as just so much junk and garbage (Henry 1995: 10-11). What survives of the late 19th and early 20th century ranch or farmsteads at the Hanford Site consists mostly of stone or concrete foundations, ceramic and glass scatters, and rusted metal objects.

Henry (1995: 11) notes that dramatic social, economic, technological, and political changes occurred during the first half of the 20th century that profoundly affected every aspect of daily life. To that we might add that the events that transpired at the Hanford Engineer Works between 1943 and 1945 have profoundly affected every aspect of daily life as nuclear war became a frightening reality for mankind. Henry (1995: 11) highlighted the major changes in the first half of the 20th century - the period of time when America evolved rapidly from 19th century agrarian, Victorian culture into a 20th century urban, technological culture. There were major, dramatic changes in virtually all areas of everyday life - technology, medicine, fashion, recreation, entertainment, sports, politics, economics, etc.

Henry (1995: 11) states that these were significant trends in the development of the nation and of our local communities, and the processes of change and their physical and social effects are etched upon the landscape and upon the patterns of material objects and sites. Henry further laments that 20th century archaeological sites are not being nominated to the National Register and either by accident or design, are being left outside the federal management and protection system. Henry (1995: 11) suggests that archaeology does not stop at 1900 and rather than declare that 20th century sites are not significant because we don't know enough to evaluate them, we should be bold and say they *are* significant, because at this point *anything* we could learn from them would be a major step forward. At the Hanford Site, such an approach to 20th century sties would only trigger the often raised question - **We've got thousands of these! What's so great about *this* one?**

Henry (1995) notes that our lack of attention to 20th century sites means that we haven't yet come to grips with the overwhelming quantities of 20th century documents and sites. While faced with apparent site redundancy, we haven't learned how to distinguish the important ones. If we don't study them, we can't make any professional decisions about redundancy, or distinguish the significant sites from the irrelevant background noise. Henry (1995: 11) also observes that some will pose the question that if we have all these documents, why do archaeology? She states (1995: 11):

> **If we declare that sites without documents are more important for research, then we're denying the validity of historical archaeology as a whole, and saying that prehistoric sites are more important than historic sites. We delude ourselves if we equate wealth of documentary information with lesser archaeological value. If we ever think that an archaeological site won't tell us anything we couldn't learn from the documents, either we're asking the wrong questions of the site, or we're foolishly asking the same questions of the site that we would of the documents.**

Henry (1995: 12) suggests that for 20th century sites, we have a source of information not available to archaeologists studying earlier sites - the site occupants themselves (or direct descendants). We have the opportunity to speak with the people who created these sites about attitudes, ideas, beliefs, values, symbolism, and the relationships among actions, objects, and place. If fact, oral interviews with knowledgeable informants that lived within or near the Hanford Site should be of the highest priority while such individuals are still alive.

Henry (1995: 12) concludes we should be viewing the environment as an artifact, as a physical manifestation of culture. She argues that for most of the 20th century, our environment has not been a wild or natural one, but one engineered and shaped by cultural and social behavior. Looking at buildings, cemeteries, parks, townscapes, city plans, rural landscapes, and other features as products of behavior is a form of archaeology (without digging). With five major information sources available to help us understand the 20th century (archaeological record, written record, photographic record, oral history, and the physical environment) we have the opportunity to conduct sophisticated archaeology and to develop new techniques and theories that could revolutionize the way archaeology is done on older sites.

4.5.4 Methods and Criteria to Evaluate Cultural Significance

National Register Bulletin #15 states that a property that possesses integrity will possess several or all of the following aspects of integrity: **location, design, setting, materials, workmanship, feelings, and association**. Perhaps the most critical hurdle to be faced at the Hanford Site is the issue of integrity. Under most circumstances, when historic properties (structures, buildings, etc.) are demolished, they most certainly lose critical aspects of integrity (design, materials, workmanship, and feelings). The question is, do such demolished historic properties at the Hanford Site still retain archaeological integrity? That is, as archaeological sites, do they retain any aspects of integrity and what aspects must they retain to be National Register eligible? Unfortunately, there are no easy answers to these questions.

Since the majority of the physical features attributed to late 19th and early 20th century Euro-American occupation were quickly obliterated by the Hanford Engineer Works in 1943-1944, historic farms, ranches, irrigation systems, and even townsites were quickly reduced to archaeological sites.

The rapid evacuation of local residents led to a sudden halt in the Euro-American agrarian system on the Hanford site, and the farms, ranches, and other improvements suddenly became a fossil cultural system. Although the residents were able to pack up their portable belongings, their homes, fields, orchards, and ditches could not be taken with them. The unique set of circumstances at Hanford created a situation where hundreds of historic archaeological sites were created almost overnight and these sites possess remarkable archaeological integrity resulting from both favorable preservation conditions and over 50 years of strict Site-wide security.

Hardesty's (1995) goals for the field of historic archaeology have applicability to a large management area such as the Hanford Site. Hardesty (1995: 8) states that without question, assessing the information content of archaeological properties for National Register eligibility demands scholarly familiarity with the questions that count in history, anthropology, and related disciplines. Research questions change as new information and theories emerge. Thus, evaluating the information potential of archaeological properties requires tracking the ever changing realms of science and scholarly research. This is a task too broad for a single individual, but one well suited to national, state, or regional research teams. Hardesty (1995: 8) also suggests that more attention should be given to monitoring the interaction between high priority research questions and their required archaeological information. He suggests the solution may be a system of national, state, or regional information offices equipped with GIS technology and personnel trained to handle issues such as data redundancy and research priorities. Such an approach should help standardize the process of evaluating the information value of archaeological properties.

With regard to vernacular architecture, Hardesty suggested that important questions for a regional research plan would include the evolution and diffusion of building forms, the organization of building space, and the structural grammars of building styles and construction. He proposed development of a contextual matrix for vernacular buildings. On one side of the matrix would be building types likely to be encountered (sod or dirt roof, rubble-rock, dugouts, wattle-and-daub, wooden mass-walled (log or railroad tie walls), brick, adobe or mud-wall, cut stone, and wood frame) and on the other side of the matrix would be listed several key research themes relating to vernacular buildings (use of space; evolution of building forms; chronology; evolution of building styles; ethnicity and building form, style, and construction; and geography of building construction). Key research questions can then be identified for each cell of the matrix and allows for the evaluation of resources that are representative of a vernacular form against prescribed Criteria of significance specific to that form.

For each property type, then, a set of criteria must be developed to assess integrity (or lack thereof) and to evaluate National Register eligibility. As noted above, the key to developing eligibility criteria is to develop a research context, with pertinent research questions, through which properties can be evaluated.

Hardesty (1986: 65) also cautioned that it is often necessary to assess the relative significance of historical sites, buildings, structures, features, deposits, and objects and such evaluations should revolve around specific significance values:

- **<u>Inventory value</u>. Poorly represented or rare historical sites and features for each cultural theme have higher inventory value than site types that are well known. In**

addition, sites and features with good time or function identification or associated with time/use diagnostics have higher inventory value than those that do not.

- **Historical value. Historical sites and features that can be associated with "important people and events" have higher historical value than those that are not. Historical sites and features that can be shown to have symbolic associates with existing cultures or peoples have higher "historical" value than those that do not.**

- **Scientific value. Historical sites and features that contain information related to key research questions for dominant cultural themes have higher historical value than those that are not. Historical sites and features that can be shown to have symbolic associations with existing cultures or peoples have higher "historical" value than those that do not.**

Agricultural Sites

Brooks and Jacon (1994: 85) observed that there is a great deal of confusion concerning how to evaluate agricultural complexes and small homestead/farmstead remains from an archaeological perspective. Part of the problem is that the archaeology of agriculture is a relatively new and evolving field. Small farmsteads which, unlike more developed agricultural properties, have fewer artifacts and features to analyze and interpret. While individually, a majority may not appear to be eligible for listing in the National Register, the key to understanding their eligibility would be to view them as part of a larger group. In a broader perspective, these sites could begin to address questions about settlement patterns, homesteading laws, cultural landscapes, consumer behavior, market accessibility, ethnicity, gender, the pioneer lifestyle and frontier adaptation. To this end, Brooks and Jacon (1994: 85-90) present a number of research areas that could be applied to the agricultural sites at the Hanford Site.

The first research area proposed by Brooks and Jacon (1994: 85) pertains to the physical manifestation of legislation. They note that when recording a homestead site(s), it is important to both record what is found and conduct thorough historical research (e.g., who settled the site, under what homestead act, and subsequent land transactions). By determining under what act the site was initially settled, one can begin to get a broader perspective as to the types of legislation that were being utilized by the homesteaders to maintain their claims. Legislation may have affected the feature systems found at a homestead. Comparison of feature systems of sites settled under the original Homestead Act of 1862 with claims established under the Enlarged Homestead Act of 1909, the Stock Raising Act of 1916, and the Timber Culture Act of 1873 or the Desert Land Act of 1877 might reveal how different feature systems are reflective of the different homesteading laws. This can be especially useful if an archaeologist must evaluate a site that lacks historical documentation.

A second research area pertains to the economic aspects of agricultural settlement (Brooks and Jacon 1994: 85). Consumer behavior is the study of behavior associated with the acquisition, use and discard of material things. The four parts to this behavior: the decision to consume, acquisition, use and post-use deposition, can be used by an archaeologist to study how this type of economic and social behavior was used to satisfy physical, social, cultural and economic needs.

Studies of consumer behavior can be used to explore the choices determined by cultural or social influences. Current theory is that consumer choices are not random but are made from a range of available commodities and consumer decisions are made according to market availability and are influenced by social and cultural persuasions. These in turn are conditioned by social status or class, ethnicity, household size and organization and political status. Hence, trash dumps, buildings, equipment, livestock and crops at homesteading sites can be used to understand the choices made by household consumers and the archaeologist must try to determine how ethnicity, class or other phenomena affected the choices made on the frontier (Brooks and Jacon 1994: 86).

Consumer behavior is also affected by access to major markets. Households in rural areas, during the 19th century, that had limited access to major markets tended to purchase and use ceramic assemblages whose total economic value is lower than assemblages from households within and near these markets. There might also be a time lag, if noticeable, in the types of ceramics that are available in rural areas as compared to urban locations. This idea can be broadened to include the range of commodities such as agricultural equipment, canned goods, seeds, etc. For early sites, archaeologists could examine the relationship between distance to the railroad or townsite and the quality and quantity of artifacts located at a property. Conversely, local transportation systems established by settlers away from the railroads and towns may invalidate any connection between an artifact assemblage and proximity to railroads. An other area that could be explored is the effect of access to a wide range of commodities, by rural households, through mail order catalogs that flourished in the late 19th and early 20th century.

Another research area is <u>land use and settlement patterns</u>. The study of land use patterns may assist a researcher in distinguishing between various types of agricultural activities since agricultural patterns can be attributed to the kind of crop, the local environment, and ethnic preferences or some combination of these. Brooks and Jacon (1994: 87) cite an example from Arizona homesteading where four homesteads were settled by an extended family. Family members had filed on adjacent claims that were in a block-like configuration and had placed their houses at the junction where the four claims met. Oral history of the area revealed that the claimants had shared equipment and supplies, worked each others claims and had eaten communally. Thus, what were four distinct homesteads on paper were actually managed as one large unit. Similar situations could have existed at Hanford.

Elements of the landscape, such as walls, road remnants, trail ruts, foundations and refuse sites, are all amenable to archaeological analysis. Historic archaeology can also use palynology and soil analysis to determine historic planting patterns and historic patterns of field division and land use; analysis of sequential land use based on existing vegetation or plant succession; remote sensing to detect buried walls, foundations, and roadways; and excavation to uncover buried irrigation systems, canals, or planting beds (cf. Brooks and Jacon 1994: 87-88). Rubertone (1989: 51) believes historic archaeologists can study the landscape to examine the way people organized their economic activities in space and the way people used space to define social relationships, attain political ends and express beliefs.

Another useful research area is the study of <u>frontier adaptation</u>, as it is reflected in the archaeological and architectural record. Anthropological perspectives such as cultural ecology and cultural materialism can be brought to bear in such studies. For example, the general layout of a site can be considered in terms of its adaptive strategy to cope with the environment and the exploitation of resources. Thus, claim era and later agricultural sites are a reflection of human behavior (Brooks and Jacon 1994: 88). Different building styles and layout can reflect various factors such as availability of materials, permanency of habitation, innovative behavior, ethnicity, gender, age, class status, environmental conditions and access to technology (cf. Panelli 1990). The archaeologist must then determine which of these factors played a role in the development of a site and how the site transformed over time as a response to a change in any of the above variables. Even ethnic identity can be ascertained from examination of the layout of a site and the use of materials.

The evolution of agricultural technology is another useful research area. The agricultural history of the Hanford Site area could provide good examples of how developments in technology are usually generated by innovations to presently existing systems. Technological change and evolution is often found at individual homesteads as personalized adjustments were made to agricultural equipment for a specific purpose. Therefore, when researching an agricultural property, the archaeologist could examine whether any innovations made to existing equipment or infrastructure (irrigation systems) were later diffused throughout a community or region. Similarly, research should explore if the agricultural property was somehow involved in the development of new crops or crop experimentation. Finally, just as Hardesty (1988) suggested that mining sites be investigated at the level of feature systems, so too should agricultural sites. Feature systems for agricultural sites could include management features, consisting of structures or the remains of structures related to water, animal or crop management. Manufacturing features could include blacksmithing sites. Thus, if an agricultural property is investigated as an evolving dynamic process made up of feature systems, then in theory, a change to any one part of the system should generate changes in its other parts. For example, a change in water management systems that created greater crop surpluses may have translated into better profits which was ultimately reflected in architectural elaborations used to display financial gain and increased social status (Brooks and Jacon 1994: 89).

The following questions can be posed of each potential historic farm or ranch property in order to gauge its cultural or historical significance.

- **Does the property provide information about a poorly documented event or statistical population (e.g., post- WW I "veterans bonus" homesteading population)?**
- **Does the property have important interpretative potential because of the large number and variety of surviving elements related to the ranching and farming process (e.g., McGee Ranch)?**
- **Does the property retain a wide range of individual building types (or intact archaeological remains) that illustrate the various activities associated with ranching (or farming)?**
- **Does the property provide important information about the historical changes in ranching and farming practices (e.g., the advent of irrigation systems, the arrival of the railroad and easier access to markets)?**
- **Was the property closely associated with the introduction of a new agricultural practice (e.g., the first farm to introduce orchard crops)?**
- **Was the property the first to be established in a particular valley or region?**
- **Was the property closely associated with an historically-important route of travel (e.g., the White Bluffs Road)?**
- **Was the property associated with a historically-important individual?**
- **Was the property associated with a particularly significant event in history?**
- **Is the property significant architecturally?**
- **Is the property a component of a larger entity?**
- **Is the property an important work of a master craftsman or architect?**

Perhaps the most outstanding example to date of how local/regional historical importance has been used to evaluate eligibility of agricultural sites is the documentation prepared to determine eligibility of the McGee Ranch/Cold Creek Valley District (Pacific Northwest Laboratory 1994). The statement of significance prepared for the District ties in a number of themes that help demonstrate how and why the historic (and also prehistoric) resources contribute to a greater understanding of local/regional history. Briefly, the Pacific Northwest Laboratory (1994: 16) argued as follows.

While many homestead/farmstead sites have been seriously disturbed (1943 evacuation and demolition activities; subsequent Hanford "cleanup" programs), the McGee Ranch/Cold Creek Valley District is a relatively intact representation of early farming and ranching ventures in the Columbia Basin including homesteads, furrowed fields, fencelines, irrigation systems, and trash concentrations. That is not to say that McGee Ranch and other historic properties in the District avoided the destructive effects of cleanups. In fact, during the 1970s, Hanford undertook the demolition of most of the remaining pre-1943 structures on Site. Thus, the destruction of the majority of the farm buildings in the District probably dates to this time. Additional disturbance occurred at the Ford, Rothrock, and Meeker home/farmsteads when the artesian wells at these locations were capped following the closure of the Basalt Waste Isolation Project in 1987. Less disturbance occurred at the Brown homestead as the well at this site was not used during Hanford Operations, and because the homestead was more remote. The semi-subterranean structures missed detection and thus avoided destruction during Hanford cleanup operations. In spite of the loss of the standing structures, the historic properties in the McGee Ranch/Cold Creek Valley District retain their archaeological integrity.

The historic properties in the McGee Ranch/Cold Creek Valley District are unique in the region insofar as their use of and reliance upon artesian wells. Throughout the region, irrigation was being developed on a mostly large-scale basis (e.g., Yakima Irrigation Company, Hanford Irrigation and Power Company, Priest Rapids Irrigation Company) but private irrigation systems, relying on wells developed along the Columbia River in the Pasco Basin, are not as well documented. Study of the archaeological remains left at sites in the District can provide new information on the agricultural development and irrigation history of the area and information on the lifestyles of these early farm/ranch families. In addition, study of the semi-subterranean complexes may also yield new information on the lifestyle of individuals during the Great Depression. Thus, using standard evaluation criteria, the District would qualify for listing in the National Register under Criterion A (association with events that have made a significant contribution to the broad patterns of our history) and D (that may be likely to yield information important in history or prehistory).

Mining Sites

At the Hanford Site, gold mining is related to Chinese "gleaners" who purchased previously worked claims. In Washington Territory, thousands of Chinese gleaners bought up secondary claims in the late 1860s and early 1870s, and established camps and settlements of their own. One observer noted that in 1864, "hundreds of Chinamen were at this time mining along the bars of the Columbia for a distance of 150 miles" upstream from Umatilla (Chatters 1989: D10). The largest group of about 100 Chinese were working a few miles above Rock Island near Wenatchee where they bought a large gravel bar the previous year from white miners, built a big "ditch" (feeder trough and sluice" and were sluicing (Splawn 1980: 200-210). At least two nearby sites were believed to be associated with Chinese mining activity -- 45-GR-418H and 45-KT-388. The former contains 13 circular pits in the cobbles of the shoreline and four rock alignments which extend into the river. The latter also contains 29 shallow depressions into the river gravels along the slope of the present shoreline. Neither site yielded any surface indications to confirm possible Chinese mining affiliation, however (cf. Harvey 1982: 197).

Hardesty (1988: 116-117) proposes the use of a significance evaluation matrix when trying to evaluate the importance of mining sites. He notes that evaluating the significance of mining sites with the scholarly/scientific information criteria can be facilitated by using a "significance evaluation matrix" for each research strategy. The matrix is a simple two dimensional table with the "contextual" scales of world system, mining district system, and feature system on the vertical axis and the key problem domains (demography, technology, social organization, ideology) on the horizontal axis. In this way, the questions to be used in the significance evaluation process are arranged within a three-tiered hierarchical framework. Hardesty (1988: 117) notes that the evaluation matrix is, of course, no more than a heuristic aid to help identify the archaeological information that is most useful in scholarly and scientific research and it should not be used rigidly. He further cautioned that the evaluation matrix is a quantitative approach that contrasts with the qualitative, either/or, approach set by National Register guidelines, but feels the two are complementary. The following questions can be posed of each potential historic gold mining property in order to gauge its cultural or historical significance:

- Is the site the first of its kind?
- Does the site represent a major change in mining technology?
- Is the site the "last of an era?"
- Does the site represent a new or innovative or experimental approach to mining?
- Does the site reflect or represent a "prospector structure" (cf. Hardesty 1988: 115)? That is, does the site reflect use of non-industrial technology consisting of such tools as "long toms: and simple arrastras that can be handled by single individuals or small groups; low capitalization, usually no more than a "grubstake;" dispersed control structure, centered upon individual miners; low potential yield from the placers; and low "spatial autocorrelation" of the placers being worked - that is, historical events in each of the placer "islands" on the frontier were more or less independent of each other?

Railroad Sites

At the Hanford Site, direct rail service was a rather late addition to the overall transportation system available to local farmers and ranchers. In 1995, the Hanford Cultural Resource Laboratory prepared an archaeological site form for the Hanford branch of the Chicago, Milwaukee, and St. Paul Railroad - a linear feature which extends for over eight miles within the Hanford Site (HT-95-221). This railroad company began construction in Washington in 1906 and the Priest Rapids line (Hanford branch line) began its service from Beverly to Hanford in 1913. Named "Sagebrush Annie", the train carried passengers, produce, and mail from Hanford to other destinations throughout the Northwest and connected Hanford to the main line at Beverly. This line effectively brought to a close Hanford's relative isolation from the rest of southeast Washington and the greater Pacific Northwest. In 1943, the government contracted Morrison Knudsen Company to remove the original tracks and replace them with tracks capable of supporting heavier weight. The line was also extended to Richland at that time.

As a property type, railroad sites can produce a variety of physical remains in various states of preservation and the Priest Rapids line is no exception in this regard. Left behind are physical remains at three of the four whistle stops: Vernita (a wooden platform), Riverland (shed), Haven Station (a train box-car supported by hand-placed river rocks), and Allard (no physical evidence). Physical remains of a short spur that split off at Bleakley to a fruit warehouse could not be found in the field. Railroad sidings are partially intact at the former location of the White Bluffs train depot and historic artifacts are scattered along segments of track (various tin cans, glass, metal hoops, nails, ceramics, and milled lumber "ties"). Even though the stations and stops and large segments of track have relatively poor archaeological integrity resulting from various actions that have taken place between 1943 and today, the Hanford Cultural Resource Laboratory indicates potential eligibility for this line based on its historical importance. One site type frequently associated with railroad construction is the small domed rock oven structure which was often constructed by Italian immigrants for baking bread (cf. Wegars 1991). Two such rock ovens are located within or adjacent to the Hanford Site (24-BN-244 which was associated with construction of the Union Pacific line and 24-BN-190 which is located near Yellepit siding; see Wegars 1991: 63).

Where historical importance is used as the prime criterion for establishing eligibility, the cultural resource specialist must clearly demonstrate how and why a railroad resource is important. In the case of the Priest Rapids line, Criterion A might be employed since the line played an important role in the region's transportation history - being the first to operate electronically (the Hanford branch locomotive operated on steam until at least 1943) and it was the last cross-continental railway system built in the United States (e.g., its association with important events or series of events - completion of last cross-continental railway, etc.). The site form prepared by the Hanford Cultural Resource Laboratory documents that the line created significant impacts to the region, and served two transportation purposes. It served the agricultural community from 1913 to 1943 transporting produce, mail, and passengers and it increased access to Seattle produce markets which added to the growth and success of local communities until the Great Depression. The Priest Rapids route was the cause for the third move of the White Bluffs townsite to its final location and after 1943, it played an important role in the transportation of materials for the construction of the Hanford Site.

Road Sites

An important property type at the Hanford Site are roads. The White Bluffs Road is a particularly good example of this property type since it has been sufficiently investigated to enable the Hanford Cultural Resource Laboratory to document its potential eligibility and prepare a nomination. Although the road has lost integrity in many places, its historical importance enabled it to be determined eligible and nominated under Criterion A. The nomination document, briefly reviewed here (Pacific Northwest Laboratory n.d.), provides a good example of how Criterion A can be used to establish eligibility of roads and other historic features or feature systems at the Hanford Site.

The White Bluffs Road probably first came into existence as a major Indian trail (Rice 1984). Within the Hanford Site, the road connected Rattlesnake Springs with a commonly-used ford across the Columbia River at White Bluffs. The first documented use of the route by settlers was in 1853 by the Longmire party, which was the first wagon train to cross the Cascades (Parker 1979). Traveling from Indiana to Puget Sound, the Longmire Party crossed the Yakima River and proceeded northwest along Cold Creek Valley at the base of Rattlesnake Mountain. At Wells Springs (Rattlesnake Springs) they encountered an uncrossable ravine. While scouting for an alternate route, they encountered a group of Indians who mapped out two roads for them, both of which aboriginal trails led away from the springs (one to the northeast and the other to the northwest). The Longmire Party took the northeast track which brought them to White Bluffs. The next day they retraced their way, located the correct road, and were able to traverse the ravine (Pacific Northwest Laboratory n.d.).

The White Bluffs landing, a common river crossing and debarkation point of local Indians, became a central fording, supply, and shipping point for traders seeking to supply the British

Columbia gold mines. By 1860, there was sufficient road traffic to support a ferry operation at White Bluffs. Charles Splawn and Major John Thorp traveled with a pack train from The Dalles through the Yakima Valley and crossed what is now the Hanford Site in order to use the White Bluffs ferry to cross the Columbia. After crossing, they turned east through the Palouse to present-day Lewiston and then proceeded north along the Clearwater to the Pierce Mines in Idaho. In 1865, the Chief Factor of the Hudson's Bay Company ordered all of that organization's shipments from Portland to Fort Colville and the northern district be sent via White Bluffs. As well, for two years in the mid-1860s, Andrew Splawn and partners operated a pack train supply business between The Dalles and Rock Island (Splawn 1917). Their established route was to ford the Yakima near the current town of Granger, cross the Hanford Site along the White Bluffs Road to the ferry, and then follow the Benjamin Snipes' cattle trail northward along the east bank of the Columbia. The inland sources of potable water within the Cold Creek Valley, which were made accessible by the White Bluffs Road, made this area an important pasturage for both horses and cattle and stimulated the development of ranching (Pacific Northwest Laboratory n.d.).

By the late 1860's, the new Mullan Road, which avoided the sandy stretches north and east of White Bluffs, coupled with the abandonment of the British Columbia mines, lead to a major decline in the ferry traffic at White Bluffs. Ferry ownership then changed hands numerous times between the late 1860's and 1870's but the ford still retained strategic importance as evidenced by the 1876 posting of 20 soldiers at the ferry to protect travelers and ranchers from Indian attack. In July, 1878, Lorenzo and Blanche Perkins crossed the Columbia at White Bluffs and crossed the Hanford Site using the White Bluffs Road and were later killed by Indians at Rattlesnake Springs (Pacific Northwest Laboratory n.d.).

The Pacific Northwest Laboratory (n.d.: 4) concluded that the White Bluffs Road played a significant role in the settlement of the immediate region, providing transportation and enhancing communication to points east and west of the early settlements along the Columbia. It is also associated with important regional historical events such as the Longmire Party's journey across the Cascades, early cattle drives and ranching, and the Indian wars of the late 19th century. It was concluded that the remaining intact portions of the road are eligible for listing in the National Register under Criterion A given its contribution to the broad patterns of local and regional history. The White Bluffs Road was found to epitomize the continuity provided by an important transportation pathway; beginning with prehistoric use and evolving into a settlers track, a cattle trail, a freight road, and finally, culminating with the development of nuclear energy and waste management use (Pacific Northwest Laboratory n.d.: 4).

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5.0 THE MANHATTAN PROJECT AND COLD WAR ERAS, PLUTONIUM PRODUCTION AT THE HANFORD SITE, DECEMBER 1942-1990

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5.1 Introduction

The development of plutonium production at the Hanford Site represents a significant national event that profoundly shaped and defined wartime events during the 1940's and military strategies and national defense during the Cold War. Hanford was the location of the world's first large-scale production of plutonium. This nuclear material was used in the world's first and third atomic bomb explosions, the Trinity bomb test at Alamogordo, New Mexico, and the bomb that was detonated over Nagasaki in Japan, ending World War II. The efforts in research and development expended during the Manhattan Project at Hanford continued to influence developments during the Cold War period in plutonium production for national defense and non-defense nuclear applications, including energy production and human health and environmental restoration fields.

Hanford's central role in producing nuclear materials for the nation's defense complex enabled it to become a national and, following World War II, an international center for nuclear-related activities. The Hanford Site became well recognized for its state-of-the-art knowledge, facilities, and capabilities related to both operations and research and development. This reputation of Hanford as a nuclear science and engineering center connected it to other nuclear centers in the United States and other parts of the world.

Eight property types are associated with the Manhattan Project and Cold War periods: 1) Plutonium production facilities, 2) Military defense facilities, 3) Utility and maintenance services, 4) Administration, Site security, health and safety facilities, 5) Non-defense facilities, 6) Communication and transportation network, 7) Environmental monitoring facilities, and 8) Waste treatment and fresh materials management facilities. The property types are organized by production areas and facility function.

5.2 Statement of Historic Context

5.2.1 Organization of the Historic Context

This historic context combines the Manhattan Project (1942-1946) and Cold War periods (1946-1990) and identifies and describes the important themes and property types associated with nuclear technology for national defense and non-military purposes, energy production, and human health and environmental protection and restoration. Eight property types are associated with the context and are listed below.

. **Plutonium production facilities** (e.g. uranium fuel manufacturing buildings, reactor buildings, chemical separation facilities, process laboratories)

. **Military defense facilities** (e.g. military police and intelligence personnel; Camp Hanford, anti-aircraft artillery, and Nike facilities);

. **Utility and maintenance services** (e.g. power and heating buildings, change houses, pump houses, production/maintenance/repair shops, storage facilities);

. **Administration, Site security, health and safety facilities** (e.g. offices, security buildings, safety and training buildings);

. **Non-defense facilities** (e.g. Radiobiology Studies, Animal Farm and Aquatic Biology Laboratory, Plutonium Fuels Pilot Plant, Fast Flux Test Facility, Plutonium Recycle Test Reactor, High Temperature Lattice Test Reactor);

. **Communication and transportation network** (e.g. automotive repair shops, radio repeat and microwave facilities, roadways and railroads);

. **Environmental monitoring facilities** (e.g. air monitoring and meteorological buildings, environmental restoration and research and characterization facilities);

. **Waste treatment and fresh materials management facilities** (e.g. water, chemical and gas treatment buildings; hazardous materials treatment and storage, single and double shell tanks, waste solidification facilities).

The context statement provides a concise discussion of important events leading to the establishment and development of the Hanford Site during the Manhattan Project and Cold War periods, and a general outline of activities at specific "areas" within the Site (Fig. 1). Property types and subtypes are discussed in terms of physical description and function followed by statements of significance and registration requirements for National Register listing. Representative buildings/structures of the identified property types are described in this context.

The Hanford Engineer Works (HEW) Village, discussed in the historic context statement, is not referenced as an associated property type since the Village is no longer owned by the Department of Energy (DOE).

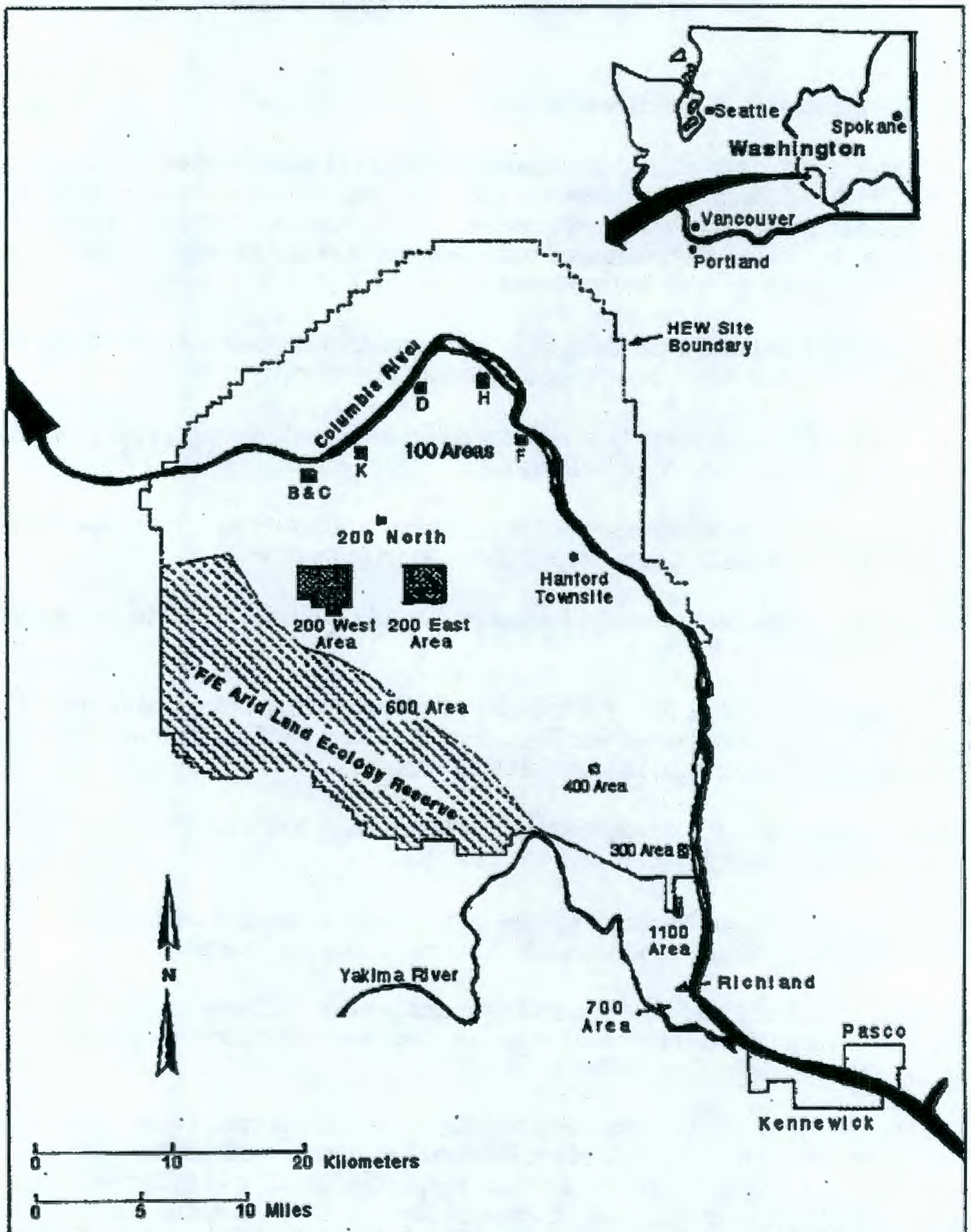

Figure 5.1 Hanford Site, Washington

Temporary buildings and associated facilities, fence lines, underground utilities, sidewalks, and roads are discussed briefly because many of these properties have been demolished/removed.

5.2.2 Manhattan Project

The Manhattan Project refers to the work of the Manhattan Engineer District (MED) of the Army Corps of Engineers conducted on the Hanford Site in southeastern Washington during the period December 1942 - December 1946. The Manhattan Project had its genesis in the Advisory Committee on Uranium (ACU), which was formed in October 1939 by President Franklin D. Roosevelt to explore the feasibility of atomic weapons and atomic power. The ACU embarked on an ambitious research program that was carried out through contracts with colleges, universities, and public and private research institutions.

The ACU concentrated on examining the possibilities of the highly fissionable isotope U-235. However, in March 1941, a research group headed by Dr. Glenn T. Seaborg at the University of California succeeded in isolating the first, submicroscopic amounts of plutonium 239 (Pu-239). Later that month, this same group confirmed the theory that, under neutron bombardment, Pu-239 atoms fissioned as rapidly as atoms of U-235.

In December 1941, the same month that the Japanese attack on Pearl Harbor precipitated United States entry into World War II, the ACU decided to sponsor an intensive research program on plutonium. The research contract was placed with the Metallurgical Laboratory (Met Lab) of the University of Chicago under the direction of Nobel Prize-winner Dr. Arthur H. Compton. The purpose of this research project was to develop the knowledge to design, build, and operate a plant for the conversion of uranium into plutonium. Dr. Vannevar Bush, head of the Office of Scientific Research and Development (OSRD - umbrella organization over the ACU), recommended that the Army Corps of Engineers carry out the construction work for such a plant.

While much scientific experimentation went forward at the Met Lab, there was very little involvement by the Army Corps of Engineers until June 1942, when Dr. Bush presented a feasibility report on the plutonium project to President Roosevelt. Bush stated that five basic plutonium production methods were "nearly ready for pilot plant construction," that an atomic weapon made from plutonium was feasible, and that it might be developed in time to influence the present war. The very next day, the Army Corps of Engineers began to form a new "district" (division) in order to build the plutonium production plant. Consciously searching for a name that would not arouse suspicions nor connote technology nor secret weapons, they chose the name "Manhattan Engineer District" (MED), simply because the office of a key Corps official was located in Manhattan. In August, formation of the MED was announced. On September 17, supply and procurement officer General Leslie R. Groves was appointed to head the MED.

At that time, the planned site for plutonium production plant was the Clinton Engineer Works, located at present-day Oak Ridge, Tennessee. In late 1942, however, discussions with key bomb development scientists such as J. Robert Oppenheimer and others pointed out to MED officials the hazardous nature of the plutonium processes under development. Further discussions with officers and scientists of the DuPont Corporation, the prime contractor for the plutonium project, underscored these hazards. As a result, a consensus was reached at a December 14, 1942 meeting to search for a more remote site in one of the western states.

The future Hanford Site was scouted eight days later and selected (in January 1943) due to its remoteness from large population centers and an abundance of clean water, electric power, accessible rail service, and heavy aggregate for making concrete. Land acquisition proceedings were begun with Secretary of War Henry Stimson's directive RE-D 2161, issued on February 8, 1943. Ground was broken for Project 9536, the Hanford Engineer Works (HEW - earliest name for the Hanford Site), in March 1943.

In the course of the next 29 months, the MED built the world's first, full-scale, self-contained, plutonium production facilities at HEW. The three essential steps in the process took place as follows: uranium fuel elements were fabricated and jacketed in the 300 Area, irradiated in the 100 Areas, and chemically dissolved and separated into plutonium, unconverted uranium, and various fission byproducts in the 200 Areas. All other areas of HEW functioned to provide support services to the crucial 100, 200 and 300 Areas. One of the support areas, the 1100 Area, included the Hanford Engineer Works (HEW) Village, constructed on the original Richland town site to house the Hanford Site's operational personnel.

The HEW plutonium production project succeeded. The special nuclear material (SNM) used in the world's first and third atomic explosions, the Trinity test on July 16, 1945 (at Alamogordo, NM), and the bomb that was detonated over Nagasaki, Japan on August 9, 1945, were produced at HEW. This feat represented enormous and unprecedented achievements in engineering and physics, the largest scale-up in the history of chemical engineering, pioneering accomplishments in uranium fuel fabrication, and in environmental monitoring.

The MED was dissolved as an entity by the McMahon Atomic Energy Act of 1946. The act took effect on January 1, 1947, when the newly created Atomic Energy Commission (AEC) assumed control of all MED functions and property, including the Hanford Site. At that time, the AEC changed the name of the Site to Hanford Works (HW).

5.2.3 Cold War

The defeat of the Axis powers in World War II, with the dropping of atomic bombs on Hiroshima and Nagasaki, saw the beginning of the nuclear age and subsequent development and stockpiling of nuclear weapons and delivery systems. The United States and the Soviet Union, wartime allies, soon became adversaries as the "older Eurocentric order yielded to a bipolar world in which the United States and the Soviet Union became the centers of two contending blocs representing fundamentally opposed political ideologies" (USDOD 1994: 73).

During the early post-World War II period, there was considerable apprehension and indecision about the future of America's nuclear weapons program. "Throughout late 1945 and most of 1946 the MED adopted essentially a caretaker position . . . instituted cost-saving measures that reduced the output of fissionable materials at HEW . . . (which) resulted in the closure of B Reactor and in the decrease of power levels at D and F Reactors" (Gerber 1991: 4). With the shifting of control of America's atomic facilities from the MED to the Atomic Energy Commission (AEC) in 1947, and the deterioration of relations between the United States and the Soviet Union, the AEC's General Advisory Committee recommended an increase in weapons research and production. This new policy meant the expansion of plutonium production facilities at Hanford.

International events associated with the intensification of the Cold War during the late 1940's increased allocations to national defense and expanded America's nuclear weapons program. The Marshall Plan was established by the United States to revive the economies of western European countries and military assistance under the Truman Doctrine was provided to counter the increased threat posed by the Soviet Union with their consolidation of hegemony over eastern Europe. The Berlin airlift, the establishment of the North Atlantic Treaty Organization (NATO) versus the Soviet's Warsaw Pact, the Soviet Union's acquisition of the atomic bomb, ascendancy of Mao Tse-Tung's communist forces in China, and the outbreak of the Korean War led to a dramatic increase in plutonium production and construction of ancillary buildings and structures at all AEC facilities, including Hanford.

The expansion of the United States nuclear weapons complex led to the establishment of research and development laboratories, nuclear materials production and processing centers, and warhead component production plants across the nation. This expansion has been categorized as follows (Office of Technology Assessment 1991: 15):

Weapons Research and Development
- Los Alamos National Laboratory
- Sandia National Laboratory
- Lawrence Livermore National Laboratory
- Argonne National Laboratory

Nuclear Materials Production and Processing
- Hanford Site (plutonium production and processing)
- Savannah River Site (plutonium and tritium production and processing)
- Feed Materials Production Center (uranium processing)
- Idaho National Engineering Laboratory (uranium processing)

Warhead Component Production
- Rocky Flats Plant
- the Y-12 Plant at Oak Ridge
- the Mound Plant
- the Pinellas Plant
- the Kansas City Plant
- the Pantex Plant

Warhead Testing
- the Nevada Test Site
- Pacific Proving Grounds

SOURCE: Office of Technology Assessment, 1991.

Figure 5.2. The DOE Weapons Complex (OTA 1991:16)

The Hanford Site N Reactor Buildings Task Study (Stapp and Marceau 1995) noted that American weapon-grade plutonium production can be divided into three phases (Albright, Berkhout, and Walker 1993: 31-32):

> 1944 - 1964. Up to 14 production reactors operated at Hanford and Savannah River. About two-thirds of the total U. S. inventory was produced during this phase.
>
> 1964 - 1981. The need for additional weapon-grade plutonium declined during this phase as the need for nuclear weapons stabilized and plutonium began to be recycled from retired warheads. During this phase weapon-grade plutonium production was centered at Savannah River.
>
> 1981 - 1988. Plutonium production expanded during this period as part of the Reagan Administration's arms build-up. Plutonium production, however, ceased by 1988.

As mentioned, the detonation of the Soviet Union's first atomic bomb in 1949 and the outbreak of the Korean War in 1950 resulted in a major expansion of Hanford's production facilities. Gerber (1992a: 21-33) has characterized this era and later expansion periods at Hanford (1947-1963) as follows:

> First Post War Expansion (1947-1949): resulted in major expansion of the Hanford facilities. Two new reactors, H and DR, and ancillary buildings were constructed.
>
> Korean War Expansion (1950-1952): aftermath of the Soviet Union's detonation of its first atomic bomb and a major Communist thrust into South Korea. C Reactor and support facilities were built.
>
> Eisenhower Expansion (1953-1955): result of Eisenhower's "massive retaliation" policy and the first Soviet hydrogen bomb detonated in 1953. Two "jumbo" reactors, KE and KW were built. The ballistic missile development program was initiated.
>
> Major Defense Production (1956-1964): the period of the most intense defense production period at the Hanford Site. N-Reactor and other major facilities were constructed.

This expansion, "the largest peacetime construction project in American history up to that point" (Gerber 1992a: 4), saw the construction of hundreds of buildings and structures at Hanford that included the "Reduction-Oxidation Chemical Processing (REDOX) Plant, the PUREX (Plutonium Uranium Extraction) Plant, the Z-Plant (Plutonium Finishing Plant), the C Plant (a radiochemical pilot plant), seven complex laboratories in the 300 Area, and 81 additional underground, high-level waste storage tanks" (Gerber 1993b: 7). The chronic shortage of tank space led to the decision to build two evaporators, 242-B and 242-T, to concentrate and reduce the volume of high level wastes. Z-Plant made possible the conversion of Pu nitrate paste to hockey puck-shaped plutonium metal, known as "buttons".

> **Work also went forward on the development of the REDOX process, the only continuous solvent extraction plant in the world to save scarce uranium that was wasted**

in the first precipitation cycle of the old bismuth-phosphate processing. In 1949, Hanford Works initiated completion of C Plant in 200 East Area as a pilot plant for the REDOX process (Gerber 1991: 5).

Additionally, other facilities on the Hanford Site were modified to accommodate new missions or expanded to more than double their previous output.

Indicative of the intensive post-World War II construction pace at Hanford and the demands precipitated by the Cold War was the growth of the 300 Area. During the Manhattan Project, the 300 Area was designated as the research and development and fuel fabrication area. During World War II over thirty buildings and structures were constructed in the Area. Today, approximately 155-160 buildings and structures (excluding mobile offices/trailers and subsurface tanks/cribs) remain in the 300 Area.

By the mid-1960's, the decreased national demand for special nuclear materials precipitated the initial down-sizing of Hanford's plutonium production mission. By 1971, all but one reactor were closed down. Plutonium production for national defense use came to a halt between 1972 and 1983 when the Site's only fuel processing facility was shut down. Fuel production at Hanford stopped when the N Reactor shut down in 1987 while numerous improvements were made. By 1988, warming relations with the Soviet Union, symbolized by Strategic Arms Reduction Treaty talks, seemingly reduced the need for special nuclear materials, and the N Reactor was put in standby mode, never to operate again. The closure of N Reactor brought to a close nearly 45 years of plutonium production at the Hanford Site.

Hanford Site Security

Increased Cold War tensions with the Soviet Union and the outbreak of the Korean War prompted the Defense Department to establish a permanent Army presence at Hanford in 1950. From the beginning, security of the plutonium production facilities at Hanford was a major concern. Hanford patrol officers were assigned to the Hanford Site at the same time construction activities were started in mid-1943. By 1944, a small force of U. S. Army military police were assisting security efforts at Hanford. The expansion of plutonium production capabilities at Hanford during the late 1940's, however, increased the need for a more permanent military presence (Harvey 1995).

In response, troops from Fort Lewis arrived at Hanford in 1950 to establish antiaircraft artillery (AAA) defenses at Hanford. In April 1951, Camp Hanford was officially designated as a Class 1 installation under the jurisdiction of the Sixth Army, 5th Artillery Group. The construction of the Camp was supervised by the U. S. Army Corps of Engineers and involved nearly 3700 acres of the Hanford Site.

Camp Hanford had an extensive cantonment area and support facilities in North Richland, with forward positions located in the central reservation, North Slope, and the current Fitzner-Eberhardt Arid Lands Ecology Reserve (ALE) that provided air defense of the Hanford Site. This was accomplished by ringing the Site with AAA batteries equipped with 90 mm and 120 mm guns. After 1955, Hanford's air defensive installations began the transition to Nike Ajax missiles; later replaced by Nike Hercules missiles. By the late 1950's, the development of intercontinental ballistic missiles had rendered Nike missiles obsolete. Camp Hanford was deactivated March 31, 1961.

Along with military defense of the Site was the concern over espionage activities and protection of the many classified aspects of the Site's mission.

Virtually everything related to that production mission was considered secret and treated as classified information. In the 1950's and 1960's, risks from espionage activities were controlled by investigating personnel backgrounds, restricting access to sensitive facilities, and restricting knowledge to those who had a need to know . . . In the 1970's, terrorism became a major concern and additional measures such as fences and increased surveillance capability were taken to protect Hanford from terrorist attacks (Stapp and Marceau 1995: 12).

Human Health and Environmental Protection

Part of the legacy of the Cold War was the accumulation of waste by-products at Hanford associated with the production of plutonium. During the Manhattan Project/Cold War era the Hanford Site produced the majority of plutonium for the nation's nuclear defense program. Expansion of facilities and growth in production of fuel led to an increase in the volume of waste materials produced. There were three types of waste generated: chemical, radioactive, and mixed. These wastes were produced as gases, liquids, and solids. The ever-expanding problem of what to do with the wastes added a different direction to technological research. Evaporators were built to "boil off low-level wastes for cribbing and to concentrate and reduce the volume of high-level wastes" (Gerber 1991: 6).

During the late 1950's and early 1960's, "Columbia River pollution from reactor effluent was becoming an increasing important factor in regional and national considerations . . . Every aspect of the bioaquatic and potential down-stream health consequences of reactor effluent was examined" (Gerber 1995c: 36).

The chemical processes required to extract the plutonium from irradiated uranium fuel generated millions of gallons of radioactive chemical waste. About 60 million gallons of this waste is stored at Hanford in 177 large underground tanks. The tanks, divided into 18 groups or "farms", are located in the 200 Area. The first 149 tanks were constructed of a single carbon-steel wall (shell) encased in concrete. The single-shell design was discontinued after 1964 with the discovery that 66 of these tanks had leaked a total of one million gallons of contaminated liquid into the ground. Leaks have not been detected in the 28 double-shell tanks constructed between 1968 and 1986, with their improved tank-within-a-tank design for better containment (WHC Communications Department 1992).

During this period of plutonium production, radioactive materials were released airborne from Hanford on a regular basis; some were routine emissions, others accidental. In 1987, the Hanford Environmental Dose Reconstruction Project began to estimate what radiation doses people may have received from these airborne releases. National security fears generated by the escalating Cold War with the Soviet Union led to an intentional experimental release in 1949, known as the Green Run containing radioactive iodine-131. The information obtained from this experiment was reportedly to assist in the monitoring of the Soviet's emerging nuclear weapons program.

Throughout the history of the Hanford Site, managers of the complex consistently attempted to reassure the public by proclaiming that the installation was safe with minimal threat to human health. "These assurances, combined with the veil of secrecy that shielded operations from outside scrutiny, sufficed for decades to calm whatever public fears may have existed and to inhibit any truly independent review of the plant's emissions" (Grossman 1994: 6). While on-the-job safety for Hanford workers and health standards for the public at large were major concerns, there was always the question whether health and safety considerations played a role subsidiary to the production of plutonium. Beginning with the Manhattan Project and through the years of the Cold War, the usual process of developing "new technologies was dramatically abbreviated at Hanford; time-consuming pilot plants and engineering analyses were side- stepped" (Grossman 1994: 7). Grossman stated further that:

> **The pattern of subordinating known health concerns to other imperatives and misleading an unwary public about plant emissions continued into the post-War period. In order to satisfy the demand for secrecy, public discussion of health effects was largely prevented. Not until the mid-1980's did the release of a large quantity of federal documents permit us to investigate the release of radioactive by-products at Hanford (14).**

Nevertheless, research has been conducted at Hanford over the decades to better understand the biological effects of radiation, establish permissible exposure limits, develop radiation measurement systems, and develop monitoring systems. Research in the biological effects radiation was conducted at Buildings 108 F, 331, 222 U. The 329 Biophysics Laboratory was built to research "state-of-the-art radiation detection instruments for the pioneering Hanford Works environmental monitoring and bioassay program" (Gerber 1991: 7). Research activities in the 3745 Standards Building, 3745 A, and 3745 B, and later at the Radiological Sciences Laboratory in the 318 Building, involved calibrating a wide range of radiation detection instruments using X-ray, alpha, gamma, and neutron sources.

An active conservation program was instituted to recycle and reuse waste. For example, the U-Plant was restructured to utilize an extraction technique, pioneered by Hanford chemists, to recover uranium from the waste stored in Hanford's tank farms (Gerber 1991: 7). The 221 B Plant was modified to process radioactive wastes from the REDOX and PUREX Plants for the extraction of relatively long-lived, heat producing isotopes as part of Hanford's Waste Management Program (Holstead and Aubaugh 1964). (See Separations Plants and Process Laboratories Subtype, p. 33, for additional information on B Plant's Partitioning mission.) The Plutonium Reclamation Facility (PRF or 236 Z) of the PFP complex was designed to be an enlarged and safer version of an earlier PFP process for recovering plutonium from contaminated scrap materials (Gerber 1995f). (See PFP Subtype, p. 38, for additional information on PRF's waste re-use and recycle missions.) The N-Reactor was built with a unique cooling system that recirculated and reused the cooling water before returning it to the Columbia River. This led to less contamination in the river compared to the older, single pass reactors where the cooling water was used only once before being pumped back into the river. Other considerations were made, and new test facilities were built to manage years of collected waste. In the 1980s, as Hanford Historical Documents released information about the volume and extent of nuclear wastes at the Hanford Site, the public, the U.S. Environmental Protection Agency (EPA), and the DOE decided to pursue waste remediation at all weapons and testing sites in the United States.

The image of the Hanford Site was shaped by its nuclear mission during the Manhattan Project and the Cold War periods. Beginning in the 1970's, as negative public perceptions increased over nuclear weapons and commercial nuclear power, Hanford gained the reputation as a dangerous, radioactive place. The increasing public concern about environmental issues during this time further focused regional and statewide interest on the environmental problems related to Hanford production and waste management activities. The Site's near-selection as the nation's repository for high-level radioactive waste, and the winding down of the Cold War further fueled political pressure to accelerate environmental remediation at Hanford.

Nuclear Technology for Non-Military Purposes

Soon after the awesome destructiveness of the atomic bomb became publicly known there emerged a movement to find peaceful means for the application of atomic energy. Finding a new application for nuclear technology for non-military purposes began with the idea of producing energy to power submarines in 1949 (Leclercq 1986: 30). "President Eisenhower initiated an 'Atoms for Peace' initiative early in his presidency and mandated that the U. S. Atomic Energy Commission (AEC) strive to bring about worldwide peaceful use and control of the atom" (Stapp and Marceau 1995: 14).

The passage of the Atomic Energy Act of 1954 allowed for more commercial atomic applications, and "brought innovative, non-defense programs to the Hanford Atomic Products Operation" (Gerber 1992a: 40). In 1954, AEC initiated a series of five prototype reactor programs to demonstrate the feasibility of a large scale reactor (Leclercq 1986: 30). By 1956, England was producing electricity at its plutonium-producing reactors at Calder Hall (Hewlett and Holl 1989).

As private industry became more involved, a variety of reactor technologies emerged in the 1950's and 1960's, and by the 1980's over 100 nuclear power plants were operating in the United States. Medical and food applications associated with nuclear technology also emerged in the 1970's and 1980's.

N Reactor

One of the initial results of President Eisenhower's Atoms for Peace initiative was the construction of 105 N Reactor at Hanford. Operating from 1963 through 1988, 105 N was the nation's first dual purpose reactor; it had the capability of producing plutonium for national security purposes and steam to generate electricity. In the 100 N Area is an electrical substation constructed in 1968 by the Bonneville Power Administration (BPA) to supply electrical power produced by 105 N and the Hanford Generating Plant to BPA's main electrical grid. Having begun producing electricity in 1966, N Reactor and the adjacent power plant was for a period of time the largest electric power producer in the country. From 1966 to its shutdown in 1987, the Hanford Generating Plant at 100 N was a major source of electricity for the Pacific Northwest.

Test Reactors

During the early 1950's physicists at Hanford were researching more closely spaced reactor lattice configurations in order to produce more plutonium. Two test reactors were located in the basement of Building 305 B for lattice configuration experiments: *the Physical Constants Test Reactor (PCTR) and the Thermal Test Reactor (TTR)*. PCTR conducted lattice configuration experiments for N Reactor, and experimental lattice measurements were conducted on the design of the Plutonium Recycle Test Reactor (PRTR). TTR conducted a variety of exponential pile physics experiments, but it was not used as extensively as the PCTR (Gerber 1992b).

During the Cold War period, however, several test reactors at Hanford were used for non-military purposes. Hanford's *Fast Flux Test Facility (FFTF)* complex, located in the 400 Area, was designed primarily to test fuels and materials for advanced nuclear power plants, providing sophisticated testing to study the effects of radiation on fuels and materials (WHC 1994a). FFTF was also used for research and testing of alloys and other materials for potential space power use and passive reactor safety testing. In addition to irradiation testing results, FFTF provided long-term testing and evaluation of plant components and systems for advanced energy system design.

Prior to FFTF was the construction of the *High Temperature Lattice Test Reactor (HTLTR)* during 1966-1967. Housed in Building 318 in the 300 Area, the HTLTR was designed to test very high-temperature fuel performance in gas-cooled reactors. This mission was part of the fuels diversification research being carried out at the Hanford Site in order to facilitate "peaceful atom" projects worldwide. The key functional concepts being tested in the HTLTR were high temperature operation and nitrogen gas cooling. The reactor operated from 1968 to 1972, at which time its funds were diverted to the pursuit of breeder reactor technology at the FFTF.

The 335 Building, the *Fast Reactor Thermal Engineering Facility*, and the adjacent 336 Building, the *Core Segment Development Facility*, were both completed in 1968 to house experimental equipment for the study of the properties of sodium and the behavior of mechanical components to be operated in a sodium environment. Through the late 1970's test loops and other test apparatus in the 335, 335 A, and 337 buildings were used in developmental studies for the establishment of the FFTF. The sodium test loops were deactivated in 1977 and removed in 1983-1984.

Another test reactor in the 300 Area that operated prior to the breeder reactor technology program at Hanford was the *Plutonium Recycle Test Reactor (PRTR)*. Located in Building 309 and completed in 1960, the reactor was designed to be the operating test reactor in the Hanford Works Plutonium Fuels Utilization Program whose purpose was to research and develop nuclear fuel technology for using plutonium as a fuel in nuclear reactors. The PRTR was part of President Eisenhower's Atoms for Peace program designed to test mixed oxide fuel blends for future use in commercial power reactors.

In 1962, the *Plutonium Recycle Critical Facility (PRCF)* was added to support PRTR operations as the location where reactivity values of fuel assemblies before and after irradiation were checked. The following year the *Fuel Element Rupture Test Facility (FERTF)* operations began in one fringe channel of the PRTR. The FERTF was used as a pilot irradiation facility to test new fuel element designs and new operating regimes. "Many of its tests involved pre-defecting fuel elements with pinhole breaks to study the stability of various pre-defected materials under irradiation" (WHC 1994b: 2). In 1986-87, a new space technology development program known as SP-100 was assigned to the 309 building, leading to an extensive clean-out of the original PRTR facilities.

Adjacent to Building 309 is the 308 Building which housed the *Plutonium Fabrication Pilot Plant (PFPP)*. Although not a test reactor, Building 308 and the PFPP were to provide a laboratory environment for research and development of nuclear fuels technology. The PFPP was essentially a fuels fabrication facility for the development of reactor fuels containing plutonium. The earliest PFPP fuels were irradiated in the nearby PRTR. In the late 1970's, the *Training Research Isotopes, General Atomics (TRIGA)* reactor was installed in the building to perform neutron radiography. By 1976, the main mission of PFPP became the preparation and quality assurance testing of FFTF fuel assemblies.

Building Conversions

Numerous facilities originally used for research and development support for plutonium production operations were later converted to non-military purposes. One example is the 185/189 D facility at the D Reactor complex. Both buildings were constructed during the Manhattan project as part of the influent water cooling system for D Reactor. By 1953, 185/189 D had been converted into the Thermal Hydraulics Laboratory and conducted tests in support of the development of PRTR. Mock-ups of many of the PRTR components were built and tested at 185/189 D. The 185/189 D facility was also used for development testing of heat transfer data for 100 N Reactor and early stages of developmental testing for FFTF.

Another example was the 108 F building located at 100 F. The facility, constructed in 1945, served as a chemical pump house to support the 105 F plutonium production reactor. The facility mixed water treatment chemicals for injection into the reactor's water supply system. In 1949, the building was completely remodeled to provide office and laboratory space for the Hanford Site biology program. For over a quarter of a century the building served as the main biology lab at Hanford for the study of the effects of radiation on animals and plants.

Site Areas

A description of Site-wide "areas", buildings and processes created by the MED, AEC, ERDA, and DOE at Hanford during the period of March 1943 through December 1990 follows below.

100 Areas

The 100 Areas at the Hanford Site were the locations of the plutonium production reactors (known initially as piles), and their ancillary and support facilities. The production reactors functioned to irradiate uranium fuel elements, the essential second step in the plutonium production process. Most of the support buildings operated to supply, treat, store and carry away the reactor cooling water, and to supply gas, electricity, fresh fuel and materials to the reactors, to test samples of irradiated fuel and tubes from the reactors during World War II and the Cold War, and supply protection, provide first aid, training services, maintenance services, and other support functions to reactor operations.

Three general types of permanent building construction were used in the 100 Areas: reinforced mass concrete, concrete block, and wood frame construction.

The number of extant buildings and structures noted below does not include mobile offices/trailers, prefabricated units, subsurface tanks and cribs and storage tanks.

Three production reactors were built at HEW during World War II: B, D, and F Reactors. The first built was B Reactor, officially designated the 105 B Building. This structure is listed in the National Register of Historic Places and was recently named a National Historic Civil Engineering Landmark by the American Society of Civil Engineers. B Reactor was the world's first full-scale operative nuclear reactor. The initial attempt to energize it took place on September 26, 1944. Loss of reactivity, leading to complete shutdown, occurred the following day. Gradually, over the next three months, a larger number of B Reactor's process tubes were "charged" (loaded) with uranium fuel elements. B Reactor first achieved its full, nameplate design level of 250 megawatts in February 1945. D Reactor started up on December 17, 1944, and F Reactor started up on February 25, 1945.

The 100 B Area contained 32 permanent buildings (not including construction field offices, temporary construction supply huts) and 22 service facilities (including electrical systems, overhead and underground pipe lines, roads, fences and parking areas) (Gerber 1993f). Currently there are 13 buildings/structures remaining in the 100 B/C Areas. The 100 D Area contained 33 permanent buildings and 23 facilities, and 100 F Area contained 29 permanent buildings and 24 facilities. The 100 D/DR Areas currently has 13 buildings and structures, while 100 F has two buildings remaining.

100 B, D, and F Areas contained at least 50 "TC" (temporary construction) structures, including the Division Engineer's Office, Government Field Office, Layout Office, Cost Office, Safety Office, Labor and Concrete Office, Paint Office, Earthworks Office, Machine-Millwright and Sheet Metal Shop, Electrical Office and Shop, Transportation Office and Garage, Pipe Office and Shop, and warehouses. Additionally, over 100 small support service TC structures were built in each 100 Area including warming sheds, privies, check booths, miscellaneous sheds and guard/badge houses. In some cases, such structures were converted to permanent buildings near the end of the construction period. Most of these TC structures, however, have been removed (Gerber 1993f).

During the Cold War period six additional plutonium production reactors, 105 C, DR, H, KE, KW, and N, were constructed along the Columbia River. These reactors, including B, D, F, have been retired from service and currently are available for decommissioning.

N Reactor, completed in 1963, was the last of the graphite-moderated reactors. "While basically the same as the previous eight reactors, the N Reactor design differed in several ways to afford greater safety and to enable co-generation of electricity" (Stapp and Marceau 1995: 3). The fabrication process at N Reactor also differed from the other eight reactors. The fuel rods for N Reactor were manufactured in the 333 Fuels Manufacturing Building using the coextrusion process. Testing of tubes made by this process "concluded that the characteristics of zirconium alloy enhanced reactor operations and provided longer life than the aluminum that had been used previously" (Stapp and Marceau 1995: 20). As Gerber (1993c: 7) stated, "the coextrusion process fundamentally altered the way fuel elements had been made at Hanford since World War II." There are approximately 70 buildings and structures remaining in the 100 N Area.

H and DR Reactors were completed during the first post-World War II expansion (1947-49) period at Hanford. Construction of the 100 H Reactor began in March 1948 and was completed in October 1949. "The reactor initially operated at 400 MW (thermal) of power. Its operating limits were gradually increased over the years, until 2140 MW was authorized in 1965. Soon thereafter the reactor was shut down and deactivated in April 1965" (DeFord and Einan 1995: 2-4). The 100 H Area included several major buildings, including the 105 H Reactor Building and several structures associated with the treatment and storage of reactor cooling water. Of the dozen or so reactor-related structures that were located in the area, only 105-H, the 107-H retention basins, 1713-H warehouse, 1720 HA arsenal, and portions of the 183-H water treatment/ solar evaporation basins are extant.

DR Reactor was completed in March 1949 as a replacement for D Reactor. D Reactor "was thought to be nearing the end of its effective operational life in the late 1940's due to growth and distortion of its graphite core. It was subsequently determined that the graphite distortion in 100 D could be controlled; both reactors would operate simultaneously" (Carpenter 1993: 2-3).

"The 100 C Reactor was Hanford's sixth production reactor. Its construction began in June 1951 and was completed in November 1952. The reactor initially operated at 650 megawatts, but its power level was increased over time to 2360 megawatts. It operated until April 1969 and has remained in deactivated status since then" (Carpenter 1994a: 2-3).

The 100 KE/KW Area contains the 105 KE and 105 KW Reactor Buildings and their support facilities, including water treatment structures, administrative buildings, laboratories, and maintenance shops. Construction of the 100 K Area Reactors began in September 1953 as part of "Project X", a large Cold war expansion effort at Hanford (Carpenter 1994b). The construction of the 1850 megawatt reactors was completed and began operations in 1955, the largest reactors built as of that date. Their operating limits were gradually increased to a limit of 4400 megawatts by 1961.

Each reactor contained 3220 individual process tubes as compared to the 2004 in previous reactors. Because of the increased size of the reactors, there were also additional control facilities. There was also an increase in the number of test facilities or openings into the reactor cores, 16 for each reactor (Carpenter 1994b: 2-4).

The 100 K Reactors, operating at full power in excess of 5000 days, had more output than the other single-pass reactors because of higher thermal power levels. Operations continued until deactivation in 1970 for KW and 1971 for KE. The reactors have remained in deactivated status since that date. However, the fuel storage basins and small portions of both reactor buildings remain active for the storage of irradiated fuels from the 100 N Reactor.

To date a total of 28 buildings and structures are extant in the 100 KE/KW Areas.

200 Areas

The 200 Areas at the Hanford Engineer Works were the locations of the chemical separations ("processing") plants and their many ancillary and support facilities. The structures built within these areas functioned as the third crucial step in the nuclear process at Hanford. The building designated as T-Plant (221-T) was the first chemical separations plant. T-Plant received and separated plutonium from fuel irradiated at B-Reactor.

The other important activities that took place in the 200 Areas were the storage of irradiated fuel rods awaiting chemical dissolution, and the processing of the finished product (plutonium nitrate) awaiting shipment to the MED installation at Los Alamos, New Mexico. The chemical separations plants functioned to dissolve irradiated fuel elements (known as "rods" or "slugs") and then to chemically manipulate the resultant, plutonium-bearing solution so as to separate the desired plutonium (Pu-239) from uranium (U) and from fission by-products formed in the irradiation process. Most of the support buildings operated to supply solvents and other chemicals to the separations facilities, to test separations plant samples, and to supply heat, electricity, protection, first aid, training and maintenance services to chemical separations activities.

Three 200 Areas were built at HEW during World War II: 200 North, 200 East, and 200 West. The 200 N Area, completely different in design and function from the 200 E and 200 W Areas, operated to store the irradiated fuel rods after their removal from the reactors but before chemical processing, to store the finished HEW product before it was shipped to Los Alamos, and to store the empty product storage cans that were returned from Los

Alamos awaiting re-fill. The 200 N Area was the first of the 200 Areas to "operate," in that it began storing irradiated fuel rods from the B Reactor in November 1944 (Gerber 1993f).

The 200 N Area contained 9 permanent buildings and 14 service facilities. The 200 E Area contained 60 permanent buildings and 33 facilities, while the 200 W Area contained 48 permanent buildings and 29 facilities (Gerber 1993f).

The 200 E and 200 W Areas were very similar to each other, although not identical. The most significant buildings were the chemical processing buildings, T-Plant and B-Plant. The 200 W Area was the first to operate, in that T-Plant (221-T Building, also known as T-Canyon) executed the first dissolving of irradiated fuel rods at HEW on December 26-27, 1944. In the 200 East Area, B-Plant (221-B Building, also known as B-Canyon) began processing irradiated fuel in April 1945 (Gerber 1993f).

Each of the 200 E and 200 W Areas contained TC structures, including an office for the Division Engineer, other offices, warehouses, and shops for Layout, Cost, and Safety, Labor and Concrete, Paint and Earthworks and Machine-Millwright and Sheet Metal, Electrical, and Transportation. These areas also contained nearly 70 small, miscellaneous TC buildings such as warming sheds, privies, and guard houses. In some cases, such structures were converted to permanent buildings near the end of the construction period (Gerber 1993f).

The 200 N Area was comprised of four separate areas, totaling 58.6 acres. The three western most of these sections (known as N, P and R Sections) were quite small, totaling about 9.7 acres each. The fourth was located on the southeast end of Gable Mountain, and totaled 29.5 acres. The 200 E Area was nearly square, containing 2,115.7 acres. The 200 W Area was rectangular and contained 1,901.7 acres (Gerber 1993f).

Five general types of permanent building construction were used in the 200 Areas: reinforced mass concrete construction, structural steel frame and concrete block construction, reinforced concrete frame and concrete block construction, structural steel frame and wood construction, and wood frame construction (See Architectural Context for specific examples).

Of the approximately 350 buildings and structures (excluding mobile offices/trailers, subsurface trenches, wells, cribs, towers and storage tanks) remaining in 200 East and 200 West, 45-50 were built during the Manhattan Project, the rest during the post-World War II period, reflecting the considerable expansion of the Hanford Site to meet national security needs due to the escalation of the Cold War. Likewise, many facilities constructed during the Manhattan Project were redesigned years later for the continually changing missions and technologies at Hanford.

> **In 1952, U-Plant in 200 West Area, built during World War II but not needed as a processing canyon, was retrofitted as the Metal Recovery Plant. Its mission was to utilize a new tri-butyl phosphate/saturated kerosene (TBP-NPH) extraction technique, pioneered by Hanford chemists, to recover uranium from the waste stored in Hanford's tank farms . . . (Gerber 1991: 7).**

The 200 East Area encompassed approximately 2500 acres, while 200 West covered 2000 acres. Both areas were enclosed by security perimeter fencing and were relatively self-sufficient. Each area contained its own coal-fired central power station to provide steam for heating and process equipment needs, a water supply, sanitary system, road and railroad grid, and miscellaneous administrative and utility buildings and structures for non-production purposes. Holstead and Aubaugh (1964: 32) noted the major functions of the process facilities were to:

- Recover plutonium from Hanford fuel elements as highly purified nitrate solution, convert to plutonium metal for weapon component fabrication.
- Recover uranium from Hanford fuel elements as highly purified nitrate solution, concentrate and calcine to uranium trioxide.
- Recover neptunium-237 as a byproduct from chemical process streams.
- Produce fission product crudes and highly purified, separated fission products from tanked wastes or current waste concentrates.
- Recover plutonium from plutonium process and research residues.
- Decontaminate large process equipment items.
- Dispose of and store all radioactive process wastes.
- Fabricate large scale complex stainless steel process equipment for the separations plants.

The primary function of the Hanford separations plants was the recovery, from irradiated production fuels, of purified plutonium and uranium as nitrate solutions, performed primarily in the REDOX and PUREX facilities.

> **Each of these plants uses solvent extraction to achieve a plutonium product containing less then 0.1 percent of uranium and an uranium product containing less than ten parts per billion of plutonium . . . (Holstead 1964: 33).**

The Plutonium-Uranium Extraction (PUREX) Plant was completed in 1955 to extract plutonium and uranium from nuclear fuel for national defense purposes. The plutonium was sent in a liquid form to the Plutonium Finishing Plant (PFP), while the uranium was sent in liquid form to the Uranium Trioxide (UO3) Plant. UO3 converted the liquid to a solid uranium oxide powder that then was shipped to other DOE defense sites where it was used in weapons. The PUREX Plant was closed in 1990 and UO3 was closed in 1993.

The reduction oxidation (REDOX) processing plant (202-S), a continuous solvent extraction plant, was completed and began operations in 1952. "REDOX used methyl isobutyl ketone as the organic extractant, and aluminum nitrate as the salting agent. It also used tall packed columns to achieve contact between the organic and aqueous phases of the process" (Gerber 1992a: 25).

The Plutonium Finishing Plant (PFP) played a significant role in both the Cold War and the development of commercial nuclear power. PFP or Z Plant (234-5Z) was constructed in 1949 during the flurry of post-War construction at Hanford in response to the acceleration of Cold War tensions. PFP made possible the conversion of plutonium nitrate (a wet paste) to hockey puck-shaped plutonium metal, known as "buttons", through the oxalate, oxide, and fluoride steps (Gerber 1992a: 21). PFP also made "pits" (actual weapon components) through 1965. Other uses of PFP included the repackaging of plutonium for shipment or storage, reclamation of plutonium bearing scrap metal, purifying plutonium solutions for further processing, and decontamination and stabilization activities.

The Plutonium Reclamation Facility (PRF) utilized a solvent extraction process to recover plutonium scrap material for re-use in Z Plant's plutonium finishing processes. Largely on the strength of PRF's capabilities, DOE/RL was

> **designated as the Central Scrap Management Organization (CSMO) for the entire AEC complex in 1972. After this time, a full range of defense-grade and commercial-grade, plutonium-bearing scrap materials were shipped to the Hanford Site for recovery and recycling of the valuable Pu. New defense grade oxides and metals could be made after Pu was reclaimed from these scraps, and commercial fuels (mixtures of plutonium and uranium oxides with other metallic powders and pellets) could be recycled and reblended (Gerber 1995f).**

300 Area

The 300 Area was the location of the uranium fuel fabrication plants, the chemical process research and development laboratories and pilot plant, the "test pile" in Building 305 - - a small reactor that tested samples of the graphite, uranium and other materials used in essential Hanford operations, the PCTR and TTR in 305 B for lattice configuration experiments, the Plutonium Recycle Test Reactor (PRTR) in Building 309 - - test reactor in the Plutonium Fuels Utilization Program, the Plutonium Fabrication Pilot Plant (PFPP) in Building 308, the High Temperature Lattice Test Reactor (HTLTR) in Building 318, and ancillary and support structures associated with all of the above facilities.

As the area that manufactured the uranium fuel that allowed the Hanford reactors to operate, the 300 Area housed the first essential step in the plutonium production process. As the area that contained chemical "process improvement" activities and essential materials testing facilities, the 300 Area housed activities that were somewhat outside (although related to) the direct production cycle.

Early HEW structures in the 300 Area that provided facilities for the first step in nuclear production were the 313 and 314 Buildings; fuel elements were initially fabricated and jacketed here.

The 300 Area contained far fewer TC buildings than did the 100 and 200 Areas, because more of the 300 Area work was done by subcontractors who provided their own facilities. The 300 Area TC buildings were designated as TC-36 Structures, and at least seven of them are known to have existed: a Division Engineer's Office, an Automotive Repair Shop, a Paint Shop, a Supervisors Office, an Area Shop, a Receiving Miscellaneous Warehouse, and Fuel Pumps. All were converted to permanent buildings at the end of the construction period (Gerber 1993f).

155 Manhattan Project and Cold War buildings and structures (excluding mobile offices and trailers, prefabs, aboveground tanks, towers, wells and subsurface tanks/cribs) are extant in the 300 Area.

The fenced-in process and support buildings of the 300 Area comprised 52.5 acres. The overall 300 Area was comprised of 115.5 acres, with the areas outside the fence being a strip of land between the western fence and the main road between Richland and the 100/200 Areas, and a wider strip between the eastern fence and the Columbia River. The unfenced areas included the locations of the parking compound, the process sewage disposal basin, and the sanitary sewage treatment facilities (DuPont 1946).

Growth of the 300 Area

Although the number of facilities in the 300 Area increased considerably during the post-World War II era, its original functions as a process improvement (research and development) and fuel fabrication area remained relatively unchanged through the duration of the Cold War period. As in the 200 Areas, many buildings and structures in the 300 Area had to be retrofitted to accommodate new technologies and changing missions. "The large defense and production expansions that increased the number of reactors, separations facilities and waste tanks at Hanford in the early 1950's also lead to growth in the 300 Area" (Gerber 1992a: 39).

During the period of considerable growth of the 300 Area in the early 1950's, many buildings and facilities were constructed under the Hanford Laboratories Operation (HLO) Program for research and development activities. The most prominent developmental laboratories and shops included the 325 Radiochemistry Building, 326 Pile Technology Building, 327 Radiometallurgy Building, the 329 Biophysics Laboratory, and the 324 Chemical Materials Engineering Laboratory. The 328 Mechanical Development Building (later called the Engineering Services and Safety Shop) was built as a central shop to support the above laboratories.

The fuel fabrication process in the 300 Area went through numerous changes after World War II, especially in Buildings 313 and 314. In 1947, the rolling of uranium rods was found to be a less expensive process and possessed metallurgical advantages over earlier fabrication efforts. A rolling mill was installed in the 314 Building, but the process was short-lived as the operation was transferred away from Hanford. In the mid-1950's, the 313 Building experienced extensive remodeling and expansion to accommodate a new fuel canning technology. Additional fuel fabrication process changes occurred in the 1950's and 1960's in both 313 and 314. By 1971, all fuel element preparation activities for the single-pass reactors ceased in 313 and 314 with the closure of the reactors.

The coextrusion process, a new fuel fabrication method, was developed in the 1960's in the 300 Area to accommodate N Reactor fuel needs. "The unique new process for jacketing or cladding uranium fuel elements for Hanford's N Reactor was initially developed in the 306 Fuel Element Pilot Plant" (Gerber 1993c: 7). The pilot plant was completed in 1956 to assist 313 Building operations and to pilot process improvements in single-pass reactor fuel fabrication methods. The facility was expanded in 1960 to develop the coextrusion fabrication process for N Reactor fuel elements. The 333 Building was constructed at the same time to manufacture fuel elements for N Reactor using the new process.

By the mid-1970's, a special waste treatment system, the Waste Acid Treatment System (WATS), "began operating to treat waste acids from 333 Building operations. The WATS represented a method to prevent fuel fabrication bulk waste acids from discharging into the 300 Area process sewer and provided a means to separate, treat, and find alternate disposal methods for them" (Gerber 1993c: 10).

400 Area

The 400 Area consists of the Fast Flux Test Facility (FFTF) complex, which includes the reactor and containment structure, heat removal equipment, core component handling and examination structures, instrumentation and control facilities, and various utilities and other service and support facilities. The complex array of buildings and equipment are arranged around the Reactor Containment (405) Building.

FFTF is a 400 megawatt (thermal) sodium-cooled, fast flux reactor. "Fast flux" means the neutrons move faster in a sodium-cooled reactor than they would if the reactor was cooled with water (WHC 1994). The reactor is located in a shielded cell in the center of the containment building. Heat is removed from the reactor by circulation of liquid sodium through three primary loops including primary pumps, piping, and intermediate heat exchangers, all located within the containment building. The facility was

> **to provide a sodium-cooled fast flux reactor designed specifically for irradiation testing of fuels and materials and for long-term testing and evaluation of plant components and systems for the Liquid Metal Reactor (LMR) Program (Mayancsik 1988: 1-1).**

The construction of FFTF began in 1970 and was completed in 1978. The reactor reached initial criticality in February 1980 and began operating at full power by the end of the year. The reactor was designed primarily to test fuels and materials for advanced nuclear power plants. Specially designed and instrumented test assemblies were used to study the effects of radiation on fuels and materials. FFTF was designed and constructed for the irradiation testing of fuels, core components and target assemblies for liquid metal fast breeder reactors. Reactor activities were later expanded to include long-term testing and evaluation of reactor components and systems, fusion power materials testing, passive safety testing and production medical isotopes, and space power system research (Mayancsik 1988).

The Fuels and Materials Examination Facility (FMEF) was constructed in the 400 Area during the mid-1980's "as a major addition to the breeder reactor technology development program at the Hanford Site" (Gerber 1995d). The FMEF was designed

> **to destructively and nondestructively inspect irradiated fuel materials from the U. S. DOE Research and Development Breeder Reactor projects being developed at that time at the Hanford Site . . . (Gerber 1995d).**

There are 68 buildings and structures (excluding "exempt" properties) in the 400 Area.

500, 800, and 900 Areas

The 500 Area at HEW was not a geographical area. It consisted of the outside electrical facilities of the entire site, including the primary, secondary, and distribution substations, transmission lines, fence and road lighting, fire alarm systems, and telephones and telephone cables. All electrical power for HEW came off of the Grand Coulee-to-Bonneville grid and was supplied to the 100 and 200 Areas via the Midway Substation (a pre-HEW structure located at the northwest corner of the Site) and the 151, 152, 153, 251, 252, and 253 Substations. Additional circuit breakers and transmission banks were added, and other apparatus were rearranged, within the Midway Substation by the MED (Gerber 1993f).

The power supply to the other HEW Areas was obtained from the 115 kV Midway-Walla Walla tie-line, and delivery was made through the Pasco Substation and former Hanford Substation of the Pacific Power and Light Company (PP&L). These substations reduced the voltage to 66 kV before final delivery over the PP&L transmission lines. An additional transformer bank was added to the Pasco Substation by the MED (Gerber 1993f).

The 800 Area at HEW was likewise not a geographical area. It consisted of the 184, 284, and 384 Power House and the overhead pipe line facilities, specifically all pipe supports, steam lines, air lines, and process lines. All of these systems were separate within each area with the exception of the 784 Boiler House that served both the 700 and 1100 Areas, and the 1187 Steam Distribution Lines that encompassed both the pipe supports and the steam distribution lines for the 700 and 1100 Areas (Gerber 1993f).

The 900 Area at HEW also was not a geographical area. It consisted of the underground pipe line facilities, specifically the export water lines and valve houses, raw water and fire protection lines, sanitary sewers, process sewers, wells, and pumps (Gerber 1993f).

In the case of the 500, 800, and 900 area structures and facilities, a prefix (and in some cases a suffix) indicated the specific location. For example, a 1501 B structure was a fence or road light in the 100 B Area. A 2902 W structure was an underground fire line in the 200 W Area (Gerber 1993f).

600 Area

The 600 Area at HEW was comprised of facilities that served more than one specific area, such as roads and railroads (along with their maintenance structures), and health protection and monitoring facilities. The 600 Area designation soon came to refer to all areas of Hanford that were excluded specifically from some other area. The 600 Area contained 130 buildings and/or structures and 20 facilities. Today, there are approximately 60 buildings/structures (excluding mobile offices, trailers, subsurface tanks, wells and cribs) remaining in the 600 Area. However, portions of 600 Area facilities that were located within other areas were designated with prefixes and suffixes that identified their physical locations. For example, a 607 Septic Tank in the 100-B Area was designated as a 1607 B Structure.

The portion of the 600 Area that contained the most structures in a concentrated location was the now-demolished Riverland Classification Rail Yard. This area comprised a strip of land 5,800 feet long and 400 feet wide, located three miles west of the 100 B Area near the Midway Substation on the Columbia River side of the existing track spur of the Chicago, Milwaukee, St. Paul and Pacific Railroad that operated between Beverly and Hanford.

Some temporary construction structures in the 600 Area, such as the Hot Mix Plant for Road Materials, survived as permanent buildings, and several miles of TC rail track, roads, and walks were converted to permanent operational use.

The 600 Area contains the remains of antiaircraft artillery (AAA) sites and Nike missile systems that provided air defense of the Hanford Site from 1950 through 1961. The most intact AAA sites are situated along Army Loop Road and on 200 East Hill, while the most intact Nike missile complex (H-52) is located in the southwest portion of the ALE Reserve.

700 Area

The 700 Area was the location of central administrative functions for HEW. Situated within the "HEW Village" (Richland, Washington), the 700 Area was bounded by Swift Boulevard on the north, Knight Street on the south, Jadwin Avenue on the east, and Stevens Drive on the west. This area was roughly rectangular in shape, with the long portion running east-west. The 700 Area within Richland was distinct and separate from the 1100 Area, which included residences, churches, commercial buildings, schools, and other community buildings.

The 700 Area contained 38 permanent buildings and 13 types of facilities. Nearly all early 700 Area buildings were of wood frame construction. However, the 702 Telephone Exchange Building, the 784 Power House, and the 784-A Emergency Generator and Water Softening Building were constructed of concrete, concrete block, or brick. Additionally, 14 sheet metal huts were situated in the area. All of the above buildings/structures were removed during the post-World War II period.

Since most of the construction of the 700 Area during the Manhattan Project was done by subcontractors, very few TC Buildings were emplaced. Additionally, five pre-Site buildings were standing within the bounds of the 700 Area when it was created. Two of these were converted for HEW use, and the others were demolished.

After the sale of the government village homes and businesses to private owners in 1957-58 and subsequent incorporation of the City of Richland, the 700 Area was no longer a fenced area. Currently there are only four DOE-RL buildings/structures remaining in the 700 Area, all constructed during the Cold War period: 703 Administration Building, 712 Records Center, 747 Environmental Health Science Building, and the 748 Radiosurgery Building. The Federal Building, built in 1963, is a General Services Administration (GSA) facility that houses federal offices including the DOE's Richland Operations Office.

1100 Area

The 1100 Area at HEW was located within the HEW Village of Richland boundaries and referred to those facilities used for housing, medical care, community recreation, religious services, and other aspects of daily living. Administratively, it did not include 700 Area facilities, although the 700 Area was located physically within Richland. Today, the 1100 Area includes DOE-RL buildings/structures west of Stevens Drive, north of Snyder Avenue.

Hanford Engineer Works (HEW) Village, Richland

The HEW Village was the new community constructed in Richland to house those working at Hanford and to supply a means of subsistence for a permanent population of 16,000. Albin Pehrson of Spokane, Washington, was the architect hired by the DuPont Corporation to design the new town. Pehrson's neighborhood-oriented plan not only focused upon the number of families, but on providing an "island of refuge" away from the military atmosphere of work at Hanford. Pehrson's plan partially reflected the democratic, environmental attitudes of 19th century utopian idealism and New Deal community planners by attempting to blend the built environment with the natural landscape. The same quality of materials and construction were used in all dwellings. Neighborhoods were planned with a predominantly curvilinear street system surrounded by parks, open spaces, and ample backyards. Traditional architectural forms and elements were used in housing designs to provide a sense of normalcy and continuity.

By 1945, HEW Village contained 4,329 individual housing units (4,304 of which were new) and 25 dormitories (all of which were "new" or emplaced by the government). There were eight different types of conventional (not pre-fabricated) houses and three styles of pre-fabricated houses . These houses were divided into types according to number of bedrooms and total cost. Each type was assigned a unit letter; conventional houses were designated A, B, D, E, F, G, H, and L; pre-fabricated houses were designated A-1, B-1, and C-1. Each type had a basic plan but variation was accomplished by altering a roof line or changing the exterior siding material.

The Village Center consisted of 24 commercial or retail stores and was located in close proximity to the residential areas. These buildings included food and drug stores, shoe repair, general merchandising, a women's apparel shop, barber and beauty shops, a hardware and a variety store, milk depot, bank, post office, garage repair and service station, a coal and wood yard, an ice establishment, laundry, and a warehouse.

Other structures included in the HEW Village Plan were for community use; public education, public service, transportation operations and utilities that included a temporary sewage disposal plant, and a water treatment plant. The community buildings constructed within the Village were a movie theater, a recreation center, a comfort station and bath house, a hospital, a church and three public schools. The municipal building was a combined fire hall and police station. A railroad service and bus line were planned and a shared depot was built.

A park along the Columbia River and various other open spaces were designed to reduce the tedium of work and provide areas for recreation. Other public open spaces and green belts or parkways were located within residential neighborhoods and ran into the center of the Village.

The post-world War II era brought additional growth and the planned, homogeneous expansion of the original village plan. By 1950, the population of Richland had grown to almost 22,000, and hundreds of additional houses had been constructed. Between 1957 and 1960, the entire town, including individual homes, commercial and community buildings, and industrial facilities not directly involved with the Hanford Site production or administration, was sold to town residents and commercial concerns. Over the next 30-plus years, the homogeneous character of the residential and commercial properties and neighborhoods was gradually modified and changed to suit private ownership and individual taste. To accommodate Richland's growing population that currently is over 30,000, additional subdivisions were constructed beyond the original Village boundaries.

3000 Area

During the 1950's the 3000 Area was the residential, commercial, administrative, and industrial area for the former Camp Hanford. Today, the area encompasses the former Camp Hanford industrial buildings and structures constructed during the post-Camp Hanford period. The 3000 Area is presently the Hanford Site Construction Services Area, administered by the ICF Kaiser Hanford Company.

During World War II, the 3000 Area was the locale for a camp that housed Hanford Site construction personnel and military police. After the war, the 3000 Area expanded considerably to accommodate the increase in Site personnel, which resulted from the post-World War II construction boom and accelerated security needs at the Hanford Site. By 1947, portions of the 3000 Area Camp were absorbed by the North Richland Construction Camp. By the late 1940's, all of North Richland housed close to 25,000 people. When Army troops from Fort Lewis arrived at Hanford in 1950 and established antiaircraft artillery (AAA) defenses, they were situated in temporary quarters in North Richland (3000 Area) until more permanent accommodations were constructed. Camp Hanford was officially established in 1951, and expanded in 1955 with the annexation of the North Richland Construction Camp.

Camp Hanford consisted of cantonment/barracks areas, an administrative area, commercial districts, a trailer park, "Bremerton" housing (residential units from the Puget Sound Naval Shipyard, Bremerton), medical facilities, recreation centers, and an industrial area. The industrial area, located within the current 3000 Area boundaries, provided strategic maintenance and shipping/storage support activities for the defense installations in the forward areas on the Hanford Site. Camp Hanford established and manned AAA and Nike defense systems for the Hanford Site in forward positions on the North Slope, the Arid Lands Ecology Reserve, and the central reservation area. By 1957, there were approximately 100 buildings/structures in the Camp plus 140 "Bremerton" housing units, all in the 3000 Area. These figures do not include the 2200 unit trailer park at the north end of the Camp that was annexed by the Army in 1955.

A total of 20 buildings/structures (excluding mobile offices and trailers) remain in the 3000 Area, 13 of them former Camp Hanford facilities. The Camp's Administration Building, currently serving as Battelle's Pacifc Northwest National Laboratory's Operations and Services Building (OSB), is located north of the 3000 Area.

5.3 Associated Property Types

5.3.1 Associated Property Type: Plutonium Production Facilities

Description: The uranium fuel fabrication plants and the chemical process research and development laboratories and test reactors were located in the 300 Area. As the area that manufactured the uranium fuel that allowed the reactors to operate, the 300 Area housed the first essential step in the plutonium production process. As the area that housed the chemical "process improvement" activities and essential materials testing facilities, the 300 Area housed activities that were somewhat outside (but related to) the direct production cycle.

Production reactors and their ancillary and support facilities were located in the 100 Areas at the Hanford Site. The production reactors functioned to irradiate uranium fuel elements, the essential second step in the plutonium production process. Most of the support buildings operated to supply, treat, store and carry away the reactor cooling water, to supply gas, electricity, fresh fuel and materials to the reactors, to test reactor samples, and supply protection, training services, maintenance services and other support functions to reactor operations.

The chemical separations ("processing") plants, the Plutonium Finishing Plant (PFP or 234-5Z), and the many ancillary and support facilities were located in the 200 and 300 Areas. These facilities and plants assisted in the storage of irradiated fuel rods awaiting chemical dissolution, and processing of the finished product (plutonium nitrate). PFP was built to provide Hanford with the capability to convert Pu nitrate into plutonium oxide or metal, and to fabricate metal into weapon parts (Rockwell International). The chemical separations plants functioned to dissolve irradiated fuel elements and then to chemically manipulate the resultant, plutonium-bearing solution so as to separate the desired plutonium (Pu-239) from uranium and from fission by-products formed in the irradiated process.

Most of the support buildings operated to supply solvents and other chemicals to the separations facilities, to test separation plant samples, and to supply heat, electricity, protection, first aid, training, and maintenance services to chemical separations activities.

Subtype: Uranium Production

Description: Facilities used for producing uranium fuel elements for the reactors were located in the 300 Area. This was the first step in plutonium production. Facilities of this subtype include:

<u>Fuel Manufacturing Support Facility (Building 313)</u>

The 313 Building's mission was to machine bare uranium rods to desired dimensions for use in the HEW production reactors, jacket ("can") the sized fuel elements, and test the jackets for proper bonding and sealing.

Completed in the autumn of 1943, the 313 Building had eight subsequent additions made in late 1943 and in 1944. It contained three fuel jacketing areas, a welding area, a fuel jacket (can) cleaning area, a control room, a tool room and various offices, storerooms, and shops (Gerber 1993f).

In the 313 Building, uranium fuel rods were machined into elements (also known as slugs or cores). Operations commenced in the facility in December 1943, when lathes began to machine bare, extruded uranium rods down to specific core dimensions. Core canning operations actually began in the 313 Building in March 1944.

The first fuel jacketing equipment to go into operation was known as the "experimental line." This equipment included an electric heater press, known by Hanford workers as the "whiz bang," to heat and bond the uranium fuel cores to their aluminum jackets. However, the heaters burned out frequently, did not heat the elements and cans to consistent temperatures, and did not produce a uniform bonding. This problem was serious because nonuniform bonding caused thin places in the jacketing that, under irradiation, heated up more than other places. These "hot spots" could cause fuel element ruptures in the reactors (Gerber 1992b).

Beginning in August, 1944 the uranium fuel cores (in the 313 Building) were jacketed in a triple-dip method that consisted of bathing them in molten bronze, tin, and then a molten aluminum-silicon mixture. The finished elements then underwent three tests, two of which took place in the 313 Building. The first, the frost test, consisted of spraying the can with acenaphthene mixed with carbon tetrachloride (CCl_4). The canned element was then placed into an induction coil to heat its surface. If there was a gas bubble or a nonbonded spot, this spot would become shiny, and the element then would be rejected and sent back through a recycling process. If the bond was good, the acenaphthene was removed with trichloroethylene, and the element was inspected in one of several autoclaves located in the 314 Building. In that inspection, the canned element was placed into a steam autoclave. Water from the steam would be conducted through any openings, and the uranium core would expand rapidly, resulting from the formation of a uranium oxide compound known as U308, and split the aluminum can. If an element passed the autoclave test it then underwent a final radiograph (X-ray) test in the 314 Building (Gerber 1992b).

Fuel elements of other types, as well as some non-fuel materials, also were fabricated in the 313 Building during the MED period. Bismuth fuel targets welded into nonbonded aluminum cans, irradiated to make polonium-210 in 100 Areas production reactors, were fabricated in the 313 Building beginning in 1944.

Some early scrap recovery processes also took place in the 313 Building. During the earliest fuel fabrication operations at HEW, uranium scraps consisted of lathe turnings, rod ends, and rejected cores from the machining and canning operations in the 313 Building. Difficulties with early fuel canning techniques produced thousands of rejected cores by mid-1944. In the mid-1950's, the 313 Building experienced extensive remodeling and expansion to accommodate new fuel canning technologies and scrap recovery processes (Gerber 1992b).

Beginning in 1975, the 313 Building played a major role in a new Waste Acid Treatment System (WATS) process that was emplaced to recover some of the chemical wastes from the N Reactor fuel fabrication activities. Waste acids were collected in the 334 A building tanks and then pumped to the south (original) end of 313 for neutralization. With the closure of N Reactor, fuel element preparation activities ceased in the 313 building. During the late 1980's, the north end of 313 received major upgrades in preparation for use as the metal working facility for N Reactor pressure tube fabrication. The closure of N Reactor also ended the metal working facility's planned mission (Gerber 1992a).

314 Press Building

The primary function of the 314 Building was to house a 1,000-ton extrusion press that allowed HEW to process raw uranium billets into extruded rods that were suitable for fabrication into fuel elements. Because the 314 Building was not completed as early as the original 313 Building, the first uranium for the fabrication of reactor fuel was sent to HEW in October 1943 as rods that had been extruded off-Site. However, MED plans called for a completely self-contained and self-sufficient fuel fabrication operation at Hanford (Gerber 1993f).

The first fabrication function to be performed in the 314 Building, autoclave testing of fuel elements jacketed in the 313 Building, started in July 1944. If an element passed the autoclave test it then underwent a final radiograph (X-ray) test in the 314 Building to detect porosity in the end weld bead.

Outgassing and straightening operations started in the 314 Building in September 1944. Beginning in November 1944, uranium was transported to HEW as billets, which were stored until the extrusion process began to operate in the 314 Building in January 1945. The press testing phase lasted into mid-spring, and then fuel operations commenced. From that time onward throughout the MED period, a complete cycle of metal preparation occurred at HEW. After being extruded, the rods were outgassed, straightened, and sent to the 313 Building for machining, jacketing, and initial inspection. They then went back to the 314 Building for autoclave and radiograph testing (Gerber 1992b).

The other important function of the 314 Building was uranium scrap recovery. Beginning with the startup of extrusion press tests in January 1945, extrusion butt ends, oxides, and container residues were collected and placed in five-gallon cans. By early 1946, however, the volume of uranium scraps accumulated from Building 314 and 313 operations, and the expense and fire and security hazards of shipment brought a change in policy. A "chip recovery" operation began in the 314 Building. It involved collecting all chips and turnings from machining operations, sorting them, breaking them into small pieces, washing, drying, and then pressing them into briquettes (Gerber 1992b).

In the spring of 1946, an additional scrap recovery operation known as the "oxide burner" began on the north side of the 314 Building. All uranium-bearing dust and particulate matter that could be collected from the fuel fabrication facilities, as well as the tailings or settlings from washes and quenches, was burned to convert it to oxide (powder) form. The UO_2 was then collected in five-gallon buckets for compact shipment off-Site.

In 1948, the extrusion method was replaced by rolled uranium rods and the building's mission and equipment changed. The 314 building continued to function in the straightening of uranium rods, providing autoclave and radiograph testing of canned elements, and providing uranium scrap processing operations. By the 1970's, with the closure of the single pass reactors and ending of fuel element preparation activities in the 300 Area, the 314 Building was modified and used by the Pacific Northwest National Laboratory for a variety of research projects and crafts services (Gerber 1992b).

<u>333 Fuels Manufacturing Building</u>

The 333 Fuels Manufacturing Building was completed in 1960 as the New Fuel Cladding Facility. The original mission of 333 was to manufacture fuel elements for N Reactor using a newly developed process called co-extrusion. The co-extrusion process fundamentally altered the way that fuel elements had been made at the Hanford Site since

World War II. Essentially, all of the fuel element components, including the uranium core and all of the cladding materials, were cleaned, assembled and extruded together. This method provided a more uniform bond than had the earlier processes of jacketing or cladding single pass fuel elements.

Other missions conducted in 333 included autoclave testing, final etching with nitric-hydrofluoric acid, and inspection of special lithium aluminate fuel targets made in the 3722 Building for the production of tritium. During the same period (1965-70) highly enriched uranium driver fuel elements for tritium programs were made in 333. The Waste Acid Treatment System (WATS) process was also developed in 333 and placed in service in 1975. Fabrication of uranium fuel elements continued in 333 until 1987 when N Reactor was closed for safety upgrades. When N Reactor was finally shutdown, the 333 Building was transferred to the deactivation program (Gerber 1996a).

305 Test Pile Building

The 305 Test Pile (reactor) functioned as a quality assurance tool to house testing of samples of each lot of graphite, uranium, aluminum jacketing material, and other materials used in the large HEW production reactors. The reactor operated at a very low critical level usually less that 50 watts, was natural uranium fueled, and air cooled. The facility sat above ground inside a concrete shielding barrier that could be opened on the south side for charging and discharging operations and for maintenance. The reactor was removed and buried in 1977-78. At that time, Building 305 was converted to the Hot Cell Verification Facility and a cold prototype for the Fuels and Materials Examination Facility (FMEF) in the 400 Area (in Building 427).

Subtype: Plutonium Production Reactors

Description: Plutonium production buildings were found in the 100 and 300 areas. These facilities functioned to irradiate uranium fuel elements, the second step in plutonium production. Facilities of this subtype include:

105 Reactors or Pile Buildings

The three reactors (105 Buildings) constructed by HEW during World War II - B, D, and F - and six reactors constructed by the AEC during the Cold War period - C, DR, H, KE, KW, N - are known as the 105 structures (Note: 105 C, KE, KW, and N had different dimensions, numbers of process channels, test holes, HCRs, VSRs, etc.). The reactors rested on 23 foot thick concrete foundations topped with cast iron blocks that served as a thermal shield. The walls consisted of reinforced concrete in the lower portions and concrete block in the upper portion, varying from three to five feet thick. The roofs were composed of precast concrete roof tile, except over the discharge area enclosure and the inner horizontal rod room. Over these areas the roofs were composed of six-foot thick reinforced concrete.

The reactor cores themselves consisted of a graphite "stack" that measured 28 feet from front to rear, 36 feet from side to side, and 36 feet from top to bottom. The stacks were pierced front to rear by 2004 process channels that held the fuel elements. Nine horizontal channels for control rods entered from the left side of each reactor, and 29 vertical channels for safety rods entered from the top (DuPont 1945).

The function of the horizontal control rods (HCR) was to control the equilibrium and transient power levels of the reactors during routine operations, and to maintain the desired neutron flux distribution. The HCRs each were about 36 feet long, with the neutron absorbing segment being about 29 feet, four and one-half inches. Two of the rods were electrically-driven, and seven were hydraulically-driven. The latter were known as shim rods, and were used to achieve ongoing operational control and desired fluctuations (DuPont 1946).

The vertical safety rods (VSR) were 39 feet long, stainless steel sleeves with three-sixteenth-inch thick, boron-stainless steel sleeves inside. The outside diameter of the VSRs was two and one-fourth inches. Each VSR was inserted and withdrawn from the reactor via two separate cables wound around a winch located 40 feet above the top of the reactor. In cases of automatic shutdown ("scram") of the reactor, electromagnetic clutch holding each rod in the out position would be de-energized (de-magnetized), and the rods would free-fall by gravity into channels penetrating the reactor. A "last ditch" safety system, a boric acid solution, was held in a large pedestal tank at the top of each reactor, and connected to each of the 29 VSR channels via one-half inch pipes (DuPont 1945).

At the front and rear of each process channel penetration, a seven and one-half foot long, carbon steel entry and exit sleeve known as a "gunbarrel" served to transfer the weight of the thermal shield to the biological shield. It also protected the graphite during charging ("C") operations, maintenance activities, and other manipulations. The ends of each process tube flared out to facilitate a close fit and interface against the gunbarrels. Additionally, an asbestos gasket lay between the flared ends and the stainless steel nozzle that projected from the front and rear of each process tube. The nozzles connected to the larger coolant delivery and exit systems (Gerber 1995c).

The graphite cores were surrounded by a cast iron, thermal shield layer that varied from eight inches thick at the reactor sides, eight and one-eighth inches thick at the top, ten inches thick at the top and rear, and ten and one-fourth inches thick at the bottom. Cooling for the top, side, and bottom shields was provided by circulating water tubes embedded in the blocks. The front and rear shields were cooled by regular reactor coolant flow that passed through the process tubes. The entire thermal shield was surrounded on all sides except the bottom by a 52-inch thick biological shield that consisted of alternate layers of masonite and steel. While the thermal shield absorbed and converted to heat nearly 97% of the gamma energy produced by the fission process, the biological shield absorbed the fast neutrons that passed through the thermal shield. The biological shield slowed the fast neutrons to intermediate flux and absorbed the released nuclear energy (DuPont 1946).

The entire reactor block then was enclosed in a welded steel box that functioned to confine the inert gas atmosphere within the reactor. Expansion joints were placed on the corners of the block to allow for thermal expansion, and expansion bellows were located at each process tube opening. The bellows served as gas seals as the process tubes expanded and contracted with temperature and with the distortions of the graphite. Additionally, each process tube penetration through the biological shield was surrounded by a series of circular cast iron shields known as "shielding doughnuts." The test holes had removable lead rods for plugs (Gerber 1995b).

New Production (105 N) Reactor

The eight production reactors were constructed between 1943 and 1955, and shut down between 1964 and 1971, with an average life span of twenty years.

The ninth and last defense production facility, the New Production or "N" Reactor, operated from 1963 to 1987. There were major differences between 105 N and the older reactors. In particular, N's cooling system recirculated and reused water many times before returning it to the Columbia River, thus contributing less overall contamination to the river than the older reactors (Gerber 1995c: 31, 32).

The other differences between N and the rest of Hanford's production reactors was its ability to produce steam for electricity and adoption of a confinement system to provide a higher degree of protection against the accidental release of fission products into the atmosphere.

The most unique aspect of N Reactor was its dual purpose.

Following on President Eisenhower's Atoms for Peace initiative, the AEC had conducted studies as early as 1953 showing the technical and economic feasibility of constructing a dual-purpose reactor capable of producing special nuclear materials for weapons and steam for electricity (Stapp and Marceau 1995: 18).

The funding for the conversion from the single-to dual-purpose mode was accomplished when the Washington Public Power Supply System (WPPSS) negotiated a contract with the AEC for construction and operation of the electrical generating and transmission facilities. Electricity was generated with the construction of the Hanford Generating Plant at 100 N in 1966.

Prior to Hanford Generating Plant coming on-line in 1966, N Reactor operated in a single-purpose mode by producing weapon grade plutonium. After 1966, 105 N began to produce plutonium and steam for electricity. During the 1970's, N Reactor produced fuel grade plutonium for the breeder reactor program and continued to supply steam to the Hanford Generating Plant.

In the early 1980's, in response to the need to upgrade the nation's nuclear weapons, N Reactor began producing weapon-grade plutonium again. During the 1980's, the N Reactor produced 100% of the nation's weapon grade plutonium, being the only plutonium producing reactor in the U. S. arsenal (Stapp and Marceau 1995: 24).

By 1988, however, the thawing of relations between the U. S. and the U. S. S. R. reduced the nation's need for special nuclear materials. The N Reactor was put into standby mode and never operated again.

Subtype: Filter Plants and Refrigeration Buildings

Description: These facilities were found in the 100 Areas, and functioned to purify and ready water for reactor use, and cool the process water before being sent to the reactors. These activities were associated with the second step in plutonium production.

<u>Filter Plants/Chemical Treatment Buildings</u>

One of these structures (183 Buildings) existed in each 100 Area. The function of these facilities was to add chemicals to purify and ready the raw water for reactor use, to filter the treated water, and then to store it. The chemicals added in the 183 Buildings were sulfuric acid (to adjust water pH), lime, chlorine, and commercial products containing primarily ferrous sulfate (to coagulate suspended solids in the water prior to filtration). The water then was passed through gravity filters consisting of sand, gravel, and anthracite coal (known as anthrafilt) and was stored in two underground "clearwells" (holding tanks having a capacity of 5 million gallons each). A pump room separated the two clearwells and contained the necessary equipment for all of the water transfers that occurred within the 183 facilities. The 183 filter plants/chemical treatment buildings have been removed in the 100 B, H, and F Areas.

The 315 Filtered Water Plant was built in the 300 Area in 1960 to filter water from the Columbia River to supply the Plutonium Recovery Test Reactor (PRTR) reservoir and rupture loop secondary cooling system. After PRTR closed in the 1970's, the filter plant was enlarged and provided filtered, sanitary water for the entire 300 Area.

Refrigeration Buildings

Two of these structures, 189-D and 189-F, were built at HEW by the MED. The 189-D structure was approximately double the size of the now-demolished 189-F Building. Their purpose was to cool the process water before it was sent through the reactors, thus allowing the reactors to operate at higher power levels and still not heat the process water to the point where it would flash to steam. The 189 structures contained large refrigeration rooms, Freon tank pits, ventilating rooms, pumps, a 25-ton crane and a one-ton monorail hoist. Refrigeration of process water began at 100-D Area and 100-F Area in April 1945. It was learned that, while refrigeration worked, it was not a necessary step in reactor operations.

During the Cold War era, about one-fourth of the 189-D Building was converted to a "Flow Laboratory", a thermal hydraulics and coolant systems development studies facility. Combined with the adjacent 185-D Building, their purposes were heat transfer and fuel corrosion studies. The 189-D "Flow Lab" consisted of a system of pipes and tubes that could be loaded with "dummy" fuel elements. These elements then were heated with water so that heat transfer from film build-up could be studied. Mock-ups of many of the Plutonium Recycle Test Reactor (PRTR) components were built and tested in the lab. Later, the laboratory performed development testing of heat transfer for N Reactor and, in 1969, conducted developmental testing for the Fast Flux Test Facility (FFTF).

Subtype: Separation Plants and Process Laboratories

Description: These buildings were found in the 200 and 300 areas. Separating plutonium from uranium fuel rods was done in these facilities. This was the third step in nuclear materials production.

Cell Buildings

Four of these structures (221 Buildings) were planned at HEW, but only three were constructed. One, the 221-B Building, was built in the 200-E Area, and two, the 221-T and 221-U buildings, were built in the 200-W Area. The fourth such structure the 221-C was canceled in November 1943, when MED planners realized that it would not be needed. However, some of its ancillary and support structures were completed.

The function of the 221 Buildings was to carry out the steps in the separation process. Called canyon buildings because of their monolithic size, massive concrete construction and the canyon-like appearance of their interiors, B, T, and U Plants were built in 1944-45 to extract plutonium from fuel rods irradiated in the production reactors. These steps were as follows (Gerber 1995f):

Dissolving:

- The aluminum-silicon jackets of the irradiated uranium fuel rods first were dissolved in boiling sodium hydroxide, to which sodium nitrate slowly was added (to reduce the formation of hydrogen).

- The fuel elements themselves then were dissolved in nitric acid. Operators performed this step three times.

Extraction:

This step separated the product (Pu-239) from most of the uranium. It also removed about 90% of the fission products, and reduced the gamma radiation activity level in the dissolved metal solution by a factor of 10. The Pu was kept in the +4 (reduced) valent state at this point. Bismuth nitrate and phosphoric acid were added to the tank, causing the formation of BiPO4 which precipitated, carrying the Pu with it ("product precipitation"). Centrifuging then separated the solids from the liquid. The precipitate cake (containing Pu) was placed in another tank. The liquid waste was jetted to single-shell high-level waste tanks (241 Structures also called SSTs). The cake was then dissolved in nitric acid. Sodium bismuthate, sodium dichromate or potassium permanganate was added to oxidize the Pu to the -6 state. This step caused the BiPO4 to precipitate ("byproduct precipitation"), leaving the Pu in solution.

Decontamination:

This step essentially repeated the extraction step, but was called decontamination because it reduced the gamma activity level by a factor of 10,000 from that in the previous dissolved metal solution, giving an overall process decontamination factor of 100,000 below that of the original solution.

The three Cell Buildings that were constructed at HEW were identical to each other, with the exception of the fact that T-Plant contained a special, 6 foot addition at the "head end" (southwest end). This addition consisted of two double-size equipment cells and continuations of the three galleries and crane rails, and it functioned as a "hot semi-works laboratory" (pilot-scale laboratory that worked with "hot" [irradiated] materials) to study, evaluate, and improve the various steps in the BiP04 process. The head end addition was separated from the main portion of T-Plant by a seven-foot thick concrete barrier wall, and it contained 14 process vessels, each scaled down to five percent of the size of the main plant equipment.

The rest of T Plant and the entire length of B Plant and U Plant contained concrete process cells arranged in pairs (called sections) along the length of the building. Each section was 40' long, and each individual cell was approximately 13' x 17' 8" x 22' high, with 7 foot thick concrete walls and a 6 foot thick cover. The exception to this size limitation in each building was Cell 3, which was designed to provide a 23 foot thick cell with adequate shielding to house the railroad tunnel into the buildings.

The cover of each cell consisted of removable sections with stepped, interlocked edges to prevent the escape of radiation. Twelve of the 20 sections in each building contained a standard grouping of process equipment that consisted of four pieces: a precipitator, a catch tank, a centrifuge and a solution tank. All pipe, instrument, sampling and control lines into the cells were buried in the concrete and terminated in standardized connector flanges on the cell walls. Each of the electrical lines contained six leads. The other instrument, hydraulic, and lubrication lines contained four small pipes. The chemical feed, steam, and water lines consisted of single, two-inch or three-inch pipe. In order to minimize the escape of radiation into the pipe gallery, an S-curve was built into the piping as it ran from the cells to the gallery. Within each section of the Cell Buildings, process lines between cells were run directly through cell walls. However, no piping pierced the walls between sections. An operating gallery and an electrical gallery also ran the full length of each Cell Building.

B Plant operated until 1956 when the Plutonium Uranium Extraction (PUREX) facilities and REDOX came on line. After modifications, B Plant was restarted in 1967 for its second mission, which was to remove cesium and strontium from stored liquid waste. The Waste Encapsulation and Storage Facility (WESF) was added to the B Plant complex in 1974 to encapsulate and store the cesium and strontium. Cesium recovery was completed in 1983, and strontium recovery was completed in 1985. Currently, B Plant is a storage facility for radioactive waste (Rockwell International).

From 1944 until 1956, T Plant was used as a separation facility for irradiated production reactor fuel. In 1957 the plant became a high-level decontamination and repair facility, and provided facilities for the testing and shipping/burial of contaminated tools and equipment from both on-Site and off-Site locations. The plant was modified in 1978 to permit storage of PWR Core II fuel assemblies (Rockwell International).

Early on it became evident that the B and T Plants were sufficient to meet production goals and U Plant was held in reserve.

> **U Plant was used to train B and T Plant operators until 1952 when it was converted to the tributyl phosphate (TBP) process to recover uranium from bismuth phosphate process wastes. In 1958, U Plant was placed in standby and was subsequently retired. All the TBP process hardware remains in place. The canyon building is currently used for storage of spare equipment that has been reconditioned in the T Plant equipment decontamination facility (DeFord and Carpenter 1995: 3-1, 3-3).**

<u>Bulk Reduction Buildings</u>

Four of these structures (224 Buildings) were planned at HEW, but only three were constructed. In the 200-E Area, the 224-B Building was built while the 224-C Building was canceled at the same time as the 221-C Building. In the 200-W Area, the 224-T and 224-U Buildings were constructed. The 224-T Building was the first to operate, beginning the last week of December 1944. The function of these structures was to house the chemical separations steps that followed the steps carried out in the 221 Buildings.

After the construction of the Plutonium Uranium Extraction (PUREX) Plant the UO3 Plant (224-U) converted uranium nitrate liquid from PUREX into uranium oxide powder, which was then processed into reactor fuel. The liquid was concentrated in 224-U, and converted to a powder in the 224-UA Building.

The steps executed in the 224 Buildings were as follows (Gerber 1993f):

- The starting batch size received from the 221 Buildings was 330 gallons.
- Pu solution from the Cell Buildings was oxidized with sodium bismuthate.
- Phosphoric acid was added to produce a byproduct precipitation (with the Pu still in solution). At this point, HEW operators wanted to get rid of all the BiP04.
- The solution and precipitate were separated by centrifuging.
- Nitric acid was added to dissolve the by-product cake, and this solution was removed as waste.
- The Pu was oxidized with potassium permanganate ($KMnO_4$).
- Hydrogen fluoride and lanthanum salts were added to the Pu solution (the "crossover" step), producing Pu lanthanum fluoride. Lanthanum was such a good carrier solution that Pu could be carried with very little bulk or volume of carrier.
- Impurities were precipitated in a by-product cake (as the Pu was oxidized at this point). Fission products were carried with the lanthanum. This byproduct cake contained all the lanthanide's (cerium, strontium, lanthanum, etc.) that the $BiP0_4$ could not carry out of the stream.
- The cake was dissolved in nitric acid, neutralized with sodium hydroxide, and sent to tanks for settling.
- Pu was reduced to the +4 state by adding oxalic acid.
- Potassium hydroxide was added to metathesize the Pu lanthanum fluoride, forming a solid Pu lanthanum oxide. (Metathesis is a chemical process to convert a solid to another solid. Pu lanthanum fluoride and Pu lanthanum oxide are both solids. There then was a solid Pu lanthanum oxide in solution.)

The liquid was removed by centrifugation (a product precipitation). The solid Pu lanthanum oxide was then dissolved in nitric acid, making Pu nitrate. By this time, each original 330-gallon batch of plutonium-bearing solution that had entered the 224 Buildings was concentrated down to eight gallons.

<u>Concentration or Isolation Facility (Building 231 Z)</u>

The 231 Z Plutonium Metallurgy Facility, originally called the Concentration or Isolation Building, was constructed in 1944 in 200 West. It was sometimes called the 231 W Building, or 231 Z, because it housed the final (Z) step in the plutonium production process, the purification of the Pu nitrate, after this product had been processed in the bismuth phosphate radiochemical separations facilities (T and B Plants, 224 T, 224 B). Its function was to complete the chemical separations and plutonium purification process as far as the HEW technology was capable of taking it. The final step, the conversion of plutonium nitrate paste to metallic plutonium, was initially performed at the MED's Los Alamos installation. The functions of 231 Z were slowly phased out after the Plutonium Finishing Plant (PFP) became operational. PFP began making and fabricating metallic Pu, eliminating the need for some of 231 Z's process development steps.

During the early 1950's research to develop separations processes at Hanford eliminated the need for the 231 Z 's concentration or isolation function. However, part of the building was modified in 1955-56 and became the Plutonium Fabrication Laboratory. The laboratory's specialized plutonium metallurgy work was associated with research for the development of more sophisticated nuclear weaponry. Research was also conducted in the facility that was associated with plutonium fuels development for the commercial nuclear industry. In 1994, 231 Z was identified for cleanout and eventual decontamination and decommissioning.

321 Separation Building

MED builders defined the 321 Building's original mission as that of "trouble-shooting" immediate problems as they developed in the bismuth phosphate ($BiPO_4$) chemical separations plants (the 221, 294 and 231 Buildings). The 321 Separation Building was constructed in the 300 Area as the HEW's cold "semi-works," or pilot scale plant for testing chemical process improvements using unirradiated or low-activity substances. However, at the same time that it was being built, a small pilot plant to test actual runs with the bismuth phosphate process was being constructed at the Clinton Engineer Works (now the U.S. Department of Energy's Oak Ridge Site in Tennessee). This pilot plant, called the Clinton Semi-Works, began to operate in the summer of 1944 and quickly demonstrated that many variables, including acid strengths, batch size, the use of different reducing and oxidizing agents, and other factors could affect processing operations. Additionally, equipment corrosion studies and methods of decontamination immediately were recognized as necessary because the operation was so corrosive and the need for remote equipment repair was so limiting (Gerber 1992b).

For all of these reasons, builders decided in the early autumn of 1944, during the equipment installation phase for the 321 Building, to add a field project request for a laboratory to work with small amounts of active solutions ranging from several tenths of a curie to a curie of radioactivity. Consequently, the laboratory on the north side was modified with lead brick shielding, additional ventilation, and a connection to the waste tanks buried south of the building. However, the 321 Building soon assumed the wartime mission of demonstrating the effects of proposed process changes on decontamination factors in the 221, 224, and 231 Buildings, conducting isotope separations experiments on small samples irradiated in the HEW production reactors, and preparing "tracer activities" (small amounts of irradiated materials used to examine and trace non-radioactive processes) (Gerber 1992b).

A series of cells and tanks ran the entire length of the 321 Building in the south half on a level 12 feet below ground. This section was known as the "canyon," and a mezzanine floor on the south wall held gauge boards and weight tanks. A large chemical storage room, heating and ventilating equipment, Sample Room One, and a pipe gallery extending the entire width of the building occupied the below ground level of the north half. The aboveground, or second floor, of the north half contained offices, various service rooms and Sample Room Two. This second level also held the control gallery, located above the pipe gallery along the center of the building. To the south of the building about 120 feet lay four below ground tanks, each 40 feet long and 10 feet in diameter and encased in concrete. Constructed to hold the strongest wastes from 321 Building processes, these tanks were accessed by stainless steel piping that sloped down to them from the building cells (Gerber 1992b).

Post-World War II missions for Building 321 included its association with the reduction-oxidation (REDOX) process, a solvent extraction method of separating plutonium from irradiated uranium. The REDOX process was developed experimentally in the 3706 Building, but the pilot scale tests were done in Building 321, and new equipment for these trials was added in 1948. Tests continued until C plant, a hot semi-works facility, was constructed in the 200 East Area in 1949. But other pilot scale developmental testing using low-activity solutions was conducted for the Uranium Plant Metal Recovery process, the PUREX process, and the reclamation of uranium and plutonium by the extraction (RECUPLEX) process. Other tests were later conducted for the extraction of various isotopes. During the late 1970's a cold hydraulic core mock-up for FFTF development was installed in the 321 Building. The building was again modified during the mid-1980's as a hydromechanical test facility, and deactivated in 1988.

Sample Preparation Laboratories

Two of these structures (222 Buildings) was constructed in the 200 E Area (222 S and 222 B), and two were built in the 200 W Area (222 T and 222 U). As with T Canyon and the 224 T Building, the 222 T Laboratory was the first to operate. The function of these laboratories was to test the 221 and 224 Building solutions samples at various steps in the separations process. Since the entire separations process was conducted remotely, the only way to verify that the process was working within specifications was to draw and test samples. The 222 Laboratories were located between the 224 and 292 Buildings, paralleling the 221 Buildings. They each contained 22 rooms, including chemical and sample preparation laboratories, a sample-measurement room, balance room, instrument repair room, equipment and machinery rooms, and general offices (Gerber 1993f). The 222 S Laboratory was built in 1950-51 to serve as the process sampling and support facility for the REDOX Plant in 200 East throughout the period of REDOX's operations (1952-1967). 222-S was also the sampling laboratory for the U Plant Metal Recovery mission, and processed samples from the 242 T and 242 S evaporators. The facility continues to serve a primary role in the characterization work for the Tank Waste Remediation Systems, the Spent Nuclear Fuel Project, the well sampling program, and other cleanup/monitoring programs (Gerber 1996b).

3706 Technical Laboratory

Completed during World War II, the 3706 building was the original radiochemistry laboratory for HEW. Its mission was to perform small-scale experiments with both low- and high-activity radioactive materials in support of all HEW processing activities. The largest portion of staff and facilities in the building performed radiochemical trials aimed at improvements in the bismuth phosphate process. During the MED period, some of the important variables and factors studied in the 3706 building were the substitution of potassium permanganate for sodium dichromate as an oxidizing agent for plutonium, variations in acid strengths in several steps of the separations process, a decrease in the "digestion time" in the reduction step, improvements in method of centrifuging lanthanum fluoride, the solubility of plutonium compounds and other substances in process solutions, methods of counting specific plutonium activity, characterization of fission products and plutonium decay products, the effects of hydrazine and lead in the dissolution process, and process equipment decontamination and corrosion studies (Gerber 1993f).

Other large sections of staff time and laboratories in the 3706 Building were devoted to metallurgical examination of irradiated fuel elements from the reactors, fuel development for the 313 Building, examination of graphite from the experimental levels of the 100 Area piles, special sample analyses from the spectroscopy and radiocounting activities, and multifaceted sample analyses for environmental and personnel survey programs (Gerber 1992b).

During the early post-World War II period, Building 3706's mission changed from bismuth phosphate process improvement studies to the development of the REDOX process. Pioneering radiochemical work in the development of the PUREX and RECUPLEX processes (to recover plutonium from waste streams) took place in the building's 57 laboratories, 19 offices, and several equipment and shop rooms (Gerber 1993f).

By the 1950's, the 3706 Building underwent a major decontamination and remodeling effort, with many of the laboratories converted to offices. Fuel fabrication operations continued to operate in the building through the mid-1960's. By 1964, 3706 became the General Services Building. Although it still contained some analytical laboratories, 3706 devoted a majority of its space as an information management and clerical facility for the Westinghouse Hanford Company, including space for graphics, photographs, duplicating, publications, word processing, document processing, and health physics technicians (Gerber 1992b).

Major Separations Plants - Cold War Period

The primary function of the Hanford separations plants was the recovery of purified plutonium and uranium as nitrate solutions from irradiated production fuels. During the Manhattan Project and early Cold War period this process was conducted in B and T Canyon Plants (U Plant was being held in reserve). By 1952, this process was also performed in the Reduction-Oxidation (REDOX) Plant, and by 1956 in the Plutonium-Uranium Extraction (PUREX) Plant.

REDOX Facility

The REDOX facility is one of the five Hanford Canyon Buildings; so called because of their monolithic size and canyon-like appearance.

> **As with the other canyon buildings, the REDOX facility is constructed entirely of concrete, and its process equipment is contained in small rooms, called cells, which are arranged in rows in an area spanned by a traveling crane (DeFord and Carpenter 1995d: 2-1).**

The REDOX processing plant, completed in 1952, was the first full-scale solvent extraction plant built in the United States for the recovery of plutonium and uranium. REDOX employed an advanced organic solvent extraction process as a replacement for B and T Plants. The REDOX chemical separation process was chosen to replace the bismuth phosphate process employed at B and T Plants. Over the years, the capacity and flexibility of the REDOX plant increased to where it was processing a wide variety of metal or oxide fuels. The REDOX plant was attractive for power reactor fuel processing because it was capable of processing small quantities of feed materials on a campaign basis with excellent recoveries and minimum cross contamination of purified products. This characteristic has been well demonstrated in the processing of Plutonium Recycle Test Reactor (PRTR) fuels.

Building 233-S, the Plutonium Concentration Facility, was constructed in 1955 as part of the REDOX Canyon and Service Facility's Phase II capacity increase. Located adjacent to the north wall of 202 S (REDOX), 233-S provided final purification and concentration of plutonium solutions using an ion-exchange process, and later for the concentration of plutonium and neptunium nitrate solutions from the REDOX plant until closure in 1967 (Gerber and Harvey 1996).

PUREX Facility

PUREX was completed in 1955 to extract plutonium and uranium from nuclear fuel.

> **The PUREX Plant post-dates the REDOX Plant and performed the same functions with respect to the recovery of plutonium, uranium and neptunium. An unique feature of the PUREX Plant was the capability for batch concentration and partial separation of fission products from waste streams" (Holstead and Albaugh 1964: 33-34).**

The plutonium was sent in a liquid form to the Plutonium Finishing Plant (PFP), while the uranium was sent in liquid form to the Uranium Trioxide (UO3) Plant, both located in the 200 Area. PUREX operated from 1956 to 1972, and during this period it was modified to reprocess zirconium alloy clad fuel elements from N Reactor. From 1972 to 1983, PUREX was on standby status. Operation resumed in 1983 to process irradiated N Reactor fuels. PUREX was closed in 1990 and deactivation activities are in process.

Sub-type: Plutonium Finishing Plant (PFP) Complex

Description: Located in 200 West, the (234-5Z) PFP facility or Z Plant was completed in 1949 to provide Hanford with the capability to further purify concentrated plutonium oxide or metal and fabricate metal into weapon parts (the conversion of plutonium nitrate into hockey puck-shaped plutonium metal or "buttons" for use in nuclear weaponry). Other uses included the repackaging of plutonium for shipment or storage, purifying plutonium solutions for further processing, and producing non-military oxide blends used in the early years of the development of commercial nuclear industry.

PFP was a complex of chemical processing facilities designed to process generated plutonium to its final product form. Irradiated fuel rods were processed through one of the 200 Area's chemical separation facilities where the plutonium was extracted and transferred as plutonium nitrate to Z Plant. Z Plant then processed the plutonium nitrate to its final form on one of three process lines; RG from 1949 to 1953, the RMA line from 1952 to 1979, and the RMC Line from 1960 to 1973, and 1975 to 1988. Each of these process lines created waste streams that contained small quantities of plutonium. The RECUPLEX and Plutonium Reclamation Facility (PRF) buildings, operating from 1955 through 1962, and 1964 through 1985 respectively, were established to recover plutonium from PFP waste streams. PRF, however, was designed to be a safer and a more flexible version of the RECUPLEX, and differed in its "use of a continuous organic treatment and recycle process, its remote operation . . . and its capability for plutonium/uranium partitioning" (Gerber 1995f).

Major structures or facilities in the PFP complex, some devoted to waste re-use and recycle activities, included the *Remote Mechanical A (RMA) Line*, which was used to convert plutonium nitrate solutions to plutonium oxide or metal, the *Remote Mechanical C (RMC) Line*, which converted plutonium nitrate solutions to plutonium metal, the *236 Z Plutonium Reclamation Facility (PRF)*, which recovered and purified plutonium from aqueous feed by a continuous solvent extraction process to convert various plutonium-bearing scrap materials into a concentrated plutonium nitrate product suitable for feedback (recycling) into

Z Plant's plutonium finishing processes (Gerber 1995f), and the *232 Z Incinerator Building*, used to recover plutonium from contaminated combustible scrap material or solid waste (produced by Z Plant, Plutonium Isolation Facility, REDOX, PUREX) by incinerator and leaching. Other major facilities in the PFP complex included the *241 Z underground sump pit* (Waste Treatment Facility), which contained five tanks in five separate cells used for intermediate storage, sampling, and neutralization of Z Plant liquid waste, the *242 Z Waste Treatment Facility*, used to treat PRF waste and extract americium from the waste (reducing the amount of plutonium disposed of as a waste), the *234-5 ZA South Annex*, which provided space and capability for a developmental laboratory to design methods to allow the Pu product material from the radiochemical separations facilities (T and B Plants, REDOX) to go directly into processing in the PFP (Gerber 1995g), and the *2736 Z, 2736 ZA and 2736 ZB Primary Plutonium Storage and Support Facilities*, which stored plutonium in a variety of forms. (The Pu was packaged in metal containers.) These facilities were also used for the shipping, receiving, repackaging, and nondestructive analysis of plutonium (Gerber 1996b).

Subtype: 300 Area Research and Development Laboratories

Description: During the expansion of facilities at Hanford in the late 1940's/early 1950's due to national security concerns generated by Cold War tensions, there was a concurrent demand for additional research and development laboratories and shops. During this period, Hanford Works operations were split into three major segments, one of which was the Hanford Laboratories Operation (HLO) for funding construction of research and development facilities. In the 300 Area many of the buildings and facilities built during this expansion were part of the HLO program. Major 300 Area research and development facilities included the following:

325 Radiochemistry Building
Completed in 1953, the 325 Building was built to safely house and handle multi-curie level chemical development work with high-activity substances. "Initial building missions listed as high priorities included production support and process improvement for REDOX, improvements for the Uranium Metal Recovery process, and studies of separations waste treatment aimed at development techniques to reduce high-level wastes to lower activity levels" (Gerber 1993c). The High-Level Radiochemistry wing addition in 1959-60 made Building 325 the largest among Hanford's laboratories (Gerber 1992b). The addition, with its three larger hot cells, housed isotope research activities:

> **A number of new techniques developed in the 325 Building separated or fractionized specific isotopes from high level waste by ion exchange, carrier precipitation, and solvent extraction . . . other radiochemical work conducted in the 325 Building hot cells has included characterization of double-shell tank slurry, tests of fuel iodine control and fuel uranium dissolution methods for N Reactor, and experiments in the recovery of strontium using antimonic acid . . . The facility now is called the Applied Chemistry Laboratory (Gerber 1993c: 23).**

329 Biophysics Laboratory
Completed in 1953, the 329 Biophysics Laboratory was constructed to "support the pioneering HW environmental monitoring and bioassay programs that were developed at the Hanford Site during the 1940's and 1950's" (Gerber 1993c: 24). The initial mission of the facility "was to house the preparation and counting of radioactivity levels in samples taken of the air, vegetation, soil, wildlife, river and well water" (Gerber 1993c: 24).

Future missions ranged from monitoring nuclear atmospheric fallout from nuclear bomb tests to fallout deposition studies on terrestrial organisms in Alaska to examinations of Mt. St. Helens volcanic ash.

320 Low-Level Radiochemistry Building
The 320 Low-Level Radiochemistry Building, built in 1966, was virtually the last Hanford facility constructed dedicated solely to national defense missions. The building's original mission was to house analytical chemistry services and plant support in work involving low-level and nonradioactive samples. "Twenty-two laboratories were located in the structure, including several devoted to wet chemistry, a large radiochemistry laboratory, an analytical research and development laboratory . . . " (Gerber 1993c: 52). Several pioneering techniques were researched in the building; these included radiometric techniques, new mass spectrometric techniques, combined atomic absorption analysis, and laser-based spectrometric techniques. The 320 Building currently provides a low-level radiochemistry facility in which very sensitive radiochemical analysis, sample preparation, and methods development can be performed.

Laboratory facilities dedicated to the direct support of reactor development included the following:

326 Pile Technology Building
Constructed in 1953, the 326 Pile Technology Building was designed to assure the maintenance and improvement of Site reactor operations while developing new technologies for future reactors. "The primary physics mission was to conduct the exponential pile physics development work . . . The primary metallurgical mission was to examine reactor components and fuel elements to evaluate characteristics and performance" (Gerber 1993c). During the 1970's and 80's, several of the 326 labs were converted to chemical work involving unirradiated or low-level radioactive materials, though the central mission continued to support the research of reactor components and fuel elements, including development and analysis work performed for the PRTR, N Reactor, HTLTR, and the FFTF (Gerber 1993c). The facility is now known as the Material Sciences Laboratory.

327 Radiometallurgy Building
The 327 Building opened in 1953 to house the examining and testing

> **of irradiated materials, particularly fuel elements and fuel cladding materials from and for the HW production reactors . . . and the effects of higher power levels of irradiation on new and different pile structural materials . . . Missions conducted . . . in the late 1950's and early 1960's included the establishment of specifications for N Reactor fuel rods and process tubes . . . and as part of Hanford's waste vitrification projects of the 1960's and 1970's, performance evaluations of both components and glassified products were conducted in the 327 Building . . . About 1980 the building was renamed the Postirradiation Testing Laboratory (Gerber 1993c: 29-31).**

324 Waste Technology Engineering Laboratory
The laboratory was constructed during the mid-1960's as the Fuel Recycle Pilot Plant (FRPP).

> **It was designed partially to support PRTR operations by housing chemical reprocessing and metallurgical examination on the PRTR's fuel elements. As such, it was built as a dual facility with both radiochemical and radiometallurgical hot cells**

and laboratories. It also was designed to house the Waste Solidification Engineering Project (WSEP), one of the first high-level waste vitrification demonstration programs in the world (Gerber 1993c: 48-50).

Vitrification continued as the major mission of the 324 building until 1980. During the early 1980's additional radiochemistry work "included the solidification, encapsulation, and packaging of spent ion-exchange resins from the Three Mile Island reactor and the pilot testing of Radioactive Liquid-Fed Ceramic Melter operations" (Gerber 1993c: 51). Building 324 missions still include vitrification research activities in the form of Hanford Waste Vitrification Plant engineering verification and process verification.

When the 325, 326, 327, and 329 laboratories were constructed during the 1952-53 expansion of the 300 Area, Hanford Works (HW) planners mandated the construction of a well-equipped central shop for the purpose of supporting these laboratories. Called the *328 Mechanical Development Building*, the facility provided space for a main metal and machine shop, two mock-up shops, a drafting room, welding, paint, carpentry, glass-blowing shops, and other specialized craft equipment. Despite a few name changes, including the present Engineering Services and Safety Shop, the functions of the 328 Building have changed very little over the years.

Statement of Significance

The Hanford Site was the site of the world's first full-scale, self-contained, plutonium production facilities, constructed by the Manhattan Engineer District (MED) of the Army Corps of Engineers. The three production reactors built at Hanford during World War II: B, D, and F, and the 305 Test Pile Reactor, were used to produce uranium fission products, specifically plutonium for the United States first atomic weapons. The B-Reactor, listed in the National Register of Historic Places, was the world's first full-scale operative nuclear reactor, starting up on December 17, 1944. During the nationally important Cold War period, six additional plutonium production reactors, 105 C, DR, H, KE, KW, and N, were constructed along the Columbia River at Hanford and produced a majority of the nation's plutonium for national defense purposes.

These important reactors and ancillary facilities were located in several Areas on the Hanford Site. The 300 Area was the site for the initial fabrication and jacketing of the uranium fuel elements, and most of the Site's research and development laboratories and shops, the 100 Areas were where the reactors irradiated the fuel elements, and the 200 Areas were where the irradiated fuel elements were chemically dissolved and separated into plutonium, unconverted uranium, and various fission by-products.

These facilities were essential elements in the world's first successful large-scale production of plutonium. The special nuclear material in the world's first and third atomic explosions, the Trinity bomb test at Alamogordo, New Mexico, and the bomb that was detonated over Nagasaki, Japan, were produced at HEW. This feat represented enormous and unprecedented achievements in engineering and physics, the largest scale-up in the history of chemical engineering, pioneering accomplishments in uranium fabrication and in environmental monitoring. Through the Cold War period, Hanford's plutonium production facilities played a major role in the production of the nation's nuclear materials, and considerable expansion of the research and development activities devoted to defense and non-defense missions.

Registration Requirements

Each 100 Area production facility was a functional unit, completely independent of the others. However, each production reactor (100 Area) was functionally dependent on the two other processing Areas on site; the 300 Area which manufactured the uranium fuel for the reactors, and the 200 Areas which was responsible for chemically processing the irradiated rods from the reactors. The critical components of each production area typically include the reactors buildings (100 Areas), uranium fuel rod production buildings and research and development laboratories (300 Areas), and chemical processing and treatment laboratories/separations plants (200 Area).

To be eligible for listing in the National Register of Historic Places under criterion A, **plutonium production facilities** need not possess an integrity of both exterior and interior features. Thus, a property can be significant for its historical associations (e.g., Manhattan Project and/or Cold War period) even if some of the original equipment has been removed from the interior. To maintain significant historical integrity under criterion A, plutonium production properties need only retain original location, setting, association, feeling, and exterior design. Properties primarily eligible under criterion C must meet a more stringent standard of physical integrity and may require a high level of both interior and exterior integrity.

Under criterion C, additions/modifications that reflect the changing missions on Site are acceptable. Changes in technology and missions on the Hanford Site are acceptable both under criterion A and C if they reflect the evolution of uses in many of the Site's structures, such as scientific experiments, establishment of testing/experimental laboratories, and mock-ups to support missions.

Subtype: Reactor Buildings

Production reactors and ancillary buildings are found in the 100 Areas. These reactors, including B, D, and F, have been retired from service and declared surplus; all except 105 N are currently available for decommissioning. The buildings/structures are potentially eligible for the Register under Criterion A due to their important association with the nationally significant Manhattan Project and Cold War periods, and possibly under criterion C if they possess distinctive methods of construction or building fabric and/or reflect unique design qualities.

The B Reactor is listed in the National Register of Historic Places, and 105 N and 105 KE have been determined eligible for inclusion in the Register. For the other reactor buildings to be eligible, standards of physical integrity need to be met that differ under criterion A versus criterion C. Under criterion C, buildings need to retain a level of interior and exterior integrity that reflects the type, style, and method of construction as originally planned. Additions and modifications that reflect the Site's changing missions and evolution of uses are acceptable. Under criterion A, a property need only retain original location, setting, association and exterior design. Thus, a property can be significant under criterion A even if much of the original interior equipment/engineering has been removed. The majority of the reactor building's processes have been modified because of the removal of machinery/equipment for health and safety concerns, such as excessive contamination, and due to changes in technology and Site missions.

All of the 105 reactors have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Uranium Production

The two original uranium production facilities, Buildings 313 and 314, are located in the 300 Area. These buildings are potentially eligible for the Register under Criterion A due to their important association with the nationally significant Manhattan Project/Cold War period. They need only possess integrity of exterior design features to be eligible under Criterion C. The buildings are representative of evolution in technology and changing Site missions. They have been the setting for numerous laboratories and scientific experiments, resulting in the removal of much of the two building's original interior equipment/technological features.

The 333 Fuels Manufacturing Building, completed in 1960 as the New Fuel Cladding Facility, was determined eligible for the Register by DOE-RL under criterion A for its fabrication of fuel elements for the Register-eligible N Reactor, and the weapons grade plutonium that resulted from irradiation of the 333 Building's fuel constituted a significant percentage of the nation's nuclear weapons capability.

The Washington SHPO originally recommended that the 313 Building was eligible for the Register as contributing to the character of a potential district in the 300 Area (The district, however, has yet to be officially evaluated for National Register eligibility.) Subsequent consultations between DOE-RL and the SHPO resulted in a programmatic agreement and establishment of the Hanford Site Historic District Treatment Plan (Sitewide Treatment Plan) for management of the Site's Manhattan Project/Cold War era buildings and structures. This agreement recognizes that Building 313, as well as Buildings 314, 333 and the 305 Test Pile Building to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Filter Plants and Refrigeration Buildings

These significant facilities are located in the 100 and 300 Areas, and functioned to purify and ready water for reactor use, and cool the process water before being sent to the reactors. The 183 Buildings, whose function was to add chemicals to purify and ready the raw water for reactor use, to filter the treated water, and store it, are eligible for the Register under criterion A due to their strategic association with the important second step in plutonium production. The DOE-RL has concluded that the 183 filter plants/chemical treatment buildings are contributing properties to the Register-eligible Hanford Site Historic District.

The 315 Filtered Water Plant, which functioned to filter Columbia River water to supply the 309 PRTR reservoir, has also been recommended as a contributing property to the Register-eligible Hanford Site Historic District.

The 189 D refrigeration building, which functioned to cool the process water before being sent through the reactors, was determined eligible for the Register under criterion A, and has been documented with the rest of the 190 D Development Laboratory Complex to Historic American Engineering Record (HAER) standards for mitigation purposes (Gerber and Harvey 1995a).

Subtype: Separations Plants and Process Laboratories

Separations and treatment laboratories are located in the 200 and 300 Areas. These facilities are potentially eligible for the Register under Criterion A due to their important association with the nationally significant Manhattan Project and Cold War periods, as the important third and final step in plutonium production. To be eligible under criterion C, exterior and interior design features must be maintained. Under criterion A, the integrity of the interiors is not as important, with only minimal evidence of intact machinery, equipment, and other features associated with the building's technological processes required.

The 221 T Plant has been determined eligible for the Register under Criteria A and C, is a contributing property to the Register-eligible Hanford Site Historic District, and mitigation recommendations noted in the Programmatic Agreement for the Built Environment specify documentation of 221 T to Historic American Engineering Record (HAER) standards. 221 B & U, as well as the 222, 224, 231 Z, 321, 3706, PUREX, and REDOX facilities, have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Building 233 S, the Plutonium Concentration Facility constructed as part of the REDOX Canyon and Service Facility's Phase II capacity increase, appeared to merit consideration as a contributing property to a potential historic district centered on the adjacent REDOX canyon building. DOE-RL has determined that 233 S is a contributing property to the Register-eligible Hanford Site Historic District, its mitigation completed in 1995 by documentation to Historic American Engineering Record (HAER) standards.

Subtype: Plutonium Finishing Plant (PFP) Complex

The PFP (234-5Z or Z Plant) complex, one of the most important facilities in the 200 West Area, is eligible for the National Register under criterion A due to its important Cold War era functions in processing plutonium-bearing chemical solutions and converting them into metal and oxide, and PRF's (236 Z) waste recovery and re-use capabilities of converting plutonium-bearing scrap materials into a concentrated plutonium nitrate product suitable for feedback into the plutonium finishing processes at 234-5Z. To be eligible under criterion A, the integrity of the interiors is not as important. The physical character of the structures in the complex need only to be sufficiently intact to convey the general function and period of significance. The original location, setting, association, feeling, and exterior designs are sufficient to make the historical association.

The PFP (234-5Z), PRF (236 Z), Plutonium Metallurgical Laboratory (231 Z), and the PFP South Annex (234-5 ZA) have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Building 232 Z, the Waste Incinerator Facility constructed in the PFP complex, was determined eligible for the Register by DOE-RL because it was a prototype for recovering plutonium through the incineration of solid contaminated wastes. 232 Z is a contributing property to the Register-eligible Hanford Site Historic District, its mitigation completed in 1995 by documentation to HAER standards.

Subtype: 300 Area Research and Development Laboratories

The intensification of the Cold War during the decade following the end of World War II saw continual expansions of Hanford's missions. In the 300 Area numerous buildings and structures were constructed during this period devoted to important research and development (R & D) activities for defense (and non-defense) purposes. These R & D facilities are eligible for the Register under criterion A due to their important association with Cold War era functions related to direct support of reactor development and nuclear energy experimentation's and design research.

The 320 Low-Level Radiochemistry Building, the 325 Radiochemistry Laboratory, the 326 Physics and Metallurgy Laboratory, the 327 Post Irradiation Test Laboratory, the 328 Mechanical Development Building, and the 329 Biophysics Laboratory have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

5.3.2 Associated Property Type: Military Defense Facilities

Description: From the beginning, security of Hanford's plutonium production facilities was a major concern. Security in the form of guard stations, patrol headquarters and fencing is described under the Administration, Site Security and Public Safety property type. This property type covers military defense of the Site. Facilities associated with this property type are found primarily in the 600 Area and 3000 Area.

Subtype: Camp Hanford

Description: Increased Cold War tensions with the Soviet Union and the outbreak of the Korean War prompted the Defense Department to establish a permanent Army presence at Hanford. On March 28, 1951 Camp Hanford was officially established. Properties associated with Camp Hanford and military presence at Hanford are found in the 600 and 3000 Areas.

Antiaircraft Artillery Units

Camp Hanford established various forward positions in the central reservation, North Slope, and in the Arid Lands Ecology (ALE) Area that provided air defense of the Site from 1951 through 1961. This was accomplished initially by ringing the Site with sixteen (16) antiaircraft artillery (AAA) batteries, equipped with 90 mm and 120 mm guns. The five AAA sites that have the most intact aboveground historic resources are located along Army Loop Road and on 200 East Hill: Sites H-61-H, H-51, H-50, H-42, and H-40. Sites H-40, H-42 and H-50 exhibit the most integrity due to the remains of the revetments and other sandbagged features.

Nike Missile Sites

Nike missile systems were developed after World War II to produce an air defense system with the capability of engaging high speed aerial targets at greater ranges than conventional antiaircraft artillery. Guided Nike missiles began to replace AAA gun emplacements in 1955 at Hanford when Nike Ajax missiles were emplaced. Several maps of the Hanford Site forward areas dated from 1956 to 1958 confirm that there were four Nike missile launch sites and four Nike radar control sites. Three were located on the North Slope, while the only relatively intact Nike radar control site and missile launch site is located at ALE (H-52-C and H-52-L). The Nike Hercules replaced the Ajax missiles in the late 1950's. By 1960, however, the development of the intercontinental ballistic missiles had rendered Nike missiles obsolete, and the Nike sites were abandoned when Camp Hanford was deactivated in 1960 and closed in 1961.

The former launch site of H-52 is currently managed by Battelle, Pacific Northwest Laboratory. Thirteen Nike-period buildings/structures (6652 Buildings) remain at the H-52 launch site, including the underground missile storage facility. The 6652-C barracks/radar control building is located at the H-52 radar control site on the top of Rattlesnake Ridge.

Camp Hanford Industrial Area

One of the components of Camp Hanford was the 3000 industrial Area. It provided maintenance and shipping/storage support activities for the defense installations in the forward areas on the Hanford Site. Located at the southern extent of Camp Hanford in North Richland, the industrial area contained the following extant buildings: brigade motor pool (Building 1226), ordnance maintenance and craft workers fabrication shops (Building 1240), warehouses for shipping and receiving dry goods (Buildings 1250 and 1252), dry cleaning facility (Building 1262), clothing sales and type writer repair (Building 1256), compressor house (Building 1242), signal maintenance shop (Building 1154), and oil and antifreeze storage (Building 1227). One of the shops, Building 1154, provided maintenance for AAA guns and NIKE missile electronic equipment and launcher systems.

Camp Hanford Administration

Located north of the 3000 industrial Area is the former Camp Hanford Headquarters Building, currently occupied by Battelle's, Pacific Northwest National Laboratory's Operations and Services Building (OSB). This is the only remaining Camp Hanford facility in North Richland outside of the 3000 industrial Area.

Statement of Significance

From the beginning, security of Hanford's plutonium production facilities was of utmost concern. Continued production expansion during the early post-World War II period brought pressure for a larger, more permanent military presence. Coupled with an increase in Cold War tensions with the Soviet Union and the outbreak of the Korean War prompted the Defense Department to establish Camp Hanford, a permanent Army presence, and the establishment of important antiaircraft artillery (AAA) defense systems.

The AAA and Nike sites were extremely important in the air defense of the Hanford Site. The AAA sites with their 90 mm and 120 mm gun emplacements, and the Nike sites with their Ajax and later Hercules guided missiles and launch and radar systems were strategic components in Camp Hanford's military defense of Hanford's nuclear reactors and other plutonium production facilities during the 1950's. Another important component of Camp Hanford was the 3000 Industrial Area. The Area provided strategic maintenance and shipping/storage support activities for the defense installations in the forward positions on the Hanford Site. Another important area was the administration area situated adjacent to the commercial and residential areas in the Camp Hanford cantonment in North Richland, symbolized by the former headquarters building situated north of the industrial area.

Registration Requirements

To be eligible for listing in the National Register of Historic Places under criterion A, **military defense facilities** need to be associated with the defense of the Hanford Site during the Manhattan Project and Cold War periods. Under criterion A, military defense properties need not possess integrity of both exterior and interior features. Thus, a property can be significant for its historical associations (e.g. military defense of the Site) even if some of the original features and equipment have been removed. To maintain historical integrity under criterion A military defense properties need only retain original location, setting, association, feeling and exterior design. To be eligible under criterion C, a property would need to meet a more stringent standard of exterior and interior integrity, and embody Site layout/design attributes, and distinctive methods of construction and building fabric.

Subtype: Camp Hanford

Antiaircraft Artillery (AAA) Units

The 16 AAA sites were located in the central reservation and the North Slope. The five most intact sites (H-40, H-42, H-50, H-51 and H-61-H) are situated along Army Loop Road and on 200 East Hill and have been determined eligible for listing in the Register due to their important association with the Cold War era and as being the best examples of installations which defended Hanford in the early post-World War II period. For the other AAA sites to be eligible for the Register, they would need to contain features and remains of the built environment that exhibit National Register characteristics. Eligible characteristics would include sandbagged revetments and other sandbagged structures, concrete pathways/sidewalks, and concrete entry pads and flooring. These features could possibly yield important information about the history of the AAA defense network.

Nike Missile Sites

There were four Nike missile launch and radar control sites at Hanford - - three were located on the North Slope and one at Fitzner-Eberhardt Arid Lands Ecology (FEALE) Reserve. The only relatively intact Nike complex (H-52 L & C) is located at the FEALE Reserve. To be eligible for the Register under criterion A, properties need to demonstrate an important association with the Nike missile program at Hanford. H-52 C & L, significant primarily for their historical association, need not possess an integrity of both exterior and interior features. Properties potentially eligible (like the Nike ALE site) under criterion A are significant insofar as the physical character of the structures or buildings is sufficiently intact to convey the general function and period of significance. The original location, setting, association, feeling, and exterior design of the property are sufficient to make the historical association. To be eligible under criterion C, properties would need to meet a more stringent standard of interior and exterior integrity, exhibit distinctive methods of construction or embody the characteristics of a period or type, and retain character-defining engineering features or equipment.

The H 52 L & C Nike complex has been determined by DOE-RL to be a contributing property to the Hanford Site Historic District.

Camp Hanford Industrial Area

There are 25 buildings/structures in the former industrial area for Camp Hanford, nine associated with the Camp Hanford era. The numerous military barracks and other living and working accommodations outside the industrial area, including the trailer park, were built as temporary structures and were removed in the years following the closure of Camp Hanford. The nine buildings, including eight other properties in the industrial or 3000

Area, were determined by DOE-RL to be ineligible for listing consideration in the National Register.

Camp Hanford Administration

The former Camp Hanford Administration building, located north of the 3000 Area and occupied by Battelle's Operations and Services facility, is a privately-owned property so registration requirements are not needed.

5.3.3 Associated Property Type: Utility and Maintenance Services

Description: Utility and maintenance services were located in the 100, 200, 300, 600, 700, and 1100 Areas of the Site. This property type includes the utilities and maintenance services and facilities related to the construction and functioning efforts of Hanford. The facilities are divided into six subtypes.

The subtypes include: Power, Heating and Air-Conditioning; Pump Houses; Change Houses; Maintenance and Repair Shops; General Equipment Storage Facilities; and Septic Systems.

Subtype: Power, Heating, and Air Conditioning

Description: Buildings associated with supplying power to Hanford were constructed in the 100, 200, 300, 600, and 700 Areas of the Site. Primary, secondary, and distribution substations each served as a step in supplying electrical power to Hanford. Power houses were steam plants which supplied steam power to the reactor turbines. Many of the original buildings have been removed or remodeled to accommodate changing Site activities. The subtypes described below include the approximate number of these structures built on Site, their original functions, and those still extant.

Substations

Primary substations (151, 251-N, and 351 Structures) existed in each 100 Area, and in the 200-North Area (serving all of the 200 Areas). Built in 1944, the 251 W Switch House is still extant. The 151 B and D Switch Houses, also built in 1944, are still intact. In 100 N the 151 N Substation and the 153 N Switchgear Building, built in 1964, are also extant. Electrical power for the Areas came off the Grand Coulee Dam-Bonneville Dam grid, via Midway Substation and the 151 Primary Substations. One 20,000 kVa transformer and one 15,000 kVa transformer were located in each 151 Building. The primary substations each contained a concrete block switch house, with a switch room, fan room, battery room, and a cable pit. A fenced area surrounded each block house, and contained a wooden frame bus structure, two main transformers, circuit breakers and terminal structures.

The 300 Area had two substations. The 351 B Substation functioned to supply power to the 305 Test Pile. The 351 A Substation functioned to supply power to the remainder of the 300 Area. Delivery of power to the 300 Area actually was made through the Pacific Power and Light Company's substation at Pasco, and former substation at the town of Hanford, and then to the 351-A and 351-B primary substations. In 1970 a new 351 electrical substation was constructed as the primary substation for the 300 Area, replacing the original 351 B substation. The following structures are extant: 351 A, built in 1943, the 352 D Switchgear Station, built in 1969, the 352 E Switch Station, built in 1972, and the 352 F Substation, built in 1978.

Ten secondary substations (152, 252-N, 252-E, 252-W Structures) were built in the 100-B Area, twelve in 100-D Area, and eleven in the 100-F Area. Other secondary substations were built in the other 100 Areas during the Cold War period. They served as a step in the electrical distribution system for the 100 Areas. None of the 152 structures remain. One of these structures was located just east of the 212-R Building, to serve the entire 200-N Area. It was much smaller than the secondary substations built to serve the 200-E and 200-W Areas. It served as a step in the electrical distribution system for the 200-N Area.

A secondary substation was built for each of the 200-E and 200-W Areas. Built in 1944 and still extant, the 252 E and 252 W Structures functioned as a step in the electrical distribution system for the 200 E and 200 W Areas.

Eight distribution substations (153, 253-N, 253 structures) were built in the 100-B Area, and six each in the 100-D and 100-F Areas. Other distribution substations were built in the other 100 Areas. Four of these structures were built in the 200-N Area, one for each Section of the Area. Thirteen structures were built in the 200-E Area, and 21 were built in the 200-W Area. Each served as a step in the electrical distribution system for the 200-E and 200-W Areas. All of these structures have been removed except for 153 N in the 100 N Area (Gerber 1993f).

Power Houses

One power house (184 Buildings) was built in each 100 Area. These steam plants functioned to supply power to steam turbine pumps for the secondary reactor coolant system, located in the 181, 182, 183, and 190 facilities. The 184 Buildings also supplied office heat and other heating needs through overhead steam lines (1802 Structures) that looped throughout the various 100 Areas. A small turbine generator in each 184 Building also supplied emergency electrical power for Area building lights and motors. The only extant 184 power house is located at 100 N.

A power house (284 Buildings) was built in 1944 in each of the 200-E and 200-W Areas. Still extant, the 284 Buildings were steam plants that functioned to supply power to steam turbine pumps for the heating and process needs of 200 Area buildings. Overhead steam lines (2802 Structures) conveyed the steam throughout the 200 Areas. The 284 Buildings were identical to the 184 Buildings except that they were smaller. These structures were modified considerably in power upgrades during the post-World War II period.

Heating Plant

A Heating Plant (384 Building) was built in the 300 Area. Still extant, the function of the 384 Heating Plant was to supply steam heat, via three coal-fired boilers and three oil-fired boiler to the Area buildings. The 384 Heating Plant was much smaller than the 184 and 284 Power Houses. It contained two stokers, seven pumps, various tanks, and a monorail hoist. A small addition on the west end of the building contained water softening equipment, and an elevated tank nearby stored the softened water. A 150-foot high, brick exhaust stack also was located at the west end of the 384 Building.

Emergency Generator Shelters

A total of twenty wood frame, one-room Emergency Generator Shelters (621, 721, 1621, 2621, 3621 Structures) were built in the 100, 200, 300, 600, and 700 Areas during the MED period. Their function was to house the emergency electric generators driven by gasoline motors. These sets were provided for buildings requiring continuos lighting service and were equipped for automatic starting in case of power failures. Others were constructed later during the Cold War period. All of the 2621 structures have been removed. 3621 D was built in 1974 to provide emergency power for the 300 Area. 3621 A, B and C have been demolished. Three of these structures were built in each 100 Area and in each of the 200 E and 200 W Areas. Three were also built in the 300 Area. Ten were built in the 600 Area. Only 621 B, built in 1944, remains in the 600 Area. The two built in the 700 Area have been demolished. Building 4721, an emergency generator facility built in 1982 in the 400 Area, is still extant.

Air Conditioning Equipment Building

One (3706 A Building) was constructed in the 300 Area. Located adjacent to 3706 (the Technical Laboratory Building), the 3706 A Air Conditioning Equipment Building functioned to house the ventilating and air conditioning equipment for Building 3706. 3706 A was constructed as one of the design changes necessitated by the increased ventilating capacity required by the numerous laboratories in 3706 (Gerber 1993f).

Subtype: Change Houses

Description: Change houses were found in most areas of the Site including the 100, 200, 300, 600, and 700 Areas. They provided clothes changing facilities for working personnel. Many of them were full service facilities with showers, lockers, and lunch rooms; some were smaller and only provided changing facilities.

The one Change House (1707 Buildings) built in each 100 Area have been removed. They functioned to provide facilities for employees to change to clothes needed to perform work in the 100 Areas - - coveralls, or full "SWP's" (a Hanford term derived from the words Special Work Permit and applied to the white clothing worn while performing jobs with radioactive materials covered by Special Work permits). Similar facilities were built in other areas of the Site: one each in 1944 in 200 E (2707 E) and 200 W (2707 W) for personnel working in the chemical processing areas and the support buildings. Change Houses 2707 AR, AX, SX, 2709 A, and 2716 B were added in the 1960's-70's. Change houses in the 300 Area include 3707 B, C, G, and H.

Subtype: Pump Houses, Lift Stations, and Wells

Description: Pump houses, and lift stations were located in the 100, 200, 300, and 1100 Areas.

River Pump Houses

One river pump house (181 Structures) was constructed in each 100 Area. Located on the shore of the Columbia River, these structures existed to draw cooling water for the reactors from the river. They did so by means of ten electric-driven pumps. Aside from pumps, the 181 Buildings contained compressors, sluice gates, and three hoists and monorails. Subsequent structural modifications during the Cold War period enlarged the pumping capacity of the river pump houses considerably. River pump houses remain in 100 B, D, KE, KW, and N.

Reservoirs and Pump Houses

Reservoir and pump houses (182 Structures) were constructed in each 100 Area. The purpose of these structures was to provide reserve (secondary backup) water for reactor cooling, water for steam condensers, and raw water for the 200 Areas (known as "export water"). Initially, the 182 B Buildings also supplied water for the 183 B Filter Plants. However, this latter function was modified in during the post-World War II era. 182 structures remain in 100 B, D, K and N.

Still extant, reservoir and water inlet/pump houses (282 Structures) were built in each of the 200 East and 200 West Areas. They were identical in design (to the 182 Structures) except for the location of the inlet house. The function of the 282 Structures was to furnish raw water to the 283 Filter Plant Buildings, cooling water to the chemical process areas, and an emergency backup water supply to the 284 Power Houses. The 282 Structures each consisted of a reservoir building (built in 1944) and an open concrete reservoir with a capacity of 3 million gallons, an inlet house (built in 1944; 282 EB Inlet House was added in 200 East in 1967) that contained the valving and piping that diverted the incoming, concrete "export" water line from the 100 Areas to steel pipelines, a pump house building (282 B and 282 BA pump houses were added at 200 East in 1963 and 1967 respectively), and a covered pit next to the pump house for the storage of chlorine cylinders.

The 382 pump house was constructed in 1944 in the 300 Area. Still extant, the pump house's function was to supply treated water to the 384 Heating Plant and to supply the remainder of 300 Area fire and process water needs. Due to the expansions to the 313 and 3706 Buildings that took place during 1944, additional water treatment capacity was needed in the 384 Building. As finished, the 382 Building was much smaller than Buildings 182 and 282. It consisted of a pump house containing pumps, engines, a generator and chlorinating equipment, and a 200,000 gallon reservoir.

The 1608 wastewater pump houses/lift stations are located in the 100 B, D, H and F Areas.

Process Pump Houses

A Process Pump House (190 Structures) was built in each 100 Area (except 100 N). Basically, they housed the next step in the reactor cooling water treatment process after the treatment and filtration steps that occurred in the 183 Buildings. Reactor process water was pumped to four 1,750,000 gallon steel storage tanks in the 190 Pump House, where sodium dichromate ($Na_2Cr_2O_7$) was added to inhibit corrosion on the reactor's process tubes. Twelve sets of steam and electric pumps (a pair of each in each set), were located in the 190 B Buildings. Their function was to pump the ready water through the reactor (105 Buildings). 190 structures remain only in 100 KE and KW (Gerber 1993f).

Wells and Pump Houses

An unknown number of wells and pump houses (905 Structures) were built at Hanford, in the 200 N, 300, 600 and 1100 Areas. The wells located in the 600 Area provided water for drinking and sanitary purposes. The wells located in other areas of the Site were probably used for other purposes as well, such as processing, heating, cooling, and laboratory use.

Irrigation Piping and Pump House

The 1186 Facilities functioned to transport Yakima River irrigation water to the parks, individual lawns, and other sites needing sustenance in the 1100 Area. The pre-Site Richland Irrigation Company canal and its wooden stave, steel-bound underground water mains (approximately 25 miles long each), along with the pump house, became federal government property in 1943. The main diversion dam, located on the Yakima River about 10 miles northwest of Richland, was not appropriated because it also supplied water to the Kennewick Irrigation District. The system then was expanded by government installation of 319,520 feet of additional underground piping, as well as five new pump houses. The new piping varied from one to 24 inches in diameter, and was partly spiral welded black steel pipe and partly wrought iron and black steel pipe.

HEW Village Wells and Well Pump Houses

The water supply for HEW Village was based on eight wells, with a total capacity of 6,000 gpm (1185 Structures). The wells, along with the eight 1185 Well Pump Houses and the 1103 Water Lines, functioned to provide drinking and fire protection water to Richland. According to DuPont, wells were chosen for the village water supply, rather than a Columbia River-based supply, because wells were much easier and quicker to construct, and the water from them did not require filtering (Gerber 1993f).

Subtype: Maintenance and Repair Shops

Description: The maintenance and repair shops included paint and carpentry services, central fabrication, electrical transportation parts and storage, automotive repair, general area shops, and water treatment. The facilities were built in almost every area of the Site.

Paint Shops

Paint Shops were located in the 200 Area (2722, 2715 T, M, EB, EC, ED), 300 Area (301 A, 350 A, 3709), 400 Area (4722 C), 700 Area (722 D and 722 E), and at the former Camp Hanford in the 3000 Area (1208). Their function was to store paint and to paint equipment and other surfaces that did not need to be painted in place.

Central Fabrication Shops

They functioned to fabricate the metallic shapes, tools, parts and other materials needed in the Areas. Building 1240, a former fabrication shop in the 3000 Industrial Area, was built in 1951 to provide support functions for Camp Hanford. 277 W, built (1952) in 200 West as a fabrication shop, 2101 M, built (1953) as the Site's major machine shop in 200 East, and 1171, built (1954) as a transportation maintenance shop in the 1100 Area, are still extant.

Carpenter Shops

Building 275 E, built in 1944 in 200 East, still functions as a carpenter shop. The 305 A building was constructed to provide storage for the 305 and 305 B facilities, and served as a pipefitter/electrical shop. In the 300 Area, Building 3722 served as a carpenter shop.

Automotive Repair Shops

The 3716 building was constructed in 1944 in the 300 Area. Its function was to house the repair and maintenance facilities for 300 Area vehicles. In 1962 it was remodeled into the Metallurgical Development Laboratory.

Building 1226, built in 1951 in the 3000 Area, provided automotive maintenance services for the Camp Hanford motor pool. The building is still used for automobile maintenance.

Building 1171 has been the main automobile and railway shop maintenance facility in the 1100 Area since its construction in 1954.

Combined Shops (1717 Structures)

One of these structures was built in each 100 Area except KE and KW which combined theirs. Each contained a machine shop, a carpenter shop, a pipe shop, and a sheet metal shop, an electric shop, a forge shop, a tool room, and six offices. These structures functioned to house the repair and fabrication facilities for repairs needed in 100 Areas operations. The only remaining 1717 shop is in the 100 K Area.

Building 1240, built in 1951 in the 3000 Area, was a machine and forge/metal shop, providing fabrication services for Camp Hanford. It is currently abandoned.

Instrument Shop

The 3717 Structure was built in 1944 in the 300 Area. Its original function was to house the fabrication and testing equipment needed for the specialized instruments used in 300 Area work (chemical experimentation, fuel fabrication and test reactor operations). It was also known as the Sheet Metal and Engineering Building. Today it functions as a spare parts warehouse.

Standards Buildings (3745, 3745 A, 3745 B, 3717 B)

The 3745, 3745 A, 3745 B and 3717 B buildings, built in 1945, 1948, 1954, 1944 respectively are located in the 300 Area. Their function was to calibrate a large variety of radiation detection instruments, using X-ray, alpha, gamma and neutron sources. The buildings accelerators provided a high dose rate of X-ray exposure for routine calibration of radiation protection instruments on the Hanford Site.

Area Shops

Area Shops (1722, 272, 722 A, 3722) functioned to provide auxiliary capability for small repair jobs on 100 Area equipment and parts. The 1722 structures built for each of the 100 B and 100 D Areas have been demolished. The 1722 building is still extant in 100 N. Three 272 shops remain each in 200 East and 200 West. The 722 A building, no longer a DOE facility, is owned and operated by the City of Richland.

Note: In each of the 100 B and 100 D Areas, one 1722 Building was converted from the

TC Electrical Shop in the 100 B Area, and from the TC Millwright Shop in the 100 D Area.

The 272 Buildings, built in 1944, are located in 200 East and 200 West. The specific function of the 272 Shops was to assemble and fit the equipment used in the cells of the 221 Buildings. Both structures contained a machine shop, electrical shop, pipe shop, forge and welding shop, carpenter shop, tool room with crib, six offices and a rest room. In addition to these features, the 272 West Shop contained a sheet metal shop and a sand blasting room. The 272 East Shop contained ten working bays, while the 272 West Shop contained only six bays with the remainder of the ground floor a large, open space. A high portion of each building also contained three dummy or mock-up cells that were identical to the cells with the 221 Buildings. The south end of 272 East Building, and the north end of 272 West Building, were served by a railroad spur that extended the length of the buildings in order to handle large tanks and heavy equipment (Gerber 1993f).

In 200 West, 272 S, a maintenance shop, was built in the 1950's. Building 272 U was added in 1956, while 272 UA was built in 1988. 272 WA, a shop/office facility, was built in 1985. In 200 East, 272 B, a service shop, was built in the 1950's. Building 272 BA, a storage building, was added in 1971, while 272 AW, a metal shop office building, was built in 1978. 274 E, a maintenance shop, was built in 1944.

The 400 Area has numerous maintenance and craft shops: 4814, 4760, 4722 B, 437, and 4713 B & A.

The 3722 Building is located in the 300 Area. It originally functioned as a carpenter shop to fabricate and repair facilities for various area equipment (although not for the specialized instruments handled in the 3717 Building). Between 1964-67, the facility housed production and canning of the lithium-aluminate fuel targets for tritium production in N Reactor. From 1968-70, thorium oxide fuel targets for producing uranium-233 in Hanford's single pass reactors were fabricated in this building. In 1973, the building reverted back to its original use as a carpenter/ironworker shop for Kaiser Engineers Hanford (Gerber 1992b).

The 328 Mechanical Development Building was built for the purpose of supporting the 325, 326, 327, and 329 laboratories in the 300 Area. The facility has provided space for a main metal and machine shop, two-mock-up shops, a drafting room, as well as a welding, paint, carpentry, glass-blowing shops and other specialized craft equipment (Gerber 1992b).

The 722 A Building functioned as a general shop, performing building, fitting and repair functions that were not specialized as carpentry, paint work, rotary press work, or electrical work.

Subtype: General Materials and Equipment Storage Facilities

Description: Gas storage facilities as well as equipment storage buildings were located in all Areas of the Site. There was a large number of ancillary type support buildings that were involved in storing materials.

<u>Gas Storage Tanks (also called Gas Transfer and Unloading Structures)</u>

One of these structures (115 Buildings) was built in each 100 Area (except 100 N). Only

115 KE and KW remain. Their function was to house the storage tanks and cylinders that held the helium and carbon dioxide for the reactor gas atmosphere. Helium arrived at HEW in rail cars, was unloaded into high pressure storage tanks at the 110 Buildings, and then was transferred into low pressure tanks for makeup in the 115 Buildings (Gerber 1993f).

Machinery Storehouses

One Machinery Storehouse (274 Buildings) was built in each of the 200 East and 200 West Areas, and are both extant. The function of these buildings was to store extra machinery for use in the chemical processing plants and/or their support structures.

Note: In each of the 100 B and 100 D Areas, the 1729 Building was converted from the TC Pipe Storage Warehouse (Gerber 1993f).

Construction Materials Storage

Located in the 300 Area are the 350 B, C, D, 3707 E and 3718 A, B, C, E, F, G, M, N, and O storage buildings. The remaining Oil and Paint Storage Buildings (1714 KE & KW, 2715, 1207, 1208, 1227, 3710 A, 3723 structures) were built to house oil and paint supplies in the 100 Areas, 200 East and West, and the 300 and 3000 Areas.

Gas Cylinder Storage Buildings (1734, 2734, 3734, 432 A, 734 Structures)

One 1734 structure was built in each 100 Area. (Only 1734 N at 100 N remains.) These buildings each contained four storage areas lined with wooden storage racks curved to fit the shapes of gas storage cylinders.

Several 2734 structures were built in each of the 200 East and 200 West Areas. Two 3734 buildings are located in the 300 Area. Their function was to house both "live" (unused) and "dead" (used or empty) cylinders that held various gases (mostly oxygen, hydrogen and acetylene) used in 300 Area operations. Their mission changed in the 1950's to become storage facilities for insulating materials such as asbestos, industrial glue and fixants, and paints and solvents.

One bottled gas storage building (432 A) is located in the 400 Area. Built in 1987, 432 A provides a weather-protected storage area for bottled gas cylinders used at FFTF.

Miscellaneous Storerooms

1713 structures were built in each of the 100 Areas. An identical building was built for 200 East and 200 West (2713 Building). They functioned to hold miscellaneous materials necessary for everyday activities in the 100 Areas, including janitorial supplies and small chemical stores used for non-process activities. Each storeroom also contained two gasoline tanks, an oil tank, and a safe. The only remaining 1713 storerooms are in 100 KE and KW.

200 Area Storerooms included 2713 B Buildings constructed in 1944 in 200 East and 200 West. Other 200 Area storage facilities included 2715 B, S, U, Z and ZL.

Note: The 2713 EB Building was formerly the 200 East Area TC Pipe Warehouse. The 2713 WB Building was formerly the TC Igloo Warehouse structure (Gerber 1993f).

400 Area storage facilities included Buildings 4726, 4734 D, 4791 TC, and 4843.

A Receiving Storeroom (3713 Building) was built in 1943 in the 300 Area. Its functions were to receive and store spare machinery and miscellaneous stores for the 300 Area and to hold materials waiting for salvage.

Two Permanent Records Storage Hutments (712 Buildings) were built in the 700 Area, next to each other with a connecting passageway in the southeast corner of the area. While not composed of the same two hutments that constituted the 712 structure in World War II, they continue to function as the repository for the permanent records of the entire HEW project and Cold War period.

Subtype: Septic and Waste Process Sewer Systems

Description: The septic system was located throughout the Site, but was referred to as 600 and 900 Area structures.

<u>Septic Tanks</u>

Thirty-three septic tanks and tile fields (607 Structures) were emplaced in the 100, 200, 300 and 600 Areas for the disposal of sanitary sewage. Many different sizes of tanks were used, but all fell into two types or categories. For tanks having a capacity of 25 persons per day or less, the design was rectangular with eight-inch thick walls and floor slab, and wooden tops and baffles. For tanks having a capacity of more than 25 persons per day, the design was rectangular with one-foot thick concrete walls, floors and tops (pierced by three manholes with wooden covers). The design basis for both types of tanks was 35 gallons of sewage per capita with a 24 hour retention period. All of the septic tanks at HEW drained into the surrounding soil via "irrigation fields" or "tile fields" composed of four-inch vitrified clay or concrete tile (Gerber 1993f).

A total of 53,745 feet of sanitary sewer lines (903 Structures) ranging from four-inch to 15-inch pipe was emplaced at HEW. In all areas except the 700 and 1100 Areas, these lines were connected to Septic Tanks (607 Structures). The sewer lines in the 700 and 1100 Areas were connected to the now-demolished HEW Village Sanitary Sewage Disposal Plant (Gerber 1993f).

Note: The sewer lines in the HEW Village were designated as the 1104 Structures.

<u>Process Sewer Lines</u>

The 904 Structures were emplaced in the 100, 200, 300, and 600 Areas to carry some process wastes, process waste and cooling water, steam condensate and building floor drainage to various points for disposal in open drainage ditches or in the Columbia River.

200 Area
Many independent process sewer systems existed in the 200 East and 200 West Areas. Each process group (T, B and U) had three process sewer networks. From the 221, 222, 224, and 291 Buildings, one such system carried process waste to the 241 Storage Tanks, one carried cooling water to the 241 Retention Basins, and one transported chemical waste,

building floor drainage and steam condensate to open drainage ditches (2612 Structures). Other separate process sewer systems served the 200 West Power and Service Area, the 231 Building, the 200 East Power Area, and the 200 East Service Area. The latter system primarily existed to carry waste from the 273 Heat Treating Furnace Structure (Gerber 1993f).

In the 200 North Area, each 212 Lag Storage Building was provided with a separate outfall process sewer that ran due south and emptied into a main 2912-N open drainage ditch.

300 Area

In the 300 Area, the process sewer network serving each building was connected to form a single system. 3904 Lines from the 305, 313, 314, 321, 382, 384, 3706, 3709 and 3717 Buildings connected through laterals to a main, 18-inch, vitrified clay pipe that ran eastward through the area to a settling basin about 800 feet east of the boundary fence. This basin, known as the Process Pond, served as a percolation vehicle for wastes to seep into the soils (Gerber 1993f).

Increases in radioactive levels in the main process pond and a large release of uranyl nitrate hexahydrate (UNH) from the 321 Building led to the decision in 1948 to build the 300 North Cribs about five miles north of the 300 Area (Gerber 1993c). An additional process pond, the North Process Pond, was constructed. In 1953, two 307 Trenches were constructed north of the 324 Building.

> **Active until 1963, these trenches received liquid waste and sludge from the South Process Pond . . . The North and South Process Ponds were phased out of service in 1974 and 1975. During the same years, two 300 Area Process Trenches (West and East Process Trenches) were constructed on a north-south axis just north and west of the old Process Ponds. Since then, 300 Area process wastes have gone to these 1500 foot facilities . . . (Gerber 1993c: 55, 57).**

With the expansion of plutonium production facilities and laboratories during the early 1950's brought an urgent need for a more modern and efficient means to sample and dispose of radioactive effluents from the Area. This led to the construction of the 340 Retention and Neutralization Building and the 307 Basins.

> **If radioactivity was not detected above release limits, these wastes were disposed of to the 307 Trenches. If levels proved to be above release limits, the effluents were pumped into the 340 Building tanks and then trucked to the 200 Area disposal facilities (Gerber, 1993c: 57).**

Six solid waste burial grounds were located and used in the 300 Area, and the grounds and burial containers reflected 300 Area missions and changing technology. For example, solid waste burial practices for the 300 Area began to change when high-level radiochemical and metallurgical operations were instituted in Buildings 325 and 327 in the early 1950's. "Beginning about 1960, after waste had become hotter in the 325 and 327 Buildings, cardboard waste containers and gunk catchers were replaced by the milk pail disposal system" (Gerber 1993c: 59). Solid waste disposal procedures for the 300 Area continued to evolve during the late 1960's with solid waste shipments to the Wye Burial Grounds. After Wye's closure in 1970, shipments went to the 200 Area Burial Grounds.

Statement of Significance

The significance of **utility and maintenance services** is centered around the supplying of power to the 300 and 100 Areas for production of uranium fuel to the reactors and irradiation of the fuel elements, and finally to the 200 Areas where chemical processes converted the irradiated fuel into plutonium. The pump houses were important because they drew water from the Columbia River as well as from reservoirs and wells for cooling the reactors and chemical process areas, and for supplying water to the power plants for steam used for heating. The retention basins were important for they retained reactor effluent for a period of time to allow partial decay of short-lived radionuclides in the waste water before the water was released into the Columbia River.

Other significant facilities included maintenance and repair shops that were built to ensure that utilities functioned efficiently, storage tanks and rooms that held chemicals for processing and waste solutions, and equipment storage that included buildings for everything from gas storage tanks to general area shops. Changing rooms were important because they provided a place for workers to switch from work clothes into street clothes. Of equal importance was the septic system that was built to dispose of the effluent and other waste waters produced throughout the Site.

Registration Requirements

To be eligible for listing in the National Register of Historic Places under criterion A, the **utility and maintenance services**, which supported reactor and plutonium production facilities, must be intact examples of one of the identified subtypes and functioned as a significant support facility in their historical association with the Manhattan Project and/or Cold War periods. Changes in missions and technology on the Hanford Site since the Manhattan Project are reflected in the evolutionary use of many of these structures. Due to the utilitarian and technological nature of the Site, modifications/additions are viewed as conveying the evolutionary changes in the built environment. Thus, the building or structures that reflect these changes could be eligible for listing consideration in the Register under criterion C.

Subtype: Power, Heating, and Air-Conditioning

Power houses, substations, and distribution stations, that supplied electricity to the Site, were found in the 100, 200, 300, 600, and 700 Areas. Heating plants and air conditioning buildings are still located in the 200, 300 and 700 Areas. These facilities are potentially eligible for the Register under Criterion A if they convey significance as physically intact support properties associated with the nationally significant Manhattan Project and Cold War periods and under Criterion C for industrial design/function considerations.

Power line towers and Microwave towers have been determined by DOE-RL and the Washington SHPO to be exempt from the historic property inventory form documentation requirement due to the minor role the structures have played at the Hanford Site.

The 284 West and East Power Houses were recommended by the Washington SHPO as eligible for listing in the National Register. The 284 buildings generated power for use in the various processes in the 200 Area since their construction in 1944, and thus, were significantly associated with both the Manhattan Project and Cold War eras. Both have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

The 384 Heating Plant has also been determined by DOE-RL to be a contributing property to the Register-eligible Hanford Site Historic District.

Subtype: Change Houses

Change houses are found in the 100, 200, 300, 600, and 700 Areas. They usually contain locker rooms and lunch rooms. These facilities are potentially eligible under criterion A if they illustrate worker experiences/health and safety concerns essential to a comprehensive understanding of the Manhattan Project and Cold War periods on the Hanford Site.

2707 AR, E, BY, SX, AX, W, 2709 A, 3707 G, 3707 H and 3707 B and C have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Pump Houses, Lift Stations, and Wells

Pump houses and retention basins, wells and irrigation piping and water storage tanks are located in the 100, 200 East, 200 West, 300 and 1100 Areas. These structures are potentially eligible under Criterion A if they illustrate the infrastructure development essential to a comprehensive understanding of the Manhattan Project and/or Cold War periods. Changes in missions and technology on the Hanford Site since the Manhattan Project are reflected in the evolutionary use of many of these structures. Due to the utilitarian and technological nature of the Site, modifications and additions are viewed as conveying the evolutionary changes in the built environment. Thus, the building or structures that reflect these changes can be eligible for listing consideration.

The recently demolished 190 DR process pump house was determined eligible for the Register under criterion A, and documented to HAER standards for mitigation purposes. DOE-RL has concluded that 190 KE and KW are contributing properties to the Register-eligible Hanford Site Historic District.

Wells, irrigation piping and water storage tanks have been determined by DOE-RL and the Washington SHPO to be exempt from the historic property inventory form documentation requirement due to the minor role these structures have played at the Hanford Site.

The Washington SHPO has recommended that the 181 B and D River Pump Houses are eligible for the Register under criterion A based upon their significant association with B and D Reactors, and the important role the properties played in the plutonium production process. All of the 100 Area river pump houses, including the 182 reservoir and pump houses, have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

The 282 reservoir and pump houses, located in 200 East and West, and the 382 pump house in the 300 Area, have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Maintenance and Repair Shops

Maintenance and repair shops are located in all areas of the Site. These structures may be eligible under Criterion A if they illustrate worker experiences and infrastructure development essential to a comprehensive understanding of the Manhattan Project and Cold War periods on the Hanford Site. While many of these buildings have taken on various other functions and have been modified accordingly, they still may be eligible under criterion C if they convey evolutionary and technological changes common to facilities of this type.

The Washington SHPO has recommended that Buildings 3745 A and 3745 B, accelerator laboratories that calibrated radiation detection instruments, are eligible for the Register as contributing properties to a potential historic district in the 300 Area. DOE-RL has determined that 3745 A & B are contributing properties to the Register-eligible Hanford Site Historic District.

Maintenance and repair shops 3722, 350, 350-A, 437, 1120-N, 1517-N, 1518-N, 1519-N, 3709 and several others have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: General Equipment Storage Facilities

General equipment storage facilities are located in all areas of the Site, and numerous of them have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District. These structures are potentially eligible under Criterion A if they are physically intact and illustrate important infrastructure development essential to a comprehensive understanding of the Manhattan Project and Cold War era periods and resulting imprint on the Hanford Site.

Subtype: Septic and Waste Process Sewer Systems

Septic tanks, waste process sewer systems and tile fields are found in the 100, 200, 300, and 600 Areas. The system consists of an integrated network of sanitary and non-sanitary sewer lines and tanks. The DOE-RL has determined that septic and waste process sewer systems are exempt from the historic property inventory form documentation requirement if the structures have minimal or no visible surface manifestations. While the sewer lines themselves may not be eligible, some of the associated buildings may hold contributing elements as historic facilities.

5.3.4 Associated Property Type: Administration, Site Security, Health and Safety Facilities

Description: Administration, Site security, health and safety facilities were located in the 100, 200, 300, 600, 700, 1100, and 3000 Areas. General supervisory offices provided administrative functions. Site security personnel were located throughout the Site in guard towers, patrol headquarters, and guard/badge houses. A rifle and pistol range complex, located in the 600 Area, was used to train Hanford Site patrolmen. First aid facilities were located in the 100, 200, 300, and 400 Areas. Fire Stations and headquarters were located in the 100, 200, 300, 400, and 600 Areas.

Subtype: Administrative Facilities

Description: During the Manhattan Project and early Cold War period, administrative facilities/offices were found in the 100, 200, 300, and 700 Areas. During the later Cold War period administrative facilities/offices were also constructed in the 400, 1100 and 3000 Areas.

Administration Buildings

The 703 Building was constructed in the 700 Area in 1952. Its function was to house the central administrative offices for the Site. A large building with six wings, the 703 Building was increased in size by approximately 40% during its construction phase. The Employment Building (705 Building), now demolished, housed personnel recruiting, processing and termination offices for HEW and during the Cold War period.

The Federal Building, a General Services Administration facility, was completed in the 700 Area in 1963. It currently houses the Richland Operations Offices for the U. S. Department of Energy.

Battelle, Pacific Northwest Laboratory's Operations and Services Building (OSB) is located north of the 3000 Area in North Richland. The building was constructed circa 1951 as the main administration facility for Camp Hanford.

Supervisor's Office Buildings and other administrative and general office facilities are located in the following Areas and buildings:

200 East	-	2722, 2713 E, 222 B, 2750, 2751, 2752, 2753, 271 B, 2704 C
200 West	-	2723, 270 Z, 271 T, 222 T, 222 U, 271 U
300 Area	-	3762, 3763, 3764, 3702, 3703, 3765, 3766, 3767, 3768, 3769, 3770, 3790, 337, 3707 D
400 Area	-	4702, 4706, 4707, 4802, 4710, 4862
1100 Area	-	1167 A
3000 Area	-	1256, 1262, 1264, 1301.

All the Manhattan Project/Cold War period administrative facilities in the 100 Areas have been removed (except trailers, modular buildings, prefabricated units).

Subtype: Site Security

Description: Security buildings (e.g. guard/badge houses) and related facilities were found in the 100, 200, 300, 600 and 700 Areas.

Rifle and Pistol Range

Located at the east end of Gable Mountain, the 661 Complex was a TC facility for training HEW patrolmen in weapons use. It consisted of a Range House Building, Well Pump House and four firing ranges. The entire complex was 1,250 feet by 1,820 feet and was surrounded on three sides by a Type No. 1, three-strand, barbed wire fence. (Gable Mountain forms a natural access barrier on the fourth side.) The ranges were of four different types: a regular Army pistol range, a Federal Bureau of Investigation "killer course" range, a submachine gun-range, and a "walk and draw" pistol range. The first two ranges were covered with a two-inch thick bituminous road mix, and the latter two ranges were equipped with manually operated, moving targets. The Range House Building was located on the opposite side of the access road from the ranges. A more recent 661 complex was constructed in 1982 (Gerber 1993f).

Badge and Guard Houses

Located at the entrance to each Area, these structures functioned to verify the identification of employees entering for work and anyone else attempting to enter the Areas. Of the 1701 series badge/guard houses built in the 100 Area, only 1701 K and 1701 BA are extant. The 1112 N and 1112 NB guard/badge houses are extant at 100 N. In 200 East, there is 2701 AB at PUREX. In 200 West, there is 2701 Z (built 1949), 2701 ZA, the Central Alarm Station, 2701 ZB, 2701 ZC, 2701 ZD, and 2701 W. The rest of the 2701 series guard/badge houses have been removed. The 3701 U Building, built in 1979 as a badge house/security facility for the south entrance of the 300 Area, has been remodeled into office space. 3701 N, built in 1965 as the badge house for the north entrance to the 300 Area, has been abandoned. In the 400 Area, 4701 B (built in 1980) served as a manned guard station until 1993 when it was converted to a center for safety drills for FMEF. 4701 A, built in 1978, is still extant.

<u>Patrol Headquarters</u>

One 1720 Building was built in each 100 Area. The only remaining 1720 patrol headquarters is at 100 K. There is a 2720 W guard house in 200 West, and the former 2721 E patrol headquarters is in 200 East, both built in 1983. Each contain a locker room, assembly room, and offices. They originally functioned to house the patrol personnel who guarded the 100 and 200 Areas. The structures built in the 200 Areas were identical in function and physical description to the 1720 Buildings, except that the 2720-21 Buildings were slightly smaller than the 1720 Structures. In the 300 Area, Building 3701 D (built in 1981) serves as the on-Site headquarters for the Benton County Sheriff and Emergency Control Center for the 300 and 400 Areas. Building 3707 D, constructed in 1944, was for a period the headquarters for the Hanford Patrol in the 300 Area, and a patrol checking station for the 300 North Exclusion Area. The building currently houses administrative offices. In the 400 Area the 4790 patrol headquarters, built in 1978, provides space for the Security Operation Center.

Subtype: Health and Safety, Waterlines and Fire Control

Description: First aid buildings were found in the 100, 200, 300, 400 and 700 Areas. Water and fire control lines were located throughout the Site. Fire headquarters were located in the 100, 200, and 300, 400, 600, 700 and 1100 Areas.

<u>First Aid Buildings</u>

In 200 West, the 2719 WA first aid facility is currently abandoned. In 200 East, the 2719 medical aid building has been converted into a computer/shop facility. They functioned to provide immediate care for injuries received by 100 and 200 Area personnel. The 3719 first aid station in the 300 Area was demolished in 1978. The 4719 Building served as the medical aid station in the 400 Area from its construction in 1979 to its abandonment in 1995.

<u>Water and Fire Lines (including elevated water storage tanks)</u>

The 901 structures at HEW were located under ground, and provided water for process, heating, cooling, laboratory, drinking, and sanitary purposes to the 100 Areas and to other process areas on Site. Lines that carried water from the 100 Areas to the 200 East and 200 West Areas were known specifically as export water lines (901-1 Structures). Piping for fire protection purposes was designated as 902 Facilities.

The 1901, 1901-1 and 1902 Structures included river water lines running from the 181 Buildings to the 182 Buildings (and to the 189-D and 189-F Buildings). Export water lines to supply sanitary and raw water to the 200-E and 200-W Areas ran from the 182 to the 282 Buildings. Raw and condensed water lines ran from the 182 to the 190 Buildings, and hot condensed water return lines were provided from the 190 to the 182 Buildings. Filtered water lines ran from the 183 to the 190 Buildings (via the 186 Building in the 100-D Area) and from the 190 to the 105 Buildings. In the 100-D Area, the pipes running from the 186 to the 190 Buildings were known as demineralized water lines.

The 2901 and 2902 Structures, built during World War II in 200 East and 200 West, included process water lines that ran from the 282 Buildings to the 221, 224 and 231 Buildings, and sanitary water lines that ran from the 282 Buildings to all area buildings via the 283 Filter Plants. A 100,000 gallon elevated tank was provided near the 2709 Fire Headquarters Buildings, a 50,000 gallon fire fighting reserve tank was provided in each of the T, B and U process group areas, and a 50,000 gallon tank for the storage of softened water was provided at each of the 284 East and 284 West Buildings.

The 200 North Area had an independent water supply, emanating from two wells (2905 North Structures) drilled in the fenced areas surrounding the 212-R Building. From these wells, 2901 and 2902 water lines ran due west to each 212 Building.

The 300 Area water supply also was independent, and emanated from two wells in the southeast corner of the area. All of the water was chlorinated, and then distributed throughout the area via two main piping loops that ran from the wells to various buildings, for process, heating, cooling, laboratory, fire, drinking and sanitary purposes. A 75,000 gallon, elevated water tank was connected to this system for fire protection purposes. The 3902 A and 3902 B elevated water tanks, which still remain, were constructed in 1943 and 1949 respectively.

The 400 Area water supply also was independent, using several water supply wells in the area. Water Supply Well's No. 1, 2, and 3 (480 A, B, C) provide water for use in the 400 Area. The 481 Water Pumphouse provides space for sanitary water pumps, an electric fire pump, and a diesel fire pump. The building also houses two sanitary water chlorinators. 481 A provides space for a diesel fire pump and two sanitary water pumps. The 400 Area has three water storage tanks, 482 A, B, C. 482 A is reserved for 400 Area fire water, 482 B is used for sanitary water, and 482 C is reserved for fire protection, along with approximately 50,000 gallons used as sanitary water.

The 600 Area water supply came from a well dug at the former Riverland Classification Rail Yard. The 6186 water treatment plant, now demolished, functioned to soften and chlorinate the water, and was built over this well. A 25,000 gallon, elevated tank for chlorinated water storage was located next to the 6186 Building. Another well in the 600 Area was located in the 661 Rifle and Pistol Range enclosure.

All 901 Structures were buried at least four feet below grade, and were surrounded by concrete kicker blocks at connections with sharp bends. All main lines were encased in concrete under road and rail crossings (Gerber 1993f).

<u>Fire Headquarters</u>

Fire Headquarters (1709, 2709, 3709, 4704 Structures) were built in each 100 Area, 200 East and West, 300, 400 and 600 Areas. They functioned to house fire protection equipment and personnel for the Areas. In the 400 Area, 4704 S was converted to a fire station in 1986. The 3709 Building served as the fire station in the 300 Area from 1944 to 1967 when it was replaced by Building 3709 A. In the 600 Area there are the 609 and 609 A fire stations. The 100 (except for 100 N) and 200 Area fire stations have been removed. 2709 W, a fire station built in 1965, is now used as an office building.

Statement of Significance

The significance of **administration, Site security, health and safety facilities** is conveyed in their ability to provide essential administrative and personnel services in all Areas. The importance of Site security was reflected in the strategically-placed guard/badge houses throughout the Site. The promotion and concern for employee safety is illustrated in the number of former and current first aid facilities, fire stations and carefully-planned fire and water lines.

Registration Requirements

To be eligible for listing in the National Register of Historic Places, the **administration, Site security, health and safety facilities** must have documented historical significance within the context of the Manhattan Project and Cold War periods on the Hanford Site. To be eligible for the Register under criterion A, the buildings need to convey worker and/or life safety experiences essential to a comprehensive understanding of the Manhattan Project and Cold War periods at Hanford.

Subtype: Administrative Facilities

Office buildings and supervisor's offices were constructed within the 100, 200, 300, 400, 700, 1100 and 3000 Areas. The office buildings were built to provide job-specific space for Site-wide employees, mainly for general administrative and personnel department purposes.

Office buildings were important to the overall historical development of Hanford and therefore would be eligible for the Register under Criterion A if they convey significant worker experiences and conditions during the Manhattan Project and/or Cold War periods. Under National Register guidelines, properties which are significant primarily for their historical associations need not possess an integrity of both exterior and interior (machinery/equipment) features. Thus, an office building may be significant even if some of the original interior features have been modified. To maintain integrity the original location, setting, association, feeling, and exterior design of the building are sufficient to make the historical association. Properties primarily eligible under criterion C must meet a more stringent standard of interior and exterior physical integrity.

The following administrative/office facilities have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District: 222 B, 271 B, T, U; 274 E & W, 2701 M, 2704 C, S, W, Z; 2709 W, 2713 E, 2722 E, 2750 E, 2751 E, 2752 E, 2753 E, 3763, 3766, 3768, 4707, 4862, 4710.

Subtype: Site Security

Site security facilities were distributed throughout the 100, 200, 300, 600, and 700 Areas. These facilities included 72 now-demolished guard towers, along with fences, guard/badge houses and patrol headquarters. One rifle and pistol range complex (Manhattan Project era complex has been demolished), located in the 600 Area, was built to train Hanford Site patrolmen in weapons use. These buildings complexes must be significantly associated with the Cold War period, and possess integrity of location, design, materials and association, to be eligible for the Register under criterion A. Fences are not usually considered eligible for the Register as linear features. Portions of the rifle and pistol complex constructed in 1982 would not be considered for Register eligibility.

Subtype: Health and Safety, Fire Control and Waterlines

The water and fire line system (including elevated water storage tanks) was so vital to the functioning of the reactors and chemical processing plants that each Area of the Site was carefully planned with water reserves and specialized holding tanks for water (e.g., softened water, filtered and unfiltered water, and chlorinated water). Water was used for processing, heating, cooling, laboratory, fire suppression, and sanitary purposes. Waterlines, however, are not usually eligible for the Register, and the DOE-RL has determined that water storage tanks are exempt from the historic property inventory form documentation requirement because they do not meet any of the criteria for eligibility to the Register.

First aid facilities and fire stations/headquarters, built in the 100, 200, 300, 400, 600 and 700 Areas, are eligible for the Register under criterion A if they illustrate life safety considerations essential to a comprehensive understanding of the Manhattan Project and Cold War periods and resulting imprint on the Hanford Site. The physical character of the structures needs to be sufficiently intact to convey their general functions and period of significance. The retainment of original location, setting, association, feeling, and exterior design are sufficient to make the historical association.

Fire stations 3709 A, 609, 609 A, 4704 S, and Fire Department training facilities 609 C & D, have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District. Medical aid stations 2719 EA and 4719 have also been determined to be contributing properties to the District.

5.3.5 Associated Property Type: Non-Defense Facilities

Description: Facilities associated with nuclear technology for non- defense purposes were found in the 100, 200, 300, and 400 Areas.

Subtype: Test Reactors and Fuel Fabrication Pilot Facilities

Description: During the Cold War period several test reactors and fuel fabrication pilot facilities in the 300 Area were used for non-military purposes. With the worldwide uranium supplies limited, research efforts were undertaken to develop and test alternate fuels. The most ambitious efforts were focused on the effectiveness of plutonium oxide and mixed oxide fuel blends. The following test reactors, the PCTR and TTR in 305 B, the Plutonium Fabrication Pilot Plant (PFPP), the 309 Plutonium Recycle Test Reactor (PRTR), and the 318 High Temperature Lattice Test Reactor (HTLTR), were constructed for the purposes noted above and other experimental testing programs.

Physical Constants Test Reactor (PCTR) and the Thermal Test Reactor (TTR)

The 305 B Building was built in 1954 as a pile physics lab to develop improvements in reactor lattice (configuration) designs to produce more plutonium in the production reactors. The original portion of 305 B was the basement area which contained two small test reactors, the Physical Constraints Test Reactor (PCTR) and the Thermal Test Reactor (TTR). The two experimental reactors have been removed. The PCTR conducted lattice configuration experiments for N Reactor, and experimental lattice measurements were conducted on the design of the Plutonium Recycle Test Reactor (PRTR). PCTR also conducted experiments in support of a gas-cooled, graphite moderated, uranium oxide-fueled reactor that was planned at the Oak Ridge site. Various other experimental physics work was conducted in the PCTR until 1970. The TTR conducted a variety of exponential pile physics experiments, but it was not used as extensively as the PCTR. All of the reactor equipment was decommissioned and removed after tests were discontinued in both facilities in 1978 (Gerber 1992b).

Plutonium Recycle Test Reactor (PRTR)

Located in Building 309 (in the 300 Area) and completed in 1960, PRTR was designed to be the operating test reactor in the Hanford Works Plutonium Fuels Utilization Program whose purpose was to research and develop nuclear fuel technology for using plutonium as a fuel in nuclear reactors. The PRTR was part of President Eisenhower's Atoms for Peace program designed to test mixed oxide fuel blends for future use in commercial power reactors. In 1962 the Plutonium Recycle Critical Facility (PRCF) was added to support PRTR operations as the location where reactivity values of fuel assemblies before and after irradiation was checked. In 1986-87, a new space technology development program known as SP-100 was assigned to Building 309, leading to an extensive cleanout of the original PRTR features (Gerber 1992b).

Plutonium Fabrication Pilot Plant (PFPP)

The PFPP was completed in 1960 in Building 308 to provide laboratories and fuel fabrication facilities for the development of reactor fuels containing plutonium. The earliest PFPP fuels were irradiated in the adjacent PRTP. In the late 1970's, the Training Research Isotopes General Atomics (TRIGA) reactor was installed in the facility to perform neutron radiography testing of fuel elements and fuel jackets. By 1976 the main mission of PPFP became the preparation and quality assurance testing of all FFTF fuel assemblies (Gerber 1993c).

High Temperature Lattice Test Reactor (HTLTR)

Prior to the establishment of FFTF was the construction of the HTLTR in 1966-67. Housed in Building 318 in the 300 Area, the HTLTR was designed to test very high-temperature fuel performance in gas-cooled reactors. This mission was part of the fuels diversification research being carried out at the Hanford Site in order to facilitate "peaceful atom" projects worldwide. The key functional concepts being tested were high-temperature operation and nitrogen gas cooling. The reactor operated from 1968 to 1972, at which time its funds were diverted to the pursuit of breeder reactor technology at the FFTF (Gerber 1993c).

Subtype: Fast Flux Test Facility (FFTF)

Description: FFTF, located in the 400 Area, is an experimental, 400 megawatt (thermal), sodium cooled, fast flux reactor. A number of 300 Area buildings were constructed/modified to pursue FFTF research and development.

Fast Flux Test Facility (FFTF)

Completed in 1978 in the 400 Area, FFTF reached initial criticality in 1980, and achieved unrestricted full-power operation in 1982. FFTF was designed primarily to test fuels and materials for advanced nuclear power plants. Reactor activities were later expanded to include long-term testing and evaluation of reactor components and systems for the Liquid Metal Reactor Program, fusion power materials testing, passive safety testing and production of medical isotopes, and space power use research.

The Fuels and Materials Examination Facility (FMEF), built in 1980-83 in the 400 Area, was a major addition to the breeder reactor technology program at Hanford. Housed in Building 427, FMEF was intended to function to inspect irradiated fuels and materials from the FFTF.

Sodium Test Facilities (Buildings 335 and 336)

Sodium-related tests for FFTF development and cold sodium purification and characterization systems used in FFTF studies were conducted in the 335 and 336 Sodium Test Facilities. Building 335, built in 1968, was known initially as the Fast Reactor Thermal Engineering Facility. Building 336, built in 1969, was known as the Core Segment Development Facility. Both facilities conducted sodium-related tests for FFTF development through the late 1970's. The sodium test loops were deactivated in 1977.

High-Temperature Sodium Facility (HTSF)

HTSF, located in Building 337, was the preeminent 300 Area structure built to support FFTF development. Built in five segments from 1970 to 1972, Building 337 originally housed engineering studies, including sodium loops and large mechanical mock-ups, and was a technical support facility for the mock-ups performed in adjacent 337 B (high bay). The main 337 facility is currently used to house office space for the Pacific Northwest National Laboratory technical support personnel. 337 B initially housed research and development activities that included a Core Mechanical Mock-up, an accessible test bed for operational trials of selected FFTF components.

Building 338

The 338 Building, built in 1961 in the 100 F Area, was moved to the 300 Area in 1971 to provide space to receive, mock-up, test, and store components and certified materials for use in the HTSF. "The 338 Building served in its initial functions of varied FFTF equipment support activities through the early 1980's . . . By 1981 FFTF developmental work had diminished greatly, and the 338 Building was converted that year to house the Secured Automated Fabrication Cold Test Facility . . . In 1988 the facility was converted to a chemical and hazardous materials storage area" (Gerber 1993c: 43).

Subtype: 100 N Reactor

Description: The 100 N Area is the locale of the nation's first dual purpose reactor, 105 N. One of the initial results of President Eisenhower's Atoms for Peace initiative was the construction of the nation's first dual purpose reactor, 105 N, at the Hanford Site. The 105 N had the capability of producing plutonium for national security purposes and steam to generate electricity. Having begun producing electricity in 1966, the reactor and the adjacent Hanford Generating Plant were a major source of electricity for the Pacific Northwest.

Subtype: Building/Facility Conversions

Description: Numerous facilities initially used for research and development support for plutonium production operations were later converted to non-military uses. These facilities are found in the 100, 200, and 300 Areas. Notable examples include:

<u>Plutonium Finishing Plant (PFP)</u>

The PFP (234 5Z), constructed in 1950 in 200 West, is representative of a major facility that initially functioned to produce Pu metal for military weapon use. In the mid-1960's, part of its mission (in PFP's A-Line) was changed to include producing non-defense oxide blends used in the early years of development of the commercial nuclear fuel industry. PFP's C-Line continued to produce defense metal until 1988.

<u>Buildings 185D/189D</u>

Both buildings were constructed as part of the influent water cooling system for D Reactor. Cooling water was to be deaerated in 185 D and cooled in the 189 D refrigeration building. By 1953, the two buildings, connected by a common wall, had been converted into the Thermal Hydraulics Laboratory and conducted tests in support of the development of the PRTR. Mock-ups of many of the PRTR components were built and tested at 185/189 D. The two buildings were also used for development testing of heat transfer data for the 100 N reactor and involved in the early stages of development testing for FFTF.

<u>Building 108 F</u>

This facility was constructed in 1945 to support the 105 F plutonium production reactor as a chemical pump house. Building 108 F mixed water treatment chemicals for injection into the reactor's water supply system. In 1949, the building was completely remodeled to provide office and laboratory space for the Hanford Site biology program, studying the effects of radiation on animals and plants.

Statement of Significance

Hanford was the site of considerable and significant research into peaceful applications for the atom, highlighted by the establishment and use of test reactors. Additionally, numerous facilities initially used for research and development support for plutonium production operations were later converted to significant non-military uses. The Plutonium Finishing Plant (PFP) was representative of a facility that initially functioned to produce Pu metal for military weapon use, and in the mid-1960's part of its mission changed to include producing non-defense oxide blends used in the development of the commercial nuclear fuel industry. The non-defense use of the atom on the Hanford Site was highlighted by the construction of N Reactor, the nation's first dual purpose reactor, which was for a period, with the adjacent generating plant, the largest electric power producer in the nation.

Registration Requirements

To be eligible for the National Register of Historic Places, **non-defense facilities** need to be associated with significant peaceful applications of the atom. Under National Register guidelines, properties which are significant for their historical associations (e.g., non-military facilities during Cold War era), need not possess an integrity of both exterior and interior (engineering/equipment) features. For non-defense facilities to be eligible under criterion A, the physical character of the facilities need to be sufficiently intact to convey the general function and period of significance. A property can be significant even if the some of the original equipment has been removed/modified; and if building conversions reflect evolutionary change of Site missions and technology.

Subtype: Test Reactors and Fuel Fabrication Pilot Facilities

During the Cold War period several test reactors in the 300 Area, PCTR and TTR in Building 305 B, PRTR in Building 309, PFPP in Building 308, and HTLTR in Building 318, were used for non-military purposes. These facilities are eligible for the Register under criterion A if they convey significant applications for non-defense purposes during the Cold War period. They must possess integrity of exterior design and interior engineering features and embody distinctive methods of construction to be eligible under criterion C.

Although most of the equipment related to the above test reactors has been removed, the 300 Area test reactor facilities, the 305 Test Pile, PCTR and TTR in 305 B, PRTR in 309, and HTLTR in 318, have been determined to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Fast Flux Test Facility (FFTF)

FFTF was built in the 400 Area to provide a sodium-cooled test reactor designed specifically for irradiation testing of fuels and materials to be used in advanced nuclear power plants. A number of 300 Area buildings were constructed/modified to conduct research for the development of FFTF. These properties are eligible for the Register under criterion A if they illustrate significant research applications for non-defense purposes. They must possess integrity of exterior design and interior engineering features, and embody distinctive methods of construction to be eligible under criterion C.

The DOE-RL has concluded that the 405 FFTF reactor containment building is a contributing property to the Register-eligible Hanford Site Historic District.

Subtype: 100 N Reactor

The 105 N Reactor, located in 100 N, was the nation's first dual-purpose reactor. DOE-RL has concluded that the 105 N Reactor is eligible for the Register, and is considered a contributing property to the Register-eligible Hanford Site Historic District.

Subtype: Building/Facility Conversions

Numerous facilities on Site that were originally devoted to defense-oriented research and operations were later converted to non-defense purposes. They are eligible for the Register under criterion A if they illustrate conversions from significant military-oriented applications to important non-defense uses. The facilities must be representative of the evolution in technology and missions on the Hanford Site. Additions and modifications that reflect the changing missions and technology are viewed as significant accretions under criteria A and C. Under criterion C, properties must meet a more stringent standard of physical integrity, while under criterion A, a property need only retain original location, setting, association and exterior design.

5.3.6 Associated Property Type: Communication and Transportation Network

Description: Elements of Hanford's communication and transportation network were constructed in all of the Areas. Roads and walkways were built to facilitate access to and around the Site. In addition, miles of standard gauge single rail track were constructed across the Site.

Subtype: Communication

Description: Offices and facilities for Site communication are found in the 200, 300, 400, 600, and 700 Areas.

<u>Radio Transmitter and Microwave Towers</u>

While the HEW Radio Transmitter Station (623 Structure) on the east end of Gable Mountain was demolished, the 623 A Microwave Equipment Facility (built 1957) and the 623 B Backup Radio Repeater Facility (built 1952) are extant. Several other 600 Area Microwaves and Radio Repeat Facilities (630 and 623 Structures) also exist (Gerber 1993f).

<u>Computer and Photography Facilities</u>

Building 3719, constructed in 1979, was originally a photography processing facility. The building currently houses computer equipment in support of HLAN and security programs. Building 3220, constructed in 1988, houses the offices for U. S. West Communications in the 300 Area. Building 3705, constructed in 1950, originally housed a laboratory for processing film dosimeters. In the 1970's the facility was converted to a photography processing laboratory. Building 339 A, constructed in 1986, houses computer and telecommunications equipment.

<u>Telephone Exchange Building</u>

Building 3506 A, built in 1944, originally housed the telephone service for the 300 Area. The building currently houses maintenance personnel and equipment.

Subtype: Transportation

Description: Industrial transportation on Site was carried out by rail cars and along roadways. Railroads and railroad facilities including shipping and receiving points were located in the 100, 200, 300, 400, 600, 700, and 1100 areas. Permanent roadways connecting all areas of the Site and walkways were included as 600 Area structures.

<u>Standard Gauge Railroad Track</u>

The designated 601 Structures applied to the 123.3 miles of standard gauge single rail track at Hanford. The 601 track functioned to carry supplies and products throughout the Site, and was divided (administratively) into process and service tracks. Process tracks were those over which "products" (plutonium, irradiated fuel rods or uranium) were allowed to move during manufacturing operations. All such tracks were laid with rail weighing not less than 80 pounds per yard, and sometimes as much as 100 pounds and 110 pounds per yard (Gerber 1993f).

Prior to acquisition by the MED, the railroad was originally the route of the Priest Rapids Line of the Chicago, Milwaukee and St. Paul Railroad Company. Built in 1913 from Beverly, Washington in a southeastern direction to the communities of White Bluffs and Hanford, the railroad had its tracks removed in 1943 and replaced with tracks capable of supporting heavier weight. During the Manhattan Project and Cold War era additional lines were constructed to connect the Areas with one another, including spur lines built to the 100 Area reactors and ancillary facilities, REDOX and PUREX in the 200 Areas, and the 300 and 400 Areas, while the original line was extended to Richland. The portion of the original line still in use (although minimally) begins east of 100 K and extends to the former Hanford town site. Immediately south of the town site the line connects with the newer railway to Richland (Gerber 1993f).

<u>Roads and Walkways</u>

The designation of 603 Structures applied to permanent roads (including gravel roads) and walkways on the Hanford Site. The function of the roads and walkways, of course, was to provide pathways for traffic and pedestrian access around the Site.

Statement of Significance

The **communication and transportation networks** are a vital aspect of the infrastructure of the Hanford Site. The structures associated with the networks may be considered as significant as the facilities which used them. The radio transmitter and microwave facilities were important for emergency and regular communication uses. The railroad transportation system was highly specialized to conform to certain regulations depending upon its use as a process or service track.

A strategically planned transportation system of permanent roads and walkways served as important links in the Hanford road network and provided a means of transporting goods and services between Hanford and the outside world. Communication and transportation networks were instrumental in the production process of plutonium and transport/shipping of nuclear-grade plutonium for national defense purposes.

Communication and transportation systems are important resources that illustrate significant infrastructure development essential to the historical development of the Site and provide an essential element to the comprehensive understanding of the Manhattan Project and Cold War periods and resulting imprint on the Site.

Registration Requirements

To be eligible for listing in the National Register of Historic Places, the **communication and transportation network** must have documented historical significance within the context of the Manhattan Project and Cold War periods on the Hanford Site. The properties must be intact examples of one of the identified subtypes, associated with the technological processes and developments that occurred on Site. In most instances eligibility of these types of resources would be under criterion A (historical associations) for their ability to illustrate important contributions to the infrastructure development of the Hanford Site, essential to a comprehensive understanding of the Manhattan Project and Cold War periods at Hanford.

Subtype: Communication

The communication system is Site-wide but the major facilities are located in the 600 Areas. Radio-repeat facilities and microwave structures are potentially eligible for the Register under Criterion A if they are able to convey important association with infrastructure development of the Hanford Site, with evidence of physically intact equipment and structural features.

Microwave towers have been determined by DOE-RL and the Washington SHPO to be exempt from the historic property inventory form documentation requirement due to the minor role these structures have played at the Hanford Site.

Subtype: Transportation

Transportation structures and facilities include roadways, walkways, railroads, and associated facilities. The transportation system is extensive and includes roadways and railroads and associated facilities. Maintenance and repair facilities were built for railroads and roadways, but most of these resources have been demolished. Many of the roadway locations are original but the roads have been widened and modified to accommodate a higher intensity of use over the years. Nevertheless, if these roadways maintain an integrity of location, setting, feeling and association they have the potential to be contributing properties within the Hanford Site historic district, as these modifications reflect the evolutionary nature of the Site and its changing missions. These roads were (and still are) important in the everyday functions at Hanford. The railroad track and bed are potentially eligible as long as the original alignment and grade of the bed have been maintained. The railroad track and bed are potentially eligible even though ties and rails may have been replaced or totally removed; such replacements are considered essential to the continuing operation of the railroad line. If the railroad right of way is extant, minus the ties and rails, the resultant "rail landscape" could still be eligible in its on-right, or contain eligible ancillary facilities.

Transportation structures and facilities are potentially eligible for the Register under Criterion A for their important association with the plutonium production process and non-defense missions by providing the transport of raw materials, goods, and production wastes needed to accomplish these important national security activities. These resources are eligible if they convey significant association with infrastructure development of the Site, essential to a comprehensive understanding of the Manhattan Project and Cold War periods and resulting imprint on the Hanford Site.

5.3.7 Associated Property Type: Environmental Monitoring Facilities

Description: The environmental monitoring facilities were found in the 600 Areas. General monitoring stations housed equipment for monitoring airborne wastes, and were located in the 100, 200, 300, 600, 700, and 1100 Areas, and off-Site. Meteorological buildings were 600 Area structures; located between the 200 East and 200 West Areas.

Subtype: General Monitoring Stations

Description: These buildings were located in the 100, 200, 300, 600, 700, 1100 Areas and off-Site. All of the stations were used for air and river quality control.

General Monitoring Stations

A total of 29 such structures (614 Buildings) were built by the MED for HEW. Seven or eight of these structures remain, mainly in the 200 Area, and have been re-numbered as 2614-E or 2614-W. In the 300 Area there is 3614 A, a river monitoring station. 1614 K3, built in 1955, is a monitoring station located in 100 K. Their function was to house the environmental monitoring equipment that sampled airborne and river process wastes. Other representative liquid effluent monitoring facilities include 100 Area 1908's and 200 Area 2904 EA, 2704 ZB, several 295's, and 242 ZA. Other representative air monitoring facilities are 296's, and annexes to the 291 facilities such as 291 ZA, and 2712 Z. Other effluent monitoring/treatment facilities include 292 AB, 2025 E, and 2025 EA at PUREX. 2712 B is also a monitoring station.

Subtype: Meteorological Buildings

Description: The meteorological towers and buildings are located near the 200 West Area.

Meteorological Tower

One Tower (622 Structure) was built in 1944-45 at HEW, located north of the connecting road between the 200 East and 200 West Areas approximately one/half mile east of the 200 West Area. Its function was weather prediction and study, specifically as it related to wind dilution factors for the airborne process wastes generated at Hanford. The scientists of the MED and the builders of HEW established an early and extensive meteorological program aimed at determining and predicting weather conditions that would allow for safe dispersion of process gasses (especially from the 221 Buildings) in the surrounding region. They relied on studies of wind factors because they emplaced no filters of any kind in the 291 Exhaust Stacks (Gerber 1993f). Its current function is to assist in the gathering of weather prediction information.

Atmospheric Sciences Building/Weather Station (622 Structures)

The Atmospheric Sciences (Physics) Building (622-R) was constructed in 1966 to provide offices and laboratories in which studies on atmospheric sciences were conducted by the

Geosciences Research and Engineering Department of the Pacific Northwest Laboratory. Today the facility primarily functions as the Site's meteorological facility/weather station, which houses precipitation chemistry labs, the Site's climatological database, and several WHC analytical/waste monitoring labs. Supporting facilities include the Atmospheric Physics Annex (622 G, built 1975), Field Office Building (622 F, built 1952), Storage Building (622 D, built 1949), the Pilot Balloon Release Facility (622 B, built 1966), and the Elevator Control Building (622 A, built 1966).

Walk-up Meteorological Towers

Nine 200-foot tall walkup meteorological towers were constructed in the former Hanford Diffusion Grid located in the 600 Area between 200 East and 200 West. The towers were installed in 1959 to support the Green Glow series of particulate tracer release experiments on the Hanford Site. Only one of the original nine towers remains. It is constructed of 34 interlocking aluminum sections mounted on base plates. The tower is supported by guy wires attached to sixteen anchors, and is situated on a concrete base (Harvey 1994).

Statement of Significance

The **environmental monitoring facilities** were crucial structures in the pioneering efforts of the Hanford Site's air and water surveillance program. The approximately eight remaining general monitoring buildings are small, windowless buildings which housed equipment that performed the environmental surveillance program at Hanford, and set a nationwide precedent for environmental air and water surveillance. The other meteorological towers and related facilities played an important role in providing data essential in determining and predicting weather conditions that would allow for the safe dispersion of process gases. They were pivotal structures in the pioneering environmental monitoring program Hanford. The construction of additional atmospheric sciences facilities in the 1950's and 60's was evident of the continuing and important scientific research in environmental monitoring and surveillance on the Hanford Site.

Registration Requirements

To be eligible for listing in the National Register of Historic Places, the **environmental monitoring facilities** must have been built and used during the nationally significant Manhattan Project and Cold War Eras. These properties must be intact examples of one of the identified subtypes. Finally, these resources must have integrity of location, design, setting, materials and association.

Subtype: General Monitoring Stations

Numerous monitoring stations were located strategically throughout the Site, mainly in the 100, 200, and 300 Areas. Monitoring buildings are potentially eligible for the Register under Criterion A due to their important association with the nationally significant Manhattan Project and Cold War periods, representing pioneering efforts in air surveillance. Significant primarily for their historical association (versus distinctive architectural features/methods of construction under criterion C), these monitoring stations need only to possess an integrity of exterior features - - location, setting, association, feeling, and exterior design - - to be eligible under criterion A.

The 2614 and 2614-A1 air monitoring stations, and the 3614 A river monitoring station, have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

Subtype: Meteorological Buildings

The meteorological buildings are located in the 600 Area. They are eligible for listing under Criterion A because they were instrumental in the pioneering efforts of air surveillance, environmental monitoring, and weather prediction/study associated with the nationally significant Manhattan Project and Cold War periods. Design considerations/methods of construction concerns under Criterion C are minimal due to the utilitarian and technological nature of these properties.

The 622 meteorological complex has been determined by DOE-RL to be a contributing property to the Register-eligible Hanford Site Historic District.

5.3.8 Associated Property Type: Waste Treatment and Fresh Materials Management Facilities

Description: Fresh and processed water, chemicals, and gas treatment facilities, located in the 100, 200, and 300 Areas, were used during and after final stages in the production process. Fresh and contaminated water and air were treated and tested for purification before use and upon being released. Water which remained contaminated were stored in hazardous waste tanks, process waste disposal systems, or other storage facilities, while contaminated air was processed/filtered through exhaust gas laboratories and stacks.

Subtype: Water, Chemical, and Gas Treatment Facilities and Holding Tanks

Description: Fresh water, chemical, and gas treatment buildings were located in the 100, 200 and 300 and 400 Areas. Test and treatment facilities for processed water, chemicals and gas were mostly located in the 200 areas and a test facility was built in the 300 Area. Holding tank facilities for fresh and processed substances were located in the 100 and 200 Areas. For convenience and clarity, this subtype was further divided into fresh materials treatment, processed materials treatment, and holding tanks.

A. Fresh Water, Chemical, and Gas Treatment Facilities:

Purification Buildings

One of these (115 Buildings) was built in each 100 Area (except 100 N), adjacent to each reactor. The only ones remaining are 115 KE and 115 KW. Their function was to house the equipment that supplied the reactor's gas atmosphere (within the welded steel shell). The atmosphere of the HEW reactors originally was composed of helium (He), an inert gas that removed heat, moisture, and foreign gases from the piles and also served as the detection mechanism for water leaks within the piles. Sampling tubes were located in the gas plenum between the rear-face biological and thermal shields. Water leaks in the core flashed to steam and were detected by measuring the amount of water vapor in the gas sampling tubes. The 115 buildings contained apparatus for circulating the gas, three silica gel towers that dried the gas as it passed through them, equipment to purify the He by pressurizing and refrigerating it, and then passing it through activated carbon.

Underground piping connected the 115 structures to the reactors. Late in the MED period, experiments with the heat transfer capacities of various gasses led to the addition of carbon dioxide (C02) to the atmosphere of the HEW and post-World War II reactors (Gerber 1993f).

Deaeration Plants

One of these structures (185 Buildings) existed in the 100 B, D, and F Areas. (185 B and F have been demolished.) The function of these facilities was to remove dissolved gasses and entrained air, particularly carbon dioxide and oxygen, from the water filtration process. It was believed by early engineers that the presence of such gases in process water could affect the heat transfer capacity of the coolant, but this problem turned out to have only minor significance and the deaeration step was eliminated. The 185 buildings contained four-stage deaerators, acid feed tanks, pumps, transfer monorails and hoists, and an instrument room. Subsequently, the structures were modified and used for various process laboratory development activities, including equipment mock-ups (Gerber 1993f). By 1959, 185 D (combined with the adjacent 189 D) was converted into the Thermal Hydraulics Laboratory and conducted tests in support of the development of the Plutonium Recycle Test Reactor (PRTR). Mock-ups of many of the PRTR components were built and tested. The laboratory also conducted development testing of heat transfer data for N Reactor, and in 1969 conducted developmental testing for the Fast Flux Test Facility (FFTF). 185 D also conducted experiments in behalf of single-pass reactors.

Filter Plant Buildings

One of these structures (283 Buildings) was built in each of the 200-E and 200-W Areas. The function of the 283 Buildings was to filter all of the 200 Areas water, except that used for process cooling and for the 284 Power Houses. The 283 Buildings each consisted of two settling basins with a capacity of 80,000 gallons each, a chlorination room, chemical mixing room, chemical storage floor with monorail hoist, alum, lime and carbon feeders and hoppers, two filters (14 feet by 16 feet each, and consisting of gravel, sand and "anthrafilt"), a pipe gallery, a pump room containing four pumps, and a 200,000 gallon capacity "clearwell" reservoir that held the treated water (Gerber 1993f).

Both of these plants were built during World War II and are still extant.

B. Processed Water, Chemical, and Gas Treatment and Sampling Facilities:

Exhaust Gas Laboratories

One 292 Building was built in the 200-E Area (292-B Building), and two such structures were built in the 200-W Area (292-T and 292-U Buildings). Like the T process group structures overall, the 292-T Building was the first such structure to operate at HEW. The function of the 292 Structures was to house equipment to test the 291 exhaust gases for levels of chemical and radioactive contaminants. These buildings were very small, and were located approximately 40 feet from the centerline of the 291 Stacks in the direction of the 222 Buildings. They contained two outside doors, roof ventilators, and various gas refrigeration, blowing and testing equipment (Gerber 1993f).

Exhaust Buildings and Stacks

Numerous exhaust buildings and structures were built in the 100 and 200 Areas. Some of these (stacks) were the 291 Buildings, four of which were built in the 200-E Area (291 AB, 291-AC, 291-B, and the later 291-BE in 1973) and three such structures were built in the 200-W Area (291-S, 291-T and 291-U). Like the T process group structures overall, the 291-T Structure was the first such HEW structure to operate. The function of the 291 Structures was to exhaust process gases from the 221 Buildings into the atmosphere, along with additional diluting air supplied by fans. The actual stacks were 200 feet high each, and were located 187 feet from the head end face of the 221-B and 221-U Buildings, and 252 feet from the head end face of the 221-T Building. They were connected to the 221 Buildings via underground air ducts, with the connection point located between Cells 5 and 6 of the 221 Buildings. (This location was chosen because the dissolver off gases, from the head-end dissolver cells, were the exhaust gases of concern to MED officials and scientists.) Another essential part of the 291 Structures consisted of three stainless steel exhaust fans, mounted on concrete foundations adjacent to the inlet and outlet air ducts. These fans were emplaced because the MED believed that additional diluting air would render the dissolver off gases safe for release into the surrounding atmosphere.

The following are representative of the numerous other exhaust buildings/stacks constructed on Site:

In 200 West, the Exhaust Building (291 T) was built in 1944, the Exhaust Fan House/Stack (291 U) in 1944, and the Exhaust Air Control Building (291 S) in 1951. In 200 East there are eleven (291) exhaust buildings and stacks from the Manhattan Project/Cold War era.

In 200 East, the Stack Monitoring Building (292 B) was built in 1944, the Exhaust Ventilation Building (292 AR) in 1976, and the Instrument Building (292 AA) in 1981. In 200 West the Gas Sampling Building (292 U) was built in 1944, the Laboratory Building (292 T) in 1944, and the Stack Monitoring Building (292 S) in 1952.

In 100 N there are the 116 N Ventilation Stack Structure (for 105 N), and the 117 N Ventilation Filter Building, both built in 1964.

At 100 K there are the 117 KE and 117 KW Exhaust Air Filter Buildings, both built in 1961 (All reactors had 117's, 116's and 119's stack filter buildings.)

<u>Chemical Preparation and Service Buildings</u>

During the Manhattan Project period one such structure (271 Buildings) was built in the 200-E Area (271-B Buildings), and two such structures were constructed in the 200-W Area (271-T and 271-U Buildings). Although the 271 Buildings were independent structures, each of them was attached to the back wall of the 221-Building that it served, at about the midway point (adjacent to Sections 10-13). Like the T process group structures overall, the 271-T Building was the first such structure to operate at Hanford. The function of the 271 Structures was to receive, store, mix, and deliver the chemicals used in the 221 Buildings processing operations, and to supply compressed air to the 211, 221, 222, 224, 271 and 291 Buildings. The 271 Buildings contained large storage rooms, a compressor room, a large chemical preparation room encompassing nearly the entire third floor, a smaller chemical control laboratory to sample the fresh chemical mixtures before they were used in the process plants, heater rooms, a communications, signal and control room, locker and rest rooms, shower room, and doctor's office and medical laboratory, and two labyrinth access-ways to the 221 Buildings. A portion of the roof of each building was reinforced to be able to support a 10,000-gallon demineralized water tank, in case such a tank became necessary for chemical process operations (Gerber 1993f).

271 B, built in 1944 in 200 East, is currently an office building. 271 CR, built in 1952, is currently abandoned. 271 T, built in 1944 in 200 West, is used as an office building. 271 U, built in 1944, is currently used as an office/service building.

Chemical Materials Engineering Laboratory (Building 324)

Built in 1964, Building 324 originally housed chemical reprocessing and metallurgical examination of PRTR's fuel elements. After the shutdown of PRTR, its mission focused on the Waste Solidification Engineering Project, one of the first high level waste vitrification demonstration programs in the world. Vitrification continued as the major mission of the 324 building until 1980 when the facility became the site of other pioneering radiochemistry projects that included the solidification, encapsulation, and packaging of spent ion exchange resins from the Three Mile Island reactor, the pilot testing of Radioactive Liquid-Fed Ceramic Melter operations, and the investigation of bioremediation techniques (Gerber 1993c: 51).

Control Building

The 3746 Structure was built in the 300 Area. Its function was to perform tests to verify that the composition of various process substances was within specifications. It contained a laboratory, shop, dark room, and four offices. By the 1980's, the facility was providing administrative support and office space for personnel associated with laboratory activities in adjacent 3746 A, 3745 A, and 3745 B (Gerber 1993f).

C. Holding tank facilities:

Chemical Pump Houses

One Chemical Pump Houses (108 Structures) was built in each 100 Area, except 100 H, KE and KW. Their function was to hold and pump the various chemicals needed in reactor water treatment and reactor purging (internal cleansing). They contained many holding and mixing tanks and pumps, along with storage bins for dry materials, conveyor systems, hoppers and power shovels. The two remaining 108 buildings are in 100 F and 100 N. Water treatment chemicals were batch mixed in 108 F and delivered through pipelines to the 183 Filter Building, the 190 F Pumphouse and the 105 F Reactor for injection into the water supply. In 1949, 108 F was completely remodeled to provide office and laboratory space for the Hanford Site Biology Program. The building was expanded in 1953 and again in 1962 to provide additional space for biological experiments. The facility was abandoned in 1977 when the Biology program was moved to the 331 Building. Constructed in 1964, 108 N housed storage tanks and equipment for pumping acids, caustics and decontamination chemicals for use at 100 N Reactor and water treatment plants.

Tank Farms (211 and 334 Structures)

Three of these Tank Farms were originally built in the 200 Area at the HEW: 211-B, 211-T, and 211-U. During the post-World War II period 211-A and 211-S were constructed. (211-C Tank Farm was canceled as were the 221-C and 224-C Buildings.) Like the T process group structures overall, the 211-T structure was the first of its kind to operate at HEW. These tank farms functioned to supply fresh chemicals directly to the 221 Buildings, in some cases, and indirectly to the 221 and 224 Buildings via the 271 Chemical Preparation and Service Buildings. These tank farms should not be confused with tank farms built to hold waste products (Gerber 1993f).

The 211 Tank Farms were located above ground, at the rear of the 221 Buildings, in the angle between the 271 Buildings and the railroad tunnels that entered the 221 Buildings. Each tank farm consisted of nine vertical storage tanks that held nitric, phosphoric and formic acids, six horizontal tanks that held nitric acid, three tanks that held 50 percent caustic solution for neutralizing the acids, one tank that held sulfuric acid, one tank that held anhydrous hydrofluoric acid, and a small expansion tank to prevent rupturing and provide for overflow. Transfer and circulation pumps and coolers completed the equipment in the 211 Tank Farms. The 211-T Tank Farm also contained drum-filling facilities, but the other 211 Tank Farms did not (Gerber 1993f).

Built in 1961 in the 300 Area, the 334 Chemical Handling Facility and Tank Farm housed control instruments for the 333 Fuel Fabrication Building's acid system, and was a tank farm for acid storage. The 334 A Building was moved from 100 D to the 300 Area in the mid-1970's to support the Waste Acid Treatment System (WATS) process of the 333 Building.

Subtype: Hazardous and Nonhazardous Materials Storage

Description: These facilities, tank farms, and retention basins were located in the 100, 200 and 300 areas.

Lag Storage Buildings

Three of these structures (212 Buildings) were built in the 200-N Area, one each in the N, P and R Sections. They were designated the 212-N, 212-P and 212-R Buildings, and built in 1944. Their function was to store the irradiated fuel rods that had exited the production reactors and that were awaiting dissolution in the chemical processing facilities of the 200-E and 200-W Areas. The storage of irradiated fuel rods before chemical processing was an important step in the environmental and personnel safety program at HEW, since storage time (also known as "cooling" or decay time) had a direct effect on how much fresh fission products would be released during dissolving. (The longer the cooling time, the more decay or stabilization of radionuclides could occur.) The 212 Buildings each contained a transfer room, where the irradiated fuel rods would arrive and leave in rail cask cars, a storage room (actually a 20' 9" water-filled concrete pool), a fan room, and an overhead bridge crane and monorail (Gerber 1993f).

Magazine/Plutonium Storage Buildings

The 213 Structure was built in the 200-N Area. It was an earth-covered bunker located in the easternmost section of the 200-N Area in the southeast end of Gable Mountain. It was divided into two parallel vault sections (designated the 213-J and 213-K Vaults). The function of the 213 Structure was to store the product (purified plutonium nitrate paste) in containers that held one kilogram (kg) each. Ammunition for HEW protection also was stored in the building, which contained a loading platform, magazine room, vestibule and instrument room in each vault section. The magazine rooms held the Pu-239, and were lined with concrete shelving interspersed with concrete brick partitions. In 1983 the structure was transferred from Rockwell Hanford to Battelle's Pacific Northwest Laboratory (PNL), after which it was used to store contaminated sodium and soil samples that had been collected from around the world. The soil samples were used in fallout studies by PNL's Environmental Science's Department. The facility is currently inactive (Gerber 1993f).

The 2736 Z (1970-71), 2736 ZA (1970-71), and 2736 ZB (1980-81) Primary Plutonium Storage Facilities were the first buildings at Hanford to be designed specifically for the storage and safekeeping of plutonium products and scraps (Gerber 1995e). Due to radiation, fire and safety concerns 2736 Z, a concrete vault building, was constructed within the Plutonium Finishing Plant (PFP) complex. The principal features of the facility were four main rooms known as vaults. 2736 ZA was a small annex building to house the ventilation equipment needed to maintain pressure gradients and frequent air changes in 2736 Z (Gerber 1995e). During 1980-81, the 2736 ZB Support Facility was built adjacent to 2736 Z to provide office space, changing rooms, enclosed glove box equipment for assaying and re-packaging Plutonium-bearing materials, and additional security protection for the 2736 Z vault rooms (Gerber 1995e).

Fresh Metal Storage Buildings

One 103 Building was built in each 100 Area. Their function was to hold fresh (unirradiated) uranium fuel elements prior to their being charged into the reactors. The structures were rectangular, and each contained a loading platform and storage room. The only extant 103 Building is located in the 100 B Area (Gerber 1993f).

Magazine Structures (also known as Fresh Metal Storage Buildings)

Nine such buildings (303 Structures) were built in the 300 Area at HEW. The function of these structures was to store the fresh (unirradiated) uranium, chemicals used in the fuel fabrication processes, and uranium scraps left from these processes. Eight of the 303 Buildings were identical, and were designated as 303 A, B, C, D, E, F, G, and K. The 303 J Building was larger, but performed the same function. 303 D has been demolished, and 303 M (Uranium Oxide Facility), constructed in 1983 and currently inactive, contained incinerators used to burn uranium chips (Gerber 1993f).

Process Waste Disposal Systems

Single and Double Shell Tanks - 200 Area
The chemical processes required to extract plutonium from irradiated uranium fuel generated millions of gallons of radioactive chemical waste. About 60 million gallons of this waste were stored in 177 large underground tanks. The tanks are divided into 18 groups/systems or "farms". The first 149 tanks constructed at Hanford, starting in 1944, were made of a single, carbon-steel wall encased in concrete. They ranged in capacity from 50,000 to 750,000 gallons. Because a number of the tanks were found to have leaked, the "single-shell" design was discontinued after 1964.

Two of these "systems" (241 Structures) were built in the 200-E Area (241-B and 241-C), and two in the 200-W Area (241-T and 241-U). (Note: when the 221-C Building was canceled, its associated process waste disposal system was retained, with the exception of the 241-C-361 settling tank and the 241-C-351 and 352 retention basins). Each system was comprised of 16 underground, single-shelled tanks for the storage of high-level wastes, a gunite catch tank (or "sump tank"), a settling tank, four reinforced concrete diversion boxes, two retention basins, and eight observation wells. Like the T process group structures overall, the 241-T structures were the first of their kind to "operate" (receive active wastes) at HEW (Gerber 1993f).

The high-level waste storage tanks in each system were built of reinforced concrete with a one-fourth inch welded steel plate lining. Twelve of these tanks were 75-feet each in diameter and were numbered in series from 241-101 to 241-112. A letter placed between the numbers designated the process group to which the tanks belonged (i.e., 241-T-101 was the first tank in the system that served T-Plant). Four of the high-level waste tanks were only 20-feet each in diameter and were designated with numbers from 241-201 through 241-204 (Gerber 1993f).

During the post-World War II period numerous 241 facilities were constructed in support of process waste disposal systems.

A 20-foot diameter catch tank, numbered 241-301, was located underground in each system approximately 112 feet away from tank 241-112. A 20-foot diameter settling tank, numbered 241-361, also was located underground in each system, to hold the process wastes from the 224 Building on a short-term basis. In each system, this tank then discharged its contents into a cooling water line that discharged into one of two 500,000-gallon retention basins that overflowed into open, earthen drainage ditches. The retention basins were numbered as 214-352 and 241-353. Once again, a letter designated the process system (i.e., 214-T-352 and 241-T 353) and the retention basins serving the 221-T/224-T buildings and their ancillary structures. Additionally, four underground diversion boxes containing piping, pipe connectors, and water spray nozzles were a part of each process waste disposal system. They functioned to direct the flow of process wastes to the various tanks. Seven of the wells were 150-feet deep, and one was 300 feet deep (Gerber 1993f).

After the termination of the single-shell designed tanks, 28 additional tanks, known as double-shell tanks, were built between 1968 and 1986, having an improved tank-within-a-tank design for better containment. Their capacity was 1 million gallons each.

Statement of Significance

Treatment, sampling, and storage facilities (100 and 200 Areas) and hazardous materials storage buildings and features (100 and 300 Areas) were significant as strategic support facilities associated with Hanford's 40 year history of producing plutonium for the nation's nuclear defense program. The importance of these facilities cannot be overstated. Fresh and processed water, chemicals and gases had to be treated and managed due to the chemical processes required to extract plutonium from irradiated uranium fuel that generated millions of gallons of radioactive chemical waste. These facilities were important for housing equipment to test exhaust gases for levels of chemical and radioactive contaminants.

Registration Requirements

To be eligible for listing in the National Register of Historic Places under criterion A, **waste treatment and fresh materials management facilities** need not possess integrity of both exterior and interior features. Thus, a property can be significant for its historical associations or events even if some of the original equipment/features have been removed from the interior. To maintain physical integrity under criterion A, treatment and management facilities need only retain original location, setting, association, feeling or exterior design.

Properties primarily eligible under criterion C must meet a more stringent standard of physical integrity and may require a high level of both interior and exterior integrity. Under criterion C, additions/modifications that reflect changing missions on Site are acceptable.

Properties that reflect changes in Site technology and evolution of Site missions are acceptable under both criteria A and C.

Subtype: Water, Chemical, and Gas Treatment Facilities and Holding Tanks

Treatment facilities are located in the 100, 200, and 300 Areas. These structures are potentially eligible under criterion A if they are documented as important support facilities associated with significant processes that were conducted during the Manhattan and Cold War periods. Due to the utilitarian and technological nature of these facilities additions/modifications that reflect changes in technology or mission are viewed as significant accretions for properties under criteria A and C.

Building 185 D, a former deaeration plant in the 100 D Area, was determined eligible under criterion A for listing in the Register. The 283 Filter Plant Buildings in 200 West and East, used to filter 200 Area water, have been determined eligible under criterion A for listing in the Register. The filter plant buildings have been determined by DOE-RL to be contributing properties to the Register-eligible Hanford Site Historic District.

The DOE-RL has determined that tank farm facilities and chemical storage tanks are exempt from historic property inventory form documentation requirement because they have minimal or no visible surface manifestations, and most are radiologically contaminated, or contaminated by hazardous waste, or both.

Subtype: Hazardous and Non-Hazardous Materials Storage

Hazardous materials storage facilities are located in the 100, 200 and 300 Areas. These structures are potentially eligible for the Register under criterion A if they convey significant association with the Manhattan Project and/or Cold War periods as important storage/support facilities for plutonium and uranium fuel elements and by-products. Due to the utilitarian and technological nature of these facilities, additions and modifications that reflect changes in technology or mission are viewed as significant accretions for properties under criteria A and C.

The Washington SHPO has recommended that the 303 Fresh Metal Storage Buildings, 303 A, B, C, E, F, G, J and K, are eligible for the National Register under criterion A for their supporting role in storing uranium and fuel to be irradiated during the fuel manufacturing process in the 100 Area reactors. DOE-RL has determined that the 303 buildings are contributing properties to the Register-eligible Hanford Site Historic District. DOE-RL has also determined that 2736 Z, ZA, and ZB vaults, due to their important association and location within the PFP complex as storage facilities for plutonium products, are eligible for the National Register under criterion A and are contributing properties to the Register-eligible Hanford Site Historic District.

The DOE-RL has determined that the process waste disposal systems (e.g. single and double shell tanks) are exempt from the historic property inventory form documentation requirement because they have minimal or no visible surface manifestations, and most are radiologically contaminated, or contaminated by hazardous waste, or both.

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6.0 THE MANHATTAN PROJECT AND COLD WAR ERAS, PLUTONIUM PRODUCTION AT THE HANFORD SITE, DECEMBER 1942-1990, ARCHITECTURAL SUPPLEMENT

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6.1 Introduction

This architectural context of the Hanford Site is a supplement to the associated historic context entitled, *The Manhattan Project and the Cold War Eras, Plutonium Production at the Hanford Site, December 1942 -1990*. Like the Manhattan Project/Cold War context, this overview is presented in the multiple property documentation format, which includes a historic narrative statement and a discussion of associated property types/subtypes. Each property type provides a property description, statement of significance and registration requirements.

The value of the architectural context is that it will serve as a basis for evaluating the National Register eligibility of related properties under criterion C. Criterion C applies to properties significant for their physical design or construction characteristics, expressed in terms such as form, proportion, plan, style, materials used or construction technology. This context will define and identify the correlation of facility functions to Site building forms.

The historic narrative section discusses principal building types, architectural styles and methods of construction at Hanford, and the influence of scale, proportion, materials, workmanship, stylistic details, and spatial arrangements of facilities on the physical character of the Hanford Site. Identified associated property types include a discussion of Hanford's industrial vernacular landscape, Site design and layout features, construction materials and building fabric, methods of construction, distinctive architectural features, military facilities, and high-style architectural forms.

6.2 Statement Of Historic Context

6.2.1 Location and Construction of the Hanford Site

Selection of the Hanford Site

The Hanford Site, established in 1943 as the Hanford Engineer Works (HEW), was the world's first plutonium production facility, constructed for the United States government by E. I. du Pont de Nemours and Company, Inc., under a contract negotiated with the Manhattan Engineer District (MED) of the Army Corps of Engineers.

Due to the hazards inherent in the production and separation of plutonium, with the handling and disposal of large quantities of radioactive materials and waste, the design and layout of the world's first plutonium production facility had to satisfy the MED's safety, location and natural resource requirements. The size of the complex had to be at least 12 miles by 16 miles, remote from major population centers (no town with a population greater than 1000 could be within 20 miles), an abundant water supply of at least 25,000 gallons per minute to cool the reactors, a dependable hydroelectric power source to supply at least 100,000 kilowatts of electricity, convenient access to railroad and highway facilities, a relatively flat landscape, and availability of fuel and concrete aggregates.

After a tour of the mid-Columbia region, the MED concluded that the Hanford area met all siting conditions. The site was remote from major populated areas, had ample electrical power from Grand Coulee Dam and associated transmission facilities, a functional railroad, clean water from the nearby Columbia River, and coarse glacial-fluvial sediments provided sand and gravel aggregate for constructing large concrete structures. "Although not an original siting requirement, Hanford's arid environment and soil features allowed large amounts of liquid waste to be released to the ground without immediately descending to the groundwater" (Gray and Becker 1993: 462).

Site Design and Layout

The production areas were to be separated by relatively large distances to meet safety and security concerns. Due to the nature of the production processes, the areas at Hanford were designed as independent units to be constructed in widely-separated districts because of:

> **the possibility of explosions of catastrophic proportions and the possibility of releasing to the atmosphere of intensely radioactive gases would dictate the selection of a site of sufficient area to permit the several manufacturing Areas to be separated by distances of several miles . . . that included six primary manufacturing areas separated by distances of not less than one mile, and four secondary manufacturing areas separated by not less than four miles from each other . . . This decision was made in order that accidents in any one area should not affect the operation of the remaining units (Manhattan District Vol. 3, 1947: 2.1).**

Early considerations in the design of the HEW took into account the supplying of adequate electrical power, communication, rail, and highway facilities to all construction, operating and housing areas. Because of the magnitude of the project and the demand upon these facilities, it was necessary, not only to expand the existing facilities, but to design additional and new and reliable power and communication lines, roads, and railroads (Manhattan History, 7.1). Additionally, soil investigations indicated that the land surface was capable of sustaining the considerable stress which would be placed on it with the construction of process area buildings.

All the process Areas were designed and constructed as semi-autonomous units; they each contained support buildings and structures that provided administrative, security, health and safety, communications, utility and maintenance, waste treatment and environmental monitoring services.

For security, safety, and functional reasons the Site was divided into the following areas:

300 Area

The 300 Area occupies approximately 1.5 square miles or 960 acres in the southeastern portion of the Hanford Site along the west bank of the Columbia River, approximately 7 1/2 miles north of the center of Richland. In March 1943, construction of a fuel fabrication complex was started in the 300 Area to support reactor fuel fabrication and other production activities. As the area that manufactured the uranium fuel that allowed reactors to operate, the 300 Area housed the first essential step in the plutonium production process. Since the 300 Area's fuel fabrication activities were the least likely of the production processes to experience a serious accident, it was considered safe enough to be located near populated areas (Richland). Nuclear fuel in the form of pipe-like cylinders ("fuel slugs") was fabricated from metallic uranium shipped in from off-Site production facilities. Metallic uranium was extruded into the proper shape and encapsulated in aluminum or zirconium cladding. The fuel slugs were transported to the 100 Area reactors for irradiation.

Besides the location of Hanford's uranium fuel fabrication plants, and much of the Site's research and development (R & D) activities, the 300 Area was also the site of chemical process laboratories, test reactors, and numerous ancillary/support structures associated with the above facilities. In the early 1950's, construction of R & D facilities accelerated in the 300 Area. In the 1960's, new laboratories were constructed and R & D activities expanded to handle the increase in defense and energy research. In the 1970's, additional support and laboratory facilities were constructed for energy research, waste management, biological sciences, and environmental sciences.

100 Area

<u>Reactor Siting</u>
The 100 Area's nine plutonium production reactors (Piles) and their ancillary/support facilities were designed and constructed along the south shore of the Columbia River. The Pile Areas had to be laid out close to the river because large quantities of water were required to dissipate the heat generated during reactor operations. Fabricated fuel slugs were shipped by rail from the 300 Area to the 100 Area reactors for irradiation. Due to the dangers inherent in the irradiation of uranium fuel elements, the essential second step in the plutonium production process, the reactors were situated as far as possible (approximately 30 miles) from Richland.

Each of the first six reactors was located in an area one square mile in size and separated approximately one to three miles from one another, a distance thought adequate enough to prevent operational difficulties in one area from affecting another. It was thought that this siting requirement would minimize the effects of an explosion or act of sabotage at one reactor from adversely affecting other 100 Area facilities.

While each 100 Area production facility was designed as a self-contained, functional unit, completely independent of the others, each production reactor was functionally dependent on the two other processing Areas (200 and 300 Areas).

Each 100 Area was designed virtually identical (except 100 N). In addition to the reactor buildings, each 100 Area had in common a retention basin, pump house, chemical and gas storage facilities, water purification facilities, river pump houses and reservoirs, filter plants, power houses, water treatment plants, water tanks, main pumphouse, electrical substations, waste processing, change houses, warehouses, maintenance shops, oil and gas storage facilities, patrol headquarters and badge houses, first aid stations, offices and water chemistry laboratories.

Temporary construction (TC) structures were used in the 100 B, D, and F Areas. TC facilities included construction offices and shops, storage buildings and yards, electric power distribution facilities, water pumping and transmission facilities, and commuting facilities.

Irradiation Process

The main component of the nuclear reactors consisted of a large stack ("pile") of graphite blocks that had tubes and pipes running through it. The tubes were receptacles for the fuel slugs (fabricated in the 300 Area) while the pipes carried water to cool the graphite pile. The first eight reactors, constructed between 1944 and 1955, used water from the Columbia River for direct cooling. The ninth reactor, N Reactor, was completed in 1963 and was a slightly different design. Purified water was recirculated through the reactor core in a closed-loop cooling system. N Reactor also had the capability of generating steam for the production of electricity. N Reactor operated with a safer, negative void efficient while the single pass reactors had a positive void coefficient.

During the irradiation process fresh fuel slugs were pushed into the front face of the reactor's graphite pile. After the irradiation of the fuel slugs, they were forced out in the rear into a deep pool of water called a fuel storage basin. After a brief period of storage in the basins, the irradiated fuel slugs were transported by rail to the 200 Areas where the plutonium was recovered. Most of the irradiated fuel produced at N Reactor from the mid-1970's to the late 1980's was, however, transported to the 100 K East and West fuel basins for temporary storage.

200 Area

200 East and 200 West are located on a plateau in the center of the Hanford Site seven and five miles, respectively, south of the Columbia River, approximately twenty miles north of Richland. The 200 Areas, the location of the chemical separations ("processing") plants and their ancillary/support facilities, functioned as the third crucial step in the nuclear process at Hanford.

The 200 Areas were designed to contain all the process facilities used in the separation, isolation, storage and shipment of plutonium. The 200 Areas provided storage for irradiated fuel rods awaiting chemical dissolution, and the processing of the finished product (plutonium nitrate) awaiting shipment to the MED installation at Los Alamos, New Mexico. The hazardous nature of 200 Area "separations" activities made it undesirable to concentrate these buildings in one process area; so the MED designated 200 North, East and West process areas.

> **Certain storage buildings were segregated (in 200 N) and the production capacity divided (between 200 East and West). The distances required between Areas made a large tract**

necessary. The sites selected lay in the intervening valley between the Rattlesnake Hills, Gable Mountain, and Gable Butte with the latter two providing a natural barricade between the 100 and 200 Process Areas (DuPont Vol. 4, 1945: 812).

The "separations plants" (canyon buildings) received and dissolved irradiated fuel then separated out the plutonium. Principal fuel-reprocessing plants in 200 East were PUREX and B Plant. The principal chemical processing facilities in 200 West were U, REDOX, and T Plants. The recovered plutonium was received at several facilities that were collectively known as the Plutonium Finishing Plant (PFP), or "Z Plant", in 200 West. PFP converted the plutonium nitrate into plutonium metal blanks or "buttons". (Prior to PFP, plutonium nitrate was converted into metal blanks or "buttons" only at Los Alamos.)

The separation plants were placed approximately two miles apart from each other, while the 200 Areas were situated four miles apart. Each 200 Area was provided with its own water supply system, steam plant and other service facilities to permit independent operation.

The 200 North Area, completely different in design and function from 200 East and West Areas, operated during the Manhattan Project to store the irradiated fuel rods after their removal from the reactors but before chemical processing, to store the finished product before it was shipped to Los Alamos, and to store the empty storage cans that were returned from Los Alamos awaiting refill.

Other determinants that influenced the siting of the 200 Areas in the central plateau area had to do with its distance above the water table. The water table is approximately 240 feet below the surface of the central plateau, whereas, the 100 Areas are situated 50-75 feet above the water table. While processing facilities in the 200 Area were built atop the same permeable gravel's as the production reactors, sediments underlying the 200 Areas were finer, and less permeable to liquids. Thus, there was less chance of contamination of the groundwater in the 200 Area (Carpenter 1996).

400 Area

The 400 Area consists of the Fast Flux Test Facility (FFTF) complex, the largest test reactor on-Site, which includes the reactor and containment structure, and various utilities and ancillary/support facilities. The complex array of buildings, equipment and roads are arranged in a traditional grid around the Reactor Containment (405) Building. This special nuclear reactor was designed primarily for testing breeder and coolant technology, and to test various types of nuclear fuel. Similar to the 100, 200 and 300 Areas, the 400 Area contains support facilities that provided administrative, security, health and safety, utility and maintenance, communications, waste treatment and environmental monitoring services.

500, 800, and 900 Areas

These three areas are not geographical areas but consist of electrical, pipeline and sewage outlets and facilities found throughout the Site. These areas are addressed in the associated historic context, *The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, 1942-1990.*

600 Area

The 600 Area is comprised of facilities that served more than one specific area, including health and safety and environmental monitoring facilities, such as radar and utility/communication towers and structures, Site security, military defense, and fire suppression facilities.

> **Included in the construction of the HEW are a number of facilities which serve more than one specific area and in cases, such as roads and railroads, serve the entire Project. For this reason they have been designated as 600 Area Buildings and Facilities, and are not confined to a single location . . . (DuPont Vol. IV, 1945: 1085).**

The initial step in organizing the 600 Area for construction began during March, 1943, when a Division engineer was assigned to handle all construction work for that Area. Layout for intra-Area roads and railroads was prepared by the Wilmington Design Division (DuPont Vol. IV, 1945: 1089). Due to the widespread locations of construction for the Plant and the volume and types of materials involved, railroads were an important method of transportation. Existing tracks were upgraded to accommodate the anticipated heavy use during the Manhattan Project, and additional tracks were added during the post-World War II era. During the Cold War period existing roads were widened and new roads built to handle the expanded uses and missions of the Hanford Site.

Anti-Aircraft Artillery (AAA) and Nike Missile Sites

The 600 Area was the location of AAA sites and Nike missile installations that provided air defense of the Hanford Site during the 1950's and early 60's. The most intact of the 16 AAA sites are five installations situated along Army Loop Road and on 200 East Hill. Extant resources include the remains of (doughnut-shaped) revetments and other sandbagged/cobblestone structures.

The internal layout of the AAA sites reflected a standard military arrangement of facilities separated by function. Four semi-circular artillery placements (revetments) were arranged in a square plan separate from the rest of the installation. The more "permanent" concrete structures were situated in a rectangular grid that included barracks, latrines, mess halls, recreation halls, motor pools, administrative and radar facilities. Each site typically had a small arms range, a water storage cistern, and sanitary/sewage waste facilities. The site facilities were connected by pathways/sidewalks, roadways, and parking lots.

Between 1955 and 1961, Nike Ajax and Hercules missiles were deployed by the U. S. Army at four locations on the Hanford Site, three on the North Slope and one on the Fitzner-Eberhardt Arid Lands Ecology (ALE) Reserve. Of the four Nike missile launch sites and radar control sites (that replaced the AAA emplacements in the mid-1950's), only the Nike launch and radar control site (H-52 C & H-52 L) on the ALE Reserve remains intact.

The buildings and structures at each Nike site were organized into two separate installations: the battery control area and launch area. Launch area batteries contained motor pools, generator buildings, acid pits, missile refueling areas, missile assembly buildings, maintenance facilities, administrative, housing, and recreation facilities. More importantly, the launch areas contained the underground missile storage magazines and launch equipment, including buildings used for the testing and servicing of missiles. The main function of the launch areas was to maintain missile batteries in a combat-ready posture that required the storage, handling, and disposal not only of missile components and propellants but also of solvents, fluids, fuels, and other materials required for a variety of support functions. The battery control areas contained all the radar, guidance, electronic, and communications equipment needed to identify incoming targets, launch missiles, and direct and guide missiles in flight to intercept enemy aircraft.

H-52 C, the former battery control area, is located at the top of Rattlesnake Mountain, while H-52 L, the associated launching area, is situated at the base of the mountain. The location of the control areas had to be

> **between a minimum of one-half mile and a maximum of three miles from the launch area. The minimum distance was determined by the maximum tracking capability in elevation of the missile tracking radar, and the maximum distance by practical considerations of providing communication by cables (Carlson and Lyon n.d., n.p.).**

While the spatial arrangement of the buildings/structures in each launch and control area was site-specific, with no standard layout plans, the H 52 L launch area was divided into two separate "zones" or areas for functional and safety reasons: one area included administrative, mess hall, residential, and recreational facilities, the other included the underground missile storage, missile refueling, missile assembly and testing, fuel storage, and generator facilities. The H 52 C control center at the top of Rattlesnake combined administrative, radar, and barracks functions in one building.

While some Nike sites nationwide had designated separate areas for housing from the two operating areas, Hanford's H-52 installation had barracks in both the launch and control areas (McMaster 1984: 4-1, 4-4).

1100 and 3000 Areas

The 1100 and 3000 Areas are located near the Site in North Richland. The 1100 Area includes Site support services such as general stores, shipping, receiving, transportation maintenance and contractors offices.

Established during World War II, the 3000 Area was originally the site of a camp that housed Hanford Site construction personnel and military police. After the war, the 3000 Area became part of the North Richland Construction Camp. The establishment of the U. S. Army's Camp Hanford in North Richland in 1951 included the acquisition of most of the 3000 Area and the Construction Camp. Today, the 3000 area includes thirteen former Camp Hanford industrial facilities and seven buildings/structures (excluding mobile offices and trailers) constructed during the post-Camp Hanford period.

Camp Hanford consisted of commercial, administrative, industrial, medical, recreational and residential facilities. The residential cantonment included repetitive rows of barracks, a trailer park and "Bremerton" prefabricated housing. The symmetrical layout of the camp, with its grid of 700-800 series temporary construction (TC) Army buildings, was similar to World War II cantonments.

The physical layout of the industrial section of Camp Hanford was not as regimented in design compared to the residential, commercial and administrative areas of the cantonment. While most of the cantonment was designed along a traditional military grid, the buildings in the industrial section were laid out in a modified grid. Camp Hanford's disparate industrial functions, and the constant removal and addition of buildings and structures, dictated a variety of construction styles/designs and placement in the industrial area.

Industrial sections of military installations consist of a variety of architectural styles reflective of the numerous functions performed. The layout and design of the Camp

Hanford industrial area was influenced by the numerous modification of area buildings/structures to accommodate rapid technological advances and changing support uses/Site missions. Many of the extant, wood and steel frame Camp Hanford industrial facilities/warehouses, however, have similar construction characteristics.

6.2.2 Industrial Vernacular Architecture

The Hanford Site is an evolving industrial vernacular landscape whose layout and design has been shaped by the variety of functional uses and changing Site missions. Function plays a significant role in industrial vernacular landscapes, reflective of the type of utilitarian facilities constructed. In the case of Hanford this includes buildings/structures in the designed production Areas, roads and railroads, and communication and utility/electrical facilities.

Vernacular architecture is defined as buildings/structures, such as Hanford's industrial facilities, not classified as "high-style" architecture. Vernacular architecture often refers to local adaptations of wide-spread, high-style architectural forms. More specifically, "vernacular architecture has been a catch-all term for the study of kinds of buildings neglected by traditional architectural history, . . . and the study of vernacular architecture is sometimes regarded as a poor relation by mainstream architectural historians" (Rydell 1985: 401).

Hanford's Manhattan Project/Cold War era landscape reflects unembellished industrial architecture, devoid of nonessential decorative elements and ornamentation. The design of Hanford's industrial utilitarian buildings is an vernacular adaptation of the International/Modernist style, an architectural expression of "aesthetic functionalism" that gained popularity during the post-World War II era. In this environment, "a building was beautiful to the degree that it was functional" (Teague 1940: 15, 54). Thus, Hanford's industrial vernacular facilities can be categorized under architect Louis Sullivan's famous maxim, "that form ever follow function" (Sullivan 1896: 403-409).

Although there were numerous factors that influenced the physical characteristics of Hanford's facilities, functional considerations were the primary determinants of the design features and layout of Hanford's facilities. While functional considerations influenced the basic architectural and Site design characteristics, the layout and construction of the Hanford Engineer Works (HEW) was also reflective of the federal government's desire for cost-effective, wartime mobilization. As with other World War II military installations, speed of design and construction was of the utmost necessity.

Since the end of World War II industrial and laboratory facilities at Hanford have been subjected to numerous internal and external modifications to accommodate technological changes, mission/scientific changes and objectives, and expansion of plutonium production and non-defense facilities. These changes have had a significant effect upon Site design and layout, and have also influenced construction designs, building materials used and variations of industrial vernacular architecture applied.

6.2.3 Construction Design, Styles, and Materials

Hanford's built environment reflected industrial and utilitarian functions over aesthetic concerns, not only in the design and layout of the Site's production Areas but also in the design of individual buildings and construction materials used. Functional, unadorned concrete and steel were the most commonly used materials at Hanford.

Common Construction Materials

Concrete is a name applied to any number of compositions consisting of sand, gravel, crushed stone, or other coarse material, bound together with various kinds of cementitious materials, such as lime or cements. Concrete is a combination of aggregate, of which sand is always a part, together with gravel, stone chippings, or crushed slag, and lime or cement to bind the aggregate (Coney n.d.). Various concrete applications include (Coney n.d.):

> Unreinforced concrete: a composite material containing aggregates held together by a cement with water to form a paste, and gets its name from the fact that it does not have any iron or steel reinforcing bars.
>
> Reinforced concrete: concrete strengthened by the inclusion of metal bars, which increases the tensile strength of the concrete.
>
> Precast concrete: concrete that is cast and hardened away from the building site and then put in place in the building as a rigid component.
>
> Cast-in-place concrete: concrete poured on-site into a previously erected framework that is removed after the concrete has set.

Corrugated (galvanized steel panel) metal is a lightweight, ribbed metal cladding that is manufactured by rolling continuous flat sheets of lightweight steel or aluminum into ribbed profiles (Architecture 1995: 119).

One of the reasons for choosing Hanford as a Manhattan Project site was that sufficient aggregate would be available locally to provide enough concrete for Site construction needs. Concrete was the most extensively used material in the construction of the Hanford Site. One of the early construction actions of the Manhattan Project at Hanford was to develop two aggregate sources on the Hanford Site. The concrete was transported from the mixing plants to the buildings by concrete pumps and by transit-mix trucks.

The amount of concrete used during the Manhattan Project was substantial. More than 780,000 cubic yards of concrete were used, an amount that equals approximately 390 miles of concrete highway 20 feet wide by 6 inches thick. About 1,500,000 concrete blocks and 750,000 cement bricks were used in the plant construction or sufficient to build one foot by six foot wall over 30 miles long (DuPont 1945).

The urgent nature of the Manhattan Project at Hanford dictated an emphasis on speed and functionalism, which translated into a preference for flat roof, concrete box-like structures over more traditional architectural forms. The exterior walls exhibited minimal non-functional ornamentation. Their steel skeletons allowed the construction of non-loadbearing exterior walls made mainly of concrete. While Hanford's industrial concrete structures lack "artificial" symmetrical features, they do express a sense of architectural balance and functional regularity.

Temporary Construction Facilities

Because of the emphasis on speed and cost-efficiency during the Manhattan Project, temporary construction (TC) facilities were constructed in large numbers on the Hanford Site. Many of the TC facilities are still extant. To accomplish speedy and low cost construction, standard design and assembly-line construction were adopted and used throughout the major portion of TC work performed at Hanford. In assembly-line construction, all materials for a certain building or group of similar buildings (barracks, bathhouses) were prefabricated at the various craft shops and then sent to the building site for erection and installation. Modified versions of the Navy's 800 series B-2 barracks were used extensively at Hanford to house construction workers at the Hanford townsite construction camp and the Hanford Engineers Works (Richland) Village. A considerable number of these barracks were later moved to the 100, 200 and 300 Areas for use as offices and other administrative purposes.

Prefabricated Units

To accommodate the larger-than expected work load during the Manhattan Project, and for speed and cost-efficiency, prefabricated units were shipped to Hanford for a wide variety of construction uses. All the process areas had prefabricated huts that included the Hobb's "Pacific" huts and the Butler "Nisson" type huts. Pacific huts were used mainly for barracks, commercial facilities, and offices at the Hanford construction camp. The larger Butler Nisson huts were used as special storage warehouses, especially in the 200, 300 and 1100 areas. The smaller Nisson huts were used for offices, warehouses and small shops in most areas. Generally, Butler-type buildings are metal structures composed of premanufactured sides and roofs, constructed of corrugated metal or sheet metal and bolted steel, commonly resting on a poured concrete slab.

Other prefabricated units were transferred from government projects and used principally for field offices and warehouses, which included Quonset huts. Quonset huts, still in use in the 200, 300, and 400 Areas, are prefabricated units constructed of semi-cylindrical roof of galvanized corrugated sheet metal attached to metal purlins supported by steel ribs. Hook bolts with nuts and washers connected the purlins to the ribs. The semicircular ends of the building were of board and batten construction. The windows and flooring were constructed of wood.

100 Area

Three general types of permanent building construction were initially used in the 100 Areas: reinforced mass concrete, structural steel framing together with concrete block and/or reinforced concrete, and wood frame (DuPont Vol. 3, 1945: 652). Common materials and stylistic features used in the 100 Area during the entire Manhattan Project/Cold War era included concrete foundations and flooring, corrugated and shingled transite siding, concrete block walls, corrugated metal/pressed steel siding and roofing, wood and steel framing, flat pre-cast concrete roofs covered with tar and gravel surfacing or composition shingles, and corrugated roll up industrial metal doors or double leaf, single panel wood doors.

During the Manhattan Project, aggregate borrow pits and concrete plants were used for construction resources in the 100 Areas, as sand and gravel deposits were found immediately underlying the surface. Two aggregate barrow pits were opened in the 100 B Area for temporary and permanent road construction and stabilization work. No aggregate barrow pits were excavated in the 100 D and 100 F Areas. Concrete aggregate was shipped to the 100 B Area by rail and truck from the Haven gravel pit located approximately 1/2 mile west of the 100 B Area. Concrete aggregate from the Haven and the Hanford gravel pits furnished the 100 D and F Areas. "The Haven pit was capable of producing 9600 tons of concrete aggregate daily. The Hanford gravel pit located just west of Hanford proper was capable of producing 14,832 tons of concrete aggregate daily" (DuPont Vol. 3, 1945: 650).

"The concrete mixing plant was erected in the immediate vicinity of the 105 building in each of the 100 B and F Areas by the Hanford contractors to furnish ready-mixed concrete for construction. Since a sizable portion of concrete yardage was concentrated at the 105 building and the 185, 189 and 190 building group, a Pumpcrete method (e.g. concrete mix pumped through pipes) of placing concrete from a central pumping plant was used. Concrete was accepted by Dupont at the mix plant and was placed by the various methods with labor furnished by Dupont" (DuPont Vol. 3, 1945: 651).

The availability of prepared concrete materials expanded at Hanford during the post-World War II period. In the 100 H Area the bulk of the concrete was prepared in the central mixing plant erected within the H Area; some amounts were also furnished from the White Bluffs plant.

Reactor Area Construction

The graphite-moderated production reactors (except 105 N) had similar design and construction features. The use of graphite as a moderator, cylindrical uranium metal fuel in the horizontal process tubes, and light water as a coolant were common to all the Hanford production reactors. Core sizes, operating conditions, primary coolant loop configurations and some minor design features varied slightly among the reactors. Because of the wartime need for speed, almost no design variations were permitted. Slight differences in reactor layout and design, however, occurred among the first generation reactors. The 105 C Reactor building, completed in 1952, was similar to 105 B (completed in 1944) except that 105 C had a larger L-shaped building size and the Area layout of the buildings was different. The siting of C Reactor adjacent to the 100 B Area was to take advantage of the pumphouse and water treatment facilities already existing for B Reactor. 105 H also had variations in layout and design from 105 B. 100 DR, which stood for 100 D replacement, was completed in 1949 and designed as a replacement for 100 D. D Reactor was thought to be nearing the end of its effective operational life in the late 1940's due to growth and distortion of its core graphite.

> **It was subsequently determined that the graphite distortion in 100 D could be controlled; both reactors would operate simultaneously. This required the construction of a separate water treatment plant for 100 DR, including modifications and additions to the river pumphouse, powerhouse, and gas recirculation facilities as well as the water treatment plants (Carpenter 1993: 2-3).**

The reactors are categorized into three generations. The first generation reactors were the small, single-pass reactors built during and shortly after the Manhattan Project: B, D, F, DR, H and C Reactors. The construction of the three Manhattan Project reactors (B, D, F) was only the second time that pumped concrete had been used in a major construction project. (The Grand Coulee Dam was the first.) The first reactors were designed for a power level of 250 MW. After some operating experience, it was realized the power level could be raised provided adequate cooling was supplied to the fuel. The K Reactors constituted the second generation of reactors. They were substantially larger, with a thermal power output 7.2 times as high at the design level. The Hanford N Reactor was a third generation reactor. It was a dual purpose reactor capable of isotope and power production, and had a recirculating primary cooling system. The emphasis of N Reactor's design was on safety, plutonium production, and the use of byproduct steam for electric power generation. The single-pass reactors were all shutdown in the time period from 1964 to 1971, and N Reactor went into cold standby status in 1988.

The cladding of the 105 Reactor buildings was consistent. Reinforced concrete shielding walls and corrugated asbestos cement siding were commonly used. Roof construction, except for reinforced concrete slabs over the Inner Rod Room and rear face enclosure, was poured insulated concrete. The ceilings were constructed of laminated gypsum board. The roof is cast concrete over the discharge area. The roofs were composed of precast concrete roof tile, except over the discharge area enclosure and the inner horizontal rod room. Over these areas the roofs were composed of 6 foot thick reinforced concrete. The massive reinforced concrete walls around the reactor core at the lower levels provide additional radiation shielding.

The reactors rested on 23 foot thick concrete foundations topped with cast iron blocks that served as a thermal shield. The walls consisted of reinforced concrete in the lower portions and concrete block in the upper portions, varying from 3 to 5 feet thick. The graphite cores were surrounded by a cast iron thermal shield layer. The entire thermal shield was surrounded on all sides (except the bottom) by a 52-inch thick biological shield that consisted of alternate layers of masonite and steel.

200 Area

Five general types of building construction were initially used in the 200 Areas: reinforced mass concrete, structural steel frame and concrete block, reinforced concrete frame and concrete block, structural steel frame and wood siding, and wood frame. Common materials and stylistic features used in the 200 Area during the entire Manhattan Project/Cold War era included concrete foundations and flooring, corrugated and shingled transite siding, concrete block walls, corrugated metal/pressed steel siding and roofing, wood and steel framing, flat, precast concrete roofs covered with tar and gravel surfacing or composition shingles, and corrugated roll up metal doors or double leaf, single panel wood doors.

Since large quantities of concrete were needed in the construction of Manhattan Project era buildings, local sources of concrete aggregates were used for cost and speed reasons, especially in the construction of the 200 Area canyon or "separations" buildings. The Manhattan Project separation buildings (U, T, B Plants), massive reinforced concrete structures, measure over 800 feet long, 65 feet wide, and 80 feet high. Because of the radioactivity present during the separation process, the concrete walls surrounding the separation cells were constructed seven feet thick to provide necessary protective shielding. Cell covers were constructed of removable, six-foot thick concrete blocks.

The Cold War period Reduction-Oxidation (REDOX) Processing Plant, like the other canyon or separations buildings, is a monolithic, rectangular (467 feet by 161 feet by 82 feet high), flat roof structure constructed almost entirely of concrete. Built in 1952, REDOX and its chemical separation process was chosen to replace the bismuth phosphate process employed at B and T Plants.

> As with other canyon buildings, its process equipment is contained in small rooms, called cells, which are arranged in rows in an area spanned by a traveling crane. The cells are topped with 4-foot concrete blocks that are removable by crane to provide access to the cell beneath . . . Heavy concrete shielding walls . . . are up to the level of the crane rails, giving the appearance of a canyon . . . From a process view point, the REDOX facility is divided into a canyon area and a silo area. The canyon consists of nine process cells arranged in two parallel rows running east to west and separated by a pipe tunnel. The five-foot thick concrete shielding walls protected REDOX workers from the intense radiation found in the process cells. The silo, located on the west end of the building is 84 feet by 41 feet by 132 feet high and contains a process area and an operating area. Its extraction column shaft is 12 feet by 69 feet by 86 feet high and has eight floor levels (DeFord and Carpenter 1995: 2-1).

The Cold War era Plutonium-Uranium Extraction (PUREX) Plant was a concrete, rectangular-shaped facility measuring 1005 feet long, 104 feet high (with approximately 40 feet below grade), and 61.5 wide. The shielding capacity of the concrete was designed so that personnel in non-regulated service areas would not receive radiation in excess of 0.1 millirem per hour. The Plant's main canyon portion was approximately 860 feet long. The reinforced concrete cell cover blocks were fabricated outside the 202 A (PUREX) Building prior to installation (Gerber 1993d: 2, 3).

The 234-5Z Plutonium Finishing Plant (PFP), or "Z Plant", is 180 feet wide by 500 feet long, extending 9.5 feet below grade to 46.8 feet above grade.

> **The frame is of structural steel with an outer sheathing of aluminum panels over rock wool insulation and 16-gauge sheet steel. The first floor is concrete slab; the duct level is sheet metal roof decking, and the second level is a concrete slab. The roof is insulated metal decking. Interior walls are reinforced concrete steel, metal studs, metal lath, and plaster. The vault and process area doors are constructed of steel . . . (Gerber 1995).**

Construction features and materials of the 200 Area are similar to those used in the other production areas. Due to the 200 Areas chemical separations function, however, the Manhattan Project/early Cold War facilities used considerable amounts of concrete material, minimal windows, symmetrical plans, and foundations constructed of poured concrete or of reinforced concrete piers with spread footings. Floors, walls and ceilings were made of reinforced concrete or concrete block. Roofs were likewise constructed of reinforced concrete and covered with built-up felt, tar and gravel material.

Except for wood framing in the Manhattan Project administrative/non-production facilities, most of the smaller, non-chemical separations buildings were constructed of structural steel framing with outer sheaths of aluminum panels, corrugated metal, or transite shingles. Some roofs were constructed of insulated metal decking. Interior walls are made of sheetrock/plasterboard, reinforced concrete or general plaster covering. Early wood frame facilities had symmetrical features with repetitive, multipane, industrial-style windows, and gable roofs. Cladding consisted of corrugated metal or transite/asbestos shingles over original horizontal wood siding.

<u>300 Area</u>

The layout of the 300 Area consists of three distinct "zones". The northern area or "zone" has had minimal building development, consisting mainly of waste sites such as trenches, ponds, and burial grounds. The central 300 Area has a congested network of infrastructure systems and Manhattan Project and early/middle Cold War era facilities. There has been minimal infrastructure and building/structural development in the south portion of the 300 Area. The south portion, lacking a grid design, is a sprawling landscape of parking lots, mobile offices/trailers and several buildings/structures that date from the late Cold War era to the post-1990 period.

The original layout of the 300 Area was concentrated in a traditional grid pattern in the central zone and northwest corner of the 300 Area. Today, the roads within the 300 Area run in a broken grid pattern; the north-south are named for states and the east-west roads are named for trees. These roads travel a short distance, and newer structures commonly encroach on right-of-ways in the north end of the Area. Liquid wastes were transported via tanker truck over the Site roads until the 1980's. Approximately 2.1 miles of railroad track is within the 300 Area. The rail system transported coal to the power house, uranium fuel to the 100 Areas, solid waste to burial grounds, and equipment and materials involved with R & D programs.

Common Construction Materials and Features

Three general types of construction were initially used in the 300 Area: reinforced mass concrete, structural steel framing together with concrete blocks and/or reinforced concrete and wood frame. Some of the Manhattan Project and early Cold War buildings were of wood frame construction, with symmetrical rectangular plans, transite shingle or corrugated metal cladding (over original wood siding), gable roofs, and repetitive, industrial style fenestration. During the entire Manhattan Project/Cold War era, however, most of the 300 Area facilities were constructed of concrete, with steel frames, asymmetrical features, flat roofs, and corrugated metal cladding.

Most of the early buildings/structures were situated in the 300 Area by function/proximity to fuel fabrication/uranium production and laboratory facilities. Buildings such as the 313 Fuel Manufacturing Support Facility, 314 Press Building, 305 Test Pile, 305 B Engineering Development Lab Annex, and 3706 Radiochemistry Lab were sited in close proximity to one another. But as the size of the 300 Area expanded and its mission diversified, research, laboratory and fuel fabrication facilities were mixed among storage buildings, shops, administrative buildings, health, security and safety facilities, and environmental monitoring structures.

Industrial buildings from the 1940's were constructed mainly of poured concrete, reinforced concrete blocks and steel framing. Non-manufacturing facilities, like Manhattan Project era administrative facilities (e.g., Buildings 3702, 3703), were of wood frame construction, with gable roofs, symmetrical, rectangular plans, repetitive double hung sash windows, swamp coolers, and horizontal wood or asbestos transite shingled siding.

By the early 1950's, 300 Area building construction had adopted additional asymmetrical design features. Framing for the most part was concrete and steel framing, and cladding was metal panel, asbestos transite shingles, corrugated transite or corrugated metal. By the 1970's and 1980's, new buildings, especially in the central and southern part of the 300 Area, were rectangular shaped, steel and wood framed, with a single story and aggregate pebble/stucco siding over plywood sheathing. Many of these facilities were prefabricated units, mainly for office and laboratory use, with premanufactured sidings and roofs constructed of fluted metal panels, sheet metal, or corrugated metal.

High-Style Architectural Forms

While the vast majority of 300 Area buildings are industrial vernacular structures, several of the facilities in the 300 Area exhibit high-style architectural features. They include:

Brutalism: Buildings 337/337 B, and certain features of Building 331, exhibit the architectural characteristics of "Brutalism". The term comes from the French "Breton Brut", meaning rough or untreated concrete. The goal of this style is an honesty in structural, spatial, organizational and material concepts that result in buildings characterized as "rude and ruthless", where the scale or relation of mass and detail to human beings is often referred to as "brutal". The distinguishing characteristics of the style, which experienced its peak popularity from the years 1955 to 1970, include (Kirk 1996):

- concrete exposed at its roughest
- exaggerated structural members
- raw and unfinished simple materials

- formalist (building forms clearly express their function)
- grand scale
- exposed mechanical systems, ducts, pipes

Art Deco/Art Moderne: The architecture of Building 3760, the Hanford Technical Library, is a vernacular adaptation of Art Deco/Art Moderne features and styles. These features include a projecting concrete entrance/frontispiece, its symmetrical design highlighted by parallel concrete piers/pilasters. Strong, decorative horizontal banding is expressed in the repetitive fenestration (ribbon window) on the front facade. Other Art Deco/Moderne elements include the building's angular, hard-edged form, simplified and streamlined, with a modified front facade setback.

400 Area

Similar to the post-1970 facilities in the 300 Area, the primary materials used in the construction of the 400 Area (FFTF complex) buildings included extensive applications of concrete, textured concrete facades, steel framing, fluted metal panels, sheet metal, and corrugated metal. Premanufactured construction materials were used in the bolted steel, Butler-style buildings in the 400 Area. Several of the wood or steel frame, flat roof buildings have fluted concrete block walls or exterior finishes of stucco fascia material/aggregate stucco over plywood sheathing, with tar and gravel built-up roof coverings.

The FFTF includes the reactor, heat removal equipment and structures, containment, core component, handling and examination, instrumentation and control, and utilities and other essential services. The complex array of buildings and equipment are arranged around Building 405, the Reactor Containment Building (Mayancsik 1988: 1-1). The Containment Building, which houses the reactor and plant operating equipment, is

> **a cylindrical carbon steel shell. Steel-lined reinforced concrete cells occupy the lower portion of the Containment Building, from grade level to approximately 78 feet below grade . . . A structural steel mezzanine above the operating perimeter provides additional work area . . . A 200-ton polar gantry crane and a jib crane are located above the mezzanine for handling large equipment and materials. The central portion of the operating floor is occupied by a steel operating deck (Mayancsik 1988: 1-8).**

The adjacent 403 Fuel Storage Facility has a below-ground cell that contains a carbon steel storage vessel 21 feet in diameter that provides storage of the FFTF spent fuel assemblies in liquid sodium.

The 400 Area Fuels and Materials Examination Facility (FMEF) (427 Building) was designed beginning in the mid-1970's and constructed during the early 1980's as a major addition to the breeder technology development program at the Hanford Site. Typical of the industrial, asymmetrical, flat roof facilities in the FFTF complex, the 427 Building is a poured concrete building, 175 feet by 270 feet by 98 feet high. The building also extends 35 feet below grade, and has a total of 188,000 square feet of operations space. It is divided into six operating floors with an attached Mechanical Equipment Wing on the west side, and an Entry Wing known as the 4862 Building (Gerber 1995b).

600 Area

The thirteen Nike period buildings/structures at the H-52 L launch site, including the underground missile storage facility, are constructed mainly of concrete. Common stylistic features and construction materials include one story, flat roof, concrete block structures erected on concrete footings and on-grade concrete floor slabs. Wood or metal, multipane, double hung sash windows, or fixed sash and glass block windows, are symmetrically placed. Roofs are constructed of wooden joists covered with wood sheathing and built-up cover of tar and gravel. Smaller support facilities (water pumping, sewage, storage) are either concrete block or wood frame, flat or shed roofs, with minimal windows and metal doors. Built-up dirt and grass berms are evident in the fueling and missile maintenance and assembly areas for safety protection purposes. Only the concrete underground missile storage facility has minimal surface manifestations; the only visible parts are the two entrance doors, set in mounds of earth covering the concrete superstructure. Concrete pads cover the former missile firing area.

Other 600 Area facilities include fire stations, atmospheric and environmental monitoring facilities, and weather station structures. The wood and steel frame buildings have mainly flat roofs, and are constructed of concrete block walls with horizontal wood siding, while the weather and environmental monitoring (meteorology) towers and radar facilities are constructed of steel and set in poured concrete slabs. The 213 J and K magazine storage facilities, which stored purified plutonium nitrate paste, contaminated sodium, and soil samples for fallout studies, are constructed of massive reinforced concrete. The remaining 600 Area facilities are Butler-type, storage/support function buildings, constructed of bolted steel and corrugated sheet metal.

3000 Area

The 3000 Area is the site of thirteen former Camp Hanford industrial buildings and seven buildings/structures (excluding mobile offices and trailers) constructed during the post-Camp Hanford period. The extant Camp Hanford industrial facilities/warehouses/shops, built during the mid-1950's, have similar construction characteristics and styles. These elements include rectangular plans, wood and steel frames and trusses, repetitive multipane industrial windows, corrugated roll up metal doors in symmetrically placed bays, transite shingled and vertical board cladding, flat or slightly pitched gabled roofs, and concrete floors and foundations.

The post-Camp Hanford period buildings consist mainly of bolted steel, Butler-type buildings with corrugated metal cladding and roofing set on poured concrete foundations. Other structures are metal framed with gable roofs and vertical board cladding. A couple of the Camp Hanford era buildings have been extensively modified with stucco siding and fixed-pane tinted windows.

6.3 Associated Property Types

6.3.1 Associated Property Type: Industrial Vernacular Landscape, Site Facilities and Construction Materials

Description: Hanford's Manhattan Project/Cold War era landscape reflects unembellished industrial architecture, devoid of "nonessential" decorative elements and ornamentation. Hanford's functional, utilitarian architecture is an vernacular expression of the International, Modernist style that gained popularity during the post-World War II period. Hanford's built environment exhibits industrial and functional/utilitarian characteristics over aesthetic concerns, not only in the design and layout of the Site's process areas but also in the type of buildings constructed and construction materials used.

Subtype: Concrete

Description: Functional, unadorned concrete was the most commonly used material in the construction of Hanford's production areas. Concrete is the term applied to any number of compositions consisting of sand, gravel, crushed stone, or other coarse material, bound together with various kinds of cementitious materials. Types of concrete applications included reinforced mass concrete, reinforced concrete, concrete block, reinforced concrete frame construction, and poured concrete slabs.

Detailed below are the uses of concrete in the individual process areas.

<u>100 Area</u>

During the Manhattan Project, aggregate barrow pits and concrete plants were used for construction resources in the 100 Areas, as sand and gravel deposits were found immediately underlying the surface. For example, two aggregate barrow pits were opened in the 100 B Area for temporary and permanent road construction and stabilization work.

Extensive amounts of concrete were used in the construction of the 105 Reactor buildings. The reactors rested on a 23 foot thick concrete foundations. The walls consisted of reinforced concrete in the lower portions and concrete blocks in the upper portions, varying from 3 to 5 feet thick. The roofs were composed of precast concrete (poured insulated concrete) roof tile, except over the discharge area enclosure and the inner horizontal rod room. Over these areas the roofs were composed of 6 foot thick reinforced concrete. Reinforced concrete shielding walls were commonly used. The massive reinforced concrete walls around the reactor core at the lower levels provided additional radiation shielding.

The N Reactor core is surrounded by a thick shield of dense concrete, contained in a reinforced concrete enclosure that serves as a confinement zone capable of withstanding moderate over-pressurization. Resting on reinforced concrete foundations, the 105 Reactor buildings have two subterranean floors constructed of reinforced poured concrete.

All types of buildings in the 100 Area have some form of concrete construction. The wood frame, gable roof administrative/office buildings, laboratories and badge houses were constructed upon concrete block foundations or poured concrete slabs. For the most part, the 100 Area industrial structures, such as pumphouses, filter plants, power plants, warehouses, maintenance/storage shops, retention and settling basins, reservoir buildings, have concrete block walls, reinforced concrete floors, concrete foundations and basements, and concrete roof panels.

200 Area

Massive amounts of concrete were used in the construction of the 200 Area canyon or "separations" (U, T, B) buildings. Because of the radioactivity present during the separation process, the canyon building's walls surrounding the separation cells were constructed seven feet thick to provide necessary protective shielding. The cell covers were constructed of removable, six-foot thick concrete blocks. The 200 Area industrial facilities, including REDOX, PUREX and the PFP complex, used considerable amounts of concrete material. Foundations were either of poured concrete or of reinforced concrete piers. Floors, walls, and ceilings were made of reinforced concrete or concrete block. Roofs were likewise constructed of reinforced concrete and covered with built-up felt (tar and gravel) material.

300 Area

A considerable majority of the 300 Area industrial vernacular facilities were constructed of reinforced concrete, concrete blocks or reinforced concrete, with steel frames, corrugated metal cladding and flat roofs. Wood frame, administrative/office facilities were constructed on concrete foundations or poured concrete slabs. Facilities that exhibit high style architectural features, such as Brutalism and Art Deco/Art Moderne, also used considerable amounts of concrete. "Brutalistic" features in Buildings 337/337 B include exposed, untreated concrete; the massive, grand scale forms clearly express the building's function and construction materials. Building 3760's projecting front entrance/ frontispiece and parallel pilasters, expressions of Art Deco/Moderne architecture, are constructed of concrete.

400 and 600 Areas

A considerable number of the 400 (FFTF complex) and 600 Area industrial and laboratory facilities were constructed of concrete materials. The former Nike facilities located in the 600 Area at ALE were constructed of poured concrete, reinforced concrete or concrete block.

Subtype: Wood and metal construction materials

Description: Manhattan Project/early Cold War era administrative/office and warehouse/shop buildings were often of wood frame construction, with rectangular plans, gable roofs, symmetrical fenestration (multipane or double hung sash windows), swamp coolers, dormers and wood and metal vents. Transite shingles or corrugated metal cladding were installed over original horizontal wood siding or diagonal wood sheathing.

Industrial buildings/structures built in the 1950's-60's were often constructed of concrete and steel framing, with corrugated metal/transite shingle cladding, or outer sheaths of aluminum/metal panels. Some of the roofs were constructed of insulated metal decking. Interior walls were made of sheetrock/plasterboard, concrete block or general plaster covering. Buildings constructed in the 1970's and 80's were mainly rectangular in shape, a single story, steel or wood framing, with aggregate pebble/stucco cladding over plywood sheathing. Many of these facilities were used for offices and laboratories, and constructed of premanufactured elements: fluted metal panels (galvanized steel), sheet metal, or corrugated metal cladding.

The post-1960's buildings were cladded with various types of metal or transite shingles. For example, Building 313 (Fuel Manufacturing Support Facility), initially constructed of structural steel framing, concrete block walls, a precast concrete slab roof, and interior partitions of concrete block and brick, had additions constructed of steel framing and double metal, insulated paneled exterior walls. The interior partitions were of moveable metal panels. While the windows on the original section are the multipane, fixed, industrial type, the windows on the new addition are of the sliding aluminum and fixed pane type. Common post-1960 exterior cladding included fluted metal panels, corrugated transite panels, or corrugated sheet metal.

Buildings 3762 and 3764, former World War II barracks, and Buildings 3702 and 3703, are representative of the wood frame, rectangular shaped, 1-2 story, gable roof administrative/office facilities constructed during the Manhattan Project/early Cold War period. Cladding ranges from horizontal wood siding to asbestos transite shingles. The repetitive fenestration and concrete block foundations are also typical of this style.

Two test reactors, the Plutonium Recycle Test Reactor (PRTR) and the Fast Flux Test Reactor (FFTF), adopted metal construction materials. The one story, steel frame section of PRTR is sided with fluted metal panels, while the dome is cladded with silver sheeting material. The dome is a welded, carbon steel containment vessel, covered with insulation and a waterproof membrane. The containment vessel is an vernacular adaptation of the hemispherical design. Similar in design and construction materials is the 405 Reactor Containment Building in the FFTF complex. The "dome" or cylindrical shell is constructed of carbon steel.

Subtype: Representative Facilities and Construction Materials

Description: Listed below is a selected list of facilities that are representative of common construction materials/building styles found in the 100, 200, and 300 Areas:

<u>100 Area</u>

1702 Badge Houses: Dwarfed by the flat roof, concrete monoliths that dominate the 100 Area landscape, the diminutive, wood frame 1702 badge houses provided security check points for entrance to the 105 C, DR and KE and KW exclusion areas. Typical of the small 100 Area badge houses, these gable roof structures have square plans, double hung sash windows symmetrically placed, small gable roofs over the front entrance, and situated on concrete slabs.

1701 K Badge House/1720 K Administration Building: Representative of the 1701 badge houses and the 1720 administration buildings, 1701 K and 1720 K have symmetrical, modified (rectangular) plans with multipane, industrial style windows, a single story with concrete and steel structural framing, corrugated transite walls, concrete foundation and floor, and flat, prefabricated cement board roofs with built-up asphalt and gravel surfacing.

108 F Biology Laboratory: The construction features and materials of the 108 F building are typical of 100 Area concrete monolithic structures. Originally, a chemical pumphouse, the 108 F building is a rectangular, four story, concrete masonry structure with an interior steel frame, and situated on a reinforced concrete foundation and flooring. The two lower floors have a reinforced concrete column and beam framing system with masonry infill. The flat roof consists of concrete panels with a tar and gravel surface. The newer annex is constructed of concrete masonry and with a similar roof system.

Retention Basins (107 structures): The construction methods and materials of the 107 retention basins were typical of basins built in the 100 Area. In 100 C, KE, KW the 107 basins were constructed of steel, while the other 100 Area (107) basins were constructed of concrete. The basins were constructed on a 6 inch concrete slab with reinforced steel mesh and concrete retaining wall supports. The 183 flocculation and settling basins were also constructed of concrete, while the 183 filtered water storage tanks were constructed of welded steel with concrete foundations.

1713 Warehouses: The construction features and materials of the 1713 warehouses are typical of warehouse construction in the 100 Area. In support of reactor operations, and in contrast to the asymmetrical, concrete monoliths, the 100 Area warehouses had modified rectangular plans, and (manually operated) overhead wooden doors situated in repetitive (shipping and receiving) bays. A portion of the cladding was corrugated asbestos transite. Common features include one-foot thick concrete firewalls that divided the interior into two storage areas due to combustible materials stored inside. Another example is the 1713 KER warehouse, a typical rectangular, corrugated metal warehouse, with a partial gable roof and multipane, symmetrically placed windows.

Main Pump House (190 structures): The 100 area pumphouses provided primary support activities to reactor operations and were constructed of concrete, concrete block and structural steel frames. Representative of 100 Area pumphouses, 190 KE provided primary coolant (housed process and service water pumps and ventilation equipment) for KE Reactor. The facility is a single story building with structural steel framing, corrugated transite cladding, a concrete basement, and reinforced concrete floors. The roof is made of corrugated cement transite on steel girders with 2-inch foam glass insulation and an asphalt-gravel, built-up surface.

1717 K maintenance shop: The 1717 K maintenance shop is representative of 100 Area shops with its rectangular plan, corrugated transite siding, steel framing girders and beams, and symmetrically placed bay areas with corrugated metal roll-up doors. Interior walls are standard sheetrock or (as in the case of 1717 K) bolted-in-place Hauserman cement asbestos panels with laminated gypsum board on 2 x 2 studs.

1714 KE and KW: These two oil storage facilities are typical of "vintage" prefabricated, corrugated metal "butler" buildings. Common features include rectangular plans and wood frame, symmetrically placed multipane windows.

100 N Buildings/Structures: Established in 1963, 100 N was the last of the 100 Areas to commence operations. Whereas Hanford's eight earlier graphite moderator reactors were essentially duplicates, differing mainly in scale, the 105 N reactor incorporated several technological advancements to improve operating efficiency, safety and to enable co-generation of electricity. The N Reactor core is a structure of interlocking graphite blocks more than 42,000 cubic feet in size. The entire core is surrounded by a thick shield of dense concrete, contained in a reinforced concrete enclosure that serves as a confinement zone capable of withstanding moderate over-pressurization. The entire facility is a 99,480 square foot, metal framed building with exterior metal cladding and a reinforced concrete foundation. The two subterranean floors are also of reinforced poured concrete construction. On the west side, 105 N shares a common wall with 109

N, the heat exchanger building for 105 N. 109 N served two primary functions: dissipate heat generated in the reactor during the fission process, and generate steam for use in producing electrical energy. 109 N is a large, rectangular shape warehouse-type structure, constructed of steel frame, corrugated metal siding, with a flat, tar and gravel built-up roof.

All of the support and auxiliary buildings/structures at 100 N are of similar construction style materials used. One difference from the earlier 100 Areas would be the use of more corrugated metal siding and steel framing in 100 N than concrete block construction and wood or steel frames that were used in the first generation (B, D, F, DR, H, C) reactor areas.

200 Area

Five general types of building construction were used during the Manhattan Project (and later in the Cold War era) in the 200 Areas: reinforced mass concrete, structural steel frame and concrete block, reinforced concrete frame and concrete block, structural steel frame and wood siding, and wood frame. During the post-World War II era construction materials and stylistic features included concrete foundations and flooring, corrugated and shingled transite siding, concrete block walls, corrugated metal/pressed steel/sheet metal siding and roofing, wood and steel framing, flat pre-cast concrete roofs covered with tar and gravel surfacing or composition shingles, corrugated roll up metal doors, and wood or metal frame multipane industrial-type windows.

The construction features and materials found in the 200 Area are similar to the other production areas. Due to the 200 Areas chemical separations functions, the Manhattan Project/early Cold war era facilities used considerable amounts of concrete. Windows were used sparingly. Rectangular plans and other industrial symmetrical features were incorporated into building construction. Except for the wood frame, non-production facilities, most of the smaller, non-chemical separations facilities were constructed of structural steel framing with outer sheaths of aluminum panels or corrugated metal/transite shingles.

300 Area

The *303 Fresh Metal Storage Buildings (A, B, C, D, E, F, G, K)*, with their reinforced concrete and concrete block construction, are representative of uranium storage facilities built during the Manhattan Project. The ninth, 303 J, is of wood frame construction. The function of these structures was to store the fresh (unirradiated) uranium and chemicals used in the fuel fabrication processes, and uranium scraps left from these processes. Their layout in a relatively east-west linear line perpendicular to the 313 Building was due to their functional association with the missions of the 313 Building.

Many of the 300 Area storage/shop facilities, like the *304 Uranium Scrap Concentration Storage Facility and the 305 A Pipefitter/Electrical Storage Shop*, have corrugated metal/fluted metal cladding or are representative of the numerous shops/laboratories that have asbestos transite shingled siding. Cold War/defense production laboratories in the 300 Area, especially those built during the decade following the Manhattan Project, have cladding constructed of corrugated metal/fluted metal panels. Of these, the most prominent were five large laboratories and shops located in Buildings 325, 326, 327, 328, and 329, all of which opened in 1952-1953.

Buildings 308, 309 (PRTR), 315, 318, and 324, constructed of a variety of metal and concrete materials, were built for research and testing of the peaceful uses of atomic energy; demonstrating the effectiveness of various plutonium oxide and mixed oxide fuel blends. Experiments in the 1960's with these type of fuels "gave way to the concept of breeder reactors, reactors that produced more fuel than they burned. The Hanford Site was chosen as the location for the DOE's prototype breeder reactor, the FFTF" (Gerber 1992b: 183). The establishment of the FFTF led to the construction of several experimental and pre-assembly buildings, including the 335, 336, 337, and 338 Buildings.

100 N Reactor facilities: The construction of the 105 N Reactor led to the establishment of numerous fuel production facilities in the 300 Area and the retrofitting of existing facilities to assist in providing fabricated fuel for N Reactor. The fuel rods for N Reactor were manufactured in the 333 Fuels Manufacturing Building using the co-extrusion process. Beginning in 1975, the 313 Building played a major role in a new Waste Acid Treatment System (WATS) process that was emplaced to recover some of the chemical wastes from the N Reactor fuel fabrication activities.

Most of the post-1960 buildings, especially facilities associated with N Reactor operations, were cladded with various types of metal or transite shingles. For example, additions to the north and middle sections of Building 313 differ considerably from the original building. The north section of 313 was constructed with steel framing and double metal insulated panel exterior walls. Building 333, built in 1960 as the New Fuel Cladding Facility, and associated with the manufacture of fuel elements for N Reactor, was also constructed of steel framing with fluted metal panels exterior cladding. Other fluted metal panel buildings in the 300 Area include the 335 Sodium Test Facility, built in 1968, the High Bay Test Facility (336 building), built in 1969 with steel framing and corrugated transite panels. The 338 Fabrication Shop, built in 1961, and the 340 Waste Neutralization Building (1953), have steel frames with cladding consisting of corrugated sheet metal panels.

The *3706 Radiochemistry Laboratory* is representative of the single story, wood frame and concrete Manhattan Project/early Cold War laboratories in the 300 Area. The construction materials and design features of 3706 are typical of the era, with its concrete block/brick walls, asbestos transite cladding, multipane fenestration (symmetrically placed), gable roofs, dormers, wooden and metal vents, and concrete firewalls capped with simulated Spanish tiles.

Buildings 3762 and 3764, former Hanford Site dormitories moved during the early post-World War II period to the 300 Area, are modified U. S. Navy B-2 series style dormitories. The B-2 series dormitories have dimensions of 42 feet x 150 feet, while Buildings 3762 and 3764 measure 120 feet x 34 feet. Cladding ranges from horizontal wood siding with a middle band of vertical board to asbestos transite shingled siding. Repetitive fenestration, with double hung sash windows, are the same as the B-2 series. The clipped gable roofs of the two buildings differ from the medium pitched gable roofs of the B-2 series.

Buildings 3702 and 3703 are representative of the wood frame, rectangular shaped, gable roof, 1-2 story administrative/office facilities constructed during the Manhattan Project/early Cold War period. The 40 foot width of both buildings is similar to the Navy's B-2 series style dormitories, but the lengths of 3702 and 3703 exceed considerably the B-2 series. Their one story heighth is similar to the U. S. Army's 700 Series Mobilization Buildings. Building 3703 has typical horizontal wood (rustic/drop) siding over 6 inch diagonal wood sheathing, while 3702 has asbestos transite shingle cladding over the original horizontal wood siding. Like 3762 and 3764, Buildings 3702 and 3703 have symmetrically placed multipane windows, dormer louvers and concrete block foundations.

Plutonium Recycle Test Reactor (PRTR): The one story, steel frame section of the 309 Plutonium Recycle Test Reactor (PRTR) is cladded with fluted metal panels, while the dome is sided with silver sheeting material. The dome is a welded, carbon steel containment vessel, covered with insulation and a waterproof membrane. The containment vessel is an vernacular adaptation of a hemispherical (dome) design found in other nuclear power plant complexes.

Subtype: Prefabricated Facilities

Quonset Huts

Description: Bolted to concrete foundations, the steel arch-rib frames of the prefabricated Quonset huts support a semi-cylindrical roof of galvanized corrugated sheet metal attached to metal purlins supported by steel ribs. Hook bolts with nuts and washers connect the purlins to the ribs. The semicircular ends of the buildings are usually of board and batten construction. Most of the huts at Hanford are constructed similar to traditional Quonset huts but some have wood and metal framing which is covered with translucent, corrugated fiberglass sheets, with large two-leaf sliding metal doors situated at either end, flanked by wood frame, six-light windows. Some of the huts have a continuous row of industrial-style, ten-light, wood frame windows on the sides. Quonset huts are located in the 200, 300, and 400 Areas.

Butler Buildings

Description: These industrial vernacular structures are composed of premanufactured sides and roofs, constructed of bolted steel, and commonly rest on poured concrete pads and concrete footings, or directly on the ground. Most of these facilities have been brought on Site within the past decade, although some of the Butler buildings date from the early 1950's. Common construction features and premanufactured materials include vertical corrugated metal sidings and roofs, fluted metal panel siding and roofs, roll up bay metal doors, aggregate pebble/stucco fascia, steel framing, fixed pane tinted windows, with either flat or low pitched gable roofs or semi-high bays.

Statement of Significance

The significance of Hanford's industrial vernacular landscape is reflected in its unembellished, functional architecture, devoid of "nonessential" decorative elements and ornamentation. Function plays a significant role in vernacular landscapes, as noted in the Site's utilitarian facilities. The design of Hanford's Manhattan Project and Cold War era buildings is an architectural expression of "aesthetic functionalism" that gained popularity during the post-World War II period. Industrial or aesthetic functionalism is reflected in the buildings/structures found in the Site's designed production areas, and Hanford's roads and railroads and communication/utility/electrical facilities. The significance of Hanford's built environment is not only due to the functional and industrial/utilitarian characteristics that influenced the design of the Site's process areas and the type of buildings constructed, but also determined the type of construction materials used. One of the reasons for the selection of Hanford as a Manhattan Project site was the availability of sufficient aggregate locally to provide enough concrete for Site construction needs.

Registration Requirements

To be eligible for listing in the National Register of Historic Places (Register) under criterion C, industrial vernacular landscape facilities and construction materials must possess a fairly high standard of physical integrity. However, because of the utilitarian and technological nature of the Site, where industrial properties have been subjected to numerous internal and external modifications to accommodate mission/scientific changes and facility expansions, construction and material compatibility is not as important as when evaluating traditional architectural properties under criterion C. Building modifications and additions which reflect changes in Site technology or mission are to be viewed as significant accretions for industrial vernacular properties under criterion C.

Subtype: Concrete

Functional, unadorned concrete was the most commonly used material in the construction of the Hanford Site. To be eligible for listing in the Register under criterion C, applications of concrete must reflect distinctive stylistic qualities or methods of construction. The Department of Energy's Richland Operations Office (DOE/RL) has recommended that Buildings 337/337 B and 3760 are eligible for Register under criterion C, partly due to their distinctive concrete applications.

Extensive quantities of concrete materials were used in the construction of 100 Area Reactor buildings and ancillary structures, the 200 Area chemical separations facilities and the REDOX, PUREX and PFP complexes, and the 300 Area fuel fabrication facilities and ancillary structures. In some cases, the extensive uses of concrete in these areas is not necessarily distinctive/significant under criterion C. Instead, the heavy use of concrete in the construction of Hanford's industrial landscape could be significant under criterion A, associated with the construction of the important Manhattan Project/Cold War Hanford Site.

The DOE-RL and the Washington SHPO have determined that the concrete process waste disposal systems (e.g. single and double shell tanks, tank farm facilities), and concrete-lined cribs, trenches, French drains, pipelines/sewerlines, underground vaults, caissons, etc., are exempt from the historic property inventory form (HPIF) documentation requirement due to the lack of surface manifestations, and presence of radiological and/or hazardous waste contamination.

Subtype: Wood and metal construction materials

To be eligible for listing in the Register under criterion C, the applications of wood and metal materials must contribute to the distinctive stylistic qualities or methods of construction of a particular property. For example, DOE-RL has recommended that the 309 Plutonium Recycle Test Reactor (PRTR) and the Fast Flux Test Facility's (FFTF) 405 Reactor Containment Building are eligible for the Register, partly due to the design and materials of their distinctive cylindrical shell, carbon steel "domes". The 3706 Radiochemistry Laboratory, determined eligible for the Register, is constructed of wood and metal materials, representative of Manhattan Project/early Cold War era laboratories with their wood framing, transite shingle cladding, symmetrical multipane fenestration (repetitive metal and wood framed windows), and wooden gable roofs.

Subtype: Prefabricated facilities

The DOE-RL and Washington SHPO have determined that prefabricated modular buildings and enclosures (e.g. storage/maintenance sheds, Butler buildings), composed of premanufactured sides and roofs, bolted steel, and commonly situated on a poured concrete slab, are exempt from the historic property inventory form (HPIF) documentation requirement as they are not eligible for inclusion in the Register due to the minor role they have played at the Hanford Site.

6.3.2 Associated Property Type: High-Style Architectural Forms

Description: While the considerable majority of Site buildings are industrial vernacular structures, several facilities in the 300 Area reflect high-style architectural features. They include:

<u>Brutalism</u>

Buildings 337/337 B, and certain aspects of Building 331, exhibit the architectural features of Brutalism, defined as meaning rough or untreated concrete. Other distinguishing characteristics include exaggerated structural members, unfinished construction materials, grand scale, exposed interior mechanical systems, and formalist style (building's form clearly expresses its function).

<u>Art Deco/Art Moderne</u>

The architecture of the Hanford Technical Library (Building 3760) is a vernacular adaptation of the Art Deco/Art Moderne style. Several stylistic features include vertical symmetrical lines reflected in the parallel concrete piers/pilasters in the projecting front entrance/frontispiece. Decorative horizontal banding is expressed in the repetitive fenestration (ribbon windows) on the front facade. Other Art Deco/Moderne features include the building's angular, hard-edged form, simplified and streamlined, with a modified, front facade setback.

Statement of Significance

While the vast majority of Site buildings are industrial vernacular structures, several facilities at Hanford reflect significant high-style architectural features. Buildings 337 and 337 B, Battelle's Technical Management Facility and High Temperature Sodium Facility respectively, embody the distinctive architectural features of "Brutalism", while Building 3760, the Hanford Technical Library, is a significant vernacular adaptation of Art Deco/Art Moderne architectural features.

Registration Requirements

To be eligible for inclusion in the Register under criterion C, a property that embodies the distinctive characteristics of high-style architecture must meet a stringent standard of interior and exterior integrity, possess representative methods of construction and materials, and have distinctive stylistic qualities that embody the period or type of the particular high-style architecture. DOE-RL has concluded that Buildings 337/337 B, the Technical Management Facility and the High Temperature Sodium Facility, and Building 3760, the Hanford Technical Library, are eligible for inclusion in the Register under criterion C for their distinctive stylistic/architectural qualities, representative methods of construction, and materials used. DOE-RL has also concluded that the facilities are considered contributing properties (and recommended for mitigation) to the Register-eligible Hanford Site Historic District.

6.3.3 Associated Property Type: Military Facilities

Description: One of the missions of the Hanford Site was the military protection of the main production areas. Extant buildings and structures associated with this military effort include the former Camp Hanford industrial buildings, Nike and Anti-Aircraft Artillery (AAA) facilities, and former World War II/early Cold War military dormitories/barracks.

Camp Hanford Industrial Buildings

The establishment of the U. S. Army's Camp Hanford in North Richland (3000 Area) in 1951 included industrial facilities that provided maintenance, warehouse storage, shipping and receiving, and other support services for the Camp's forward positions (encampments, AAA and Nike installations) on the Hanford Site. Today, the 3000 Area includes thirteen former Camp Hanford industrial facilities. The physical layout of the Camp Hanford industrial facilities was in a modified military grid. Camp Hanford's disparate industrial functions, and the constant removal and addition of buildings, dictated a variety of building designs and layouts not found in a traditional military grid. Nevertheless, many of the extant Camp Hanford industrial facilities have similar construction features and materials, with symmetrical rectangular forms, wood or steel frames and trusses, repetitive multipane industrial windows, corrugated roll up metal doors, and flat or slightly pitched gabled roofs. Siding consisted of vertical board, transite shingle, or corrugated metal cladding over diagonal wood sheathing.

AAA and Nike Installations

The 600 Area was the location of Camp Hanford's AAA sites and Nike missile installations that provided air defense of the Hanford Site during the 1950's and early 1960's. The most intact of the 16 AAA installations are five sites situated in the central plateau south and southeast of the 200 Areas. Aboveground resources include the remains of (doughnut-shaped) revetments and other sandbagged/cobblestone structures. The layout design of the AAA sites reflected a standard military arrangement of temporary, concrete facilities separated by function. The four semi-circular artillery placements/sandbagged revetments were arranged in a square plan separate from the concrete structures.

The Nike launch and radar control site (H-52 C & H-52 L) on the Fitzner-Eberhardt Arid Lands Ecology (ALE) Reserve is the only intact Nike installation on the Hanford Site. The buildings and structures at each Nike installation were organized into two separate installations: the battery control area and the launch area. The launch area batteries contained the underground missile storage magazines and launch equipment, including buildings and structures used for testing and servicing of missiles. The main function of the launch areas was to maintain missile batteries in a combat-ready posture that required the storage, handling, and disposal not only of missile components and propellants but also of solvents, fluids, fuels and other materials required for a variety of support functions. The battery control areas contained all the radar, guidance, electronic and communications equipment needed to identify incoming targets, launch missiles, and direct and guide missiles in flight to intercept enemy aircraft.

H-52 C, the former battery control area, is located at the top of Rattlesnake Mountain, while H-52 L, the associated launching area, is situated at the base of base of the mountain. The partial arrangement of the buildings and structures in each launch and control area was site-specific, with no standard layout plans. H-52 L was divided into two separate zones or areas for functional and safety reasons: one included the administrative, residential and recreational facilities, the other included the underground missile storage, refueling, assembly and testing, and generator facilities. The H-52 C control center at the top of Rattlesnake combined administrative, radar and barracks functions in a single building.

Barracks/Dormitories

Numerous two-story barracks/dormitories from the Hanford construction camp, the Hanford Engineer Works (Richland) Village, and military facilities around the State, were transferred to the Hanford Site during the post-World War II period. Some were used to house military personnel at Camp Hanford in North Richland during the 1950's. Others were moved to the 100, 200 and 300 Areas for administrative/office uses and various other support functions. Buildings 3762 and 3764, former two-story World War II era barracks/dormitories transferred to the 300 Area, are modified U. S. Navy B-2 series style dormitories. The rectangular shaped B-2 series had dimensions of 42 feet x 150 feet, while Buildings 3762 and 3764 measure 120 feet x 34 feet. Cladding ranges from horizontal wood (dropped) siding with a middle band of vertical board to asbestos transite shingled siding over the original wood siding. Repetitive fenestration of 3762 and 3764, with wood framed, double hung sash windows, is similar to the B-2 series dormitories. The clipped gable roofs of 3762 and 3764 differ from the medium pitched gable roofs of the B-2 series.

Statement of Significance

The significance of the design and construction of Hanford's military defense facilities centers around the U. S. Army's former Camp Hanford and its forward positions. The Camp's industrial facilities, located in the 3000 Area in North Richland, provided important maintenance, warehouse storage, shipping and receiving, and other support services for the Camp's forward positions (encampments, AAA and Nike installations) on the Hanford Site. The extant industrial facilities reflect representative styles, designs and materials found in military industrial areas nationwide. The physical layout of the Camp Hanford industrial area is similar to other military facilities with its modified military grid.

Camp Hanford's sixteen Anti-Aircraft Artillery (AAA) sites and four Nike missile installations were strategically arranged along the perimeter of the Hanford Site to provide air defense of the main process areas of the Hanford Site. The design and structural remains of five of the most intact AAA sites, situated south of the 200 Areas, are representative of AAA design and materials. Aboveground resources include important artillery emplacement revetments and other sandbagged/cobblestone structures. The layout design of the AAA sites reflect standard military arrangement. Facilities were divided by function, especially the separation of residential and administrative facilities from the artillery emplacement revetments and ammunition caches/small arms firing ranges.

H-52 C and H-52 L, the Nike launch and radar control site located in the ALE Reserve, is the most intact Nike installation on the Hanford Site. The design, architecture and construction materials of H-52 are representative of significant Nike features found nationwide. The buildings and structures, including the important underground missile storage facility, are constructed of concrete. Common stylistic features and construction materials consist of one story, flat roof, concrete block structures erected on concrete footings or slabs, with symmetrically placed windows. The launch area's facilities are laid out by function: the residential and administrative structures are separated from the missile fueling, maintenance and storage/firing facilities.

Registration Requirements

To be eligible for inclusion in the Register under criterion C, Hanford's former military facilities must possess distinctive, representative methods of construction and materials, a high standard of physical integrity, and embody stylistic qualities of military architecture and design/layout features.

Hanford's most intact AAA sites (H-40, H-42, H-50, H-51 and H-61-H) have been determined eligible for inclusion in the Register under criterion A due to their important association with the Cold War era and military defense of the Hanford Site. These sites are also potentially eligible for the Register under criterion C due to the presence of the remains of the important artillery emplacement revetments, and site design features in the form of concrete pathways/sidewalks and parking lots, and concrete entry pads and flooring.

H-52 C and H-52 L, the most intact Nike installation on Site, has been recommended as eligible for the Register by DOE-RL as a significant complex under criterion A, due to its important association with the defense of the Hanford Site. To be eligible under criterion C, H-52 L and C would have to demonstrate representative and distinctive methods of construction and materials. The design/layout of the facility needs to demonstrate that its physical design embodies distinctive stylistics features and functional integrity common to Nike sites nationwide.

The Camp Hanford industrial area facilities have been determined not eligible for inclusion in the Register by DOE-RL as they were found not to manifest exceptional significance under Criteria Consideration G for properties under 50 years of age.

6.3.4 Associated Property Type: Site Layout and Design Features

Description: The layout of the Hanford Site production areas was influenced by safety, security and functional concerns. Due to the nature of the production processes, the areas at Hanford were designed as independent units to be constructed in widely-separated districts because of the possibility of dangerous explosions. This decision was made in order that accidents in any one area should not affect the operation of the remaining production units. Although the main plutonium production areas were functionally dependent upon each other to conduct Site missions, all the process areas were designed and constructed as semi-autonomous units; they each contained the necessary utility/communication and power infrastructure to carry on if operations were disrupted at any of the other production areas.

<u>300 Area</u>

Located in the southeastern portion of the Hanford Site approximately 7 1/2 miles north of the center of Richland, the 300 Area manufactured the uranium fuel that allowed the reactors to operate. Since the 300 Area's fuel fabrication activities were the least likely of the production processes to experience a serious accident, it was considered safe enough to be located near populated areas (Richland). From its construction in 1943-44 to the present, the 300 Area has been the site of most of the research and development activities conducted at the Hanford Site.

100 Area

The nine 100 reactor Areas had to be situated close to the Columbia River because large quantities of water were required to dissipate the heat generated during Pile operations. Also, due to the dangers inherent in the irradiation of uranium fuel elements, the reactors were constructed as far as possible from the City of Richland.

200 Area

The hazardous nature of the 200 Area separations activities made it undesirable to concentrate these buildings in one process area; so the Manhattan Engineer District (MED) designated 200 North, East and West. The Areas are located on a plateau in the center of the Hanford Site between the Rattlesnake Hills, Gable Mountain and Gable Butte with the latter two providing a natural barricade between the 100 and 200 process areas. The nature of contaminants present in the separations processes dictated a location a considerable distance above the water table. The central plateau location also made it easier to defend (from air attack) by the AAA batteries on the perimeter of the Site.

400 Area

The 400 Area was placed approximately 8 miles northwest of the 300 Area for convenient access to the 300 Area's research and development facilities and fuel manufacturing capabilities. Other siting considerations included favorable geological (seismic stability) conditions, sufficient feet above the water table, and safe distance from the Columbia River.

600 Area

The 600 Area was comprised of facilities that served more than one specific area, including health and safety protection, environmental monitoring, Site security, military defense and fire suppression facilities. The AAA and Nike missile installations in the 600 Area were situated on the perimeter of the Site's main production areas to provide air defense of Hanford during the 1950's and early 1960's. The internal layout of the individual Sites reflected a standard military arrangement of facilities separated by function. The residential, administrative, maintenance and recreational concrete structures were situated in a rectangular grid, separated from the sandbagged artillery revetments. The buildings/structures at each Nike site were organized into two installations: the battery control area and the launch area. While the spatial arrangement of the buildings/structures in each launch and battery control area was site-specific, with no standard layout plans, administrative, residential and recreational facilities in the launch areas were separated from the missile storage, refueling, and maintenance area for functional and safety reasons. The radar, communications, and missile guidance/tracking facilities in the battery control areas were generally smaller than the launch areas. H-52 C combined administrative, radar and barracks facilities in one building.

3000 Area

The 3000 Area includes thirteen former Camp Hanford industrial facilities and seven buildings/structures built during the post-Camp Hanford era. The physical layout of the former Camp Hanford industrial facilities is a modified military grid. Camp Hanford's disparate industrial functions, and the constant addition and removal of buildings, dictated a variety of building designs and layouts not found in traditional military grids. The layout and design of the industrial area was influenced by the numerous modification of area buildings/structures to accommodate rapid technological advances and changing support uses/Site missions.

Statement of Significance

The layout of the Hanford Site process areas was influenced by important safety, security and functional concerns. The selection and layout of the Hanford Site represented the nation's first attempt to match reactor siting requirements to engineering, security and safety considerations. Over the course of less than two and a half years, the MED designed and built the world's first full-scale, self-contained, plutonium production facilities at HEW. The successful design and construction of six additional plutonium production reactors along the Columbia River during the post-World War II era led to Hanford's production of the majority of the nation's plutonium.

Due to the hazardous nature of the production processes, the important process areas at Hanford were designed as independent units to be constructed in widely-separated districts because of the possibility of dangerous explosions. Significant areas in the plutonium production process included the 300 Area, the site of important fabrication and jacketing of uranium fuel elements, the 100 Areas, where the fuel elements were irradiated, and the 200 Areas, where the irradiated fuels were chemically dissolved and separated into plutonium, unconverted uranium, and various fission by-products.

Registration Requirements

To be eligible for inclusion in the Register under criterion C, Site layout and design features must clearly contain significant character-defining attributes, such as safety, security and functional elements, and be representative of original design features or layout plans. The Site process areas must retain their original boundaries, and reflect original functional capabilities to be eligible under criterion C.

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7.0 Summary of Identification and Evaluation Methods

To facilitate the evaluation of identified cultural resources for National Register of Historic Places (NRHP) eligibility and NRHP nominations on the Hanford Site, the Cultural Resources Project of the Pacific Northwest National Laboratory (PNNL) was contracted by the U. S. Department of Energy, Richland Operations Office (DOE-RL) under contract DE-AC060-76RLD 1830 to complete a National Register of Historic Places Multiple Property Document (MPD) of the Hanford Site. This MPD documents and evaluates groups of thematically related properties or property types into historic contexts, and facilitates the evaluation of individual properties by comparing them with resources that share similar physical characteristics and historical associations. The MPD's historic contexts will provide DOE-RL the framework to make decisions concerning the identification, evaluation, registration and treatment of significant cultural resources.

The multiple property listing of the historic, archaeological, and traditional cultural properties of the Hanford Site groups thematically related properties under the following historic contexts:

> The Prehistoric Period of the Hanford Site and Associated Portion of the Columbia River, Washington, circa 10,000 B.P. - A.D. 1805,
>
> The Ethnographic/Contact Period of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943),
>
> The Euro-American Resettlement of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943),
>
> The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990,
>
> The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990, Architectural Supplement.

The following methods were used to prepare this multiple property listing, and varied from context to context:

The <u>Prehistoric Period Context</u> contains a synopsis of known information relating to the prehistoric setting and human adaptations in the study area. A majority of archaeological survey and research work conducted on the Hanford Site has been conducted in response to Section 106 and Section 110 actions. This approach to cultural resource management practices has meant a steady increase in the number of acres surveyed and archaeological sites documented. The context discusses what is currently known about the prehistoric environment, prehistoric cultural chronologies, and the archaeological record as it has been documented on the basis of surface observations, analyzed excavations, and archaeological reports.

The <u>Ethnographic/Contact Period Context (1805 - 1943)</u> notes that both the spirit and intent of federal cultural resource regulations requires the identification and evaluation of cultural resources (e.g. TCPs) that are of importance to local Indian tribes. The context recommends that the identification of local use areas should consider the indigenous cultural logic of the Indians as they perceive an area consisting of natural, archaeological and botanical resources. National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties," provides guidance to federal agencies for identifying characteristics common to TCPs and calculating their significance. This context emphasizes that Indian participation is crucial if TCPs pertaining to the Ethnographic/Contact period are to be recognized, evaluated for their eligibility, and ultimately protected by DOE-RL. To the Tribes, the identification and evaluation of cultural resources includes not only archaeological and sacred sites, but traditional use areas, landforms, animals, fish, and vegetation.

Research of the Euro-American Resettlement Period (1805 - 1943) emphasized the homestead/farming period since most of the historic archaeological remains in the study area pertain to agricultural development and related activities in the overall resettlement of the Hanford Site. Since the majority of the physical features attributed to late 19th and early 20th century Euro-American occupation were quickly obliterated by the construction of the HEW between 1943-1945, farms, ranches, irrigation systems, and even townsites were reduced to archaeological sites. Hundreds of historic period archaeological sites were created almost overnight and these sites possess remarkable archaeological integrity resulting from both favorable preservation conditions and over 50 years of strict Site-wide security.

The Manhattan Project and Cold War Era Context is the result of field survey and research efforts to-date, based upon approximately 900 Manhattan Project and Cold War Era buildings and structures remaining from the period spanning 1943 - 1990. Additional information was also gleaned from the records of buildings and structures that have been demolished due to Site-wide clean-up efforts or removed for health and safety concerns. The Manhattan Project/Cold War period has been identified as a significant national event that included the production of plutonium for the nation's nuclear weapons that ended World War II, and contributed significantly to national defense needs during the Cold War period. There are plans over the next five years for the completion of the inventory and evaluation of all Manhattan Project/Cold War Era properties, and mitigation of Register-eligible buildings and structures and contributing properties to the Register-eligible Hanford Site Historic District.

The Architectural Context is a supplement to the Manhattan Project/Cold War Era document. Research for this context focused on Hanford's built environment and Site layout, emphasizing principal building types, architectural styles and methods of construction. The value of the architectural context is that it will serve as a basis for evaluating the National Register eligibility of related Manhattan Project/Cold War Era properties under criterion C. Criterion C applies to properties significant for their physical design or construction characteristics, expressed in terms such as form, proportion, plan, style, materials used or construction technology.

This MPD was compiled, organized and edited by PNNL's Cultural Resources Project staff. PNNL solicited review comments on the draft contexts from the cultural resources staff of DOE-RL; the Yakama Indian Nation, the Wanapum Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe; the Westinghouse Hanford Company, the Bechtel Hanford Company, and CH2 M Hill; and interested parties. The MPD's historic contexts were researched and written by members of the cultural resources staff of PNNL, CH2 M Hill, and the Westinghouse Hanford Company (WHC). The *Prehistoric Period Context* was authored by Mona K. Wright of PNNL. The *Ethnographic/Contact Period Context* was authored by Dr. James C. Bard (with assistance of Mr. Robin McClintock) of CH2 M Hill. (The cultural resources staff of the Nez Perce Tribe provided review comments on the draft manuscript. The final context document incorporated their comments and concerns.) *The Euro-American Resettlement Context* was authored by Dr. James C. Bard and James B. Cox (with assistance of Mr. Robin

McClintock) of CH2 M Hill. The *Manhattan Project and Cold War Era Context* was authored by Dr. Michelle S. Gerber of WHC, David W. Harvey of PNNL, and Julia Longenecker of PNNL. The *Architectural Supplement Context* was authored by David W. Harvey of PNNL.

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8.0 Geographical Data

The Hanford Site is located in southeastern Washington just north of the Tri-Cities (Richland, Pasco, and Kennewick) metropolitan area. The Site, 560 square miles in area, encompasses a portion of three counties: Benton, Franklin, and Grant, and one existing city, Richland. It is bordered on the north by the Saddle Mountain Range; the southern border is Rattlesnake Mountain and City of Richland; the eastern edge is the Columbia River, the western limit is the Cold Creek Valley and Rattlesnake Hills. Route 240 extends diagonally east-west across the Site from the City of Richland to the northwestern corner of the Site.

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United States Department of the Interior
National Park Service

9.0 National Register of Historic Places Multiple Property Documentation Form

A. Name of Multiple Property Listing

Historic, Archaeological, and Traditional Cultural Properties of the Hanford Site, Washington.

B. Associated Historic Contexts

The Prehistoric Period of the Hanford Site and Associated Portion of the Columbia River, Washington, circa 10,000 B.P. - A.D. 1805.

The Ethnographic/Contact Period of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

The Euro-American Resettlement of the Hanford Site, Washington (Lewis and Clark 1805 - Hanford Engineer Works 1943).

The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990.

The Manhattan Project and Cold War Eras, Plutonium Production at the Hanford Site, Washington, December 1942 - 1990, Architectural Supplement.

C. Form Prepared By

U. S. Department of Energy, Richland Operations Office (509-372-2299)
Date prepared: September 1996
Contact: Battelle, PNNL, P.O. Box 999, MSIN K6-75, Richland, WA 99352, (509) 373-2894.

D. Certification:

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hearby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR Part 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. (__ See continuation sheet for additional comments.)

Signature and title of certifying official — Date

State or Federal agency and bureau

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

Signature of the Keeper Date of Action