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START

1324-NA

4/24/87, Rev. 0

CLOSURE PLAN

1324-NA PERCOLATION POND

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FOREWORD

The U.S. Department of Energy - Richland Operations Office (DOE-RL) Part B Permit Application for the Hanford Site consists of separate permit applications for the following hazardous waste treatment, storage, and disposal units:

1. Nonradioactive Dangerous Waste Landfill and Storage Facilities
2. Alkali Metal Treatment and Storage Facilities
3. Low-Level Burial Grounds and Retrievable Storage Facilities
4. 1324-N Surface Impoundment
5. 1706-KE Waste Treatment System

The following facilities are known to have received hazardous waste. These facilities will continue to operate, receiving only non-regulated wastes, and are described in a closure/post-closure plan:

1. 216-B-3 Pond
2. 216-A-29 Ditch
3. 216-B-63 Trench
4. 2101-M Pond
5. 100-D Ponds
6. 1324-NA Percolation Pond (closure plan only)
7. 300 Area Process Trenches

In addition, the following hazardous waste treatment, storage, and disposal units will be closed under interim status and have been described in a closure post-closure plan:

1. Solar Evaporation Basins

2. Solvent Evaporator (closure plan only)

3. 1301-N Liquid Waste Disposal Facility

Each separate permit application and closure/post-closure plan provides a complete description of the hazardous waste management activities as required in the Washington Administrative Code (WAC) 173-303-806 and Title 40 Code of Federal Regulations (CFR) Part 270 Subpart B, and WAC 173-303-400 (40 CFR 265 Subpart G), respectively. It is anticipated that each separate Part B permit application will be reviewed individually and will undergo subsequent revisions prior to acceptance by the State of Washington Department of Ecology (WDOE) or the U. S. Environmental Protection Agency (EPA), Region X.

The following submittal contains the DOE-RL Closure Plan for the 1324-NA Percolation Pond.

1.0 PART A APPLICATION

1.1 INTRODUCTION

The 1324-NA Percolation Pond historically received corrosive hazardous wastes from the regeneration of ion exchange columns in the 163-N Demineralization Plant and also received non-regulated filter backwash water from the 183-N Filtered Water Plant. These wastes were first piped to two settling ponds, located adjacent to the west side of the percolation pond, to settle out the solids from the filter backwash water wastes. The liquid hazardous wastes from 163-N were then transferred to the 1324-NA Percolation Pond for treatment.

Volume 2 of the U.S. Department of Energy (DOE-RL) Part A Permit Application was prepared for submittal to the State of Washington Department of Ecology (WDOE) and the U.S. Environmental Protection Agency (EPA), Region X, on August 15, 1986. This submittal contained waste designation and treatment process information for the DOE-RL 1324-NA Percolation Pond which is located in the 100-N Area of the Hanford Site.

The wastes which were historically treated in the 1324-NA Percolation Pond were not considered hazardous wastes until samples taken in late 1985 showed that the pH of the wastes ranged at times from less than 1 to as high as 14 standard units. The wastes were then designated as hazardous due to the characteristic of corrosivity. The 1324-N Surface Impoundment was then constructed to treat these corrosive hazardous wastes. This surface impoundment has been used since May 13, 1986. The 1324-N Surface Impoundment has been described in a Part B Permit Application submitted to the EPA and WDOE in December of 1986.

The corrosive hazardous wastes discharged to the 1324-NA Percolation Pond were treated by neutralization. Acidic wastes from the regeneration of the cation exchange columns and alkaline wastes from the regeneration of anion exchange columns were alternately discharged to the percolation pond. The alternate addition of low and high pH wastes served to neutralize the wastes in the percolation pond. The buffering capacity of the soil, as well as the calcareous nature of the soil underlying the percolation pond were also used to neutralize the corrosive wastes.

The volume of 1324-NA Percolation Pond was enlarged to 2-1/2 its original volume in early 1983. At the same time, the two settling ponds were removed from service, and the filter backwash water was routed to a new disposal facility. The enlarged 1324-NA Percolation Pond is capable of containing up to 3,000,000 gallons of wastes.

The 1324-NA Percolation Pond has not received hazardous wastes since May 13, 1986, when the 1324-N Surface Impoundment was placed in service to treat the corrosive wastes. The 1324-NA Percolation Pond and the associated south settling pond will be closed under interim status according to the plan described in this Closure Plan. The north settling pond will be closed at the time of closure of the 1324-N Surface Impoundment.

1.2 PART A APPLICATION

The following Part A Application contains waste designation information and process codes for the 1324-NA Percolation Pond.

PART A

DANGEROUS WASTE PERMIT FORMS

(FORMS 1 and 3)

ECY 030-31 INSTR.
REV. 8/82

FORM 1—INSTRUCTIONS

This form must be completed by all applicants.

Completing This Form

Please type or print. If you print, place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response.

Section I

Space is provided at the upper right hand corner of Form 1 for insertion of your EPA/State identification number. If you have an existing facility, enter your identification number. If you don't have an EPA/State identification number, please contact the Department of Ecology (206) 459-6303 and one will be provided for you. If your facility is new (not yet constructed), leave this item blank.

Section II

Enter the facility's official or legal name. Do not use a colloquial name.

Section III

Give the name, title, and work telephone number of a person who is thoroughly familiar with the operation of the facility and with the facts reported in this application and who can be contacted if necessary.

Section IV

Give the complete mailing address of the office where correspondence should be sent. This often is not the address used to designate the location of the facility or activity.

Section V

Give the address or location of the facility identified in Section III of this form. If the facility lacks a street name or route number, give the most accurate alternative geographic information (e.g., section number or quarter section number from county records or at intersection of Rts. 425 and 22).

Section VI

List, in descending order of significance, the four 4-digit standard industrial classification (SIC) codes which best describe your facility in terms of the principal products or services you produce or provide. Also, specify each classification in words. These classifications may differ from the SIC codes describing the operation generating the dangerous wastes.

SIC code numbers are descriptions which may be found in the "Standard Industrial Classification Manual" prepared by the Executive Office of the President, Office of Management and Budget, which is available from the Government Printing Office, Washington, D.C. Use the current edition of the manual. If you have any questions concerning the appropriate SIC code for your facility, contact your Department of Ecology Regional office (see Table 1).

Table 1. Department of Ecology Regional Offices

Northwest Regional Office 4350 - 150th NE Redmond, Washington 98052 Tel: 206-885-1900	Southwest Regional Office 7272 Cleanwater Lane Olympia, Washington 98504 Tel: 206-753-2353
Eastern Regional Office East 103 Indiana Spokane, Washington 99207 Tel: 509-456-2926	Central Regional Office 3601 West Washington Yakima, Washington 98903 Tel: 509-575-2490

Section VII-A

Give the name, as it is legally referred to, of the person, firm, public organization, or any other entity which operates the facility described in this application. This may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation rather than the plant or site manager. Do not use a colloquial name.

Section VII-B

Indicate whether the entity which operates the facility also owns it by marking the appropriate box.

Section VII-C

Enter the appropriate letter to indicate the legal status of the operator of the facility. Indicate "public" for a facility solely owned by local government(s) such as a city, town, county, parish, etc.

Sections VII-D—H

Enter the telephone number and address of the operator identified in item VII-A.

Section VIII

Indicate whether the facility is located on Indian lands.

Section IX

Provide a topographic map or maps of the area extending at least to one mile beyond the property boundaries of the facility which clearly show the following:

The legal boundaries of the facility;

The location and serial number of each of your existing and proposed intake and discharge structures;

All hazardous waste management facilities;

Each well where you inject fluids underground; and

All springs and surface water bodies in the area, plus all drinking water wells within ¼ mile of the facility which are identified in the public record or otherwise known to you.

If an intake or discharge structure, hazardous waste disposal site, or injection well associated with the facility is located more than one mile from the plant, include it on the map, if possible. If not, attach additional sheets describing the location of the structure, disposal site, or well, and identify the U.S. Geological Survey (or other) map corresponding to the location.

On each map, include the map scale, a meridian arrow showing north, and latitude and longitude at the nearest whole second. On all maps of rivers, show the direction of the current, and in tidal waters, show the directions of the ebb and flow tides. Use a 7-½ minute series map published by the U.S. Geological Survey, which may be obtained through the U.S. Geological Survey Offices listed below. If a 7-½ minute series map has not been published for your facility site, then you may use a 15 minute series map from the U.S. Geological Survey. If neither a 7-½ nor 15 minute series map has been published for your facility site, use a plat map or other appropriate map, including all the requested information; in this case, briefly describe land uses in the map area (e.g., residential, commercial).

You may trace your map from a geological survey chart, or other map meeting the above specifications. If you do, your map should bear a note showing the number or title of the map or chart it was traced from. Include the names of nearby towns, water bodies, and prominent points.

U.S.G.S. OFFICES	AREA SERVED
Western Mapping Center National Cartographic Information Center U.S.G.S. 345 Middlefield Road Menlo Park, Ca. 94025 Phone No. (415) 323-8111	Ariz., Calif., Hawaii, Idaho, Nev., Oreg., Wash., American Samoa, Guam, and trust Territories

Section X

Briefly describe the nature of your business (e.g., products produced or services provided).

Section XI

For a corporation, by a principal executive officer of at least the level of vice president.

For partnership or sole proprietorship, by a general partner or the proprietor, respectively; or

For a municipality, State, Federal, or other public facility, by either a principal executive officer or ranking elected official.

FORM 1

State of Washington Department of Ecology

1324-NA

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Read "Form 1 instructions" before starting)

I. EPA/STATE I.D. NUMBER

W A 7 8 9 0 0 0 8 9 6 7

II. NAME OF FACILITY

US Depart of Energy Richland Operations Office

III. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
Fitzsimmons, T.R. Assist. Mgr. Safety*	509 376 7387

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

P. O. Box 550

B. CITY OR TOWN	C. STATE	D. ZIP CODE
Richland	WA	9352

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

Hanford Site

B. COUNTY NAME

Benton

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE
Richland	WA	99352	005

VI. SIC CODES (4-digit, in order of priority)

A. FIRST		B. SECOND	
9711	National Security	8922	Nuclear Non-Commercial Research Development and Education
C. THIRD		**D. FOURTH**	
9611	Administration and General Economic Program	4911	Steam - Electric Generator

VII. OPERATOR INFORMATION

A. NAME

US Dept. of Energy Richland Operations

B. Is the name listed in item VII-A also the owner? [X] YES [ ] NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC (other than federal or state)
O = OTHER (specify)

F

D. PHONE (area code & no.) 509 376 7387

E. STREET OR P.O. BOX

P. O. Box 550

F. CITY OR TOWN	G. STATE	H. ZIP CODE
Richland	WA	99352

VIII. INDIAN LAND

Is the facility located on Indian lands? [ ] YES [X] NO

COMPLETE BACK PAGE

* Office of Assistant Manager for Safety, Safeguards and Quality Assurance

ECY 030-31

AP

...ch to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

X. NATURE OF BUSINESS *(provide a brief description)*

- o National Defense Nuclear Material Production
- o Energy Research and Technology Development
- o Defense Nuclear Waste Management
- o By-product Steam, Sold for Electric Power Generation
- o and sic 15: Buidling Construction - General Contractors and Operative Builders

XI. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
T. R. Fitzsimmons, Asst. Manager		

CSO-21 Reverse

FORM 3—INSTRUCTIONS

Completing This Form

Please type or print. If you print place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response.

Section I

Existing dangerous waste management facilities should enter their EPA/STATE identification Number *(if known)*. New facilities should leave this item blank.

Section II

A. FIRST APPLICATION. If this is the first application that is being filed for the facility place an "X" in either the Existing Facility box or the New Facility box.

1. EXISTING FACILITY. Existing facilities are:

a. Those facilities which received hazardous waste for treatment, storage, and/or disposal on or before November 19, 1980; or

b Those facilities for which construction had commenced on or before November 15, 1980. Construction had "commenced" only if:

(1) The owner or operator had obtained all necessary Federal, State, and local preconstruction approvals or permits; and

(2-a) A continuous physical, on—site construction program had begun *(facility design or other preliminary non—physical and non—site specific preparatory activities do not constitute an on—site construction program)*, or

(2-b) The owner or operator had entered into contractual obligations *(options to purchase or contracts for feasibility, engineering, and design studies do not constitute contractual obligations)* which could not be cancelled or modified without substantial loss. Generally, a loss is deemed substantial if the amount an owner or operator must pay to cancel construction agreements or stop construction exceeds 10% of the total project cost.

EXISTING FACILITY DATE. If the Existing Facility box is marked, enter the date dangerous waste operations began *(i.e., the date the facility began treating, storing, or disposing of hazardous waste)* or the date construction commenced.

2. NEW FACILITY. New facilities are all facilities for which construction commenced, or will commence, after November 19, 1980.

NEW FACILITY DATE. If the New Facility box is marked, enter the date that operation began or is expected to begin.

B. REVISED APPLICATION. If this is a subsequent application that is being filed to amend data filed in a previous application, place an "X" in the appropriate box to indicate whether the facility has interim status or a permit.

1. FACILITY HAS AN INTERIM STATUS PERMIT. Place an "X" in this box if this is a revised application to make changes at a facility during the interim status period.

2. FACILITY HAS A FINAL PERMIT. Place an "X" in this box if this is a revised application to make changes at a facility for which a permit has been issued.

(NOTE: When submitting a revised application, applicants must resubmit in their entirety each item on the application for which changes are requested. In addition, Items I and IX [and Item X if applicable] must be completed. It is not necessary to resubmit information for other items that will not change).

Section III

The information in Section III describes all the processes that will be used to treat, store, or dispose of dangerous waste at the facility. The design capacity of each process must be provided as part of the description. The design capacity of injection wells and landfills at existing facilities should be measured as the remaining, unused capacity. See the form for the detailed instructions to Section III.

Section IV

The information in Section IV describes all the dangerous wastes that will be treated, stored, or disposed at the facility. In addition, the processes that will be used to treat, store, or dispose of each waste and the estimated annual quantity of each waste must be provided. See the form for the detailed instructions to Section IV.

Section V

All existing facilities must include a drawing showing the general layout of the facility. This drawing should be approximately to scale and fit in the space provided on the form. This drawing should show the following:

The property boundaries of the facility;

The areas occupied by all storage, treatment, or disposal operations that will be used during interim status,

The name of each operation. *(Example—multiple hearth incinerator, drum storage area, etc.)*;

Areas of past storage, treatment, or disposal operations;

Areas of future storage, treatment, or disposal operations; and

The approximate dimensions of the property boundaries and all storage, treatment, and disposal areas.

Section VI

All existing facilities must include photographs that clearly delineate all existing structures; all existing areas for storing, treating, or disposing of hazardous waste; and all known sites of future storage, treatment, or disposal operations. Photographs may be color or black and white, ground-level or aerial. Indicate the date the photograph was taken on the back of each photograph.

Section VII

Enter the latitude and longitude of the facility in degrees, minutes, and seconds. For larger facilities, enter the latitude and longitude at the approximate mid-point of the facility. You may use the map you provided for Section IX of Form 1 to determine latitude and longitude. Latitude and longitude information is also available from Regional Offices of the U.S. Department of Interior, Geological Survey and from State agencies such as the Department of Natural Resources.

Section VIII

See the form for the instructions to Section VIII.

Section IX and Section X

All facility owners must sign Section IX. If the facility will be operated by someone other than the owner, then the operator must sign Section X. Federal regulations require the certification to be signed as follows:

A. For a corporation, by a principal executive officer at least the level of vice president;

B. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively; or

C. For a municipality, State, Federal, or other public facility, by either a principal executive officer or ranking elected official.

FORM 3

1324-NA PERCOLATION POND

Please print or type in the unshaded areas only
(fill—in areas are spaced for elite type, i.e., 12 characters/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (mo., day, & yr.)	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION (place an "X" below and provide the appropriate date)

[X] 1. EXISTING FACILITY (See instructions for definition of "existing" facility. Complete item below.)

MO 09 DAY 01 YR 77 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

[ ] 2. NEW FACILITY (Complete item below.)

MO __ DAY __ YR __ — FOR NEW FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION (place an "X" below and complete Section I above)

[ ] 1. FACILITY HAS AN INTERIM STATUS PERMIT

[ ] 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided on the (Section III-C).

B. PROCESS DESIGN CAPACITY — For each code entered in column A enter the capacity of the process.
1. AMOUNT — Enter the amount.
2. UNIT OF MEASURE — For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET (the volume that would cover one acre to a depth of one foot) OR HECTARE-METER
LAND APPLICATION	D82	ACRES OR HECTARES
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	T 0 4	2,000,000	U		7				
2					8				
3					9				
4					10				

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CONTINUE ON REVERSE

Continued from the front.

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T04; The 1324-NA Percolation Pond historically received corrosive effluents from the regeneration of ion exchange column resins used to provide demineralized water for cooling needs at N-Reactor. Acid and basic wastes were discharged to this pond in series. This situation, as well as the large volumes of non-regulated process and cooling waters that were mixed with the corrosive discharges served to rapidly neutralize the waste stream. Any dangerous wastes which reached the soil underlying the pond were further neutralized by the calcareous nature of the soil. Hazardous waste discharges into the 1314-NA Percolation Pond were discontinued on May 13,1986. The pond now receives only nonregulated neutralized waste from the 1324-N Surface Impoundment.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non—listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non—listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER — Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K054	900	P	T03	D80			
X-2	D002	400	P	T03	D80			
X-3	D001	100	P	T03	D80			
X-4	D002			T03	D80			included with above

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Continued from page 2
NOTE: Photocopy this page before completing if you have more than 26 wastes to list

I.D. NUMBER (enter from page 1)

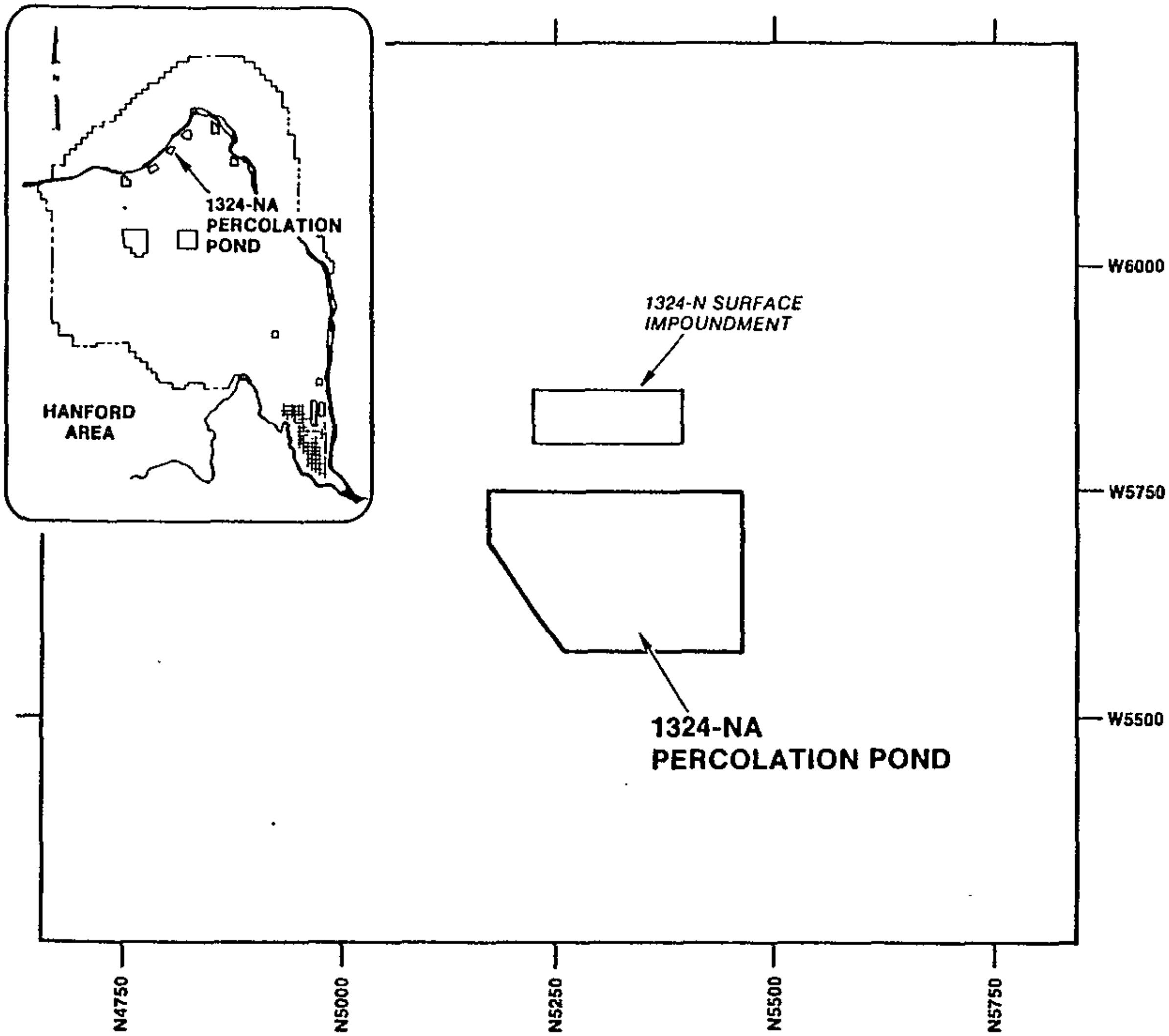
W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D 0 0 2	2,338,920,000	P	T 0 4	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

SECTION V - FACILITY DRAWINGS

1324-NA PERCOLATION POND

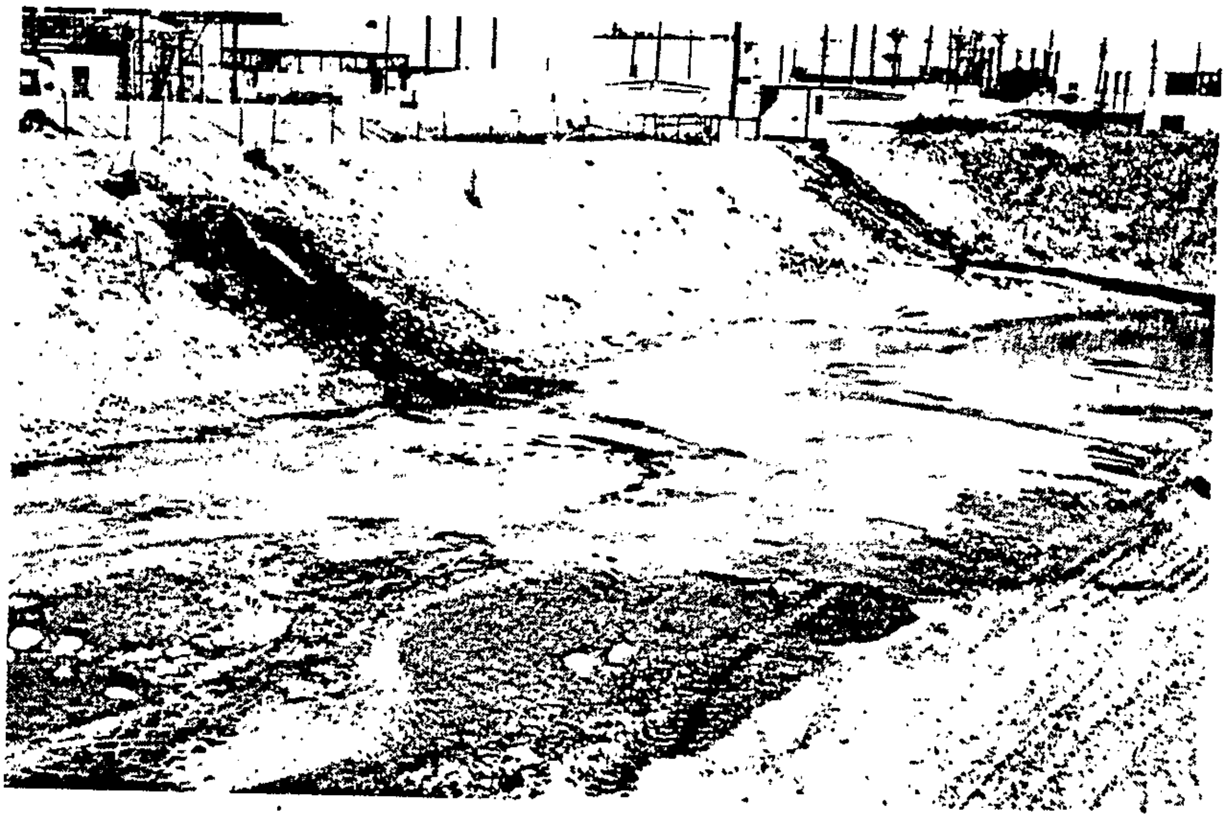


2K8607-21.29

SECTION VI - PHOTOGRAPHS

WA7890008967

1324-NA PERCOLATION POND



Longitude
119° 33'59.584"

Latitude
46° 40'16.934"

PHOTO TAKEN 1986

2K8607-21.25

2.0 FACILITY DESCRIPTION

This section provides a general description of the hazardous waste management facility being described in this closure plan. This description is intended to provide the permit application reviewer/permit writer with an overview of the Hanford Site and this facility. More details on this facility can be found in other parts of this closure plan.

2.1 GENERAL DESCRIPTION

The Hanford site is a 570 square mile tract of semi-arid land which is owned and operated by the U. S. Department of Energy. This site is located northwest of the city of Richland, Washington in the Columbia Basin. The city of Richland lies approximately three miles from the southern-most portion of the Hanford Site boundary and is the nearest population center (see Figure 2-1). In early 1943, the United States Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related facilities for the production and purification of plutonium. A total of eight graphite-moderated reactors using Columbia River water for once-through cooling were built along the Columbia River. These reactors were operated from 1944 to 1971.

N Reactor is a dual-purpose reactor used to produce plutonium and generate steam for the production of electricity. N Reactor began operating in 1963 and remains in operation today. N Reactor is cooled with a recirculating water coolant.

Activities are centralized in numerically designated areas on the Hanford Site. The reactor facilities (active and decommissioned) are located along the Columbia River in what are known as the 100 Areas. The reactor fuel processing and waste management facilities are in the 200 Areas which are on a plateau about seven miles from the river. The 300 Area, located north of Richland, contains the reactor fuel manufacturing facilities and the research and development laboratories. The 400 Area, five miles northwest of the 300 Area, contains the Fast Flux Test Facility (FFTF). The 1100 Area, north of Richland, contains facilities associated with maintenance and transportation functions for the Hanford Site. Administrative buildings and other research and development laboratories are found in the 3000 Area, also located north of Richland. The Nonradioactive Dangerous Waste Landfill is located two miles southeast of the 200 East Area in the 600 Area of the Hanford Site. The Nonradioactive Dangerous Waste Storage Facility is located between the 200 East and 200 West Areas on Route 3S, which is also located in the 600 Area.

The 1324-NA Percolation Pond is a newly identified treatment facility which historically received hazardous wastes. This facility will be closed under interim status. A brief description of this facility follows:

1324-NA Percolation Pond

The 1324-NA Percolation Pond is a large unlined pond that was historically used to treat corrosive hazardous wastes. The pond was placed in service in August, 1977, and was used to treat corrosive regeneration wastes from the 163-N Demineralization Plant and filter backwash water from the 183-N Filtered Water Plant. The wastes were treated in the 1324-NA Percolation Pond by the alternate addition to the pond of acidic cation column regeneration wastes and alkaline anion column regeneration wastes. This alternate addition of low and high pH wastes served to neutralize the wastes in the 1324-NA Percolation Pond. The 1324-NA Percolation Pond also made use of the buffering capacity and calcareous nature of the soil underlying the pond to neutralize the corrosive wastes. The wastes which were treated in the 1324-NA Percolation Pond were first transferred to two small settling ponds located directly west of the percolation pond. These settling ponds were used to settle out the solids in the filter backwash water waste stream. The settling ponds were removed from service in early 1983.

In the spring of 1983 the percolation pond was enlarged from a bottom area of 9,200 square feet with a volume of approximately 1,200,000 gallons to a bottom area of 29,000 square feet. This enlarged pond was designed to contain up to 3,000,000 gallons of corrosive wastes from the regeneration of ion exchange columns in the 163-N Demineralization Plant. The entire bottom area of the pond has not been covered with wastes since the enlargement of the pond. The filter backwash water was routed to a new disposal basin at this time, and the south settling pond was backfilled to grade.

Use of the 1324-NA Percolation Pond to treat hazardous wastes was discontinued by May 13, 1986 when the 1324-N Surface Impoundment was put into service to treat the corrosive wastes. The 1324-N Surface Impoundment is a double-lined pond with a leachate collection system which is used to neutralize the wastes prior to their discharge to the percolation pond. The 1324-N Surface Impoundment is described in a Part B Permit Application submitted to WDOE and EPA on December 10, 1986.

2.2 TOPOGRAPHIC MAPS

The first map in Appendix A is a general overview map of the entire Hanford Site property and the surrounding countryside. It is intended to be used as a location map and illustrates the following:

- The facility boundary, which for purposes of this closure plan is defined as those portions of the Hanford Site located within the perimeter security fences shown on the map;

- Surrounding land use including the Saddle Mountain National Wildlife Refuge and the State Game Reserve to the north and the Rattlesnake Mountain Ecological Reserve located to the west. Land east of the Hanford Site across the Columbia River is primarily farmland or a part of the Game Reserve. The surrounding land area is also shown in Figure 2-1 of this closure plan;

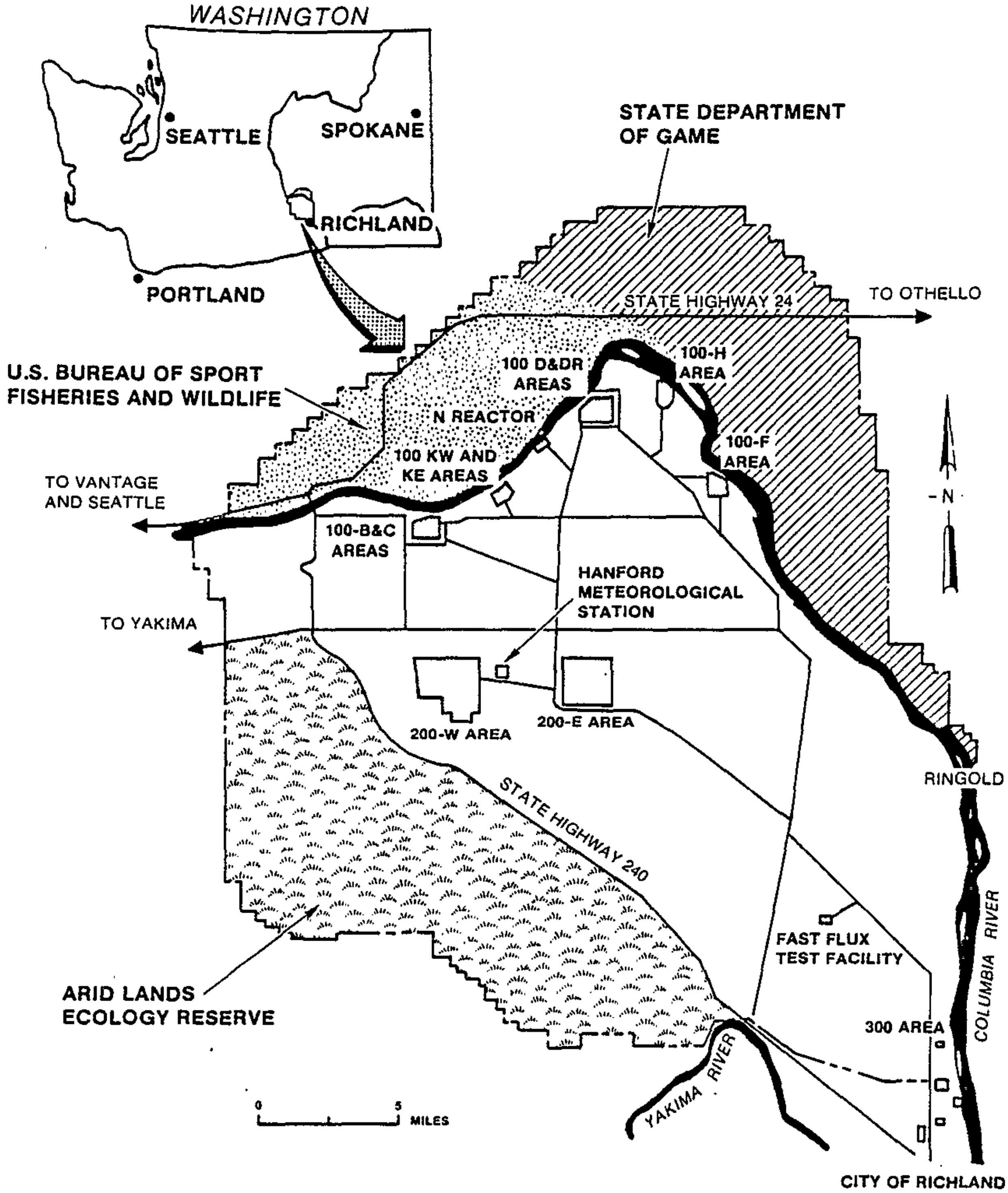


FIGURE 2-1
SURROUNDING LAND USE

- o Contours sufficient to show surface water flow. Because of the area shown, contours are 20 foot spacing;
- o Fire control facilities located on the Hanford Site;
- o Locations of access roads, internal roads, railroads, and perimeter gates and barricades; and
- o Longitudes and latitudes.

Appendix A also contains a topographic map of the 100-N Area of the Hanford Site. This map indicates the location of the 1324-NA Percolation Pond. This map is drawn to a scale of 1" = 100', and the contours are 2-foot spacing. The locations of the 100-N Area hazardous waste management units are also shown on this map.

Figure 2-2 illustrates the wind rose data for various locations on the Hanford Site. The winds on the Hanford Site are predominately from the west.

Figure 2-3 shows the original layout of the 1324-NA Percolation Pond. This layout of the facility existed from August, 1977 to early 1983. Figure 2-3 also contains a photograph of the original layout of the 1324-NA Percolation Pond. This photograph was taken on October 24, 1980. The settling ponds shown on this drawing have not received dangerous wastes since early 1983, and the south settling pond was backfilled to grade at that time. At the same time, the 1324-NA Percolation Pond was enlarged. Figure 2-4 shows the layout of the Percolation Pond from early 1983 to May of 1986.

In May of 1986 a new lined surface impoundment (1324-N) was constructed to treat the 163-N Demineralization Plant regeneration wastes. Figure 2-5 shows the layout of the 1324-N and 1324-NA facilities as they exist today. The facilities are surrounded by a perimeter chain link fence with one access road and a locking gate.

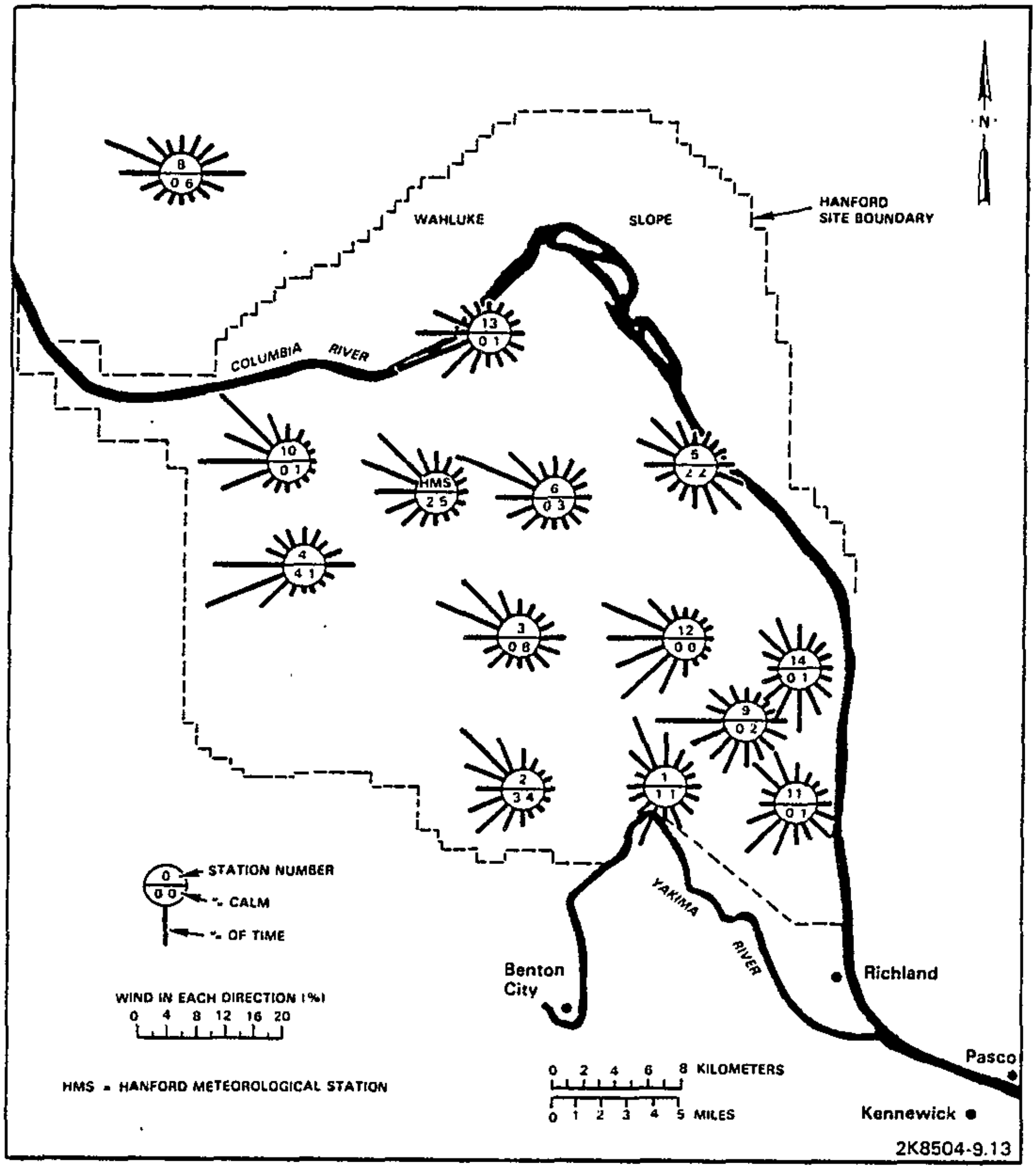


FIGURE 2-2
WIND ROSE DATA FOR THE HANFORD TELEMETRY NETWORK

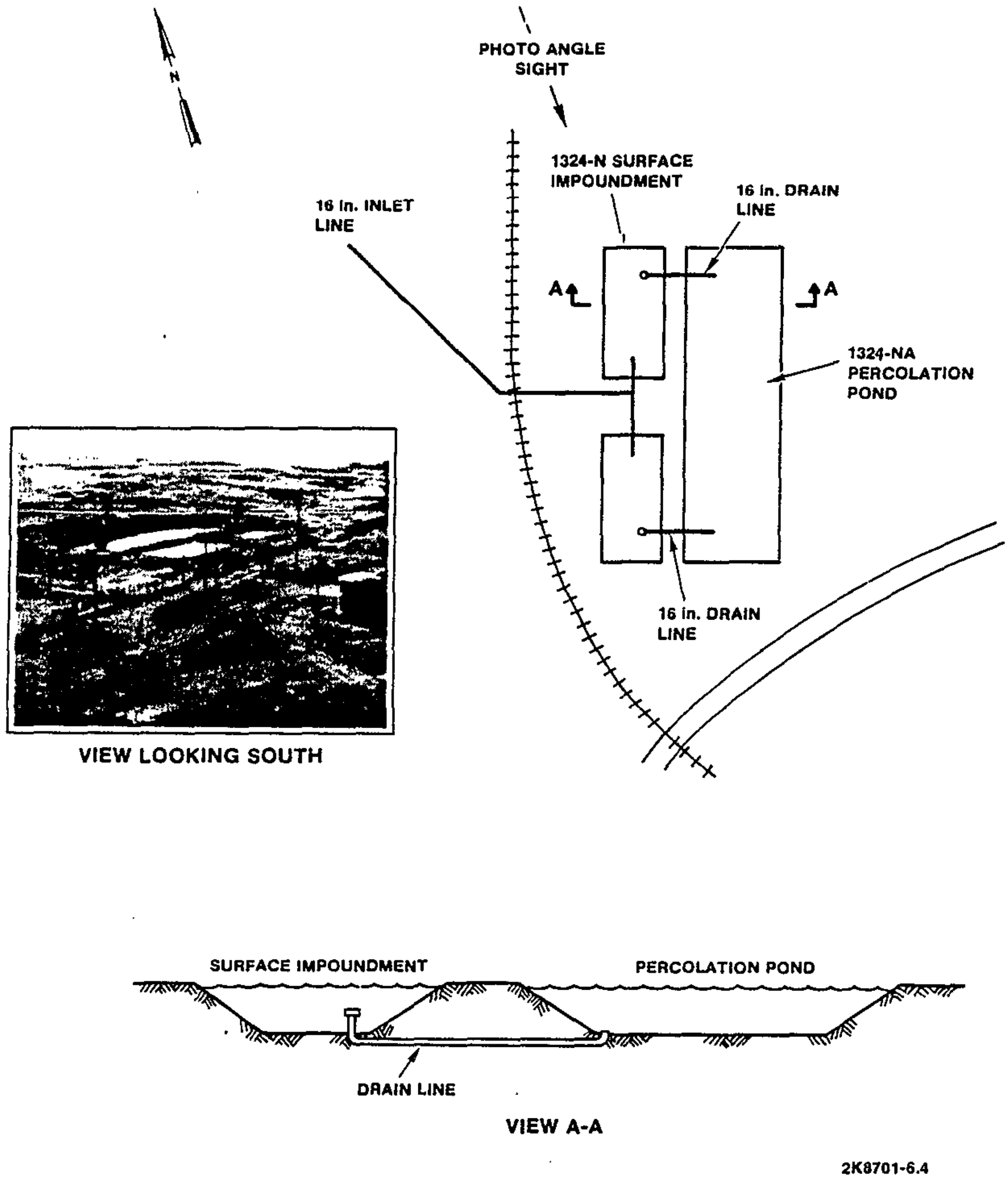


FIGURE 2-3
1324-NA PERCOLATION POND LAYOUT, 1977-1983

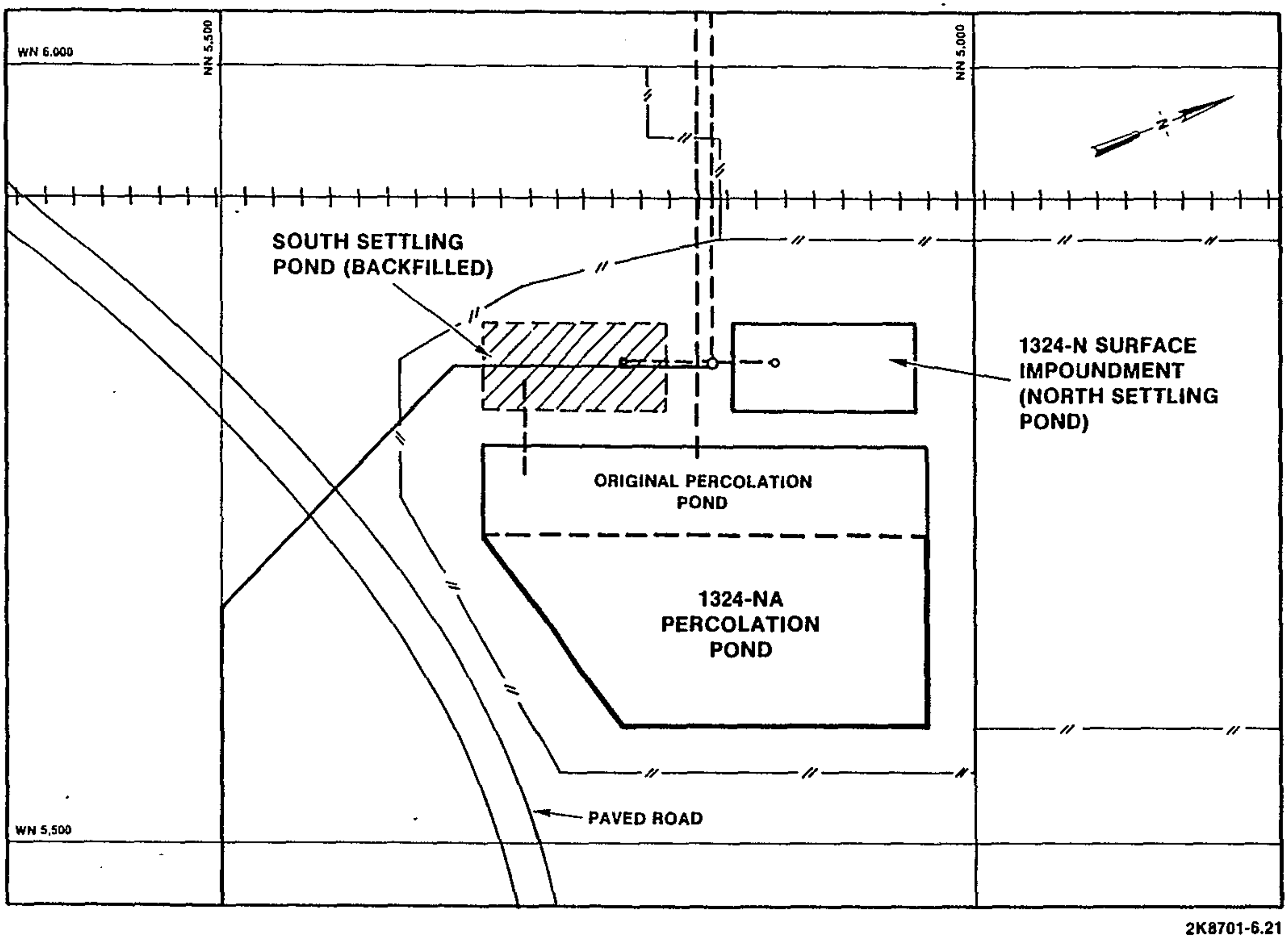
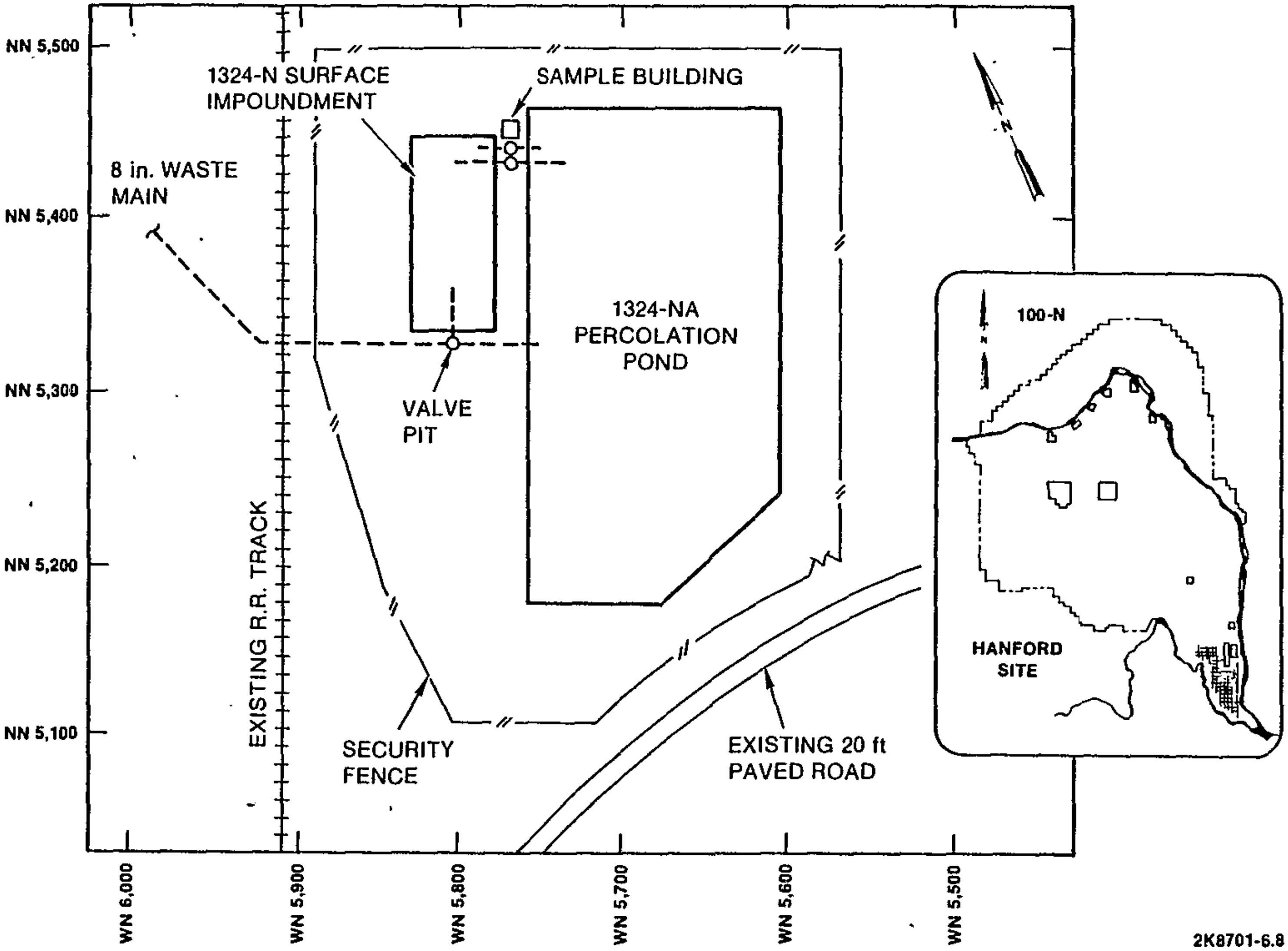


FIGURE 2-4
1324-NA PERCOLATION POND LAYOUT, 1983-1986

9 0 1 1 7 8 9 0 4 5 7



2K8701-6.8

FIGURE 2-5
1324-NA PERCOLATION POND LAYOUT, 1986-PRESENT

Figure 2-6 shows the general layout of the 100-N Area of the Hanford Site, and the location of the hazardous waste management units in the 100-N Area.

A water table contour map of the uppermost aquifer showing the groundwater flow directions for the Hanford Site Facilities is also located in Appendix A. Further hydrology and geology information is discussed in Section 5.0 of this Closure Plan.

2.3 LOCATION INFORMATION

Seismic Consideration

The DOE Hanford Site is not located within any of the political jurisdictions identified in Appendix VI of 40 CFR 264 or WAC 173-303-420(3)(C) which are considered to be seismically active. Therefore, no further information is required to demonstrate compliance with the seismic standard.

Floodplain Standard

The Army Corp of Engineers (Jamison, 1982) has calculated the probable maximum flood based on the upper limit of precipitation falling on a drainage area and other hydrologic factors such as antecedent moisture conditions, snowmelt, and tributary conditions that could lead to maximum runoff. The probable maximum flood for the Columbia River below Priest Rapids Dam has been calculated to be 1.4 million cubic feet/second. The floodplain associated with the probable maximum flood is shown in Figure 2-7. The inundated area shown in Figure 2-7 is greater than that which would be inundated during a 100 year flood. The facilities addressed in this Closure Plan are located above the 100-year floodplain.

2.4 TRAFFIC INFORMATION

The 1324-NA Percolation Pond is located within the Hanford Controlled Access Area where roadways cannot be accessed by the general public. The facility is isolated from the nearest public highway, State Highway 24, by at least four miles.

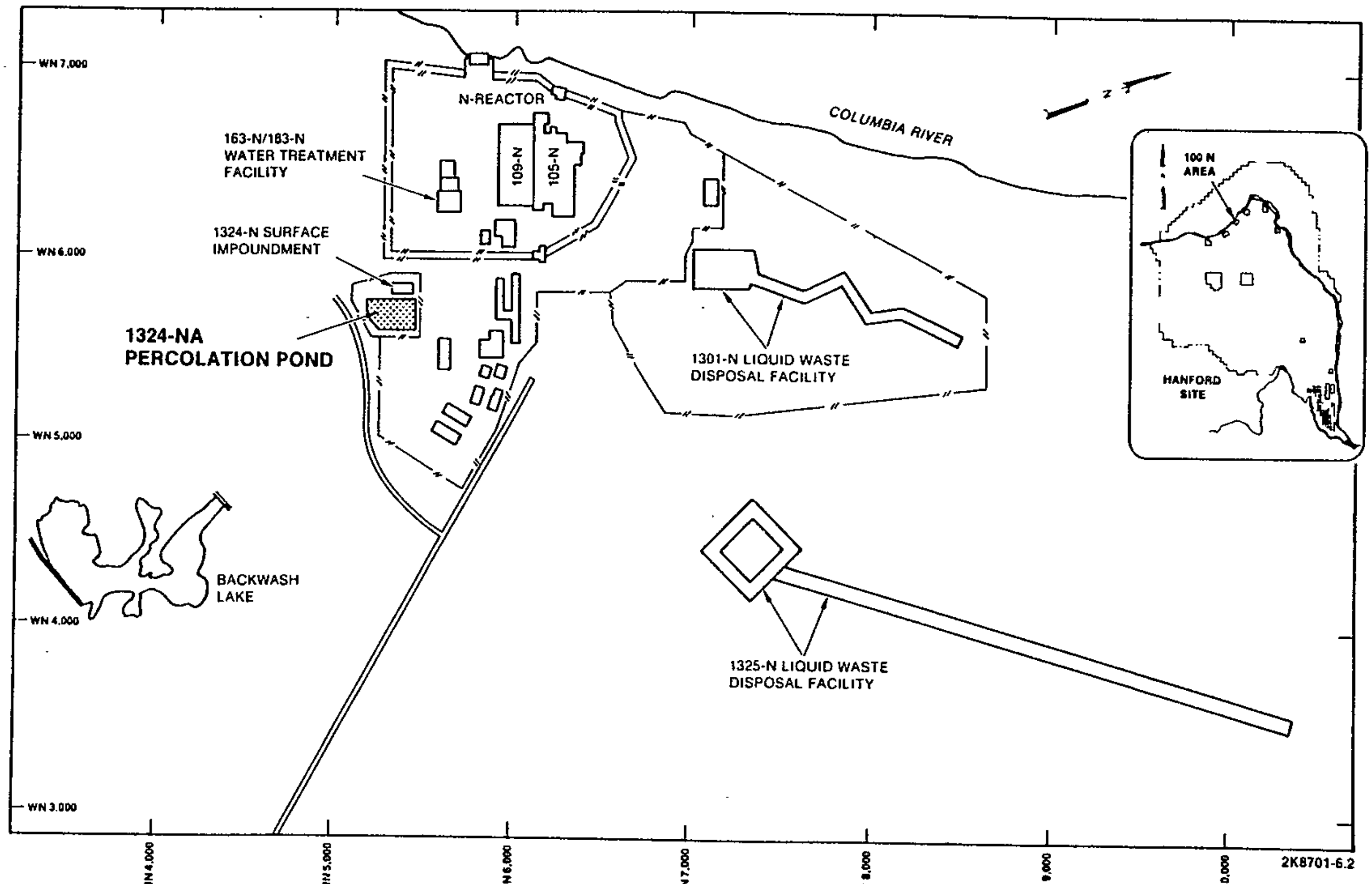


FIGURE 2-6
100-N AREA FACILITIES

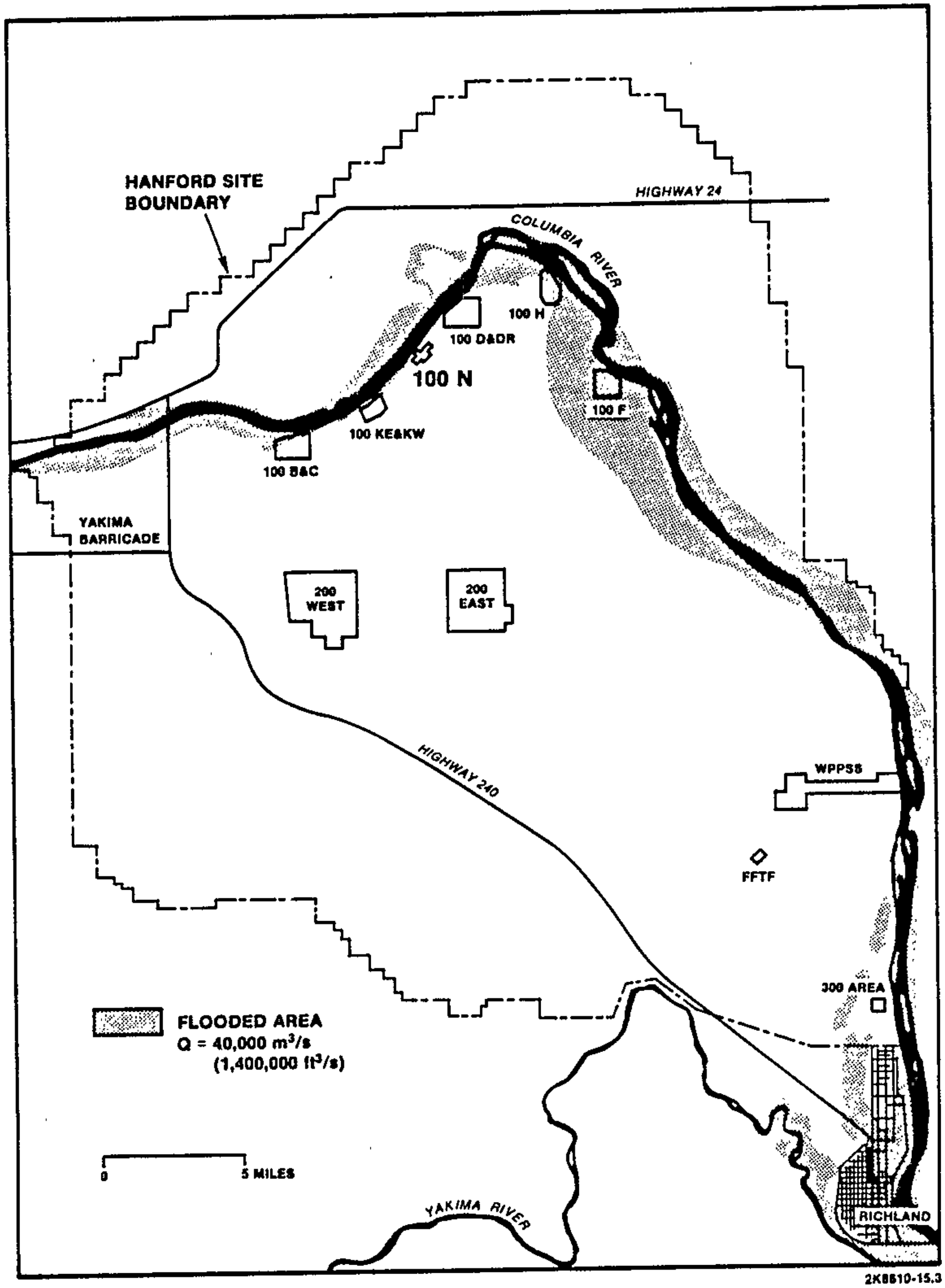


FIGURE 2-7
PROBABLE MAXIMUM FLOOD AREA

Roadways inside the Hanford Site are restricted to authorized personnel and cannot be accessed by the general public. The majority of traffic inside the Hanford Site boundaries consists of light duty vehicles and buses used to transport the employees to the various operations sites located within the site.

Figure 2-8 shows the major roads throughout the Hanford Site. These roads are classified as either primary or secondary routes. The primary routes include Routes 4S, 10, 4N and the portion of 11A east of route 4N. All other roads are secondary routes. The primary routes are constructed of bituminous asphalt (usually two inches thick, but the thickness of the asphalt layer will vary with each road) with an underlying aggregate base. The secondary routes are constructed of layers of an oil and rock mixture with an underlying aggregate base. The aggregate base consists of various types and sizes of rock found on site.

The 1324-NA Percolation Pond is located approximately one-half mile southwest of the Hanford Site highway which is used by site personnel traveling between other areas of the Hanford site and the 100-N Area. The road leading to the facility is asphalted. This road is also traveled by Hanford Generating Plant (HGP) personnel for access to the Washington Public Power Supply System steam generating electric plant. Emergency vehicles would be routed from the asphalt roadway to a dirt road via a separate locked entry gate to gain access to the 1324-NA facility.

All hazardous wastes are now carried from the point of generation in the 163-N Demineralization Plant to the 1324-N Surface Impoundment via an 8" PVC plastic pipeline. After the wastes have been treated so that they are no longer corrosive hazardous wastes, the waste water in the surface impoundment is routed to the 1324-NA Percolation Pond via a 12" PVC plastic drain line. Vehicle traffic on the roads around the 1324-N facility is light and no waste is transported via roadways to the surface impoundment or the percolation pond.

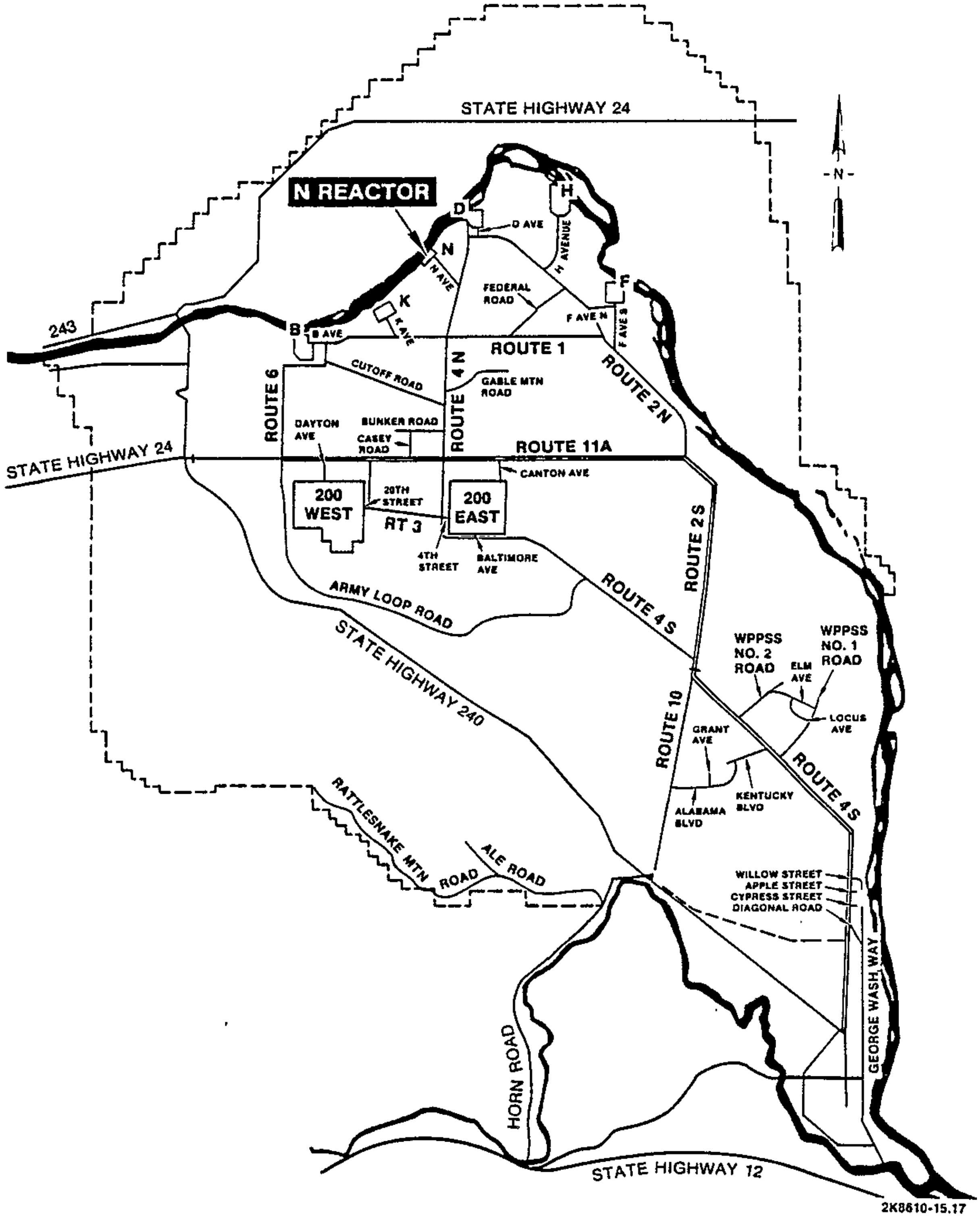


FIGURE B-8
HANFORD SITE ROADS

2.5 REFERENCES

Jamison, J. D., "Standardized Format for Hanford Environmental Impact Statements," PNL-3509 PT2, 1982.

3.0 WASTE CHARACTERISTICS

The hazardous wastes which were historically treated in the 1324-NA Percolation Pond were produced during the regeneration of the ion exchange columns used in the 163-N Demineralization Plant. The 163-N Demineralization Plant uses four primary cation exchange units, four primary anion exchange units, four secondary cation exchange units, and four secondary anion exchange units to provide a source of high-quality demineralized water for cooling needs at N Reactor.

The primary and secondary cation exchange columns are regenerated using 2 - 4% sulfuric acid (H_2SO_4). The dilute acid is injected to the cation exchange column resins. The primary and secondary anion exchange column resins are regenerated using sodium hydroxide (NaOH) at a 4% dilution. The cation and anion exchange column resins are rinsed with filtered water following the acid or caustic injection.

Process and cooling waters from the 163-N Demineralization Plant are also combined with this waste stream. The viscosity of the caustic wastes is high and the waste stream would not flow well through the piping without the addition of the process and cooling waters. The process and cooling waters are not a dangerous waste prior to being mixed with the regeneration wastes.

The pH of the demineralized water plant waste varies from less than 1.0 to as high as 14.0 standard units depending on the type of regeneration taking place and the time into the regeneration cycle. This waste, when the pH is less than or equal to 2.0 or greater than or equal to 12.5, meets the characteristic of a corrosive dangerous waste as defined in 40 CFR 261.22(a)(1) and WAC 173-303-090(6)(a)(i).

The 163-N Demineralization Plant regeneration wastes have also been analyzed for the characteristic of corrosivity according to 40 CFR 261.22(a)(2) and WAC 173-303-090(6)(a)(ii). The results of the National Association of Corrosion Engineers (NACE) Standard TM-01-69 test indicate that at a pH of less than 3.5 standard units this waste will corrode SAE 1020 steel at a rate greater than 0.250 inches per year at a temperature of 55 degrees. These test results are included as Appendix H. Therefore, when the pH of the waste influent to the 1324-NA Percolation Pond was less than 3.5 or greater than or equal to 12.5 standard units the wastes discharged to the percolation pond were hazardous wastes.

The wastes that were formerly treated in the 1324-NA Percolation Pond have been analyzed at one point during both the cation and anion regeneration cycles, and the results are contained in Tables 3-1 and 3-2. The waste exhibits the low and high pH characteristics of a corrosive dangerous waste. This waste exhibited no other dangerous waste characteristics or criteria. Analysis of the waste generation processes indicates that this waste stream also did not contain any listed hazardous wastes or dangerous waste sources.

Table 3-3 presents the waste designation information available for the waste influent to the 1324-NA Percolation Pond up until May 13, 1986. The acids and caustics used for regeneration of the ion exchange columns were essential materials which were controlled by Quality Control Requirements.

The 1324-NA Percolation Pond also historically received filter backwash water wastes from the 183-N Filtered Water Plant. The solids in this waste stream were settled out in the settling ponds, and the liquid portion was then discharged into the 1324-NA Percolation Pond and allowed to percolate into the soil column underlying the pond. In 1983 a new disposal basin was built to dispose of the filter backwash water. The location of this basin is shown in Figure 2-6.

The waste analysis data for the 183-N Filtered Water Plant filter backwash effluent is included as Table 3-4. This waste stream is of neutral pH, and contains low concentrations of several anions and cations. The filter backwash waste did not exhibit any dangerous waste characteristics or criteria. Analysis of the waste generation processes indicates that this waste stream also did not contain any listed dangerous wastes or dangerous waste sources.

TABLE 3-1
163-N DEMINERALIZATION PLANT REGENERATION EFFLUENT WASTE ANALYSIS
CATION REGENERATION CYCLE

PARAMETERS (MDL)	SAMPLE			
	1	2	3	AVERAGE
pH (standard units)	0.894	0.936	0.922	0.917
Conductivity (micromhos)	37000	40100	35000	37367
Mercury (.0001 ppm)	LD	LD	LD	LD
Ethylene glycol (10 ppm)	LD	LD	LD	LD
Enhanced thiourea (.2 ppm)	LD	LD	LD	LD
TOC (1 ppm)	.0013	.0019	.0018	.0016
Cyanide (.01 ppm)	LD	LD	LD	LD
Barium (.006 ppm)	.030	.023	.020	.024
Cadmium (.002 ppm)	.003	.002	.003	.003
Chromium (.01 ppm)	LD	LD	LD	LD
Lead (.03 ppm)	LD	LD	LD	LD
Silver (.01 ppm)	LD	LD	LD	LD
Sodium (.1 ppm)	12.2	16.5	9.6	12.8
Nickel (.01 ppm)	LD	LD	LD	LD
Copper (.01 ppm)	LD	LD	LD	LD
Vanadium (.005 ppm)	.025	.027	.020	.024
Antimony (.1 ppm)	LD	LD	LD	LD
Aluminum (.15 ppm)	.725	.842	.655	.741
Manganese (.005 ppm)	.027	.035	.027	.030
Potassium (.1 ppm)	12.2	15.5	14.8	14.2
Iron (.05 ppm)	1.1	1.2	1.0	1.1
Beryllium (.005 ppm)	LD	LD	LD	LD
Osmium (.3 ppm)	LD	LD	LD	LD
Strontium (.3 ppm)	1.3	1.4	1.2	1.3
Zinc (.005 ppm)	.016	.024	.067	.036
Calcium (.05 ppm)	282.6	347.4	324.9	318.3
Nitrate (.5 ppm)	1.0	.5	.8	.8
Sulphate (.5 ppm)	2310	4271	2952	3201
Fluoride (.5 ppm)	LD	LD	LD	LD
Chloride (.5 ppm)	2.0	1.8	1.9	1.9
Phosphate (1 ppm)	LD	LD	LD	LD
Phosphorus Pesticides (.005 ppm)	LD	LD	LD	LD
Chlorinated Pesticides (.001 ppm)	LD	LD	LD	LD
Enhanced ABN List	LD	LD	LD	LD
Citrus Red (1 ppm)	LD	LD	LD	LD
Arsenic (.005 ppm)	LD	LD	LD	LD
Ammonium Ion (.05 ppm)	LD	LD	LD	LD
Coliform (3 MPN)	LD	LD	LD	LD
Selenium (.005 ppm)	LD	LD	LD	LD
Thallium (.01 ppm)	LD	LD	LD	LD
Enhanced VOA (10 ppm)	26	28	26	27

LD = Less Than Detectable
MDL = Minimum Detection Limit
Data obtained from samples taken August, 1985.

TABLE 3-2
163-N DEMINERALIZATION PLANT REGENERATION WASTE ANALYSIS
ANION REGENERATION CYCLE

PARAMETERS (MDL)	SAMPLE			
	1	2	3	AVERAGE
pH (standard units)	13.72	13.74	13.77	13.74
Conductivity (micromhos)	62000	60000	70000	64000
Mercury (.0001 ppm)	.00018	.00013	.00019	.00017
Ethylene glycol (10 ppm)	LD	LD	LD	LD
Enhanced thiourea (.2 ppm)	LD	LD	LD	LD
TOC (1 ppm)	462	499	456	472
Cyanide (.01 ppm)	.010	.015	LD	.013
Barium (.6 ppm)	LD	LD	LD	LD
Cadmium (.2 ppm)	LD	LD	LD	LD
Chromium (1 ppm)	LD	LD	LD	LD
Lead (.2 ppm)	LD	LD	LD	LD
Silver (1 ppm)	LD	LD	LD	LD
Sodium (10 ppm)	26910	28200	26330	27150
Nickel (1 ppm)	LD	LD	LD	LD
Copper (1 ppm)	LD	LD	LD	LD
Vanadium (.5 ppm)	LD	LD	LD	LD
Antimony (10 ppm)	LD	LD	LD	LD
Aluminum (15 ppm)	LD	LD	LD	LD
Manganese (.5 ppm)	LD	LD	LD	LD
Magnesium (5 ppm)	LD	LD	LD	LD
Potassium (10 ppm)	26.5	27.2	26.3	26.7
Iron (5 ppm)	LD	LD	LD	LD
Beryllium (.5 ppm)	LD	LD	LD	LD
Osmium (30 ppm)	LD	LD	LD	LD
Strontium (30 ppm)	LD	LD	LD	LD
Zinc (.5 ppm)	LD	LD	LD	LD
Calcium (5 ppm)	LD	LD	LD	LD
Nitrate (.5 ppm)	1.0	1.4	.9	1.1
Sulphate (.5 ppm)	30.9	30.6	30.6	30.7
Fluoride (.5 ppm)	LD	LD	LD	LD
Chloride (.5 ppm)	2.5	2.3	2.3	2.4
Phosphate (1 ppm)	LD	LD	LD	LD
Phosphorus Pesticides (.005 ppm)	LD	LD	LD	LD
Chlorinated Pesticides (.001 ppm)	LD	LD	LD	LD
Enhanced ABN List	LD	LD	LD	LD
Citrus Red (1 ppm)	LD	LD	LD	LD
Arsenic (.2 ppm)	LD	LD	LD	LD
Ammonium Ion (.05 ppm)	2.3	2.7	2.8	2.6
Coliform (2.2 MPN)	LD	LD	LD	LD
Selenium (.002 ppm)	LD	LD	LD	LD
Thallium (.4 ppm)	LD	LD	LD	LD
Enhanced VOA (10 ppm)	26	28	26	27

LD = Less Than Detectable
MDL = Minimum Detection Limit

Data obtained from samples taken 1987.

TABLE 3-3
WASTE DESIGNATION INFORMATION FOR
REGENERATION MATERIAL DISCHARGED
TO THE 1324-N SOUTH SETTLING POND
AND THE 1324-NA PERCOLATION POND

CONSTITUENTS	VIRGIN CONCENTRATION	DISCHARGE CONCENTRATION	pH VALUE DISCHARGE
Sulfuric Acid (H_2SO_4)	97%	.9%	1.0
Sodium Hydroxide (NaOH)	50%	.6%	14.0

Dangerous waste ID = D002

TABLE 3-4
183-N FILTERED WATER PLANT BACKWASH EFFLUENT ANALYSIS

PARAMETER (MDL)	SAMPLE 1	2	3	AVERAGE
pH (standard units)	7.08	7.65	7.64	7.46
Conductivity (micromhos)	160	150	150	153
Mercury (.001 ppm)	LD	LD	LD	LD
Ethylene glycol (10 ppm)	LD	LD	LD	LD
Enhanced thiourea (.2 ppm)	LD	LD	LD	LD
TOC (1 ppm)	.00277	.002185	.002257	.002404
Cyanide (.01 ppm)	LD	LD	LD	LD
Barium (.006 ppm)	.030	.031	.030	.030
Cadmium (.002 ppm)	.004	.002	.002	.003
Chromium (.01 ppm)	LD	LD	LD	LD
Lead (.03 ppm)	LD	LD	LD	LD
Silver (.01 ppm)	LD	LD	LD	LD
Sodium (.1 ppm)	2.202	2.287	2.186	2.225
Nickel (.01 ppm)	LD	LD	LD	LD
Copper (.01 ppm)	LD	LD	LD	LD
Vanadium (.005 ppm)	LD	LD	LD	LD
Antimony (.1 ppm)	LD	LD	LD	LD
Aluminum (.15 ppm)	.392	.389	.376	.386
Manganese (.005 ppm)	.020	.015	.014	.016
Potassium (.1 ppm)	.799	.814	.762	.792
Iron (.05 ppm)	LD	LD	LD	LD
Beryllium (.005 ppm)	LD	LD	LD	LD
Osmium (.3 ppm)	LD	LD	LD	LD
Strontium (.3 ppm)	LD	LD	LD	LD
Zinc (.005 ppm)	LD	LD	LD	LD
Calcium (.05 ppm)	17.340	17.720	17.020	17.360
Nitrate (.5 ppm)	.789	.500	.500	.596
Sulphate (.5 ppm)	18.900	20.980	19.110	19.663
Fluoride (.5 ppm)	LD	LD	LD	LD
Chloride (.5 ppm)	2.846	2.671	2.901	2.806
Phosphate (1 ppm)	LD	LD	LD	LD
Phosphorus Pesticides (.005 ppm)	LD	LD	LD	LD
Chlorinated Pesticides (.001 ppm)	LD	LD	LD	LD
Enhanced ABN List	LD	LD	LD	LD
Citrus Red (1 ppm)	LD	LD	LD	LD
Arsenic (.005 ppm)	LD	LD	LD	LD
Ammonium Ion (.05 ppm)	LD	LD	LD	LD
Coliform (3 MPN)	.240	2.400	2.400	1.680
Selenium (.005 ppm)	LD	LD	LD	LD
Thallium (.01 ppm)	LD	LD	LD	LD
Enhanced VOA (10 ppm)	---	.024	.025	.025

LD = Less Than Detectable
MDL = Minimum Detection Limit

Data obtained from samples taken August, 1985.

Although the 1324-NA Percolation Pond has been closed to further treatment of any hazardous wastes, the facility will continue to receive neutralized liquid wastes from the 1324-N Surface Impoundment and non-regulated process and cooling waters from the 163-N Plant. These wastes will all be non-regulated. Procedural controls are in place to ensure that no hazardous wastes are discharged to the pond. These procedural controls are described in greater detail in Section 4.0 of this Closure Plan.

The current operating procedure for the 1324-N Surface Impoundment, included as Appendix B of this Closure Plan, allows release of the wastes from the surface impoundment to the percolation pond only when the pH of the impoundment contents is within the process standard limits of 4.0 to 11.0 standard units. The process standard has been amended to allow only the discharge to the 1324-N Percolation Pond of wastes with a pH between 4.0 and 11.0 standard units. The Process Change Authorization (PCA) for the discharges from the 1324-N Surface Impoundment is also included in Appendix B of this Closure Plan.

4.0 PROCESS INFORMATION

The 1324-NA Percolation Pond is a large unlined pond which was historically used to treat corrosive hazardous wastes. The pond historically received corrosive liquid hazardous wastes from the 163-N Demineralization Plant and filter backwash water, a non-regulated waste, from the 183-N Filtered Water Plant. This pond will continue to operate, but will only receive non-regulated wastes in the future.

The corrosive wastes from the 163-N Demineralization Plant were produced during regeneration of the anion and cation exchange column resins in the plant.

The ion exchange columns treat filtered water from the 183-N Filtered Water Plant to produce a source of high-quality demineralized water for cooling needs at N-Reactor. During normal reactor operations, the cation and anion exchange column resins are each regenerated about twice per day. This may increase to a maximum of eight regenerations per day during reactor fuel charge/discharge operations.

To regenerate the cation exchange columns, a solution of 2-4% sulfuric acid (H_2SO_4) is injected into the cation exchange column resins. Sodium hydroxide (NaOH) is injected at a 4% dilution into the anion exchange column resins to regenerate those resins. The cation and anion exchange column resins are rinsed with filtered water following the injection of acid or caustic.

The wastes from the regeneration flow into process trenches in the 163-N Demineralization Plant. There the wastes are mixed with a flow of non-regulated process and cooling water from the 163-N Demineralization Plant. This additional flow makes the viscous corrosive wastes flow more easily through the process trenches.

The 163-N Demineralization Plant process trenches are lined concrete trenches, 1-foot deep by 2-feet wide, covered with a metal grating. The trenches run throughout the 163-N Demineralization Plant and carry the wastes to a sump located near the northwest corner of the plant. From there, the sump pumps pumped the wastes into a waste transfer line. The waste transfer line historically carried the corrosive wastes approximately 1300 feet to the 1324-NA Percolation Pond and the associated settling ponds.

Design of the 1324-NA Percolation Pond and the Settling Ponds

The 1324-NA Percolation Pond and associated settling ponds were first used in August of 1977 to treat corrosive wastes from the 163-N Demineralization Plant and filter backwash water from the 183-N Filtered Water Plant.

From 1977 to 1983, the 1324-NA Percolation Pond was a large unlined basin with a bottom area of about 9200 square feet. The pond was approximately 10-feet deep and had an available volume of approximately 1,200,000 gallons. The percolation pond was used to percolate the liquid wastes into the soil column.

The associated settling ponds were small, unlined basins which were used mainly to settle out the solids from the filter backwash water waste stream. The ponds had bottom dimensions of 10-feet by 70-feet, and were approximately 10-feet deep. The liquids were transferred from the settling ponds to the 1324-NA Percolation Pond via an underground drain line.

Figure 4-1 shows the original design (1977 - 1983) of the 1324-NA Percolation Pond and the associated settling ponds. The location of the waste transfer line and the drain lines are also shown on this drawing. The functional design criteria and the conceptual design report for the design of the original 1324-NA Percolation Pond and the associated settling ponds are included as Appendix C.

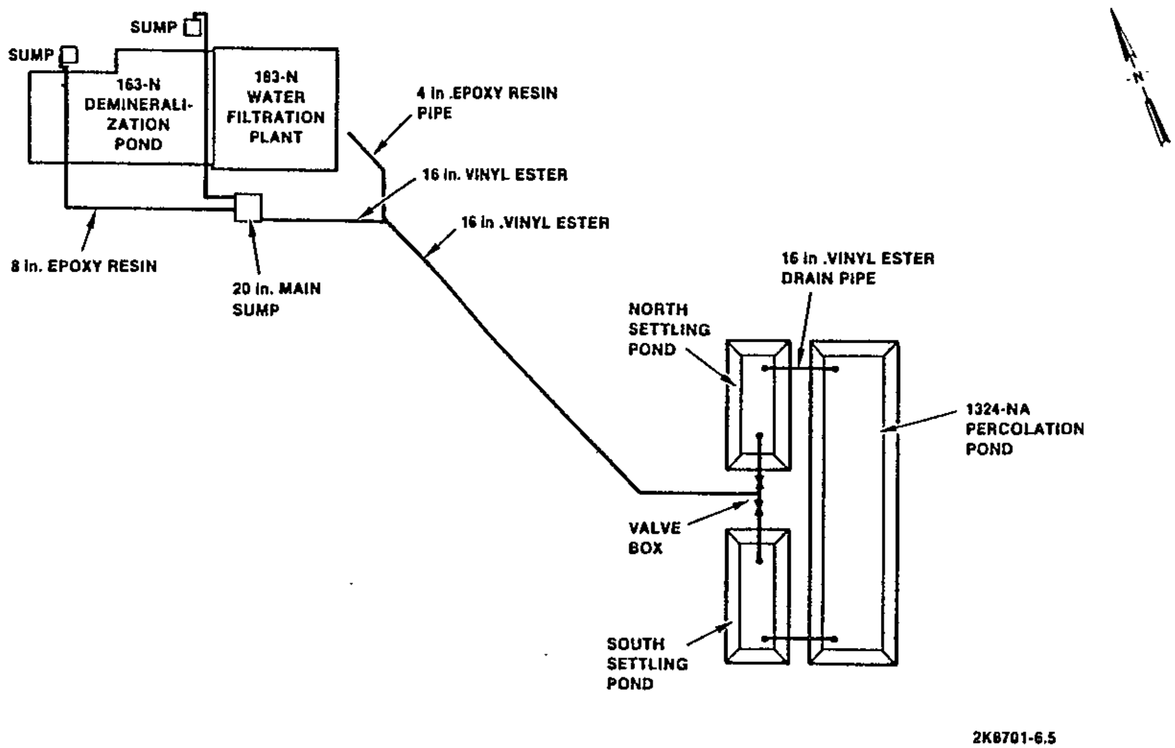


FIGURE 4-1
DESIGN OF 1324-NA PERCOLATION POND, 1977-1983

The percolation pond and the settling ponds received an average flow of 160,000 gallons per day of corrosive regeneration wastes. This flow ranged from a minimum of 80,000 gallons per day to a maximum of 250,000 gallons per day.

The filter backwash wastes from the 183-N Filtered Water Plant contributed an additional flow of approximately 300,000 gallons of non-regulated water to the percolation pond per day on the average. The maximum flow of filter backwash wastes was approximately 470,000 gallons per day. Thus, the total flow to the 1324-NA Percolation Pond ranged from 230,000 gallons per day to 720,000 gallons per day, with an average influent flow of 450,000 gallons per day.

Operational problems were experienced at the settling ponds shortly after they were first put into use. The filter backwash water contained separan and alum, both chemicals used in the 183-N Filtered Water Plant. These chemicals formed an impervious layer on the bottom of the settling ponds which prevented percolation of the liquid wastes. In order to prevent flooding of the settling ponds, the settling ponds were dredged annually beginning in 1978.

By late 1981 it was apparent that annual dredging of the settling ponds was not sufficient to prevent flooding. The schedule for dredging of the ponds was accelerated at this time. In 1983, the volume of the 1324-NA Percolation Pond was enlarged by approximately 60%. The enlarged percolation pond had a bottom area of approximately 29,000 square feet, was approximately 12-feet deep and had an available volume of 3,000,000 gallons. The hazardous regeneration wastes were then transferred directly from the 163-N Demineralization Plant to the 1324-NA Percolation Pond. The two settling ponds were removed from service at this time, and the south settling pond was backfilled to grade.

At the time of the enlargement of the percolation pond, a new disposal basin was built to receive the filter backwash water from the 183-N Filtered Water Plant. A new 16-inch line was installed to transfer these wastes.

From early 1983 to May 13, 1986, the 1324-NA Percolation Pond received only the hazardous regeneration wastes and nonhazardous cooling water from the 163-N Demineralization Plant. These wastes were transferred to the pond via an 8-inch underground transfer line. The design of the 1324-NA Percolation Pond from 1983-1986 is shown on Figure 4-2.

On May 13, 1986, the new 1324-N Surface Impoundment was placed into service. The 1324-N Surface Impoundment is a double-lined pond with a leachate collection system with an available volume of 424,000 gallons. The surface impoundment is used to neutralize the 163-N demineralization plant regeneration wastes. The 1324-N Surface Impoundment is described in a Part B Permit Application which was submitted to the Washington Department of Ecology (WDOE) and the U.S. Environmental Protection Agency (U.S. EPA) in December, 1986.

The 1324-NA Percolation Pond now receives only the neutralized, non-regulated wastes from the 1324-N Surface Impoundment and the nonhazardous cooling water from the 163-N Demineralization Plant. The current design of the 1324-NA Percolation Pond and the 1324-N Surface Impoundment is shown in Figure 4-3.

Closure of the 1324-NA Percolation Pond

Administrative and physical controls were instituted when the 1324-N Surface Impoundment was installed to ensure that the 1324-NA Percolation Pond would not receive hazardous wastes at any time in the future.

The administrative controls for operation of the 1324-NA Percolation Pond consist of the process standard and the operating procedure. The process standard and the operating procedure for the 1324-NA Percolation Pond are included as Appendix B-2 of this closure plan. The physical controls consist of a series of valves designed to prevent the discharge of hazardous wastes to the 1324-NA Percolation Pond.

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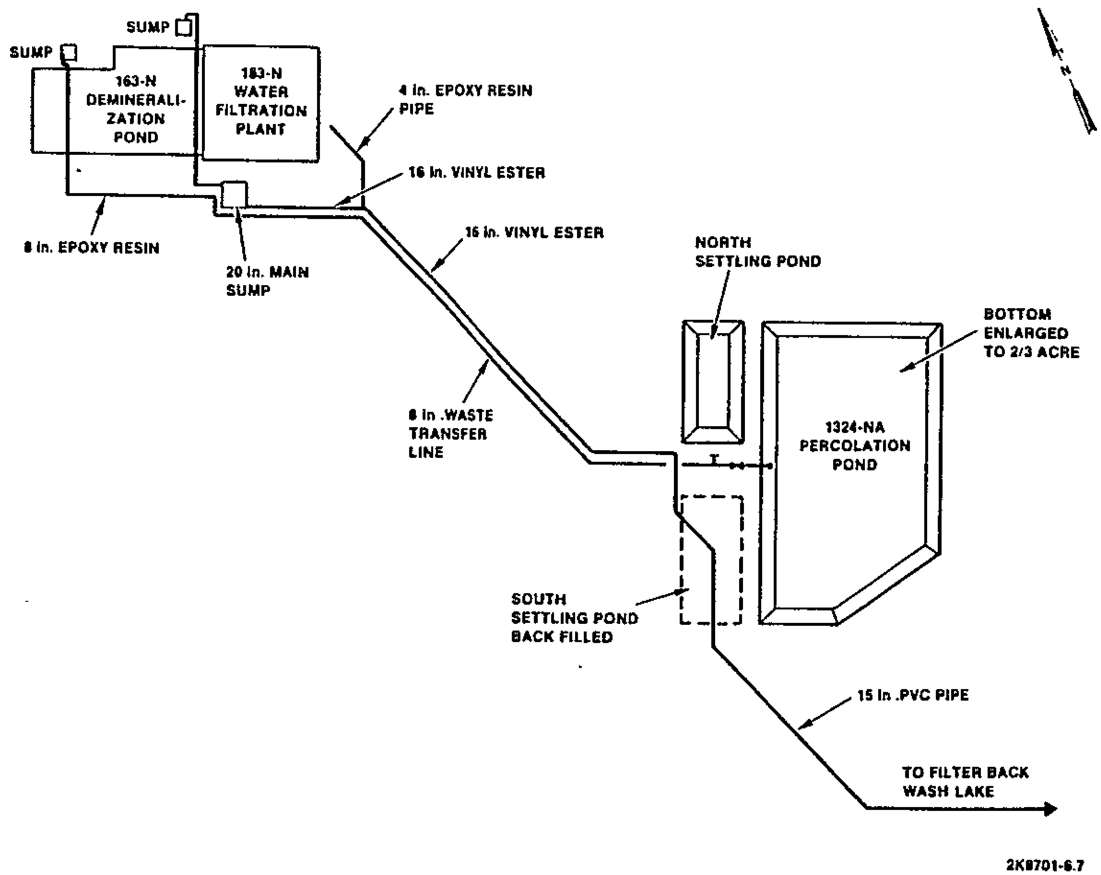


FIGURE 4-2
DESIGN OF 1324-NA PERCOLATION POND, 1983-1986

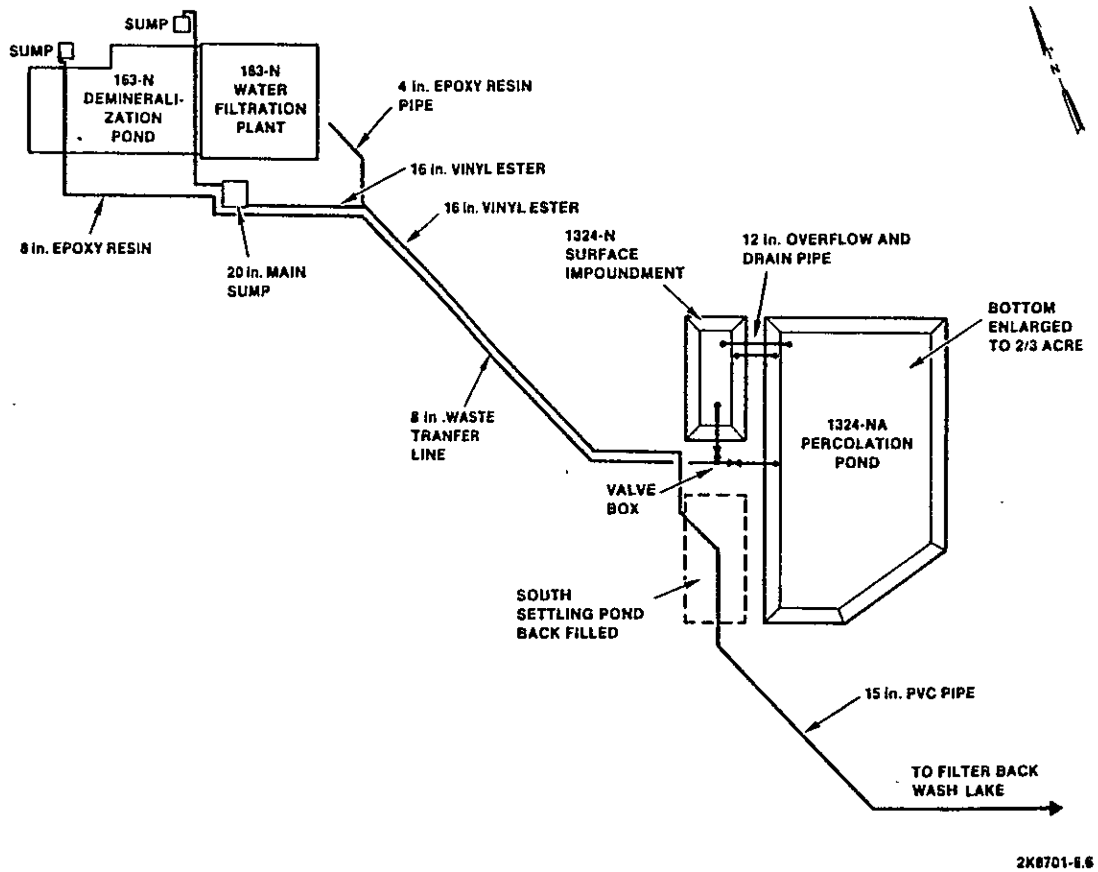


FIGURE 4-3
DESIGN OF 1324-NA PERCOLATION POND, 1986-PRESENT

Until March 20, 1987 the process standard required that the pH of the wastes in the 1324-N Surface Impoundment be between 3.0 and 11.0 standard units before the wastes were discharged to the 1324-NA Percolation Pond. The process standard has been amended with a Process Change Authorization (PCA) to reflect the results of the NACE test. The new discharge limits for the 1324-N Surface Impoundment contents are wastes with a pH of between 4.0 and 11.0 standard units. This PCA is included in Appendix B-1.

The 1324-NA Percolation Pond will continue to receive non-regulated wastes from two sources. The process and cooling waters from the 163-N Demineralization Plant will continue to be discharged directly to the percolation pond when the ion exchange columns in the plant are not being regenerated. When the non-regulated process and cooling waters are being discharged directly to the percolation pond, valve DCWV-800 will be completely open, and the interlocked valve DCWV-801 will be completely closed. This will ensure that these wastes all be directed to the percolation pond. The location of these valves is shown on Figure 4-4.

When the ion exchange columns in the 163-N Plant are being regenerated, the operating procedures for regeneration of the columns require that valve DCWV-800 be completely closed, and that valve DCWV-801 be completely open (see steps F-4a and 4b of the operating procedures for regenerating the primary anion and cation resins). This valving will route the hazardous corrosive regeneration wastes to the 1324-N Surface Impoundment, and will prevent the discharge of hazardous wastes to the percolation pond. The operating procedures for regeneration of the ion exchange columns are included as Appendix B-3 of this closure plan.

Following impoundment of the regeneration wastes to the surface impoundment, the 163-N operating procedures require (in steps G-12a, 12b, and 12c) that valve DCWV-800 to the percolation pond be opened, and valve DCWV-801 to the surface impoundment be closed when the pH of the wastes being discharged from the 163-N Demineralization Plant is within the process standard limits.

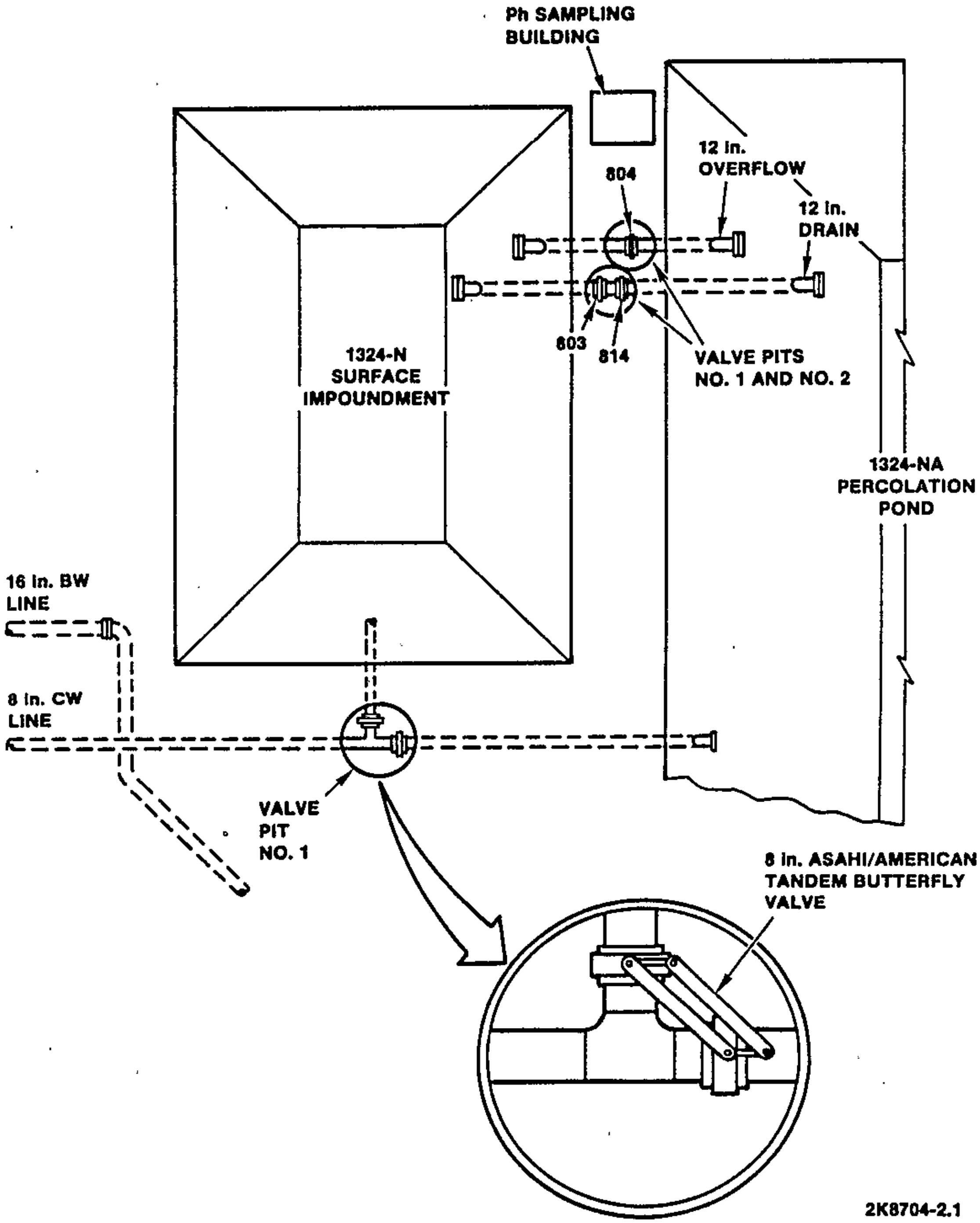


FIGURE 4-4
1324-N FACILITY, PIPING AND VALVES

The operating procedure for the surface impoundment requires the operators to check the pH of the impoundment contents prior to discharging the wastes (steps 11-22 and 111-22). If the pH of the wastes is within the process standard discharge limits, the impoundment contents can be discharged to the percolation pond as a non-regulated waste. If the pH is not within process standard limits, the wastes in the pond will be neutralized by the addition of either acid or caustic.

The operating procedure for the 1324-N Surface Impoundment (Appendix B-2) then requires (in steps 11-31, 11-31A, 111-31 and 111-31A) that valves DCWV-803 and DCWV-814 in the drain line from the surface impoundment be opened to drain the surface impoundment contents to the percolation pond.

Steps 11-32, 11-32A, 111-32, and 111-32A of the surface impoundment operating procedure require that when draining of the 1324-N Surface Impoundment has been completed, drain valves DCWV-803 and DCWV-814 be closed. This will prevent further discharges from the surface impoundment to the percolation pond until the next discharges to the surface impoundment have been neutralized.

The process standard, operating procedures, and physical controls ensure that the only wastes to be discharged to the 1324-NA Percolation Pond are the process and cooling waters from the 163-N Demineralization Plant and the neutralized wastes from the 1324-N Surface Impoundment. The operating procedures are periodically audited to ensure operator compliance.

WP #9126A

5.0 GROUND WATER MONITORING

5.1 EXEMPTION FROM GROUND WATER PROTECTION REQUIREMENTS

This section is not applicable as DOE-RL is not proposing to apply for an exemption from ground water protection requirements at the 1324-NA Percolation Pond.

5.2 INTERIM STATUS PERIOD GROUND WATER MONITORING DATA

No ground water monitoring program is currently in place at the 13240NA Percolation Pond, therefore no interim status ground water monitoring data exists. Section 5.5 describes the proposed ground water monitoring program for the 1324-NA Percolation Pond. Data obtained from this ground water monitoring will be submitted to the Washington State Department of Ecology and the EPA to satisfy the requirements for interim status ground water monitoring as soon as such data are available.

5.3 REGIONAL HYDROGEOLOGY AND AQUIFER IDENTIFICATION

5.3a Hydrogeologic Setting

Ground water has been monitored on the Hanford Site since the 1940's. While the main purpose of this monitoring was to track the movement of radionuclides in the ground water, analysis of these ground water monitoring data provides a sound overall view of the hydrogeology of the Hanford site.

This hydrogeologic information gathered from years of ground water monitoring was used to identify the uppermost aquifer and underlying hydraulically connected aquifers, and to establish ground water flow direction and rate under the site of the 1324-NA Percolation Pond.

As a preface to the required discussion of the hydrogeologic properties underlying the 1324-NA Percolation Pond, the total regional and local meteorologic, geologic, and hydrogic properties of the Hanford Site are presented. The following is a summary of this information. This information was gathered from the the documents listed in Appendix D. If more information is desired, these reports are available upon request.

Meteorological data are collected at a number of locations at the Hanford Site. Complete climatological data are available since 1945 for the Hanford Meteorological Station (HMS), located approximately five miles (eight kilometers) south of the 100-N Area. Temperature and precipitation data from the old Hanford Townsite are available for the period 1912 through 1943, which is located approximately 3 miles downriver from N Reactor (Stone, et. al., 1983).

Average monthly temperatures at HMS range from a low of 29.3 degrees Fahrenheit (-1.5 degrees Centigrade) in January to a high of 76.4 degrees Fahrenheit (24.7 degrees Centigrade) in July. The maximum monthly average temperature at the HMS during the winter is 44.5 degrees Fahrenheit (6.9 degrees Centigrade), and the minimum is 21.4 degrees Fahrenheit (-5.9 degrees Centigrade), both occurring during February. The maximum monthly average temperature at HMS during the summer is 81.8 degrees Fahrenheit (27.7 degrees Centigrade) in July, and the minimum is 63.0 degrees Fahrenheit (17.2 degrees Centigrade) in June. The annual average relative humidity at the HMS is 54 percent, with a maximum of about 75 percent during the winter months and a minimum of about 35 percent during the summer months.

Average annual precipitation at the Hanford Meteorological Station is 6.3 inches (16 centimeters). The months of November through February account for nearly one-half of the annual precipitation. Fewer than one percent of the days have rainfall greater than 0.5 inches (1.3 centimeters). The maximum 24-hour rainfall event in a 100-year period was predicted to be 2.0 inches (5 centimeters) (Stone, et. al., 1983). Total precipitation over the entire Pasco Basin is estimated at less than 8 inches (20 centimeters) annually. Mean annual run-off is generally less than 0.5 inches (1.3 centimeters) for most of the basin and the basin-wide run-off coefficient, for all practical purposes, is zero (Leonhart, 1979).

Average annual evaporation on the Hanford Site can exceed 60 inches (152 centimeters). Average annual lake evaporation ranges from approximately 39 to over 42 inches (99 to over 107 centimeters). Actual evapotranspiration for a 6-inch (15-centimeter) water-holding-capacity soil (uncultivated) is approximately 7.5 to 8.5 inches (19 to 22 centimeters) (Leonhart, 1979; Wallace, 1978). Studies by Last et. al. (1976), Brown and Isarcson (1977), and Jones (1978) suggest that much of the percolated water is subsequently dispersed by evapotranspiration.

In summary, the Hanford Site climate is mild and dry with occasional periods of high winds. Summers are hot and dry; winters are less dry, but are relatively mild for this latitude. Average maximum temperatures occur in July, and average minimum temperatures occur in February. Average relative humidity is lowest in the summer and highest in the winter. Average annual precipitation is about 6.3 inches (16 centimeters). The 100-year maximum predicted rainfall event in a 24-hour period is 2.0 inches (5 centimeters). Potential evapotranspiration rates greatly exceed annual precipitation rates, but much of this precipitation is received between November and February when evapotranspiration rates are low. The highest monthly average winds occur during the hot summer, creating higher evaporative potentials.

5.3b Regional Geologic Setting

5.3b(1) Introduction

The Hanford Site in south-central Washington State is located in the Columbia Plateau Physiographic Province, which is generally defined by a thick accumulation of a basaltic lava flows. These flows extend laterally from central Washington eastward into Idaho and southward into Oregon (Figure 5-1). Deformation of these lava flows has formed a series of broad structural and topographic basins. The Hanford Site is located in one of these basins, the Pasco Basin, at the confluence of the Yakima and Columbia Rivers.

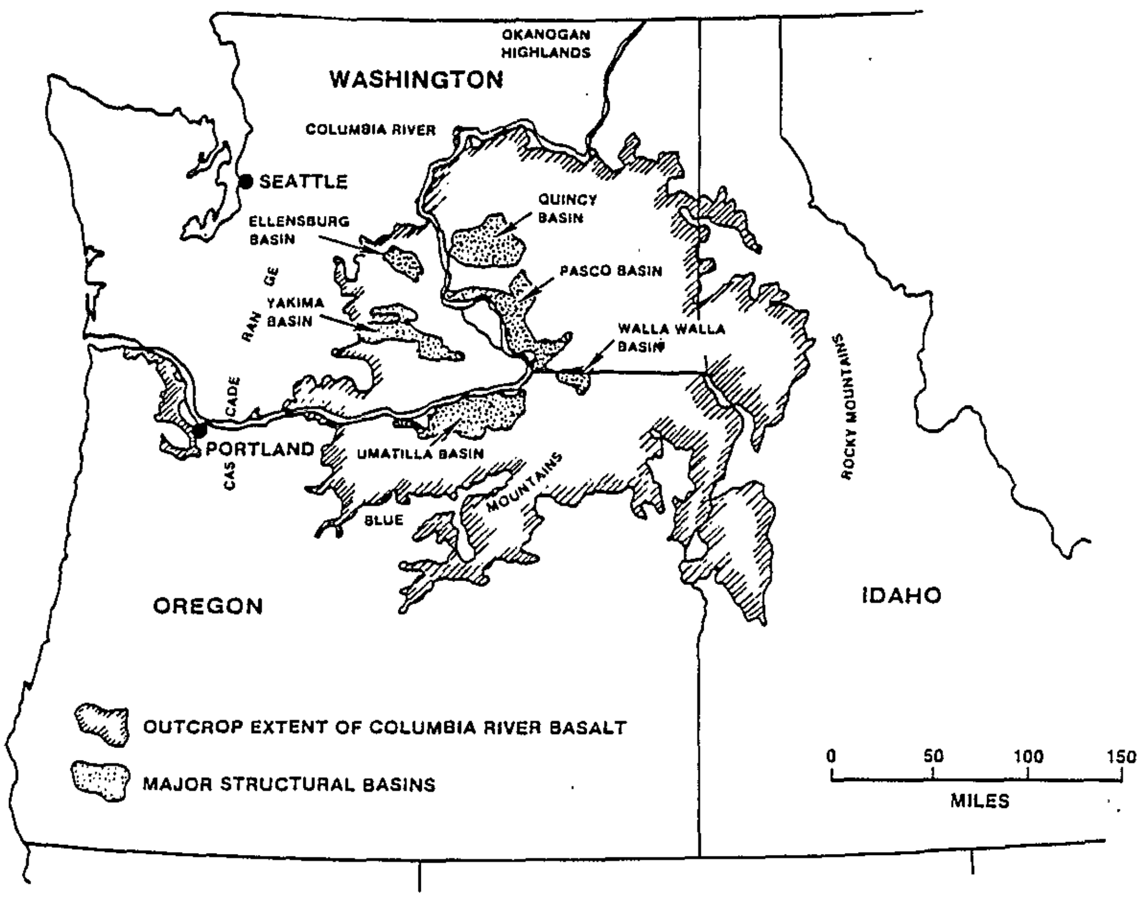


FIGURE 5-1
GEOGRAPHIC EXTENT OF THE COLUMBIA RIVER BASALT GROUP

The Pasco Basin is bounded on the north by the Saddle Mountains; on the west by Umtanum Ridge, Yakima Ridge, and the Rattlesnake Hills; on the south by a series of doubly plunging anticlines which merge with the Horse Heaven Hills; and on the east by a broad monocline, locally known as the Jackass Mountain Monocline (Figure 5-2). Very little topographic relief exists within the Pasco Basin.

The stratigraphy underlying the Pasco Basin is divided into six major units. They are, in general ascending order: (1) the basement rocks, (2) the Columbia River Basalt Group, (3) the Ellensburg Formation, (4) the Ringold Formation, (5) the early "Palouse" soil, and (6) the Hanford Formation. Alluvium, colluvium and eolian sediments locally veneer the surface of the Pasco Basin. These six units are described below.

5.3b(2) Basement Rocks

The basement rocks underlying the basaltic lava flow in the Pasco Basin are of uncertain composition. Pre-basalt rock types can be projected from the margins of the Columbia Plateau, 100 to 150 miles (160 to 240 kilometers) away, and are inferred to exist locally in the central plateau area, perhaps beneath the Pasco Basin. For example, data from the Basalt Explorer Well northeast of the Pasco Basin indicate that sandstones and shales comparable to the sedimentary rocks of the Cascade Range may lie beneath the Pasco Basin. Recent magnetotelluric surveys indicate a very deep conductive section, possibly representing these sediments (BWIP, 1978). Beneath these sediments are probably granitic rocks comparable to those in the Okanogan Highlands; the Snoqualmie Pass area of the Cascade Range; the Moscow Basin, Idaho; the base of the Basalt Explorer Well; and parts of the core of the Blue Mountains, Oregon. There, granitic rocks were intruded into largely Paleozoic and early Mesozoic metavolcanic and metasedimentary rocks whose equivalents might also occur beneath the Pasco Basin.

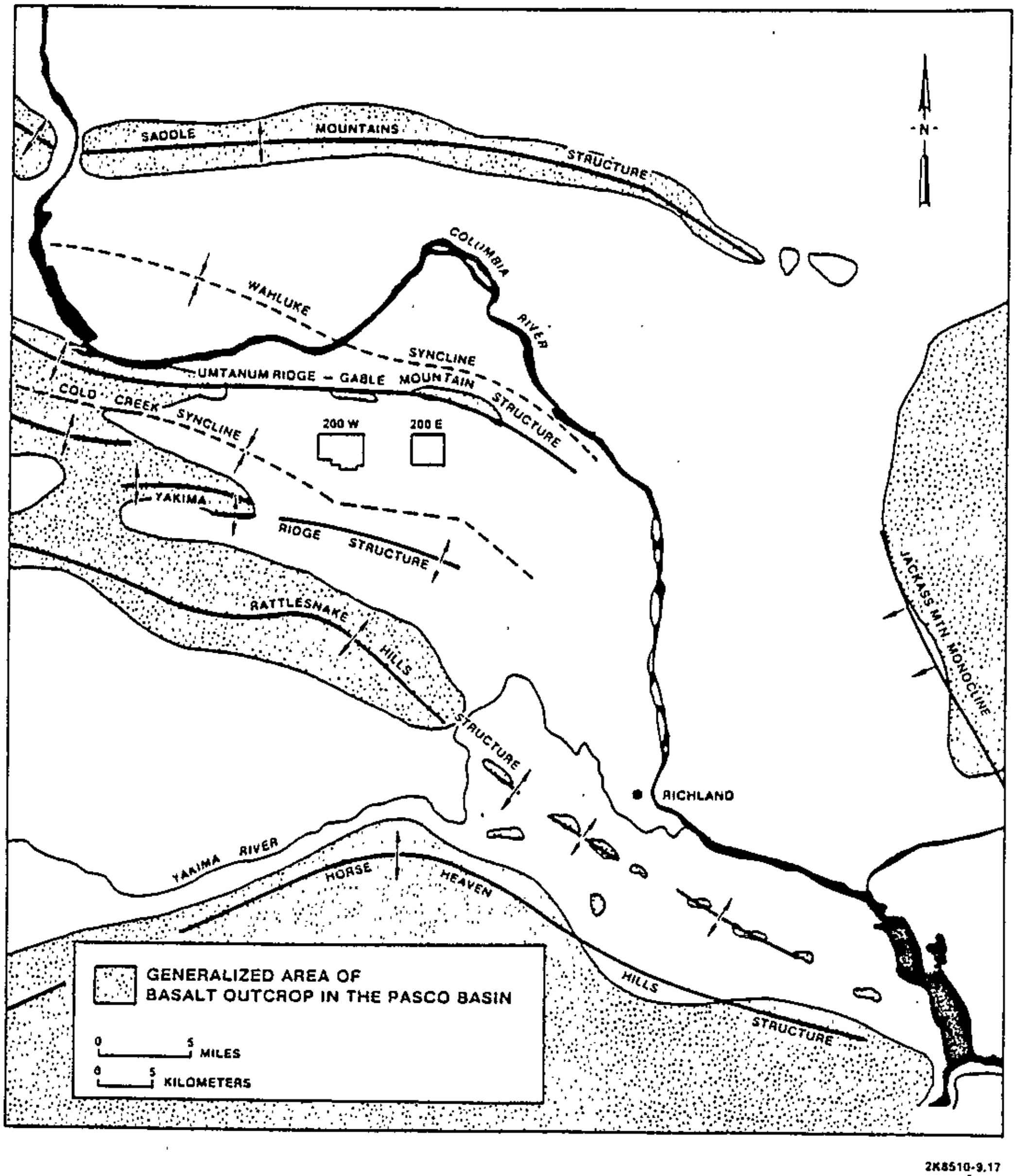


FIGURE 5-2
STRUCTURAL GEOLOGY OF THE PASCO BASIN

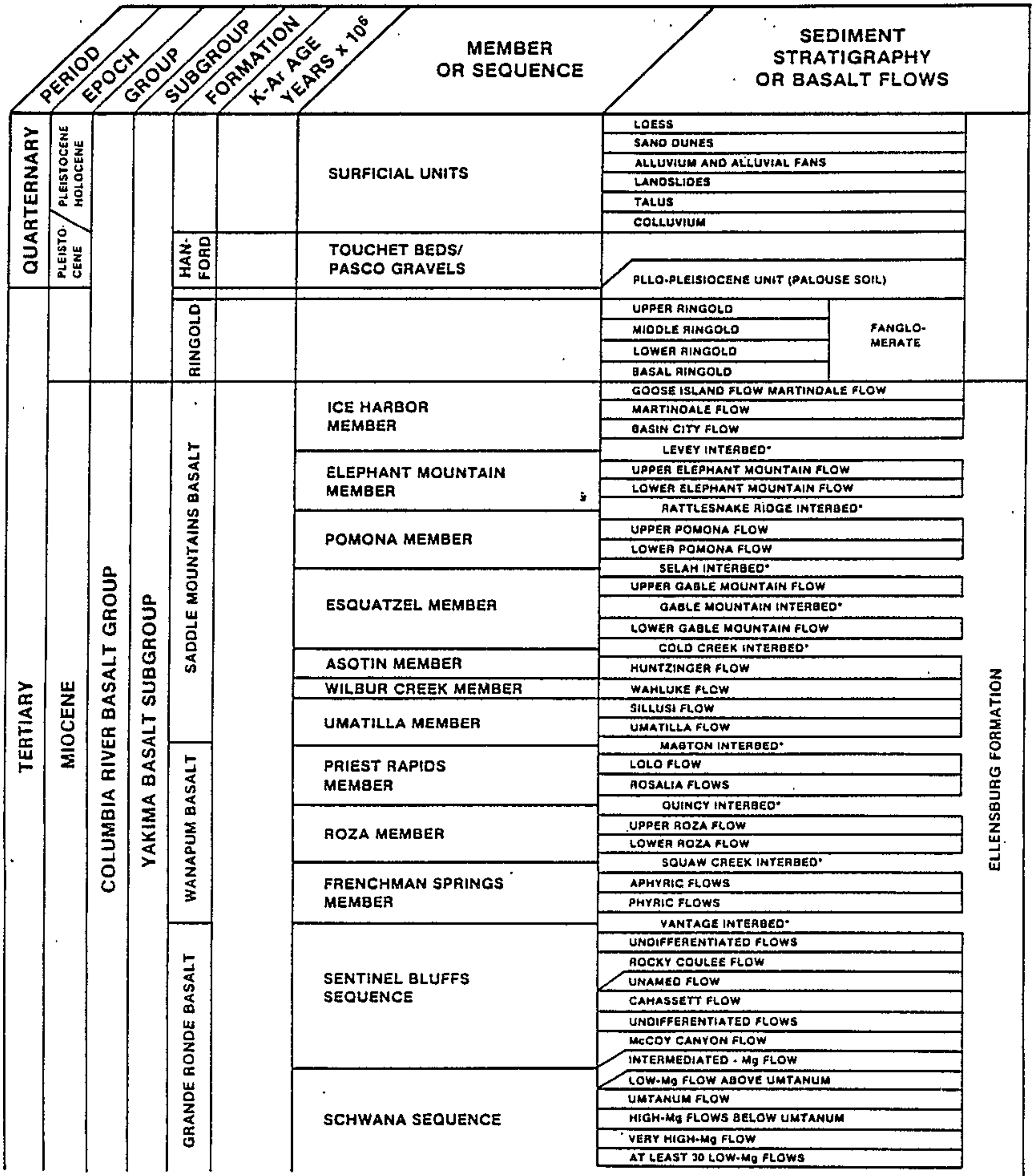
5.3b(3) Columbia River Basalt Group

The regional geology surrounding the Pasco Basin is dominated by a tholeitic flood basalt province in the Columbia Plateau and adjacent Blue Mountains of Washington, northern Oregon, and adjacent Idaho (Figure 5-1). The flood basalt province is a layered mass of more than 50,000 cubic miles (208,420 cubic kilometers) of basalt covering an area of more than 60,000 square miles (155,400 square kilometers). The flood basalts and associated rocks form a plano-convex lens. The upper surface of the lens slopes gently inward except where locally modified by fold systems (Figure 5-1). Basin deformation and the development of fold systems in the Columbia Plateau started between 16 and 13 million years before present and continued through Columbia River Basalt time (Bentley, 1977).

The basalts emanated from linear fissure systems in the eastern and southern portions of the Plateau (Swanson et. al., 1975; Walters, 1961). Most of the basalt was emplaced during a three-million-year volcanic pulse between 16 and 13 million years before present during the Miocene Epoch (Baski and Watkins, 1973). However, sporadic fissure eruptions continued until about six million years before present (McKee, et. al., 1977).

The flood basalts are collectively designated the Columbia River Basalt Group, which has been subdivided into five formations (Figure 5-3) (Ledgerwood, et. al., 1978; Swanson et. al., 1978). The lower two formations are the Imnaha Basalt (Hooper, 1974) and the Picture Gorge Basalt (Swanson et. al., 1975). The upper three formations, the Grande Ronde Basalt, the Wanapum Basalt, and the Saddle Mountains Basalt collectively constitute the Yakima Basalt Subgroup (Swanson et. al., 1978).

In the Pasco Basin near the center of the area covered by the Columbia Plateau, the basalt sequence is more than 10,000 feet (3,048 meters) thick (Raymond and Tillson, 1968) and perhaps as much as 19,000 feet (5,791 meters) thick (BWIP, 1978). In the Basin, a 5,000-foot (1,524-meter) thick sequence of Columbia River Basalt apparently overlies a series of older basalt of Oligocene to Eocene age (Swanson et. al., 1978). Approximately 100 basalt



* THE INTERBEDS ARE STRATIGRAPHICALLY CONTAINED IN THE ELLENSBURG FORMATION

2K8701-6.16

FIGURE 5-3
STRATIGRAPHIC NOMENCLATURE OF THE PASCO BASIN

flows, including both the Columbia River Basalt Group and older lavas, have been identified from geophysical logs obtained from a 10,655-foot (3,248-meter) deep borehole located along the western margin of the Pasco Basin (Swanson et. al., 1978).

5.3b(4) Ellensburg Formation

Within the upper part of the Columbia River Basalt sequence, sediments were transported into the central portion of the Columbia Plateau between basalt eruptions. These sediments, which include tuffs and tuffaceous sediments of many kinds in part now altered to clay, form the Ellensburg Formation (Swanson et. al., 1978). Many basalt flows above the Vantage sandstone interbed are capped locally by stream-deposited sediments. The extent and thickness of the sediments generally increase upward in the section.

About 1.5 million years ago, ancestral river systems were crossing central Washington, laying down trains of gravel, sand, silt, and clay comparable to today's Columbia River and Snake River sediments. As the plateau subsided, the ancestral Columbia River returned by gravity to the center of the Columbia Plateau, leaving sediment trains as a mark of its earlier courses. East of the present course of the Columbia River, sediments are virtually nonexistent between basalt flows. This attests to the fact that the ancestral Columbia River source being limited to the western half of the Columbia Plateau.

5.3b(5) Ringold Formation

Deformation during the later stages of Columbia River Basalt volcanism resulted in the emergence of the Yakima fold system in the western Plateau. Growth of these folds created a system of structural ridges and basins, which include: the Ellensburg Basin, Quincy Basin, Yakima Basin, Pasco Basin and Umatilla Basin (Figure 5-1). Thick sequences of sediments transported from the surrounding highlands accumulated in these basins.

In the Pasco Basin, the Pliocene Ringold Formation (Gustafson, 1978) was deposited in response to a flattening of the gradient of the Columbia and Snake River systems, perhaps related to the uplift of the Horse Heaven Hills (Newcomb, 1958; Newcomb et. al., 1972). The Ringold Formation in the Pasco Basin accumulated to a thickness of up to 1,200 feet (365 meters).

The Ringold Formation can generally be divided into four units on the basis of texture: sand and gravel of the basal Ringold unit; clay, silt and fine sand with lenses of gravel of the lower Ringold unit; occasionally cemented sand and gravel of the middle Ringold unit; and silt and fine sand of the upper Ringold unit (Brown, 1959) (Figures 5-3 and 5-4).

The basal portion of the Ringold Formation is, in general, conformable with the surface of the underlying basalt bedrock. The lower Ringold unit is thickest in the central portion of the Pasco Basin and thins to the basin's margins. The matrix supported conglomerate of the middle Ringold unit overlies the lower unit. The upper Ringold unit is generally confined to the margins of the basin; elsewhere, it either was not deposited, or has been eroded by ancestral river systems and by Pliestocene catastrophic flooding of the basin.

5.3b(6) Early "Palouse" Soil

An eolian silt and fine sand (loess) overlie part of the eroded surface of the Ringold Formation in the western part of the Hanford Site (Brown, 1970) (Figures 5-3 and 5-4). Elsewhere, the silt was not deposited or was eroded during Pliestocene catastrophic flooding. The silt is considered to be the equivalent of early loess deposits of the Palouse Hills in eastern Washington and western Idaho. It indicates a climate comparable to that of today, with effective wind transport and deposition of sediment.

5.3b(7) Hanford Formation

The Ringold Formation and the basalts and sedimentary interbeds were locally eroded and truncated by multiple floods that occurred as ice-dammed lakes released catastrophic torrents of water and ice when the ice dams were

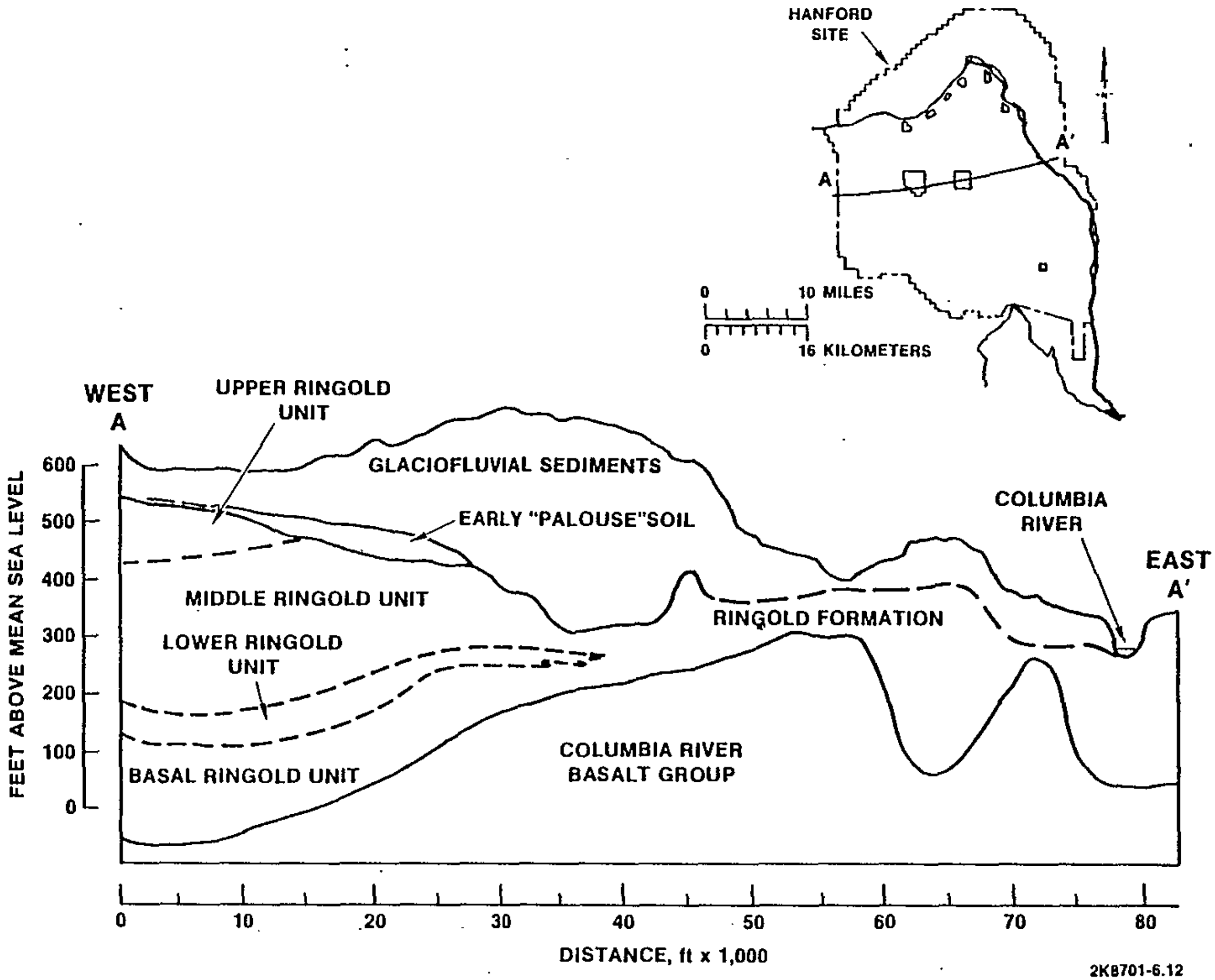


FIGURE 5-4
GENERALIZED GEOLOGIC CROSS SECTION THROUGH THE HANFORD SITE

breached during Pliestocene glaciation (Bretz, 1959; Baker, 1973; Fecht and Tallman, 1978). The floods scoured the land surface, leaving a network of buried channels crossing the Pasco Basin.

The glaciofluvial sediments in the Pasco Basin, informally named the Hanford Formation, were deposited on the Columbia River Basalt Group and Ringold Formation (Figures 5-3 and 5-4). These sediments can be divided into the coarser sand and gravel which are referred to as the Pasco Gravels (Brown, 1975), and the finer sand and silt units called the Touchet Beds (Flint, 1938).

The Touchet Beds represent low-energy (slackwater) sediments deposited in Glacial Lake Lewis, which formed when flood waters were backed up behind the Wallula Gap constriction (Flint, 1938). The Pasco Gravels represent high energy deposition in areas of more rapid water flow. In general, the Touchet Beds are found on the margins of the basin and the Pasco Gravels in and near the center of the basin. The characteristic variability of sediment size and degree of sorting within the "gravel" unit can be attributed to changes in water velocity and water level which occurred during the flooding process. The thickness of the Hanford Formation varies significantly within the basin, with the thickest occurrence in the region of buried channels.

5.3b(8) Eolian Deposits

Loess and sand dunes mantle the surface of the Pasco Basin (Lillie, et. al., 1978). These deposits are primarily reworked sediments of the Hanford Formation from surrounding areas. The thickness of the wind-blown sediments varies considerably, ranging from zero to more than 30 feet (9 meters) in some dunes.

The land surface has been only slightly modified since the deposition of the Hanford Formation. Eolian erosion and deposition have resulted in minor deflation and deposition of sand and silt veneers up to 25 feet (8 meters) thick.

5.3c Geology of the 100-N Area

In 1984, fourteen new wells were drilled in an area northwest of the 1324-NA Percolation Pond. Study of these wells provides general geologic information on the 100-N Area. Figure 5-5 shows the location of the 100-N Area wells.

Two geologic formations were encountered: The Hanford Formation and the underlying Ringold Formation. Both of the formations were found to contain sand, silt and gravel (up to boulder size). The Hanford Formation consisted of thinly interbedded sediments (i.e., a series of thin layers of different materials). The Ringold Formation had thicker, better defined layers, which were either primarily gravel or sand and silt. The contact between the two formations was found at an elevation of about 405 feet above mean sea level, and the average elevation of the water table in the ten wells was about ten feet lower (about 395 feet above mean seal level). Figure 5-6 shows the location of the water table through the ten new wells.

Examination of the geophysical logs provided additional information on the sediments penetrated by the new wells. In particular, the natural gamma logs for all ten wells indicated (by a marked deflection to the right) the presence of a relatively thick layer with a high silt content. Although present in all of the wells, the character of the silty deposit varies slightly from well to well. For example, in well 199-N-42, the natural gamma log indicates the presence of a series of thin, silty layers interbedded with more sandy/gravelly layers, while the log of well 199-N-38 indicates the presence of one thick silty layer.

After this silty deposit was identified in the geophysical logs, the drilling samples were re-examined. In general there was a higher percentage of silt in the samples from the interval in which the deflection occurred on the logs. Thus, the interpretation of the geophysical logs was verified by the composition of the drilling samples. Although its character changes somewhat in the lateral direction, this silty deposit is continuous in the study area covered by the new wells.

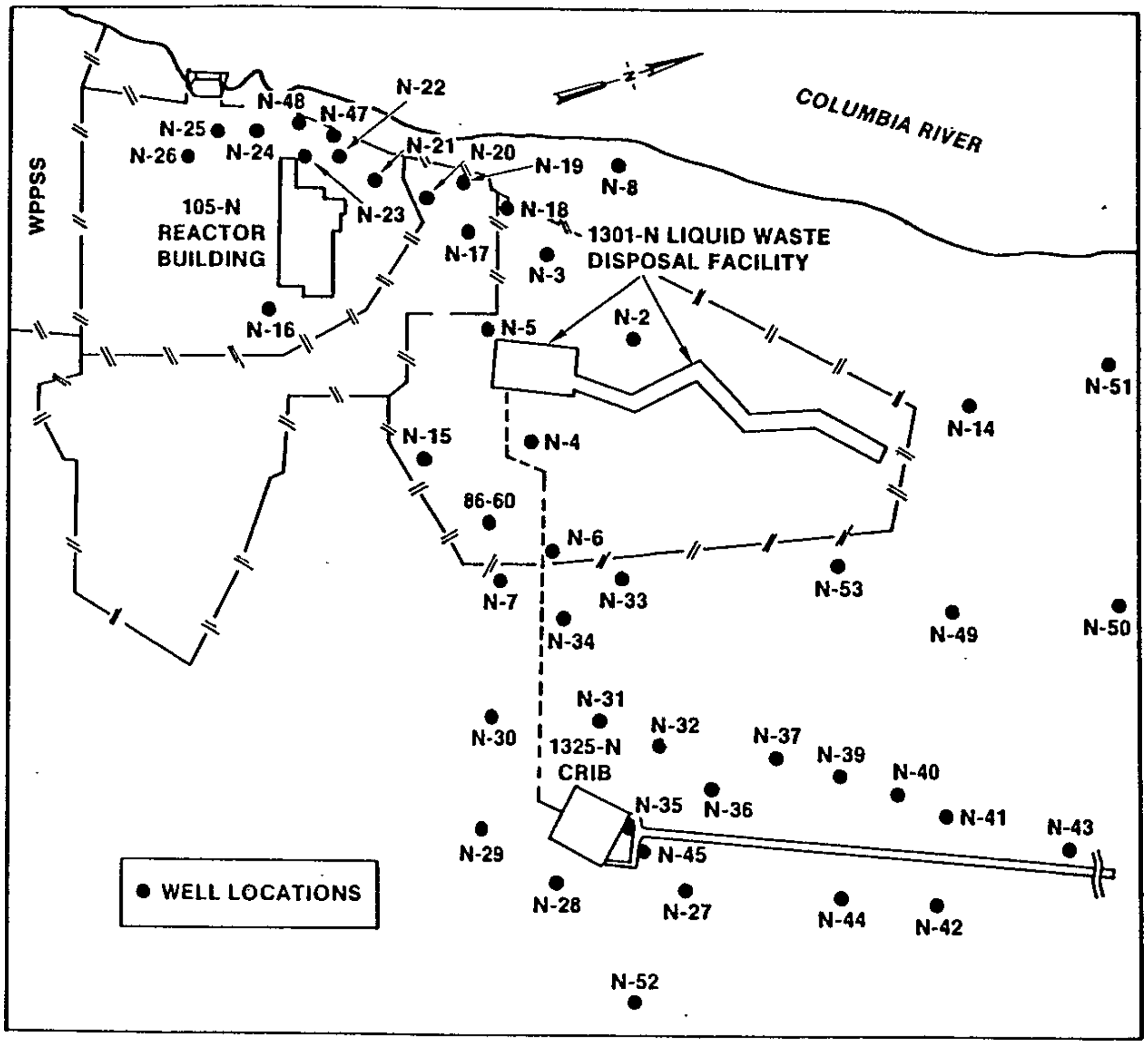


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FIGURE 5-5
LOCATION OF GROUND-WATER WELLS AT 100-N AREA

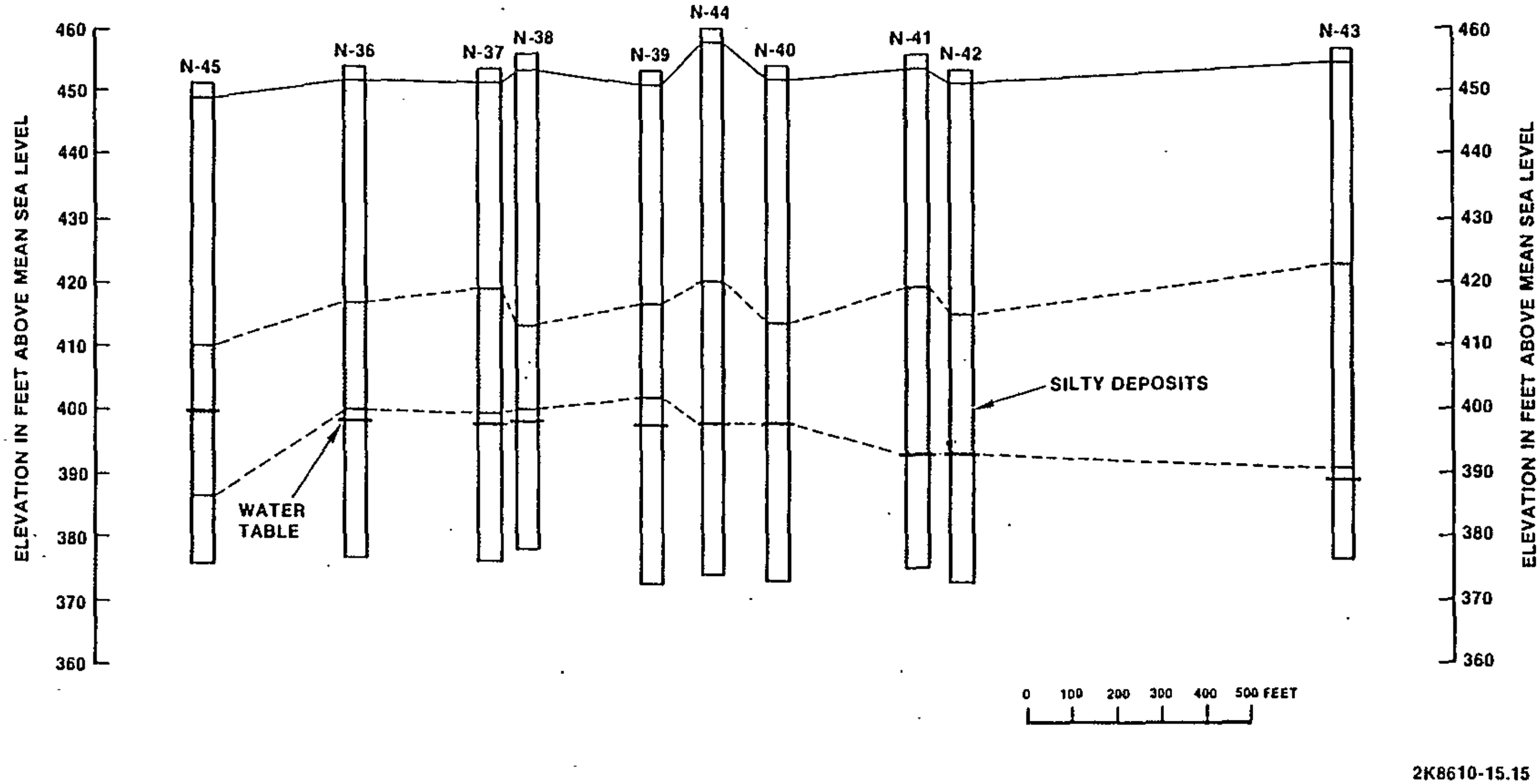

FIGURE 5-6
SILTY DEPOSITS IN 100-N AREA WELLS

This silty deposit is located between the land surface and the present water table. The top of the deposit is about 36 to 44 feet below the land surface; corrected to mean sea level, the elevation of the deposit's top is about 414 to 420 feet. This deposit extends down to the present water table in most of the wells, and its thickness ranges from about 15 feet to over 30 feet.

Figure 5-7 is a generalized geologic column for the 100-N Area.

5.3d <u>Regional Hydrologic Setting</u>

5.3d(1) <u>Surface Hydrology of the Hanford Site and Surrounding Pasco Basin</u>
In the Pasco Basin, the Columbia River receives surface drainage from several adjacent basins. These major tributaries include the Yakima, Snake, and Walla Walla Rivers. No perennial streams are supported by hydrologic systems operating solely within the Pasco Basin. Streamflow within the Pasco Basin is recorded as inflow at the U.S. Geological Survey gauge below Priest Rapids Dam and outflow at the gauge below McNary Dam. Average annual flow at these stations is 87 X 10^6 and 140 X 10^6 acre-feet per year, (10 X 10^{12} and 17 X 10^{12} cubic meters per year) respectively. A total gauged flow of approximately 45 X 10^6 acre-feet per year (5.5 X 10^{10} cubic meters per year) enters from tributaries, and an additional 2.3 X 10^5 acre-feet per year (2.8 X 10^8 cubic meters per year) enter as irrigation returns.

The Hanford Site occupies approximately one-third of the land area within the Pasco Basin. Primary surface-water features associated with the Hanford Site include the Columbia and Yakima Rivers. Several artificial surface ponds and ditches are present, and are generally associated with fuel and waste processing activities (Figure 5-8).

The section of the Columbia River along the Hanford Site reach has been inventoried and was described in detail by the U.S. Army Corps of Engineers (COE, 1977). Flow along this reach is controlled by the Priest Rapids Dam. Several drains and intakes are also present along this reach. Most notably,

GENERALIZED GEOLOGIC COLUMN
FOR WELLS N-35 THROUGH N-45

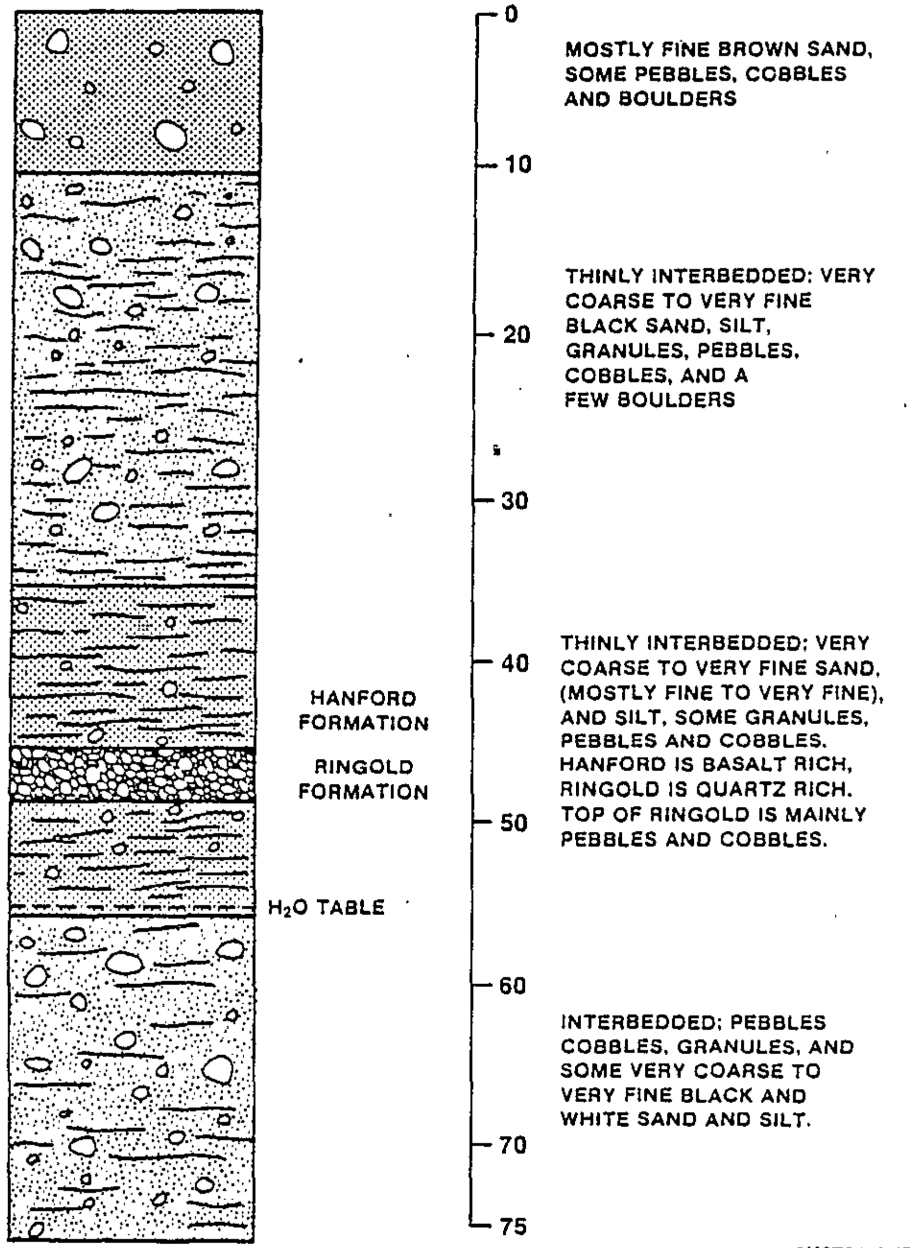

FIGURE 5-7
GENERALIZED GEOLOGIC COLUMN OF THE 100-N AREA

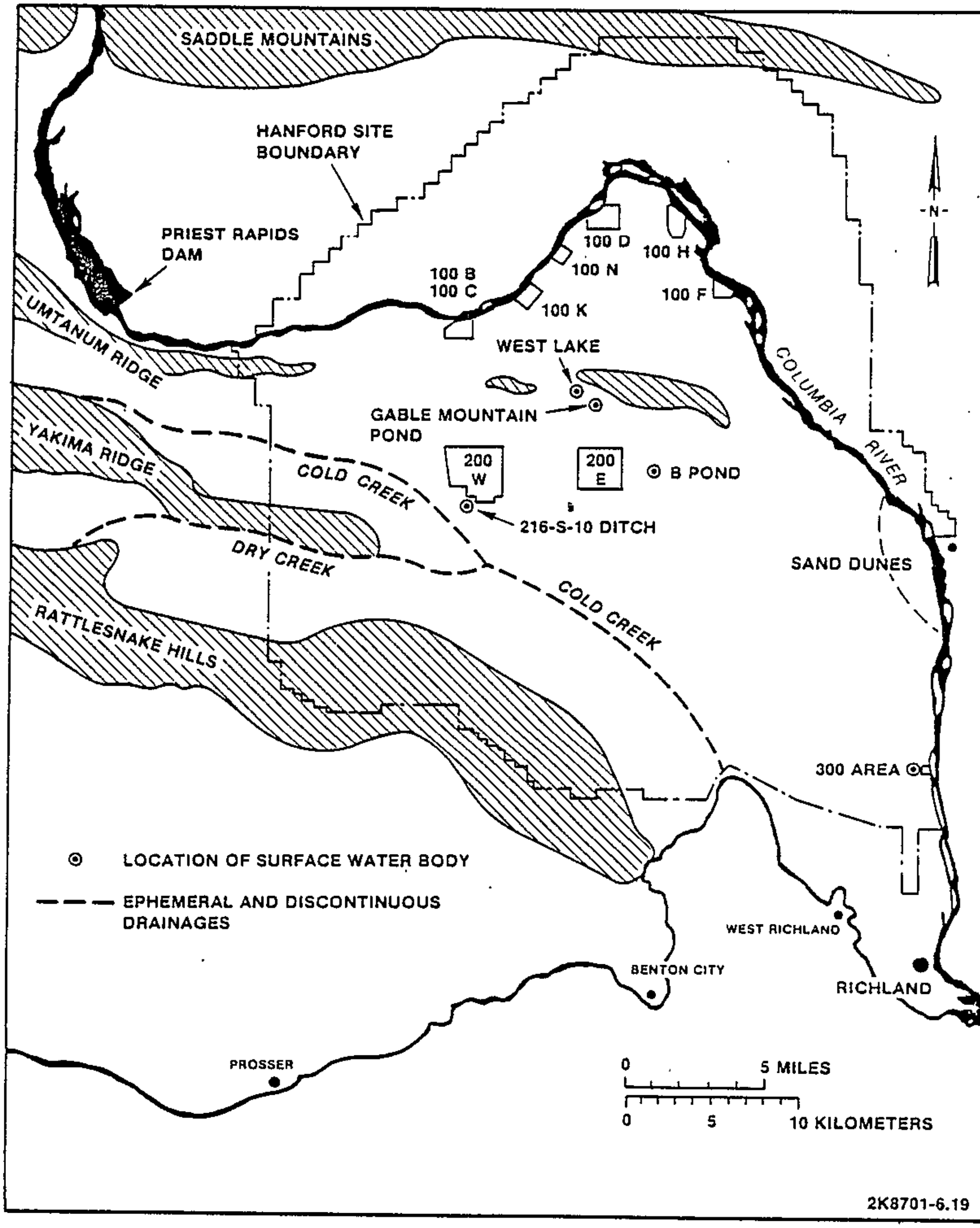

FIGURE 5-8
SURFACE WATER BODIES INCLUDING EPHEMERAL STREAMS
ON THE HANFORD SITE

these include irrigation outfalls from the Columbia Basin Irrigation Project and Hanford Site intakes for the on-site water export system. Intake and outfall structures for the Hanford Generating Project and N-Reactor also occur in the Hanford Reach.

West Lake, a shallow pond 3 feet (1 meter) deep, is the only natural pond on the Hanford Site. The pond generally averages 10 acres (0.04 square kilometers) in size. A number of man-made ditches and ponds are used for the routine disposal of chemical processing cooling waters, plant cooling water and several laboratory waste water streams (ERDA, 1975).

The Cold Creek watershed (area draining into Cold Creek) is located along the western boundary of the Pasco Basin. The 200 East Area lies outside the Cold Creek watershed. Cold Creek, trending northwest-southeast within the wash, is the only defined channel within the southeastern portion of the Hanford S ite watershed (Figure 5-8). The drainage system within the Cold Creek watershed may be described as ephemeral and discontinuous.

5.3d(2) Aquifer Identification

5.3d(2)(a) Background

The subsurface of the Hanford Reservation is underlain by various geologic units having widely different water-bearing properties. The rock types include: unconsolidated silts, sands and gravels; semiconsolidated lake and stream sediments; and dense basalts with interbeds separating individual flows. From a hydrologic standpoint the most permeable horizons are the sands and gravels of the Upper Ringold Formation and the Pasco Gravels. The water table over the western portion of the Hanford Reservation lies at the top of the Ringold Formation. However, between the high terrace plateaus and the Columbia River, the water table rises above the Upper Ringold and intersects the overlying Pasco Gravels.

Above the water table lies the unsaturated or vadose zone. Any waste that percolates into the subsurface within the 100 Areas of the Hanford Reservation must flow through a section of unsaturated glaciofluviatile sediment prior to reaching the water table.

The uppermost aquifer lies between the water table and the silts and clays of the Middle and Lower Ringold Formation. In general, ground water in these unconsolidated and semiconsolidated sediments occurs under unconfined or water table conditions, although locally confined zones exist. Some semiconsolidated gravels and sands are locally found in the Lower Ringold Formation. These beds are usually separated from the overlying unconfined aquifer by a layer of silt and clay of variable thickness. These sands constitute the uppermost confined aquifer.

The Ringold Formation overlies a warped and severely deformed layer of basalt. The Columbia River basalt series has, in general, a saucer-shaped synclinal structure. It is an accordantly layered sequence of flows which were extruded as highly fluid lava in Miocene and early Pliocene time. Narrow zones of rubbly, permeable scoria somewhat similar to flow breccia occur at the top of a few flows and may be quite permeable. Some of these permeable zones in the basalt may constitute rather good confined aquifer systems.

During the past 30 years, wells have been drilled at Hanford through all the above-mentioned formations in order to:

- o provide water,
- o provide quantitative data for evaluating the chemical and physical properties of the underlying material,
- o measure the hydrological characteristics of the various sediments,
- o determine engineering design,

- monitor waste disposal facilities, and
- monitor the radiological status of the ground water.

The Hanford Site Water Table map in Appendix A shows the location of some of the wells available for hydrological measurements.

The aquifers in the Hanford Reservation have been studied extensively using data from existing wells, predictive mathematical studies, and regional hydrologic studies. All these data have been used in preparing the subsequent sections.

5.3d(2)(b) The Unconfined Aquifer

The unconfined aquifer consists of both glaciofluviatile sand and gravel deposits and the Ringold silts and gravels. Since these materials are very heterogeneous, often greater lithologic differences appear within a given bed than between beds (Gephart et. al., 1979; Graham et. al., 1981). The aquifer bottom is the basalt bedrock in some areas and silt/clay zones of the Ringold Formation in other areas. The impermeable boundaries of the unconfined aquifer within the Hanford Reservation and vicinity are the Rattlesnake Hills, Yakima Ridge, and Umtanum Ridge to the west and southwest. Gable Mountain and Gable Butte, as well as other small areas of basalt outcrop above the water table, also impede the ground water flow. The Yakima River forms a hydraulic potential boundary which is mainly a discharge boundary for the aquifer. However, the ground water flow from 1 to 3 miles inland from the Columbia River is affected by seasonal river stage fluctuations. The flow pattern that originally prevailed in the unconfined aquifer was primarily to the east and northeast with discharge into the Columbia River. Natural recharge occurs at the foot of Rattlesnake Hills and Yakima Ridge. Surface flow sinks into the floor of the valley at the foot of the paralleling Rattlesnake Hills. The underflow is to a great extent interrupted by a buried extension of Yakima Ridge which parallels Rattlesnake Hills at a distance of about 2 miles and which rises above the water table.

The regional water table is largely within the Ringold Formation and to a lesser extent in the Pasco Gravels. Geologic work has pointed to the existence of highly permeable sediment on portions of both the northern and southern flanks of Gable Mountain. A filled erosional channel southeastward from the western side of Gable Mountain toward the Columbia River permeable zones parallel the river.

In 1944, before operations at Hanford began, the hydraulic gradient in all but the south-westernmost portion of the Hanford Reservation was about 5 feet/mile (Figure 5-9). Waste disposal at Hanford raised the water table in the recharge sites and altered the existing hydraulic gradient (Figure 5-10). Local ground water mounds formerly existed at each reactor site along the Columbia River. The mound at the still active 100-N Area is the only one of these remaining. A minor recharge mound exists under the 300 Area. The differential change in the Hanford Site water table between January 1944 and January 1975 is demonstrated in Figure 5-11 (ARCO, 1975). A Hanford Site water table map is shown in Appendix A.

The natural recharge due to precipitation over the lowlands of the Hanford Reservation is not measurable since the evaporation potential during the summer months greatly exceeds total precipitation. Data on migration of moisture from natural precipitation in deep soils (below 30 feet) show movement rates less than 1/2 in./yr at one measurement site.

To hydrologically describe an aquifer, four parameters should be considered. These are:

- hydraulic conductivity: a quantity having the units of velocity that relate the flux of ground water to the hydraulic gradient

- aquifer thickness: the thickness of permeable sediment lying between the water table or an upper confining bed and lower confining bed

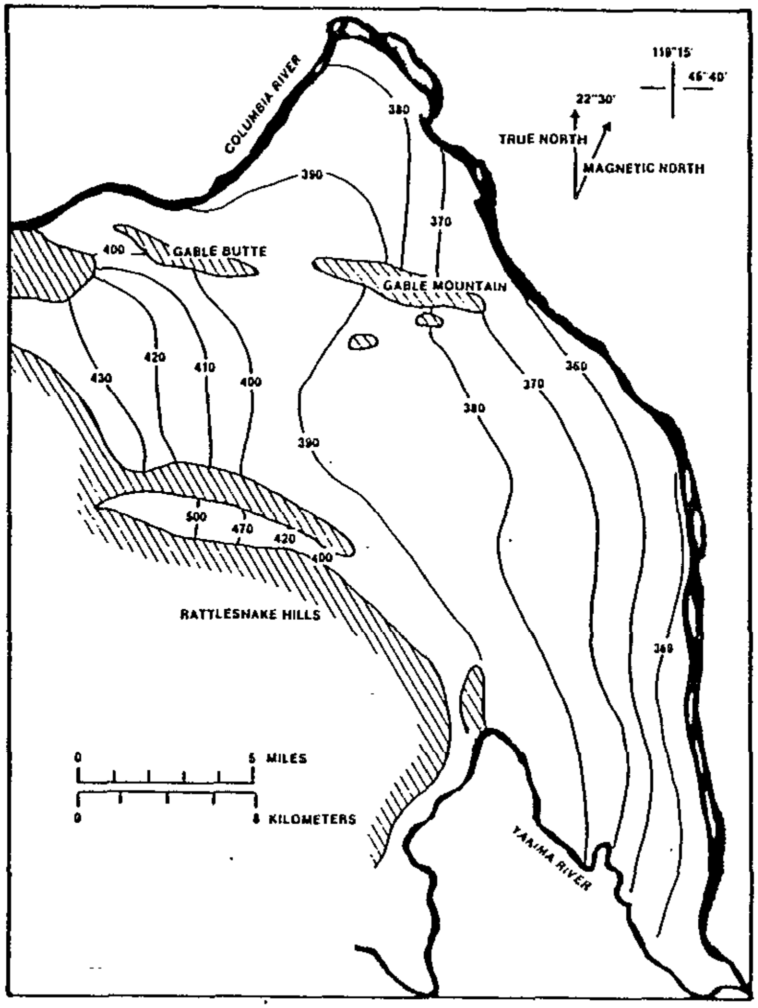

FIGURE 5-9
HANFORD SITE WATER-TABLE MAP, 1944

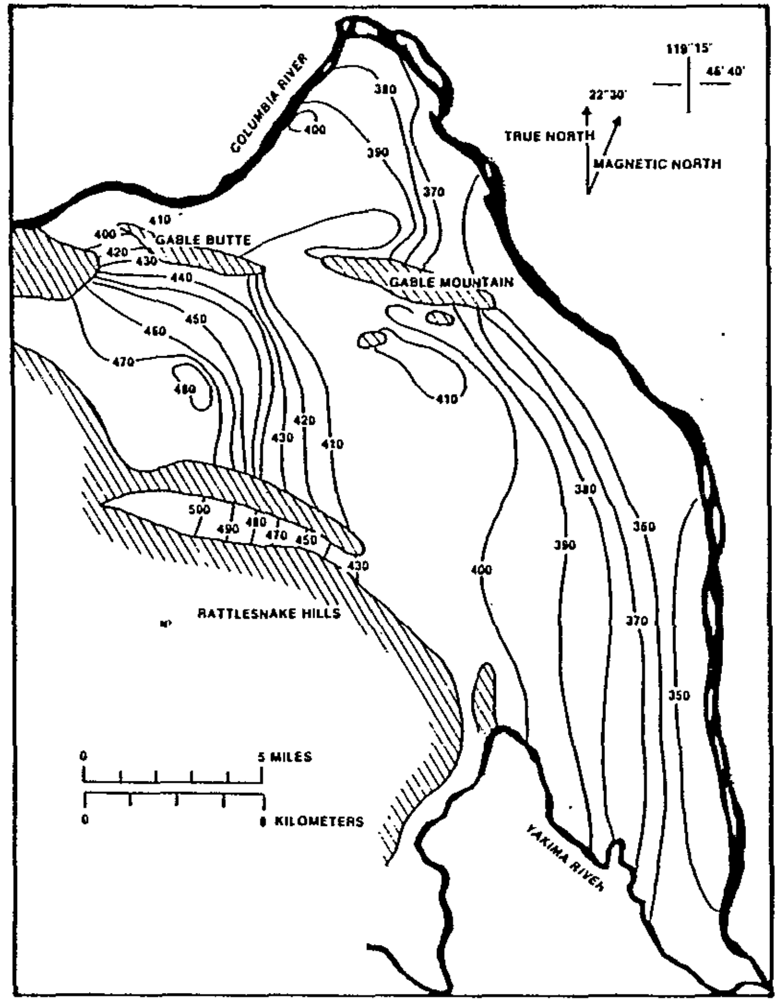

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FIGURE 5-10
HANFORD SITE WATER-TABLE MAP, 1978

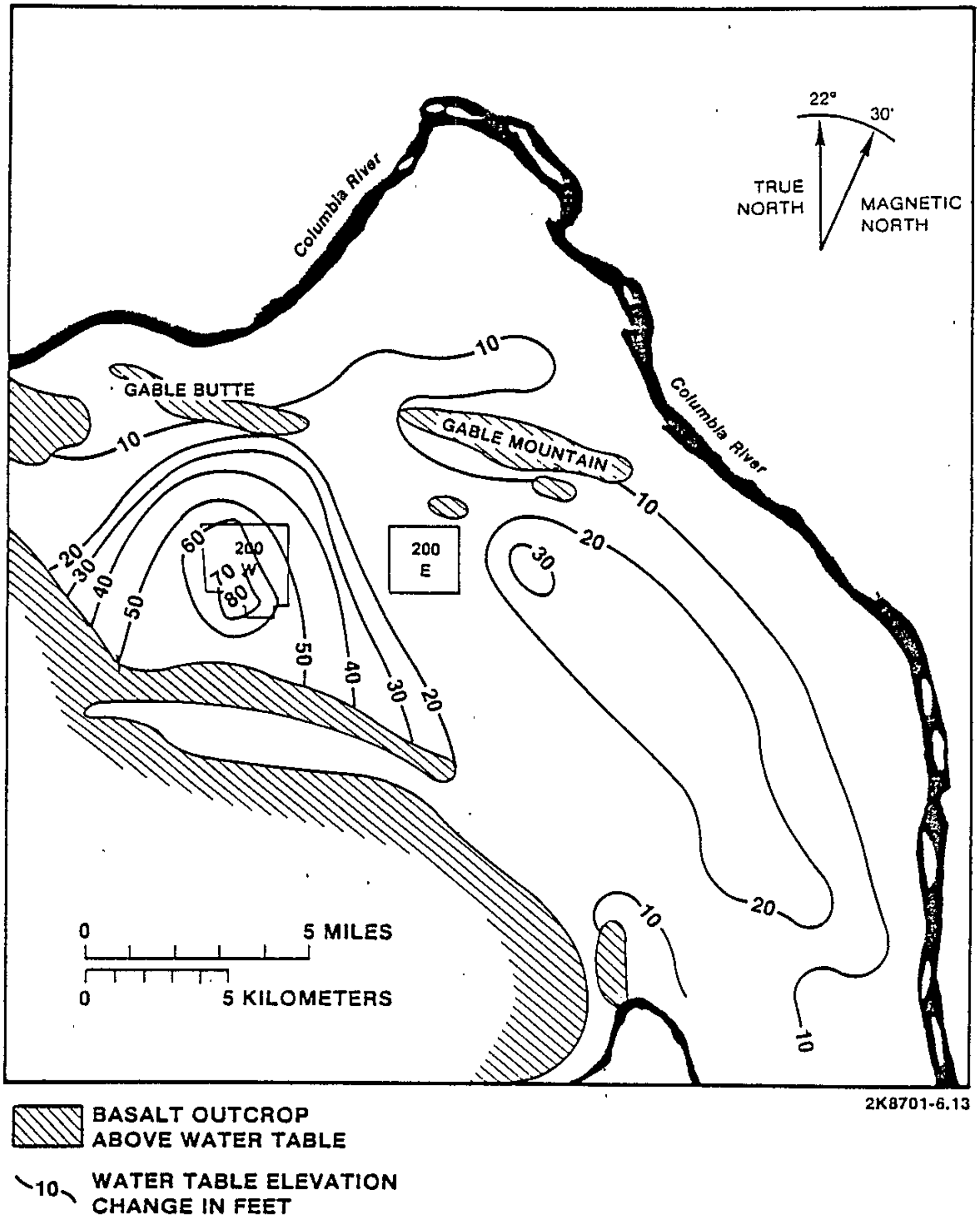


FIGURE 5-11
DIFFERENTIAL CHANGE IN THE HANFORD SITE WATER TABLE BETWEEN JANUARY 1944 AND JANUARY 1975

- effective porosity: the fraction of porous media capable of transmitting water

- storage coefficient: the volume of water that a unit decline in head releases from storage in a vertical column of aquifer of unit cross-sectional area.

For an unconfined aquifer, the storage coefficient approaches the effective porosity. Therefore, to describe the unconfined acquifier underlying the Hanford Reservation, measurement is needed of the hydraulic conductivity, aquifer thickness and storage coefficient.

Qualitatively, the hydraulic conductivity and storage coefficient distributions are a function of the different geologic formations in the unconfined aquifer. Ancestral Columbia River channels incised in the Ringold Formation are filled with more permeable glaciofluviatile sediments. Channels of permeable sediments have been identified and are reflected in the ground water flow pattern of the region.

Quantitative measurements of the hydraulic conductivity have been made at several locations over the Hanford Reservation using a variety of techniques (Figure 5-12). Excluding clay zones, the values obtained for the Ringold Formation range from 10 to 7000 ft/day. Hydraulic conductivities of glaciofluviatile sediments range from 500 to 20,300 ft/day (Gephart et. al, 1979) (Table 5-1). The hydraulic conductivity distribution has been obtained using pumping test data and information from driller logs.

Storage coefficient values were measured in the field by using pumping tests. For unconsolidated sediments, the storage coefficient ranges between 0.05 and 0.3. However, few measurements of the storage coefficient have been made to-date at Hanford. The bottom of the unconfined aquifer has been determined throughout the Reservation using data from wells. The surface depicting the aquifer bottom corresponds to basalt bedrock in some areas and silt-clay zones

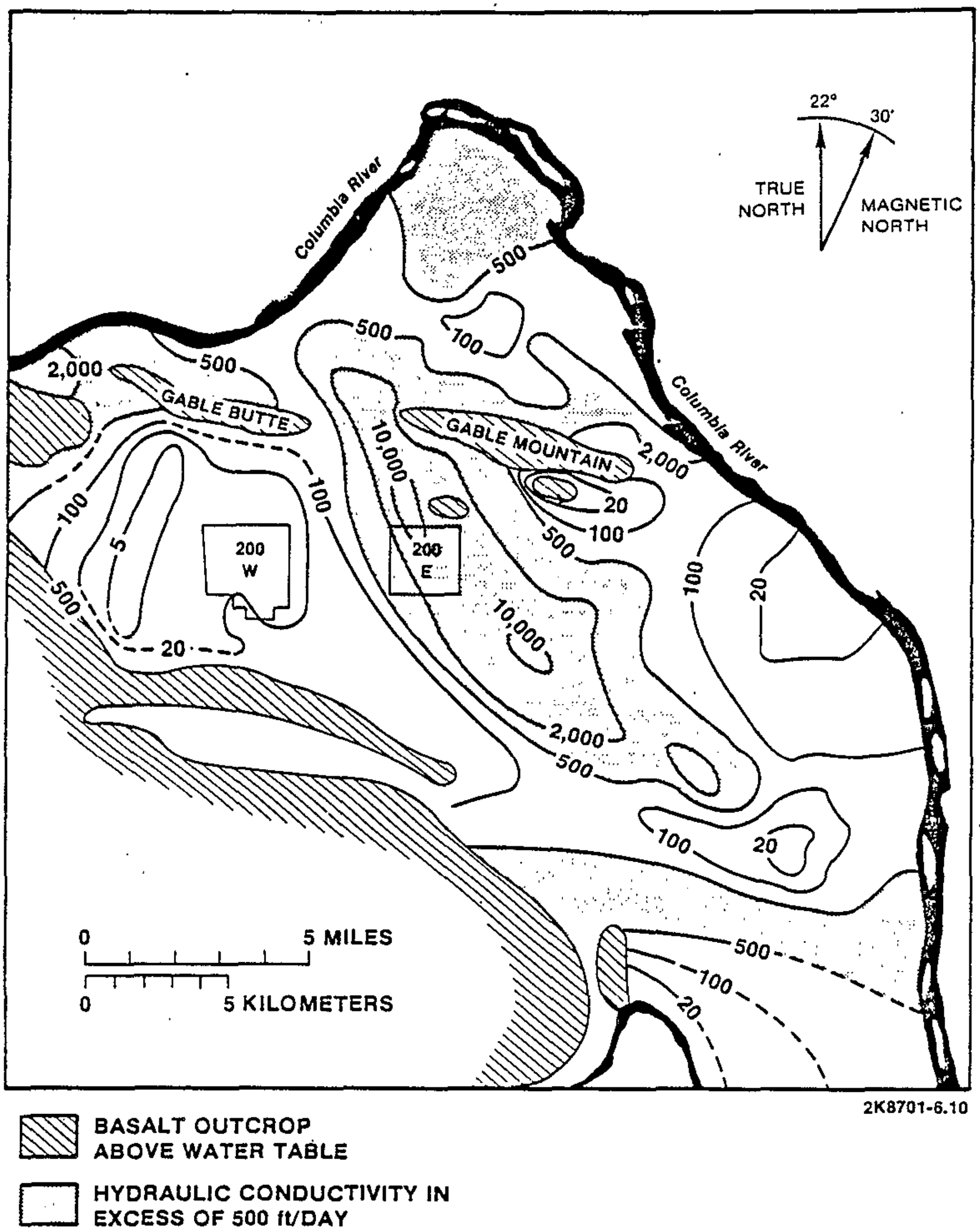


FIGURE 5-12
AREAL DISTRIBUTION OF HYDRAULIC CONDUCTIVITY FROM THE UPPERMOST AQUIFER AT THE HANFORD SITE

TABLE 5-1

REPRESENTATIVE HYDRAULIC PROPERTIES IN THE UPPERMOST AQUIFER*

Stratigraphic Interval	Hydraulic (ft/day)	Conductivity (m/day)
Hanford Formation (informal name)	500-20,300	150-6,100
Undifferentiated Hanford and Middle Ringold Unit	100-7,000	30-2,100
Middle Ringold Unit	20-600	6-180
Lower Ringold Unit	0.1-10.0	0.03-3.0

*Modified after Gephart, et. al.; 1979

of the lower Ringold Formation in other areas. Ultimately, all ground water in the unconfined aquifer flows into the Columbia River except for that small amount which is lost to the atmosphere by evapotranspiration.

The chemical quality of the ground water in the unconfined aquifer is measured semiannually at seven locations. Sodium, calcium, and sulfate ions are measured as well as pH. Water from wells in the 300 Area is analyzed for chromium and fluoride ions associated with fuel manufacturing operations. Nitrate ion, which is a waste product from the manufacturing and chemical separations operations, is monitored over the entire Hanford Reservation. Maps of the nitrate ion concentration near the water table of the unconfined aquifer are published semiannually.

The temperature of the ground water in the unconfined aquifer has been measured on an intermittent basis. Local thermal anomalies may be caused by vertical flow within a well casing. In the past, 100 Area reactor ground water mounds contained water on the order of 70-90°C.

5.3d(2)(c) The Confined Aquifers

A confined aquifer is one where the water-bearing stratum is overlain and underlain by relatively impermeable beds. Confined aquifers in the Hanford Reservation include 1) permeable sands and gravels in the lower part of the Ringold Formation overlain by thick silts and clays and 2) extensive basalt interbeds confined by individual basalt flows. The confining beds include sequences of individual basalt flows, where they are continuous and greater than about 50 feet thick, and the silts and clays of the lower part of the Ringold Formation. Within the basalt sequence, ground water is transmitted primarily in the interflow zones, either in sedimentary beds or in the scoria and breccia zones forming the tops and bottoms of the flows. Some of the basalt flows in the Pasco Basin have been eroded, particularly in the anticlinal ridges. In some locations, the basalts are highly jointed and contain breccia, pillow and palagonite complexes through which ground water can move. The lower-most Ringold Formation silts and clays are of various thicknesses, and distinct hydraulic potential differences have been observed below the silts and clays. About 90 wells on the Hanford Reservation have been drilled to basalt. Most of these wells only barely penetrate the top basalt flows. Thus, data on the confined aquifers in the basalt flows are scarce and much more data must be gathered to fully characterize these aquifers. In general, the hydraulic potential observed in the confined aquifer zones above the basalt is greater than in the overlying unconfined aquifer. However, the flow rates are expected to be quite small due to the low transmissivity range of this water-bearing zone.

In 1970 and 1971, 23 wells penetrating the sands in the lower Ringold Formation and the first few basalt flows and interbeds were pump tested and transmissivity values calculated. From these tests, values of transmissivity ranging between 2 and 8 ft^2/day were obtained for the confining beds and values between 50 and 2,000 ft^2/day for the permeable horizons. The hydraulic conductivity of the confining beds ranges between 0.02 and 0.2 ft/day and that of the aquifer, ranges between 2 and 30 ft/day.

Some data on the aquifer properties of the various confined aquifers are available from the ARHCO deep drilling project well ARH-DC-1 (Figure 5-13). At this well the basalt from 362 to 1200 feet depth has a transmissivity of 695 ft^2/day. A sedimentary unit contained in this zone from 830 to 936 feet has a transmissivity of 355 ft^2/day. A dense basalt zone from 960 to 1090 feet depth has a transmissivity of 0.2 ft^2/day. There is one significant water-bearing zone, 10 feet thick, occurring at 3230 feet depth with a transmissivity of 68 ft^2/day.

Water-bearing sedimentary interbeds are centered at 500, 650, and 900 feet and range from 25 to 100 feet thick. The bed at 900 feet is about 100 feet thick consisting of well-sorted medium sand of moderate permeability. Its hydraulic conductivity is about 3.5 ft/day, making it the most productive aquifer penetrated by this well.

Data on the storage coefficients on the basalt aquifers are very inconclusive. All evidence so far suggests that the storage coefficient in these aquifers is approximately equal to the compressibility of water. This suggests that these aquifers behave as elastic bodies.

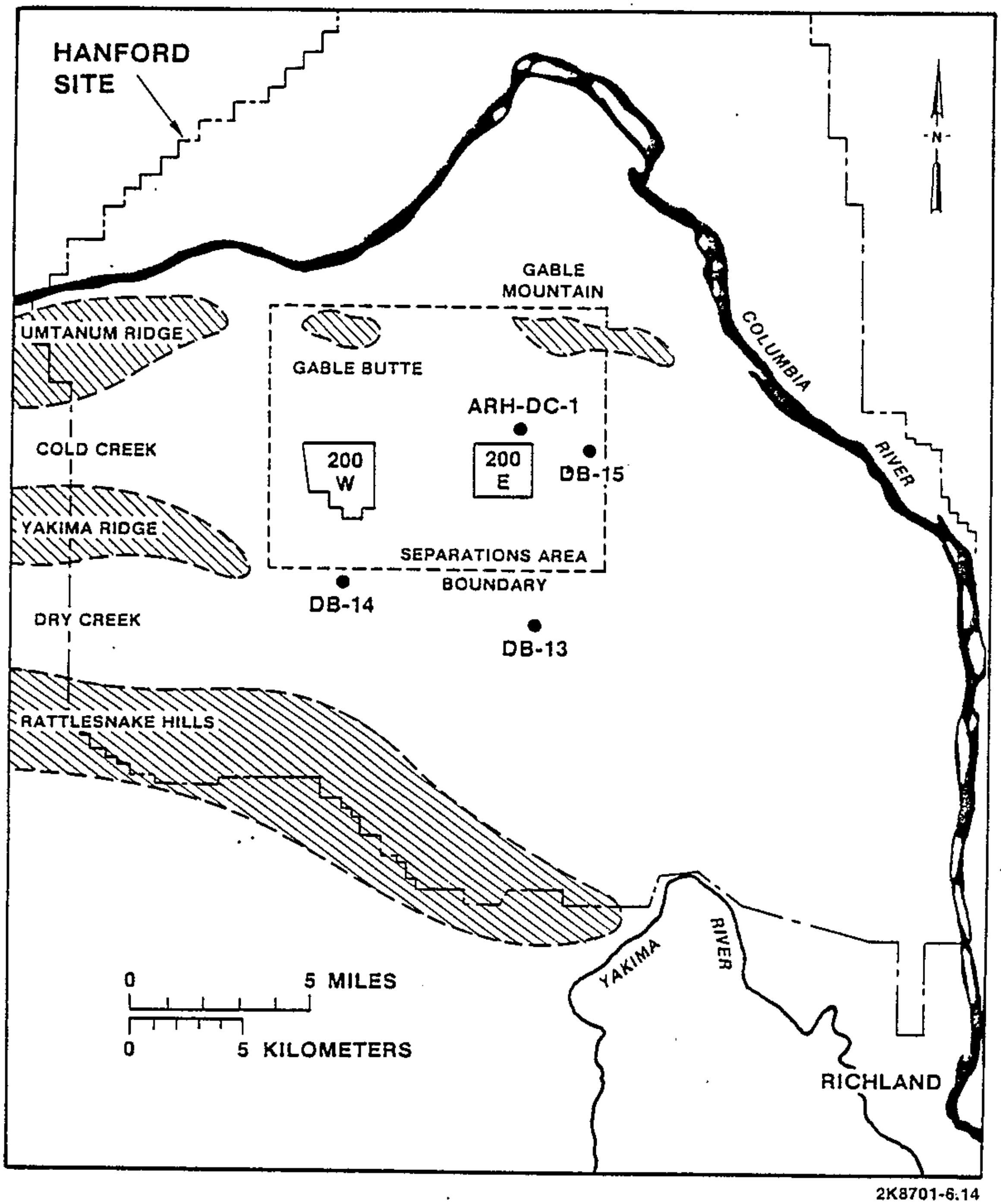


FIGURE 5-13
LOCATION OF WELLS DB-13, DB-14, DB-15, AND ARH-DC-1

5.3d(3) Aquifers North and East of the Columbia River

Very little data are available on the ground water aquifers to the north and northeast of the Columbia River. The confined basalt aquifers underlie this area as well as the present Hanford Reservation. The unconfined aquifer exists only under the parts of the Wahluke Slope between the higher bluffs and the Columbia River. The Ringold Formation and glaciofluviatile sediments form this aquifer.

The Saddle Mountains form the northern boundary to the confined aquifers and are a potential recharge site from precipitation due to basalt flow outcropping. The Columbia River behind Priest Rapids Dam and Wanapum Dam and the Columbia Basin Irrigation Project are other probable recharge areas. The Columbia River forms the primary discharge boundary for the unconfined aquifer. Seasonal river-bank storage and discharge occur as on the Hanford side of the river.

The remaining sources of recharge to the unconfined aquifer are the irrigation wasteways and ponds that have been created. There are no observation wells monitored by DOE to record the recharge effects of these ponds. The water table elevations in the unconfined aquifer near the Columbia River range from 370 to 405 feet MSL at the four available observation wells. The hydraulic potentials in the wells that penetrate the confined aquifers average about 50 feet higher. These wells are also perforated in several basalt aquifers precluding representative potential measurements.

5.3e Aquifer Identification in the 100-N Area

In the region of the 100-N Area during the low stage of the river-flow the elevation of the water table is at its minimum level. In this position the ground water body is entirely within the sand, silts, and gravels of the Ringold formation. These materials for the most part are unconsolidated; in certain areas, however, they have been cemented by calcium carbonate and iron oxides. The average permeability of these rocks ranges from 100 gpd/ft^2 to 600 gpd/ft^2 on unit gradient, depending largely on the amount of fines and the degree to which the material had become cemented. It is conceivable that the permeability of the material comprising this zone could differ by one or two orders of magnitude from one location to another.

In the late spring and early summer flood waters moving down the Columbia River cause the water table to rise. During the rising stage the water table moves upward into more permeable fluviatile and glaciofluviatile rocks. The rock fragments associated with these deposits are generally coarse sands and gravels with only small amounts of silt and clay.

The methods used to calculate aquifer characteristics generally give average values over the whole aquifer thickness. The aquifer thickness and the type of material through which the ground water is percolating establish the measured characteristics. It would be expected that the values measured during the winter months would be significantly different from those measured in the summer.

Figure 5-14 is a geologic cross section constructed through the 100-N Area normal to the Columbia River. In this figure, two relative positions of the water table are shown. The lower of the two is based on an average minimum flow rate of the Columbia River and the other is based on an average maximum flow rate. The rocks through which the ground water percolates at these two extreme stages are also indicated. The sands and gravels of the Ringold formation are shown to be locally cemented although the degree of cementation and the areal extent of the cemented zones are not known. The total aquifer thickness may be as much as 80 or 90 feet.

It was recognized that the aquifer characteristics change significantly from one season to the next as a result of water table fluctuations. Therefore, the measurements of the water table and river-level elevations to determine the transmissibility were made during the high water stage to include contributions of all geologic units that might comprise the aquifer. The transmissibility obtained from these measurements is representative of the unconfined aquifer underlying the 100-N Area, involved in most waste disposal problems.

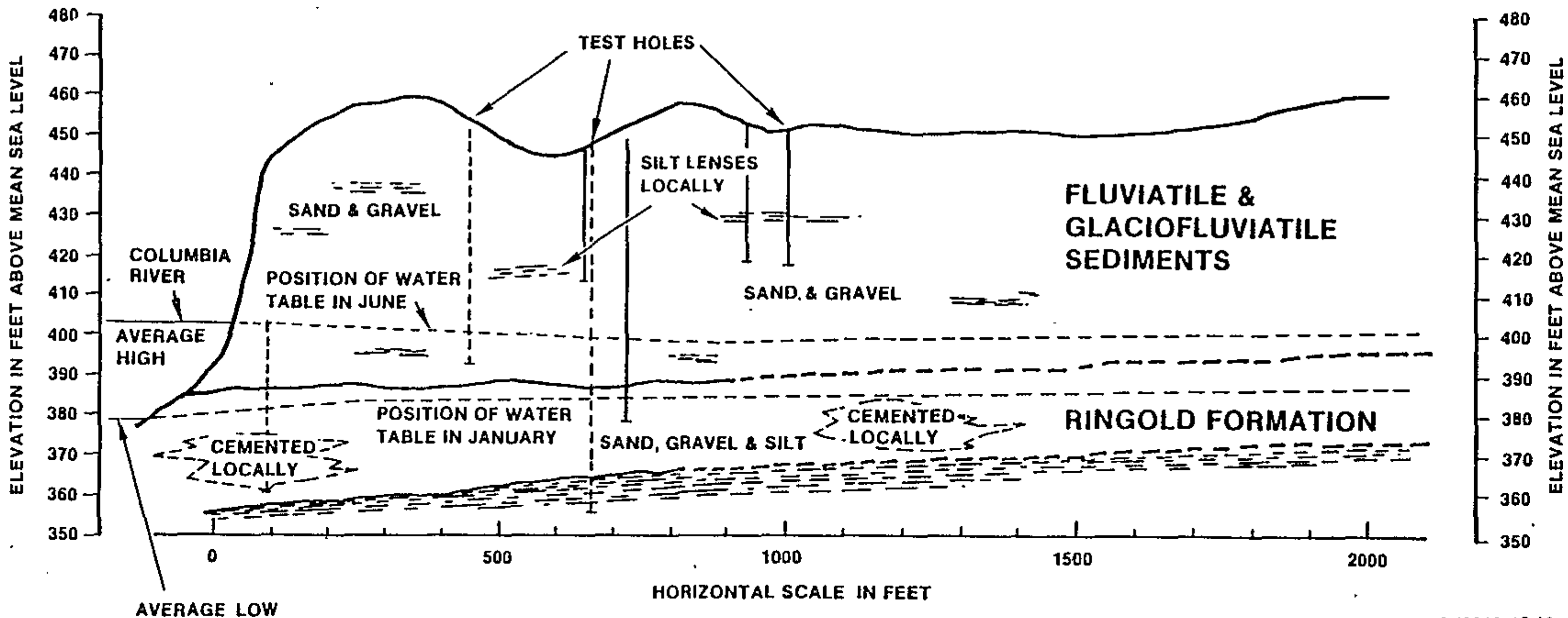


FIGURE 5-14
GEOLOGIC CROSS SECTION OF THE 100-N AREA

Based on the transmissibility data and the coefficient of storage of the aquifer and using an average aquifer thickness of 20 feet, the average permeability of the aquifer ranges from 1,500 gpd/ft^2 to 3,000 gpd/ft^2.

The seepage velocity, based on the calculated average permeability and the maximum gradient observed during the period studied was determined to be three to four feet/day. The natural ground water would not attain this velocity. Sometimes the river level rises so rapidly that the normal gradient toward the river is reversed. This reverse gradient away from the river has been detected several thousand feet inland at certain locations on the project. Beneath the 100-N Area the reversed gradient might extend as much as 1000 feet from the river.

5.4 CONTAMINANT PLUME DESCRIPTION

No ground water monitoring has been conducted at the 1324-NA Percolation Pond site. Due to the nature of the corrosive wastes and the calcareous soil beneath the pond, it has been assumed that the dangerous corrosive wastes that were discharged to the 1324-NA pond in the past were neutralized and rendered nonhazardous before the wastes reached the ground water. Should the proposed ground water monitoring program, as described in Section 5.5, indicate contamination of the ground water at the facility, further studies will be undertaken to characterize the plume of contamination at that time. This characterization would consider the extent of the plume and the concentration of each constituent throughout the plume.

5.5 GROUNDWATER MONITORING PROGRAM

5.5a Purpose

The purpose of this plan is to implement a ground water monitoring program at the 1324-NA Percolation Pond and 1324-N Surface Impoundment in accordance with the Resource Conservation and Recovery Act (RCRA) as described in 40 CFR 265.91. The scope for the plan includes the characterization of the hydrogeology and the monitoring of ground water beneath the percolation pond and surface impoundment.

5.5b Background

The source of natural recharge to the unconfined aquifer in the 100-N Area consists of rainfall and recharge from the Columbia River. The flow pattern is from the south, northward toward the river. Near the river, flow direction is determined by changes in river stage. The May 5, 1986 water table map indicates that water discharged to the 1325-N Liquid Waste Disposal Facility has created a ground water mound and that water moving from this mound moves toward the settling and percolation ponds.

The water level contours shown in Figure 5-15 indicate that there is a drop in ground water level of about 8 feet from the ponds to the river. On May 5, 1986 the average river stage was 384.9 feet above seal level. The maximum stage level of 387.9 feet is based upon a flow of 160,000 cfs (verbal communications with G.S. Jean II, Washington Public Power Supply System). These data indicate that there may be a flattening of the water table near the river and a limited impact on the water table under the ponds.

The existing monitoring well network in the 100-N Area consists of the following:

- o 48 wells that could or do monitor ground water in the 100-N Area (Figure 5-5).
- o Two wells that are within 1,000 yards of the settling and percolation ponds, well N-16 and well N-26.
- o Well samples that are collected from at or near the top of the unconfined aquifer.

5.5c Objectives

Four specific objectives must be met to achieve an adequate RCRA Ground water monitoring system for the settling and percolation ponds. These objectives include:

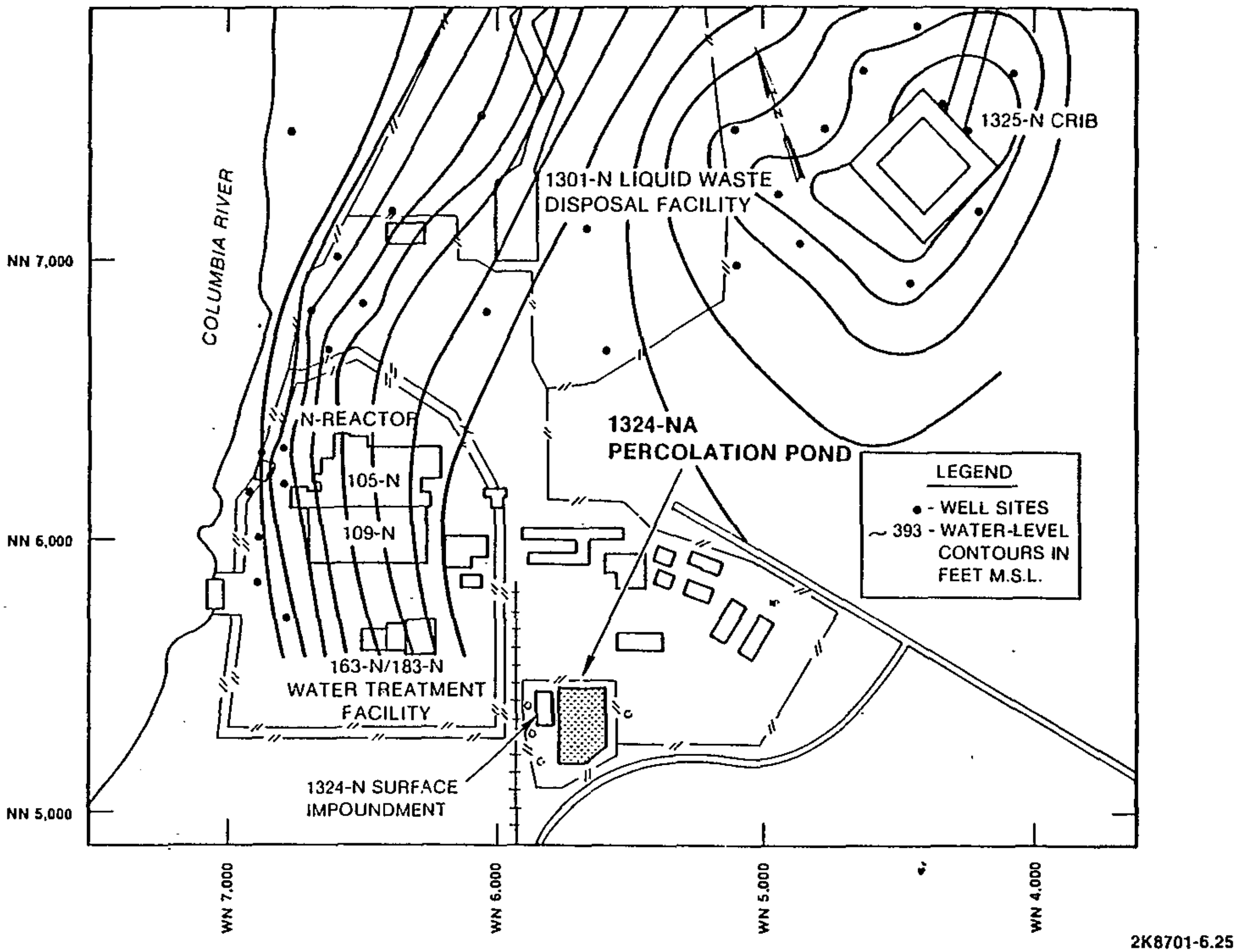


FIGURE 5-15
100-N AREA WATER TABLE CONTOUR MAP

- Determine if hazardous waste constituents from the 1324-NA Percolation Pond have entered the ground water system.
- Refine the understanding and knowledge of the hydrogeology of the unconfined aquifer using existing data.
- Determine the direction and rate of ground water flow.
- Develop a better understanding of the hydrogeology of the Hanford formation and the Ringold Formation in the area of the percolation pond.

5.5d Technical Approach

A two-phase approach will be used to meet the above objectives. Phase 1 will include: A detailed review of existing data, determination of well location, the drilling of wells, aquifer tests, and refinement of hydrologic and geologic data. Phase 2 will include: Collection of water-level data over time, design of a sampling system, determination of analyses to perform and assuring the adequacy of the new monitoring system. The details of the proposed approach to meet each of the objectives are discussed in detail in the following paragraphs.

5.5d(1) Phase 1

Phase one will consist of reviewing existing data, determining where wells should be drilled, testing each well as it is drilled, and refining the hydrology and geologic data. Because of the limited areal extent of the facility and the fact that the facility has only received corrosive waste, the proposed plan is to construct the minimum required number of monitoring wells. Four wells are planned at this time to comply with State regulations.

The review of existing data will allow for a better understanding of where to start the drilling portion of the work. After a well site has been determined and the drilling started, a careful analysis of the sediments derived from the drilling will be used to determine the potential for downward movement of hazardous contaminants. Specific data will be collected on mineralogy, grain-size analysis, temperature, conductivity, and water levels where saturated. After the well has been completed and screened at the appropriate depth, a flow meter will be installed to determine the direction and rate of ground water flow. Based on these data, the location of the next well will be determined (Table 5-2). As each well is completed, the flow meter data will be used to determine the location of the remaining wells.

All planned wells will be installed using the cable tool or air rotary drilling method. The wells will consist of an artificial sand-pack, stainless-steel well screen to above the water level and stainless-steel casing to land surface (Figure 5-16). The finished inside diameter of the wells will be 6 inches. Screened intervals will typically be 15 to 20 feet with the exact length depending on the thickness of the interval of interest. Drilling equipment, casings, and screens will be steam-cleaned prior to use and kept off of the ground.

Borehole geophysical logs will be made for each well upon reaching final depth and after completion. A qualified geologist will be present during drilling to examine the materials penetrated, prepare geologic logs, oversee the drilling activities, and revise well design if needed. Sediment samples will be collected every 5 feet and at changes in lithology.

After the completion of the wells, an aquifer test will be performed by pumping the most productive well to obtain the hydrologic characteristics. The remaining wells will be used as monitoring wells during the test. The selection of the pumping well discharge rate, and probable duration of the test will be determined by drawdown tests during well development and bailer tests performed on each well during drilling.

Figure 5-17 shows the location of the proposed wells relative to the 1324-NA Percolation Pond.

TABLE 5-2

JUSTIFICATION OF PROPOSED MONITORING WELLS

WELL NO.	JUSTIFICATION
1324-NA-1	This well will be located on the upgradient side of the two ponds and within the influence of the 1324-NA percolation pond. The approximate location of this well will be on the east side of the two ponds shown in Figure E-7. This well will be completed approximately 20 feet into the saturated zone of the unconfined aquifer.
1324-NA-2	Based upon water level maps and the flow meter results, this well will be one of the three down gradient wells required by law. It is assumed at this time, that the well will be to the west side of the two ponds shown in Figure E-7. The well will be completed approximately 20 feet into the saturated zone of the unconfined aquifer.
1324-NA-3	Based upon water level maps and the flow meter results, this well will be the second of the three down gradient wells required by law. It is assumed at this time that the well will be to the west side of the two ponds shown in Figure E-7. The well will be completed approximately 20 feet into the saturated zone of the unconfined aquifer.
1324-NA-4	Based upon water levels maps and the flow meter results, this well will be the third of the three down gradient wells required by law. It is assumed at this time that the well will be to the west side of the two ponds shown in Figure E-7. The well will be completed approximately 20 feet into the saturated zone of the unconfined aquifer.

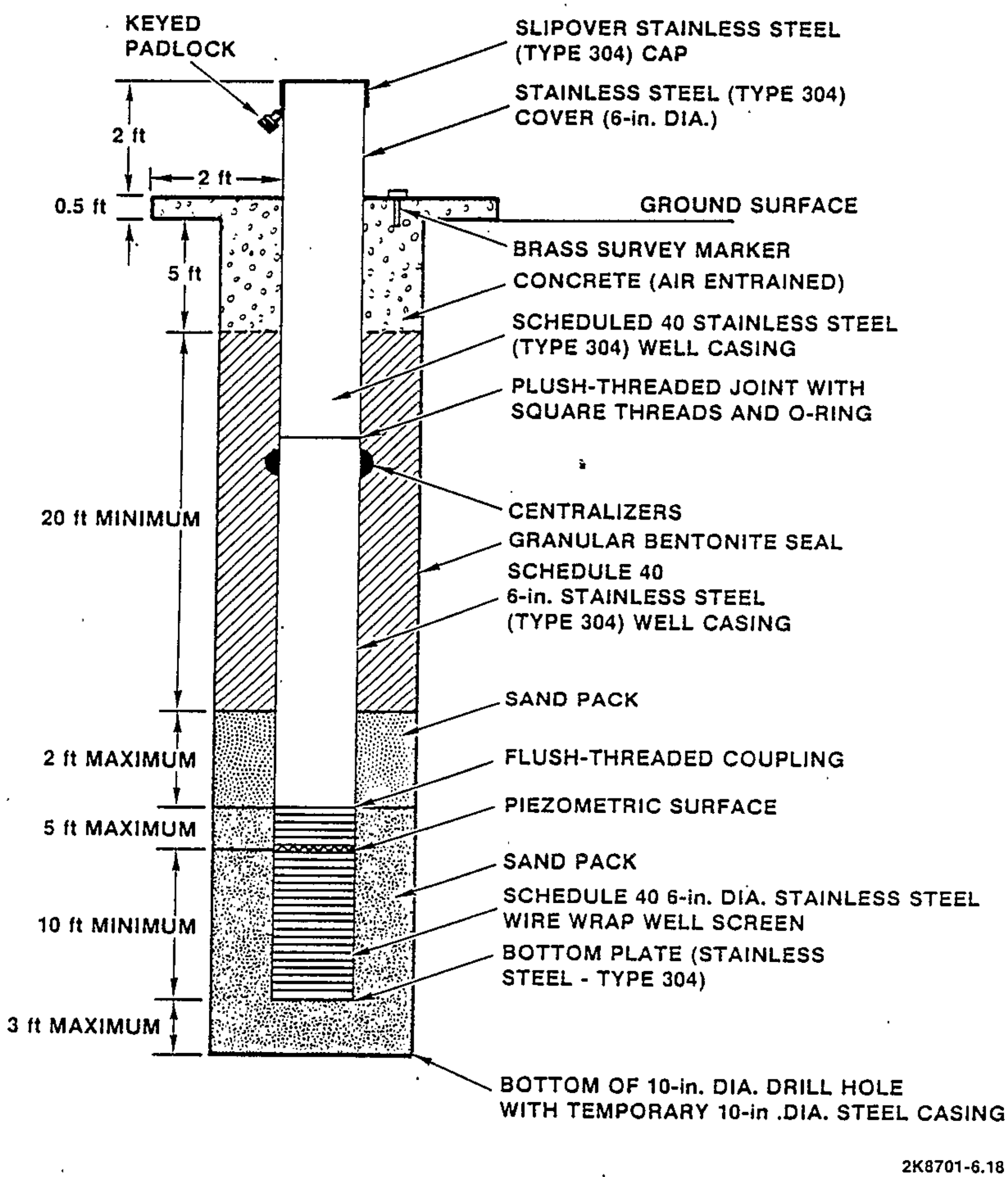


FIGURE 5-16
DIAGRAMMATIC SKETCH OF WELL STRUCTURE

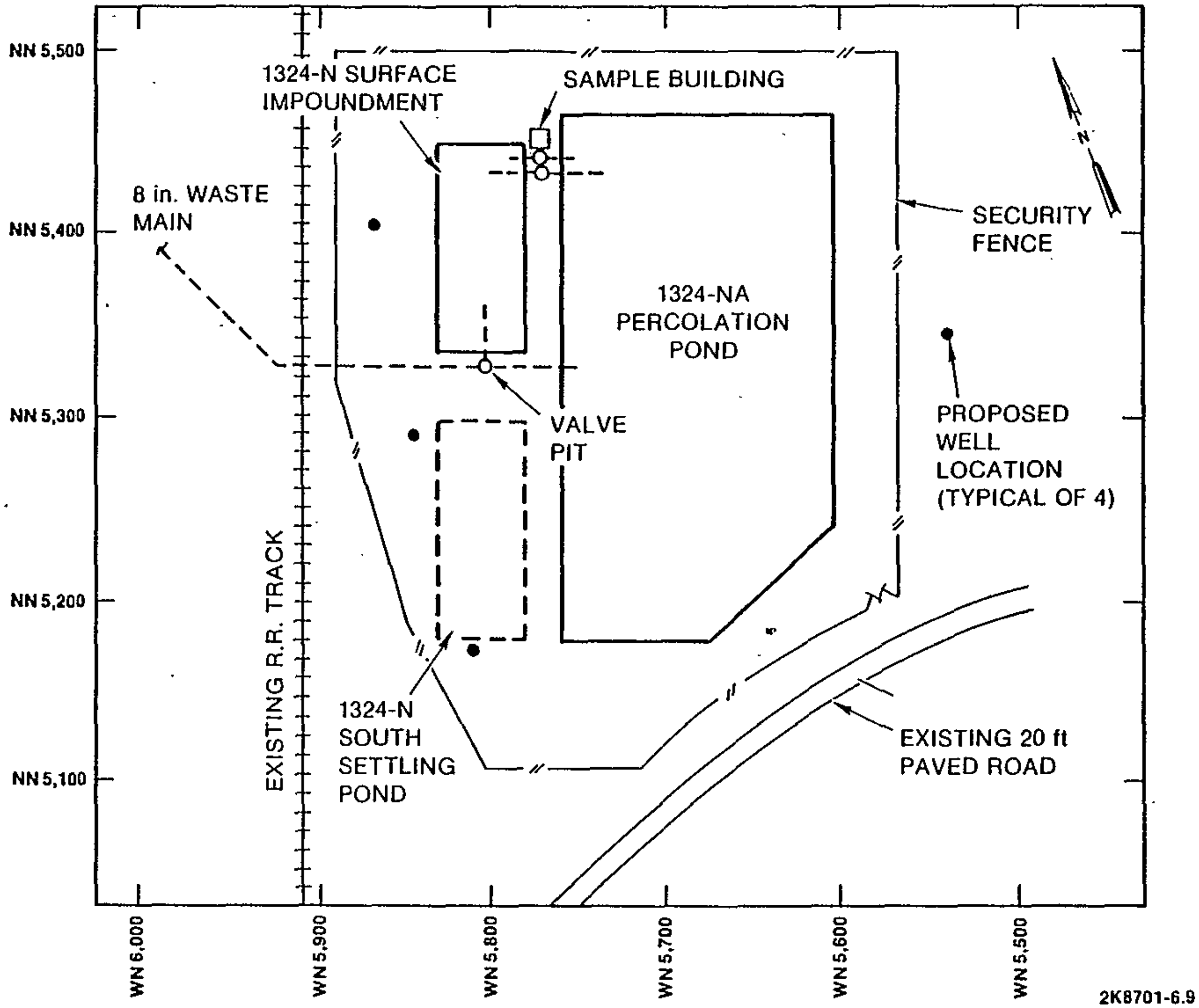


FIGURE 5-17
LOCATION OF PROPOSED GROUND-WATER MONITORING WELLS

5.5d(2) Phase II

Phase two will include obtaining water level data over time, designing a sampling system, determining analyses to be performed on samples, and assuring the adequacy of the new ground water monitoring system for the settling and percolation ponds by the use of appropriate statistical methods, modeling, and data review.

In order to efficiently collect water level-data, the measurements will be taken at the same time water samples are collected. The measurements will be taken with a calibrated steel tape and records kept in a field notebook.

To meet the requirements of a detection-level program, the sampling program will, at a minimum, consist of thirty analyses. These analyses will consist of: 1) Parameters characterizing the suitability of the ground water as a drinking water supply, as specified in 40 CFR 265.92(b)(1) Appendix III (Table 5-3), 2) Parameters for establishing ground water quality, as defined in 40 CFR 265.92(2), (Subpart F) (Table 5-4), and 3) Parameters used as indicators of ground water contamination, as outlined in 40 CFR 265.92(3) (Subpart F) (Table 5-5). Samples will be collected on a monthly basis until a database is established. The schedule will then be modified according to the results from the previous analysis.

Samples will be collected according to established written procedures as described in PNL-MA-580. Water-level measurements will be taken before sampling, and the wells will be purged according to the borehole volume removal procedure. Samples will be collected using dedicated sampling pumps appropriate for the analyses to be conducted.

Samples will be sealed and transported to the laboratory using the established chain-of-custody procedures as outlined in PNL-MA-580.

QA/QC procedures will be the same as those described in the existing ground water monitoring plans for other Hanford facilities (PNL, 1986).

TABLE 5-3

MAXIMUM CONCENTRATIONS OF CONSTITUENTS FOR GROUNDWATER PROTECTION
IN 40 CFR 265.92(b)(1) APPENDIX III

CONSTITUENT	MAXIMUM CONCENTRATION Mg/l
Arsenic	0.05
Barium	1.0
Cadmium	0.01
Chromium	0.05
Fluoride	1.4-2.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	0.1
2,4,5-TP Silvex	0.01
Radium	5 pCi/
Gross Alpha	15 pCi/
Gross Beta	4 millirem/yr
Turbidity	1/TU
Coliform Bacteria	1/100 ml

TABLE 5-4

PARAMETERS ESTABLISHING GROUND WATER QUALITY
IN 40 CFR 265.92(b)(2)

Chloride
Iron
Manganese
Phenols
Sodium
Sulfate

TABLE 5-5

PARAMETERS USED AS INDICATORS OF GROUND WATER CONTAMINATION
IN 40 CFR 265.92(b)(3)

pH
Specific Conductance
Total Organic Carbon (TOC)
Total Organic Halogen (TOX)

Methods to be used for sample analysis, sample preservation, and data evaluation are the same as those in the existing RCRA ground water monitoring plans for other Hanford facilities (PNL, 1986).

5.5e Anticipated Deliverables

Interim reports on the results of the characterization work will be produced at the end of Phase 1 and Phase 2. The final report will be compiled at the end of the project. In general, each report will contain: 1) narrative descriptions of the local geologic units and ground water flow; 2) geologic cross sections; 3) water-table maps; 4) geological and drilling logs; 5) results of the various tests conducted; and 6) analytical results.

5.5f Schedule

Drilling of the necessary characterization/monitoring wells is anticipated to commence after funding has been identified for well installation. Based on a drilling rate of 15 ft/day (8 hours) and an average depth of 90 feet, it is estimated that the drilling of each well will take about 6 working days with 3 working days for testing and screen installation, 3 working days to pull back the casing, and 1 day for recovery, for a total of 13 working days to complete each well or 52 days for the complete project.

5.6 DETECTION MONITORING PROGRAM

A ground water detection monitoring program will be developed. It is assumed that the ground water monitoring data will indicate the absence of dangerous waste constituents in the ground water. This program will address:

- o indicator parameters to be sampled for,
- o a proposed ground water monitoring system,
- o background values for each proposed monitoring parameter,
- o ground water quality at point of compliance,

- o ground water flow rate and direction,
- o a description of proposed sampling, analysis and statistical procedures to be utilized in evaluating ground water monitoring data (PNL, 1986).

5.7 COMPLIANCE MONITORING PROGRAM

If the ground water monitoring data indicates the presence of dangerous constituents in the ground water at the point of compliance, a compliance monitoring plan will be developed and submitted to the Department of Ecology for approval. This plan will provide:

- o a description of the wastes previously handled at the facility,
- o a characterization of the contaminated ground water,
- o a list of constituents that will be monitored (may include part of the WAC 173-303-9905 List),
- o proposed concentration limits for those constituents,
- o a description of the proposed ground water monitoring system,
- o a description of proposed sampling, analysis and statistical procedures to be utilized in evaluating ground water monitoring data (PNL, 1986), and
- o continual evaluation of the Compliance Monitoring Program and corrective action.

5.8 CORRECTIVE ACTION PROGRAM

The interim status program is designed to provide a description of the appropriate corrective actions, but the presently available monitoring data are not sufficient. Therefore, plans for a corrective action program will be determined after enough data are collected.

5.9 References See Appendix D.

WP #9130A

6.0 Closure and Post-Closure Plan

The 1324-NA Percolation Pond and the South Settling Pond comprise a land disposal facility that received regulated hazardous waste in the past. On May 13, 1986 the 1324-N Surface Impoundment was put into service to discontinue discharges of regulated waste into the ponds. The percolation pond currently receives nonhazardous, nonregulated aqueous solutions (for composition of the discharge, see Section 3.0). All future discharges into the percolation pond will be nonhazardous. DOE-RL has administrative controls in place to ensure that the future releases are within acceptable limits and will not harm the environment (Appendix C).

DOE-RL wishes to make it understood that a commitment to close the facility under RCRA does not necessarily preclude the use of the facility in its current capacity (i.e., as a receiver of nonregulated solutions). The intent of DOE-RL is to operate the percolation pond while establishing that the percolation and settling ponds are not an environmental hazard. Should investigations reveal that significant and nonlocalized contamination is present at depth, then DOE-RL will begin immediately to initiate physical closure of the facilities or to take other appropriate actions that are consistent with RCRA. Should they become necessary, those activities will be conducted in accordance with common best engineering practices, under the direction of a registered professional engineer and with the approval of the cognizant regulatory authorities; i.e.:

Regional Administrator
Region X
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

or

Director
Washington Department of Ecology
Mail Stop PV-aa
Olympia, Washington 98504

This closure plan includes general facility information, a description of how the facility will be closed, an estimate of the maximum volume of waste in storage and/or treatment at any time, a description of steps necessary to decontaminate the facility equipment during closure, a schedule for final closure activity and an estimate of the expected year of closure. The locations of official copies of the Closure/Post-Closure Plan are given in Appendix E. The person responsible for storage and updating these copies is given in Appendix F. The certification of closure is found in Appendix G.

6.1 Closure Plan

6.1a Closure Performance Standard

This closure plan has been developed using methods and procedures to complete all the activities necessary to close the 1324-NA Percolation Pond located at the U.S. Department of Energy Hanford Site in the 100-N Area (Figure 6-1). Closure will occur in a manner which will accomplish the following:

- Minimize the need for further maintenance;
- Control, minimize, or eliminate any potential threats to human health and the environment, post-closure escape of dangerous waste, dangerous waste constituents, leachate, contaminated rainfall, and waste decomposition products to the ground, surface water, ground water, and the atmosphere;
- Return the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

6.1b Facility and Process Descriptions

The 1324-NA Percolation Pond and the South Settling Pond are unlined facilities that were used to dispose of dangerous wastes (Figure 6-1). The ponds received nonradioactive dangerous waste, exhibiting corrosive characteristics from the regeneration of ion exchange column resins located in the 163-N Demineralization Plant. The ponds also received non-regulated filter backwash water from the 183-N Water Filter Plant.

The unlined percolation pond is located adjacent to the existing 1324-N Surface Impoundment. At its top, the pond was originally about 80 feet wide by 270 feet long. It was approximately 10 feet deep. At its bottom, the pond was approximately 40 feet wide by 230 feet long (Figure 6-2). The total volume of the pond was about 1,200,000 gallons. In 1983, the percolation pond was enlarged to approximately 2/3-acre and deepened to 12 feet, increasing the total available volume to about 3,000,000 gallons (Figure 6-3).

The unlined South Settling Pond was located adjacent to the percolation pond. At its top, the pond was approximately 50 feet wide by 110 feet long. It was approximately 10 feet deep. At its bottom, the pond was about 10 feet wide by 70 feet long (Figure 6-2).

The total volume of the South Settling Pond was approximately 213,000 gallons. This pond was backfilled in 1983 with clean natural soil.

Approximately 35 percent of the total flow to the ponds was from the demineralization plant and 65 percent from the water filter plant. The normal average and maximum flow to this system was 457,000 gallons, and 727,000 gallons per day, respectively.

Demineralized water for the operation of N Reactor is produced by passing filtered water through columns of ion-exchange resins, specifically primary and secondary cation units and primary and secondary anion units.

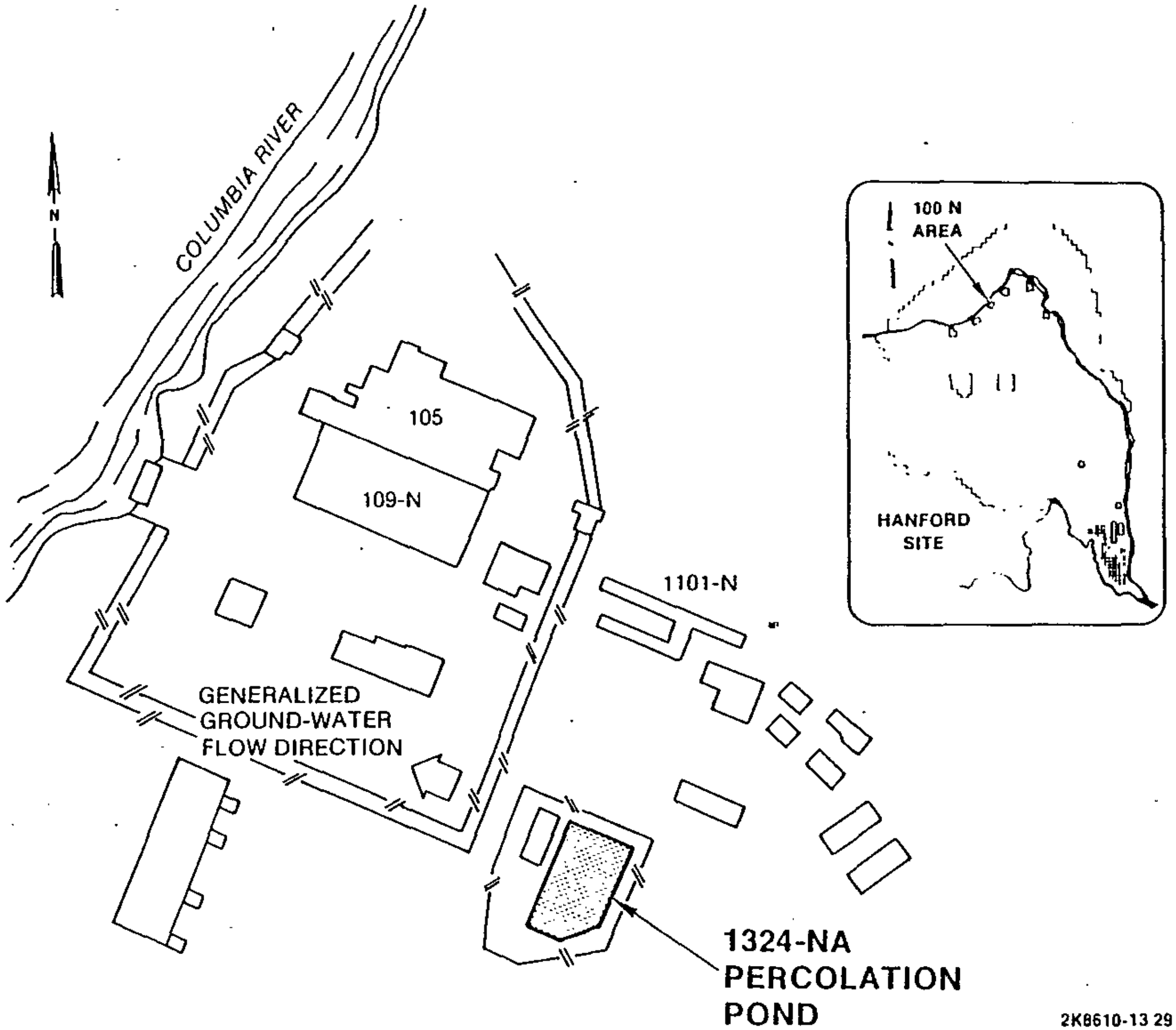


FIGURE 6-1
1324-NA FACILITY DIAGRAM WITH LOCATION MAP

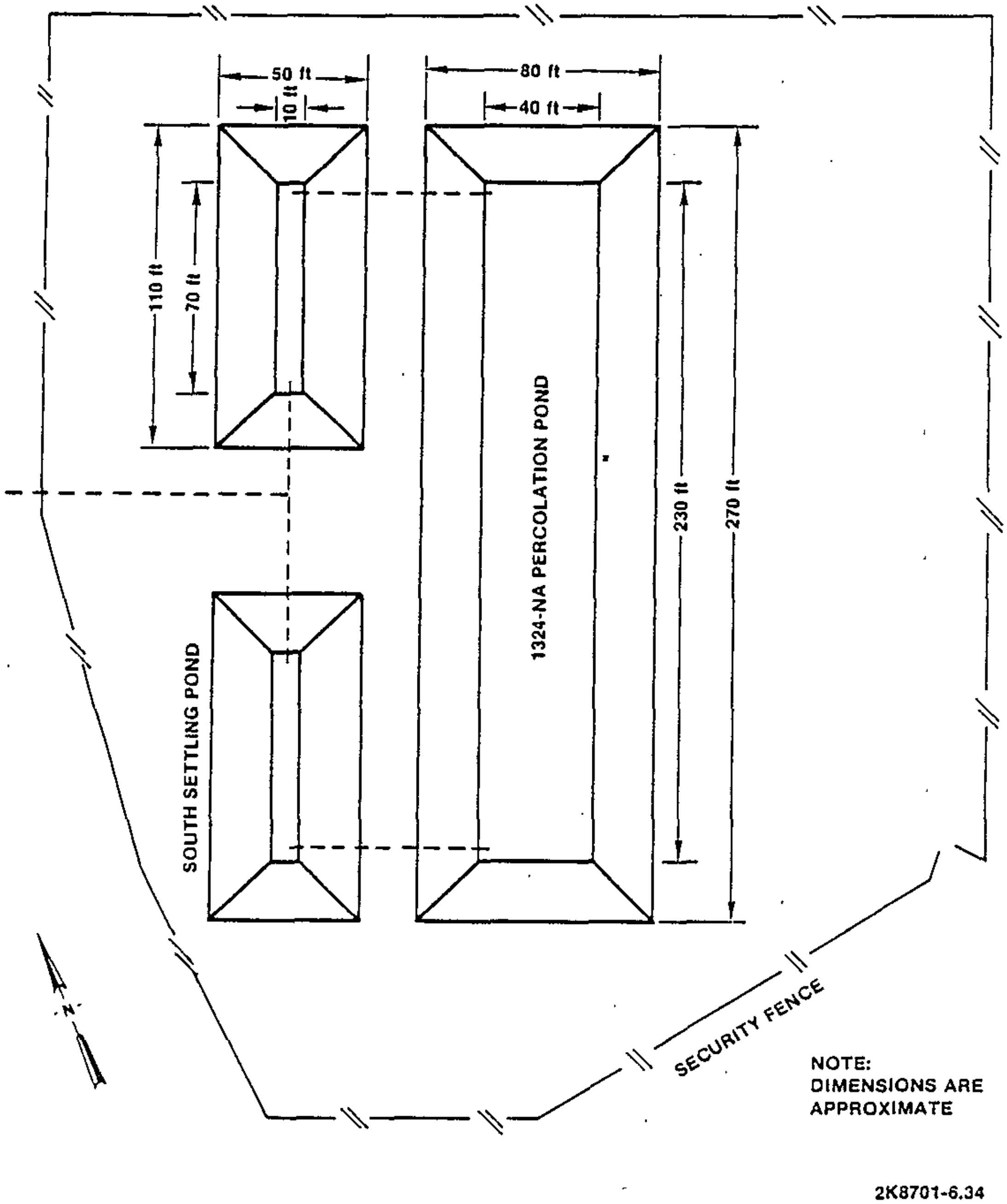


FIGURE 6-2
1324-NA FACILITY DIAGRAM WITH DIMENSIONS, 1977-1983

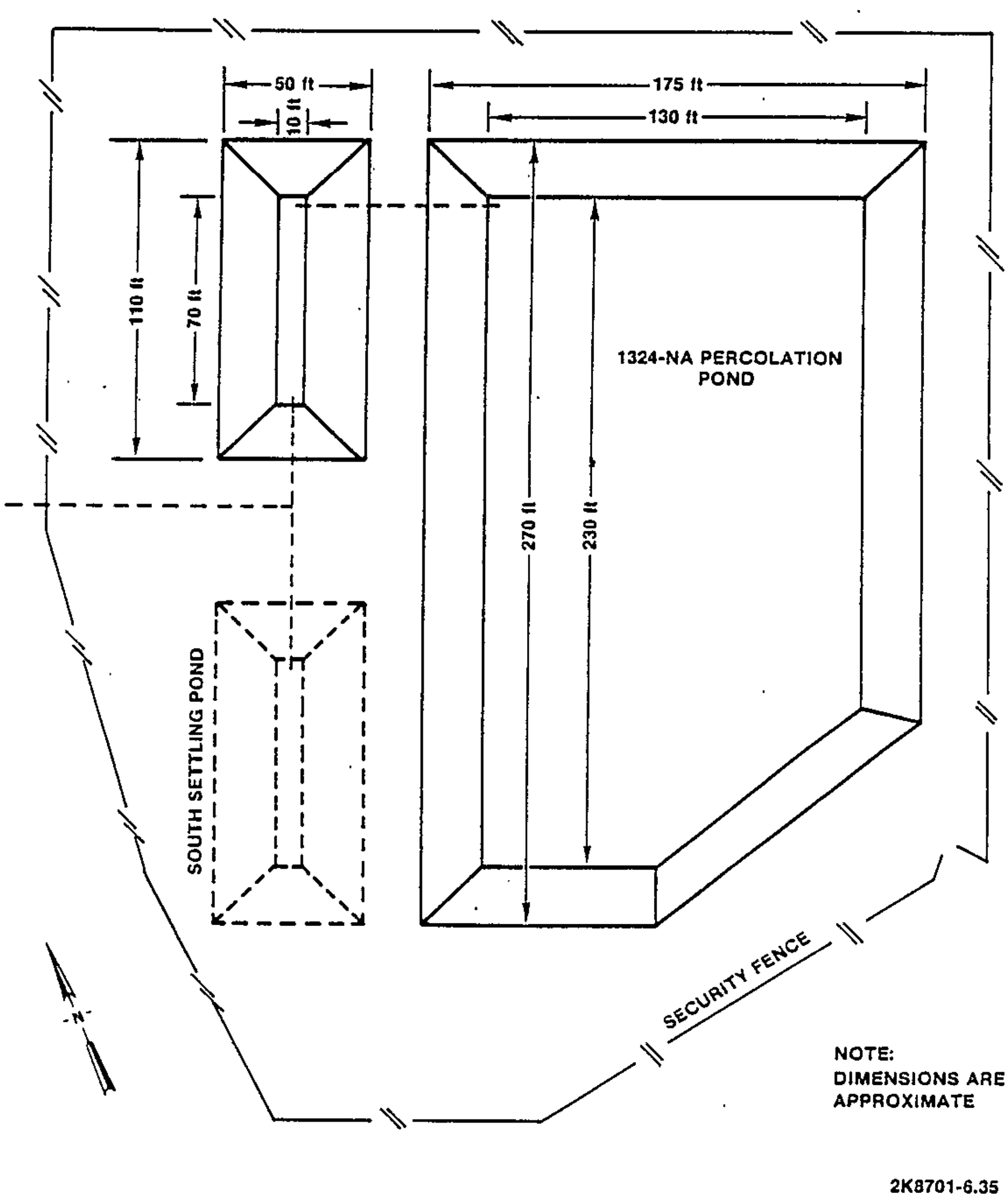


FIGURE 6-3
1324-NA FACILITY DIAGRAM WITH DIMENSIONS, 1983-PRESENT

To maintain the efficiency of the ion-exchange resins, these resins must be regenerated periodically using sulfuric acid (cation resins) and sodium hydroxide (anion resins). During normal reactor operation, cation and anion resins are regenerated about twice per day. Regenerations are required more frequently (6 to 8 per day) during reactor charge-discharge (refueling) operations since more demineralized water is needed during those times.

During a regeneration, approximately 600 gallons of acid or caustic is injected into the resin columns followed by about 19,000 gallons of rinse water for the cation cycle, and about 37,000 gallons of rinse water for the anion cycle.

Following regeneration, the acid or caustic and associated rinse water are discharged to a sump where they are mixed with process and cooling water from the 163-N Demineralization Plant (Figure 4-1).

This mixture was discharged to a second sump where further mixing occurred with filter backwash water from the 183-N Water Filter Plant. This combined mixture was then discharged through a 1300-foot long 16-inch Vinylester pipeline to the settling pond (Figure 4-1). The waste was then discharged through a 16-inch drain line from the settling pond to the existing 1324-NA Percolation Pond.

In 1983, a new 1,300-foot long 8-inch diameter epoxy resin waste transfer line was installed (Figure 4-2). This new line bypassed the filter backwash sump and discharged regeneration waste water to the 1324-NA Percolation Pond. A new 15-inch PVC line was tied into the old 16-inch vinyl ester line to discharge the filter backwash waste to an 8-acre pond southeast of the percolation pond.

In 1986, the 8-inch line was repiped to discharge the regeneration waste water to the 1324-N Surface Impoundment (Figure 4-3). The regeneration waste water is now neutralized before being discharged to the 1324-NA Percolation Pond.

6.1c Partial and Final Closure Activities

DOE-RL does not expect there to be any hazardous waste contamination of the soil and/or ground water at this facility. If contamination does exist, then the closure plan will be amended and resubmitted to the appropriate regulatory agency. The closure operations will consist of the following phases:

(1) Corrosive, hazardous waste is no longer discharged to the 1324-NA Percolation Pond. The regeneration waste is now discharged via an 8-inch line directly to the 1324-N Surface Impoundment where the waste is neutralized. The unregulated neutralized waste is then discharged to the 1324-NA Percolation Pond. In addition, nonhazardous cooling water from the 163-N Demineralization Plant is also discharged directly to the 1324-NA Percolation Pond. The filter backwash and coagulation waste are now discharged via a 15-inch PVC line to an 8-acre filter backwash lake.

(2) A soil and ground water sampling and analysis program will be conducted. Test results will be compared to background levels. If the test results are higher than background levels, this will be cause to consider the environmental media contaminated. If this occurs, this closure plan will be amended and resubmitted to the appropriate regulatory agency. Details of the soil and ground water analysis plan are given in Section 6.1e of this Closure Plan.

(3) Restoration of the site will occur after closure activities are complete. This will be done in accordance with the restoration plan provided in Section 6.1.e.(5).

6.1d Estimate of Maximum Waste Inventory

The 1324-NA Percolation Pond originally had a maximum volume of approximately 1,200,000 gallons. In 1983 the maximum volume was increased to approximately 3,000,000 gallons.

The settling pond had a maximum volume of 213,000 gallons.

6.1e <u>Facility and Equipment Decontamination Steps</u>

The 1324-NA Percolation Pond Facility historically received corrosive effluents from the regeneration of anion and cation exchange columns used to demineralize N Reactor cooling water. Because of these past disposal practices, the possibility exists that contamination of soil and ground water occurred.

In 1983 the discharges of corrosive dangerous waste into the south settling pond were discontinued and the pond was backfilled with clean soil. This unit no longer receives waste water of any kind. Discharges of corrosive dangerous waste into the 1324-NA Percolation Pond were discontinued on May 13, 1986. This unit now receives nonregulated waste water from the 163-N Demineralization Plant or nonregulated neutralized waste water from the 1324-N Surface Impoundment.

To determine the possible extent and concentration of hazardous constituents in the soil and/or ground water, a soil and ground water sampling program will be implemented. If the environmental media is determined to be contaminated, this closure plan will be amended and resubmitted to the appropriate regulatory agency.

6.1e(1) <u>Soil</u>

Assuming percolation of wastes into the soil occurred over the pond's entire surface area, random soil sampling will be performed. A detailed soil sampling program will be developed after the ground water monitoring wells have been installed, thus taking advantage of enhanced knowledge of local geology, soil types, ground water movement, etc.

If soil contamination is found to exist, the depth of contamination is not expected to exceed six inches due to the attenuating ability of the soils underlying the percolation pond.

6.1e(2) Ground water

Four new ground water monitoring wells will be installed around the 1324-NA Percolation Pond Facility. One well will be located up gradient and three down gradient of the 1324-NA Percolation Pond. All four wells will be completed approximately 20 feet into the saturated zone of the unconfined aquifer. A more indepth description of the proposed monitoring wells is addressed in Section 5.5 of this document. These wells will be sampled and the samples tested at an analytical laboratory for the parameters listed in Table 6-1. Test results will be compared to background water levels. If the test results are higher than background levels, this will be cause to consider the ground water contaminated and justify corrective action at the facilities or to develop alternate concentration levels. Procedures in the PNL-MA-580, Environmental Monitoring Procedures Manual, will be used during the ground water monitoring program. This manual contains detailed descriptions of ground water sampling and quality assurance/quality control procedures. Assuming that the routine ground water monitoring program does not show any ground water contamination, the sampling schedule below will be followed.

(a) Monthly until a data base is established.

(b) Quarterly for one year.

(c) Annually for the following three years.

(d) Discontinue sampling after the fourth year.

Section 5.0 of this permit application contains a complete list of testing parameters.

6.1e(3) Equipment

Any equipment associated with closing, if found to be contaminated, such as a tracked bulldozer, roadgrader, dump trucks, water truck, etc., will be decontaminated after they are no longer required for waste handling. The decontamination of this equipment will be by steam cleaning at the 1324-NA Site.

TABLE 6-1

GROUND WATER TESTING PARAMETERS

- o Ground water quality - 40 CFR 265.92 (2)
  - Iron
  - Manganese
  - Phenols
  - Sodium
  - Sulfate
- o Drinking Water Quality - 40 CFR 141.23
  - Arsenic
  - Barium
  - Cadmium
  - Chromium
  - Lead
  - Mercury
  - Nitrate
  - Selenium
  - Silver
  - Fluoride
- o Ground water Contaminants - 40 CFR 265.92 (3)
  - pH
  - Specific Conductance
  - Total Organic Carbon
  - Total Organic Halogen

6.1e(4) Media Impacts

No adverse impacts to air, surface water, soil, ground water, or sediments are expected as a result of closure of this impoundment. DOE-RL does not expect there to be any hazardous waste contamination of the soil and/or ground water at this facility. If contamination does exist, then the closure plan will be amended and resubmitted to the appropriate regulatory agency. The only potential emission may be fugitive dust generated during closure.

6.1e(5) Restoration

After closure of the 1324-NA Percolation Pond, some degree of restoration may be required. This may be justified in order to control dust, erosion, or surface water runoff, restore the water table, and promote post-closure usage.

The 1324-NA Percolation Pond will be regraded to reduce the slopes of the steep side walls to resemble the surrounding terrain. The sloped terrain will then be revegetated with indigenous flora to stabilize the soil surface.

6.1f Schedule for Closure

The estimated year of final closure of the 1324-NA Percolation Pond and the Settling Pond will be established upon acceptance of this Closure Plan by the appropriate regulatory agency. DOE-RL expects to begin final closure after notice of acceptance.

6.1g Amendments to Closure Plans

This closure plan will be amended whenever changes in operating plans or facility design effect the plan, or whenever there is a change in the year of closure or if the soil and/or ground water surrounding the ponds are found to be contaminated. Any amendments to this closure plan will be submitted to the appropriate regulatory agency for approval.

6.1h Certification of Closure

Upon completion of closure of the 1324-NA Percolation Pond, DOE-RL will submit to WDOE and EPA a certification (Appendix G), signed by both DOE-RL and an independent registered professional engineer, stating that the facility has been closed in accordance with the approved closure plan.

6.1i Continuance of Operation

After the closure of the 1324-NA facility to receive hazardous waste, the percolation pond will continue to receive nonregulated, neutralized regeneration waste from the 1324-N Surface Impoundment and process cooling water from the 163-N Building.

6.2 Post-Closure Plan

It is believed that no dangerous waste or dangerous waste residue will remain in the 1324-NA Percolation Pond following closure, therefore, neither ground water monitoring, post-closure care, nor restriction of future use is necessary.

If the soil and/or ground water underlying the ponds is found to be significantly contaminated, an amended closure and post-closure plan will be developed and submitted to the appropriate regulatory agency.

6.3 Notice to Local Land Authority

This section is not applicable because DOE-RL does not expect there to be any hazardous waste contamination of the soil and/or ground water at this facility. If the soil and ground water investigations indicate that contamination exists then this closure plan will be amended and resubmitted to the appropriate regulatory agency.

6.4 Notice in Deed to Property

This section is not applicable because DOE-RL does not expect there to be any hazardous waste contamination of the soil and/or ground water at this facility. If the soil and ground water investigations indicate that contamination exists then this closure plan will be amended and resubmitted to the appropriate regulatory agency.

6.5 Closure Cost Estimate

This section is not applicable because federal facilities are exempt from this section per 40 CFR 265.140(c).

6.6 Financial Assurance Mechanism for Closure

This section is not applicable because federal facilities are exempt from this section per 40 CFR 265.140(c).

6.7 Post-Closure Cost Estimate

This section is not applicable because federal facilities are exempt from this section per 40 CFR 265.140(c).

6.8 Financial Assurance Mechanism for Post-Closure Care

This section is not applicable because federal facilities are exempt from this section per 40 CFR 265.140(c).

6.9 Liability Requirements

This section is not applicable because federal facilities are exempt from this section per 40 CFR 265.140(c).

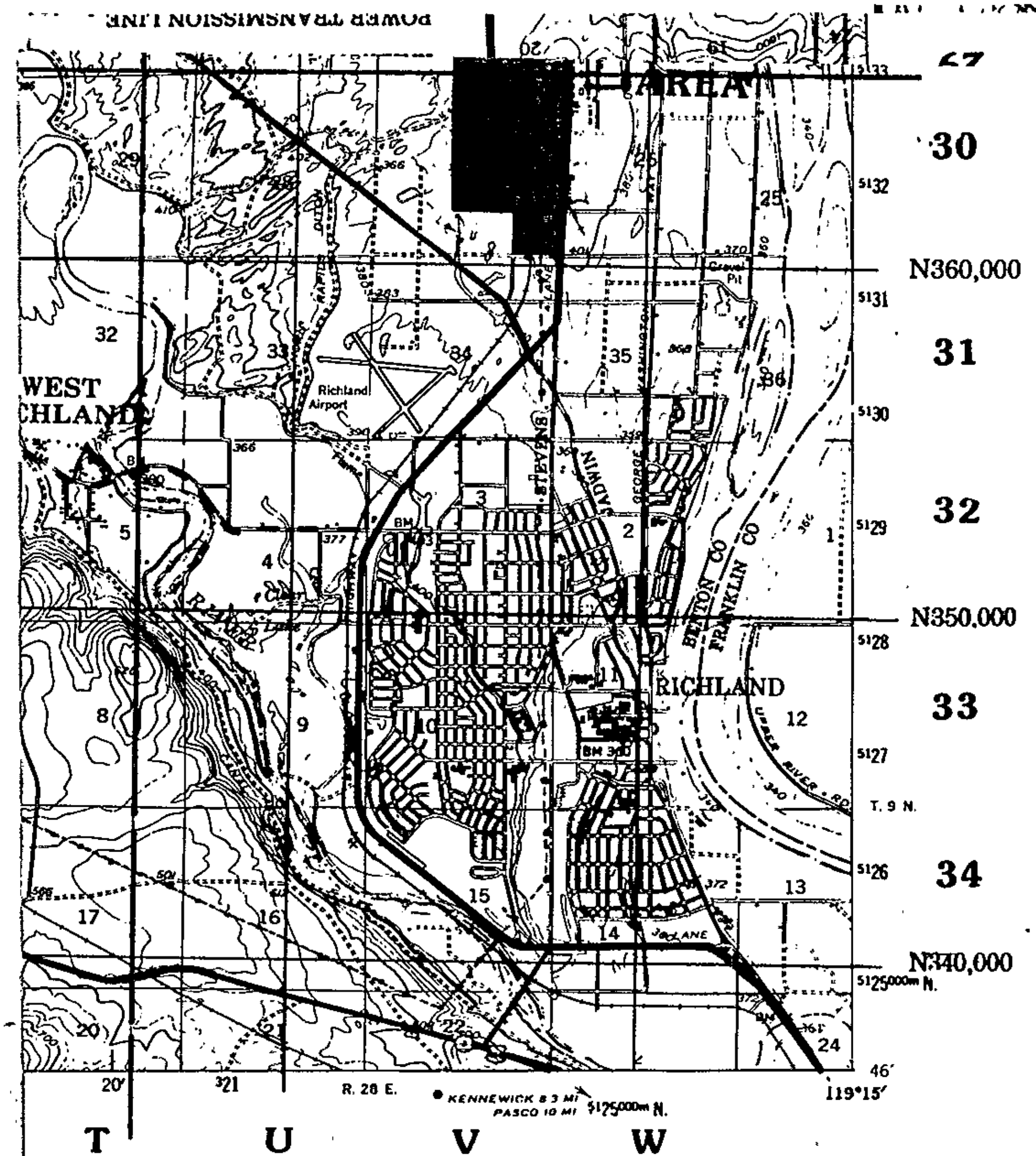
6.10 REFERENCES

See Appendix D.

APPENDICES

APPENDIX A

HANFORD SITE MAP
100-N AREA TOPOGRAPHIC MAP
HANFORD SITE WATER TABLE MAP



WING APPROVALS	DATE	U. S. Department of Energy Richland Operations Office
FOR QUALITY ASSURANCE		Rockwell Hanford Operations Richland, Washington 99352
[signature]	1/18/85	**HANFORD SITE MAP**
ONSIBLE ENGINEER MARTELL	1/18/85	
[signature]	2/8/85	
[signature]	1/18/85	
[signature]	1/18/85	

SCALE	BLDG NO	INDEX NO.
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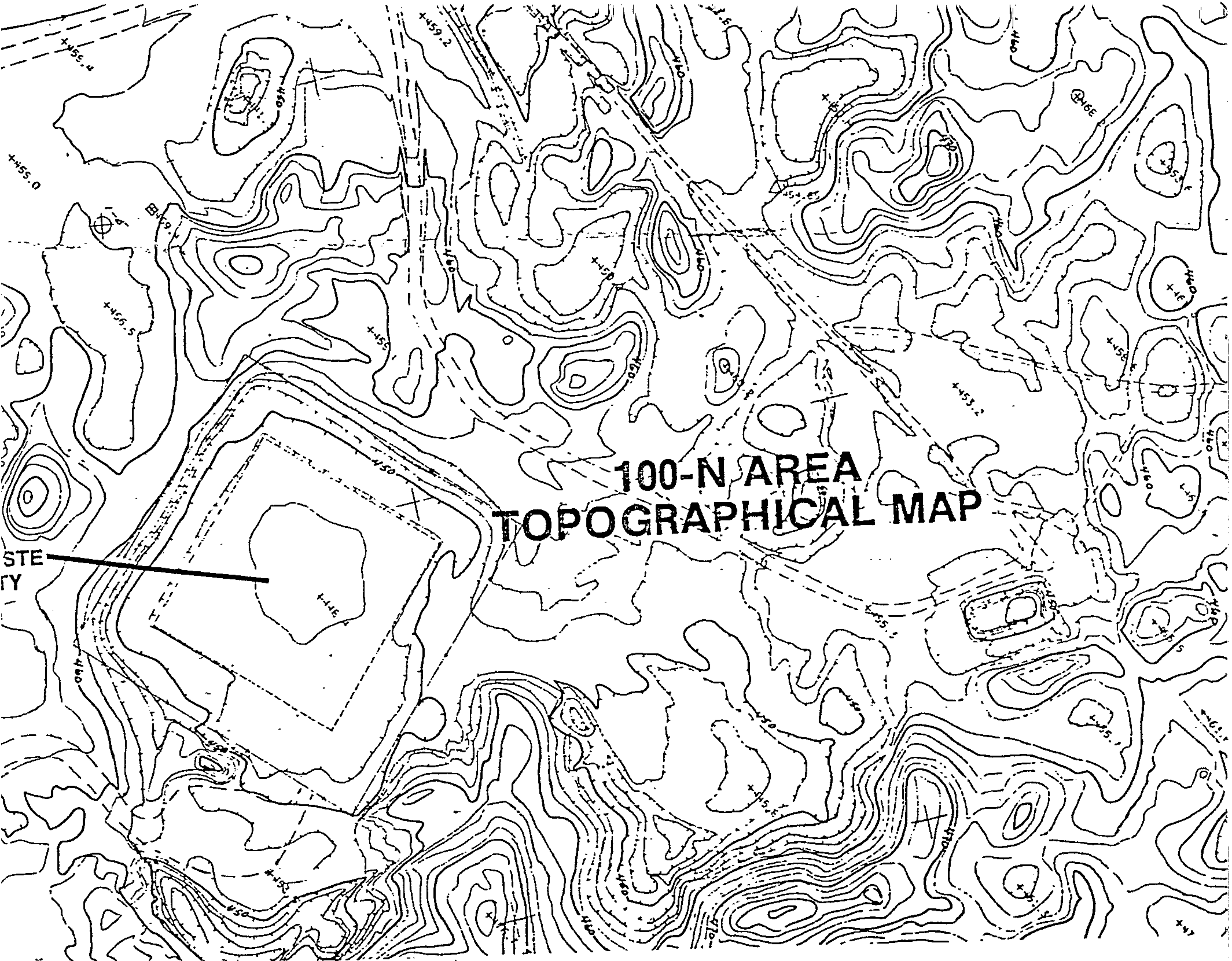
100-N AREA
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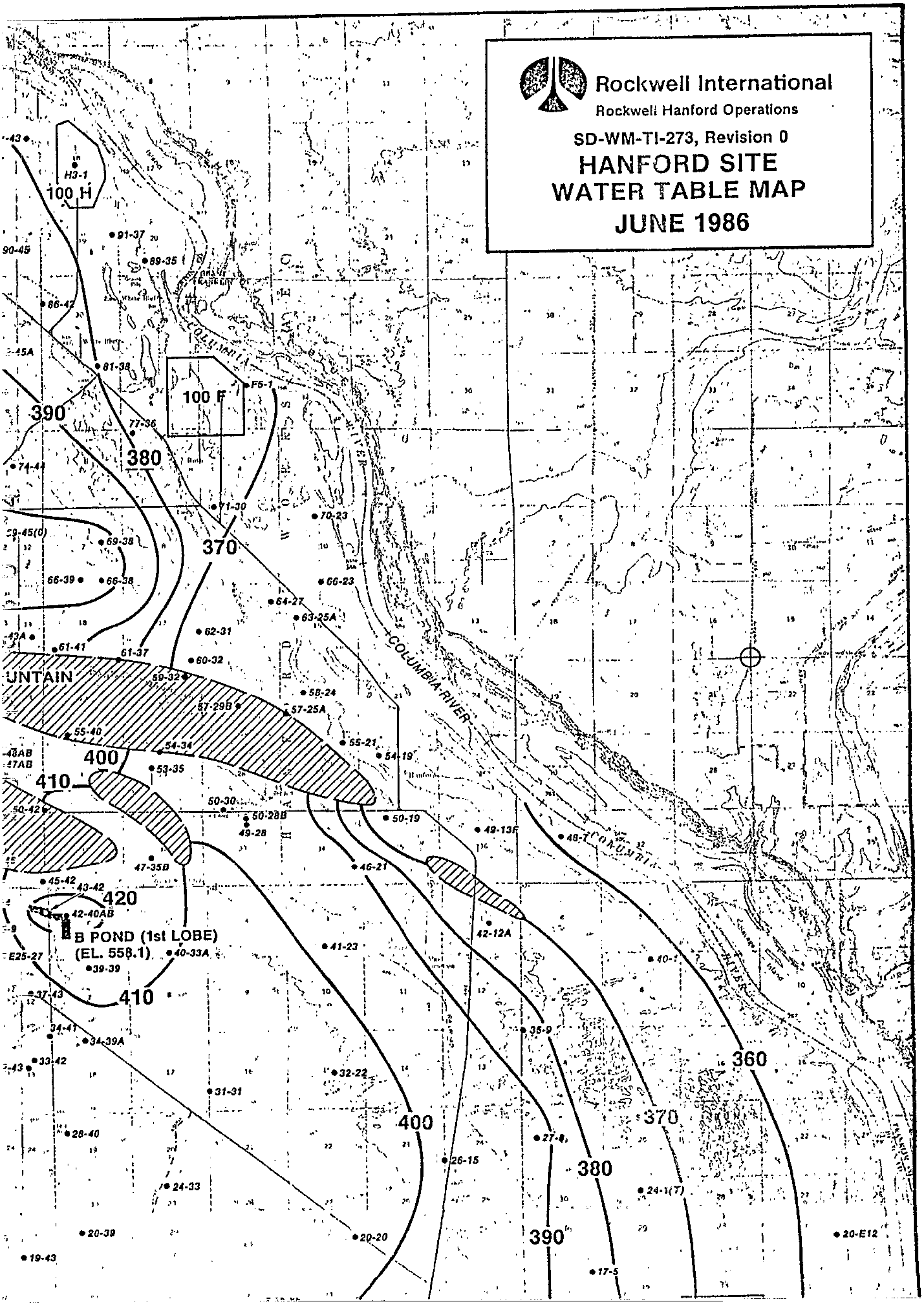
Rockwell International
Rockwell Hanford Operations
SD-WM-TI-273, Revision 0
HANFORD SITE
WATER TABLE MAP
JUNE 1986
100 H
H3-1
100 F
F5-1
COLUMBIA
COLUMBIA RIVER
UNTAIN
B POND (1st LOBE)
(EL. 558.1)
360
370
380
390
400
410
420

APPENDIX B

PROCESS STANDARD
AND
OPERATING PROCEDURES

APPENDIX B-1

PROCESS STANDARD D-406
AND
PROCESS CHANGE AUTHORIZATION

UNC NUCLEAR INDUSTRIES

PCA No. N-86-86 N-89-86

January 19, 1987

NOTICE OF CHANGE
NEW STANDARD HAS BEEN ISSUED

To: Distribution

NEW PROCESS STANDARD
D-406 "WAC 173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS"

The installation of the lined 1324-N Neutralization Pond provides for the treatment of 163-N resin bed regeneration wastes prior to disposal to ground. The waste treatment is accomplished through pH adjustment.

The purpose of this new process standard is to provide guidelines for the degree of pH adjustment necessary, prior to disposal, and set monitoring requirements for the treatment facility.

GWD:cam
GWD

K L Fowler
K. L. Fowler, Manager
Process Standards Subsection

NOTE: The following pages will be inserted in your copy of Process Standards Manual, HW-76500 and obsolete pages removed by a clerk from Process Standards or a clerk from UNC Document Control Center:

Pages to be Inserted:	Pages to be Removed:
406 - TC-1, 1&a, 2&a, 3 1-19-87	None

If your manual is not an on-the-floor copy (see dist.) and you need to review this revision before you receive your copy from DCC, it is suggested that you contact the manager of Process Standards Subsection.

UNC NUCLEAR INDUSTRIES PROCESS STANDARDS — N REACTOR	Document No. HW—76500 VOL 2	
	Page No. TC-1	Issue Date 1-19-87
Standard WAC 173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS	Superseded Date NEW	Standard No. D-406

TABLE OF CONTENTS

Prepared By: Engineer	Date	~~Issued By:~~ Approved By: Mgr. Nuclear Safety	Date	~~Reviewed By:~~ Mgr. N Plant Operations	Date
George W. Goffield	8/27/86				
Reviewed By: Mgr. Process Standards	Date	~~Reviewed By:~~ Mgr. Technology	Date	~~Accepted By:~~ Dir. Reactor Operations	Date
R L Oeuler	12/19/86				

Revised By:

BM-4600-052.2 (2-82)

UNC NUCLEAR INDUSTRIES PROCESS STANDARDS — N REACTOR	Document No. HW-76500 VOL 2	
	Page No. 1	Issue Date 1-19-87
Standard: WAC 173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS	Superseded Date NEW	Standard No. D-406

A. WAC 173-303 EFFLUENT DISCHARGE LIMITS

1. Definitions

a. WAC 173-303 - State of Washington Administrative Code Chapter 173-303 "Dangerous Waste Regulations."

b. 1324-N Neutralization Pond - A 424,000 gallon, plastic lined treatment pond, to receive resin bed regeneration wastes from 163-N.

c. 1324-NA Percolation Pond - An unlined, pond with a bottom area of 29,000 ft^2, to receive building waste from 163-N and effluent from the 1324-N Neutralization Pond.

B. GENERAL LIMITS

Liquid effluent discharges from 163-N shall be limited as follows:

1. Resin bed regeneration wastes shall, as a normal mode of operation, be impounded in the 1324-N Neutralization Pond.

   Following pH adjustment of these wastes, discharge to the 1324-NA Percolation Pond is allowable, providing the following criteria are met.

   a. pH of the solution is greater than 3.0 and less than 11.0 standard units.

   b. pH monitoring, as described by this process standard, has been provided for.

2. Normal 163-N wastes, other than resin regeneration wastes, may be discharged directly to the 1324-NA Percolation Pond with the provision:

   a. The pH shall be greater than 3.0 and less than 11.0 standard units.

J. J. Dorian 9/2/86
Reviewed by: Manager, Environmental & Emergency Preparedness

Prepared By: Engineer	Date	Issued By: Approved By: Mgr. Nuclear Safety	Date	Reviewed By: Mgr. N Plant Operations	Date
George W. Duffield	8/27/86	R D Warner	9/2/86	R R Moffitt	12-19-86
Reviewed By: Mgr. Process Standards	**Date**	**Reviewed By: Mgr. Technology**	**Date**	**Accepted By: Dir. Reactor Operations**	**Date**
R L Fowler	9/2/86	[illegible]	9/4/86	[illegible]	1/12/87

Revised By:

BM-4500-052.2 (2-82)

UNC NUCLEAR INDUSTRIES

PROCESS STANDARDS — N REACTOR

Standard
WAC 173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS 1a

BASIS

B. General Limits

The State of Washington Dangerous Waste Regulations (Washington Administrative Code Chapter 173-303) includes requirements for the proper management of designated dangerous waste. Due to the pH of the 163-N regeneration wastes, these wastes are designated as dangerous waste, having exhibited a characteristic of corrosivity. The wastes generated during the regeneration of anion and cation resin columns at 163-N must therefore be managed at a state approved treatment, storage, or disposal facility. Further, the influence of these wastes on the 009 discharge (seal well) has been demonstrated to cause conditions of noncompliance with the Hanford NPDES Permit which regulates discharges to the Columbia River. To address these concerns, a neutralization pond to receive and treat regeneration wastes has been constructed and put into service. This Process Standard implements the limits set forth in the State Dangerous Waste Regulations and makes provision for the operation of the 1324-N Neutralization Pond.

The 163-N resin column regeneration wastes have been characterized and found to contain no elements which would cause them to be classified as a dangerous waste other than pH. Therefore, the waste will be undesignated and may be disposed of to ground in the 1324-NA Percolation Pond after neutralization.

Under normal operating conditions there is a continuous discharge from the 163-N Building. This effluent consists of steam injector quenching water and demineralized water system bleed off. The pH range of this effluent results in this waste being undesignated. Therefore, impoundment of this effluent in the neutralization pond is not necessary. However, controls relating to this discharge must be adhered to closely to ensure compliance with dangerous waste regulations.

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C. SAMPLING AND MONITORING REQUIREMENTS

1. Routine Monitoring and Reporting

   a. An in-line pH meter, with recorder, shall be maintained in the following locations:

      (1) 163-N waste transport line prior to the three-way diversion valve at the 1324-N Neutralization Pond.

      (2) 1324-N Neutralization Pond overflow pipe (DC-WV-804).

      (3) 1324-N Neutralization Pond drain pipe (DC-WV-803).

   b. All in-line pH meters associated with the operation of the 1324-N Neutralization Pond shall be calibrated monthly.

   c. The pH recorder charts shall be forwarded to the Environmental Protection Subsection monthly.

   d. Total flow to the 1324-N Neutralization Pond shall be determined and reported to the Environmental Protection Subsection monthly.

D. J. Orine 9/2/86
Reviewed by: Mgr. Environmental & Emergency Preparedness

Prepared By: Engineer	Date	Issued By: Approved By: /Mgr. Nuclear Safety	Date	Reviewed By: Mgr. N Plant Operations	Date
George W. Duffield	8/27/86	K C Warner	9/2/86	R. J. ...	12-19-86
Reviewed By: Mgr. Process Standards	**Date**	**Reviewed By: Mgr. Technology**	**Date**	**Accepted By: Dir. Reactor Operations**	**Date**
K L Doucher	9/2/86	...	9/4/86	...	1/12/87

Revised By:

BM-4600-062.2 (2-82)

UNC NUCLEAR INDUSTRIES

PROCESS STANDARDS — N REACTOR -

Standard

WAC 173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS 2a

BASIS

C. Sampling and Monitoring Requirements

The 163-N Neutralization Pond is not currently permitted as a treatment facility and therefore no requirements for reporting of activities exist. However, it is expected that as a condition of the treatment, storage and disposal permit which has been applied for, there will be reporting requirements which will call for knowledge of the quantity and quality of wastes being discharged. Item C of this process standard provides for accumulation of data which will satisfy these anticipated needs.

UNC NUCLEAR INDUSTRIES PROCESS STANDARDS — N REACTOR	Document No. HW—76500 VOL 2	
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2. Deviations From Routine Monitoring and Sampling

a. The routine monitoring and reporting schedule shall not be deviated from except:

(1) When equipment failure precludes monitoring. Repairs shall be made as soon as practical.

b. Upon deviation from the routine monitoring and reporting schedule:

(1) The Environmental Protection Subsection shall be notified within 24 hours of the deviation.

(2) The cause of the deviation and alternate actions shall be recorded in the 163-N control room log book.

c. If continuous pH monitoring is not available, pH data shall be collected in the following manner:

(1) 1324-N Neutralization Pond discharges:

(aa) five minute intervals while discharging.

(2) 163-N waste transport line:

(aa) one hour intervals while the flow is directed to the 1324-NA Percolation Pond.

(bb) none required while the flow is directed to the 1324-N Neutralization Pond.

WP#0127P

J. J. Orvin 9/2/86
Reviewed by: Mgr. Environmental & Emergency Preparedness

Prepared By: Engineer	Date	Issued By: Approved By: Mgr. Nuclear Safety	Date	Reviewed By: Mgr. N Plant Operations	Date
George W. Duffield	8/27/86	J. Warner	9/2/86	R. J. Moffitt	12-19-86
Reviewed By: Mgr. Process Standards	**Date**	**Reviewed By: Mgr. Technology**	**Date**	**Accepted By: Dir. Reactor Operations**	**Date**
K L Fowler	9/2/86	[illegible]	9/4/86	[illegible]	1/12/87

Revised By: ______

BM-4500-052.2 (2-82)

UNCLASSIFIED

N-REACTOR PROCESS CHANGE AUTHORIZATION			OTHER BLDG. IMPL. 163-N	PCA NO. N-18-87
				ISSUE DATE 3-20-87
APPROVED (Mgr. Nuc. Safety) [signature]	DATE 3-10-87	Mgr. Environmental Safety [signature]	DATE 3/10/87	EXPIRATION DATE Standard Revision
APPROVED (Mgr. N Plant Operations) [signature] for	DATE 3/19/87		DATE	TS IMPLICATIONS None
REFERENCE Process Standard D-406 "WAC-173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS				REASON FOR PCA Revise Standard
TITLE CHANGE IN pH LIMITS AND INSPECTION REQUIREMENTS				

This Process Change Authorization will amend the pH limits and establish the inspection requirements necessary for compliance with WAC-173-303 requirements for the operation of the 1324-N surface impoundment.

Section B.1.a and B.2.a (page 1) of the referenced standard are revised as follows:

B. GENERAL LIMITS Liquid effluent discharges from 163-N shall be limited as follows:

1. Demineralizer resin bed regeneration wastes shall, as a normal mode of operation, be impounded in the 1324-N Neutralization Pond.

   Following pH adjustment of these wastes, discharge to the 1324-NA Percolation Pond is allowable, providing the following criteria is met.

   a. pH of the solution is greater than 4.0 and less than 11.0 standard units.

2. Normal 163-N process waste water, other than demineralizer resin regeneration wastes, may be discarded directly to the 1324-NA Percolation Pond with the provision:

   a. The pH shall be greater than 4.0 and less than 11.0 standard units.

Section C.1 of the referenced standard is revised as follows:

C. SAMPLING AND MONITORING REQUIREMENTS

1. Deviations From Routine Monitoring and Sampling

   If continuous pH monitoring is not available, pH data shall be collected and recorded on the attached form (Attachment 1).

   a. 1324-N neutralization pond discharges:

      - Fifteen-minute intervals while discharging.

   b. 163-N waste transport line:

      - Twice per shift while the flow is directed to the 1324-NA percolation pond.

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A-4500-165 (10-86)

N-REACTOR PROCESS CHANGE AUTHORIZATION

OTHER BLDG. IMPL. 163-N				PCA NO. N-18-87
				ISSUE DATE 3-20-87
APPROVED (Mgr. Nuc. Safety) [signature]	DATE 3-10-87	Mgr. Environmental Safety [signature]	DATE 3/10/87	EXPIRATION DATE Standard Revision
APPROVED (Mgr. N Plant Operations) [signature] for	DATE 3/19/87		DATE	TS IMPLICATIONS None
REFERENCE Process Standard D-406 "WAC-173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS"				REASON FOR PCA Revise Standard
TITLE CHANGE IN pH LIMITS AND INSPECTION REQUIREMENTS				

Additional new requirements call for the inclusion of the following inspection procedure to be recorded on the attached form (Attachment 2) on a weekly basis.

D. INSPECTION REQUIREMENTS

1. Inspection

a. Inspection of Overtopping Control System

Normal operation of the 1324-N surface impoundment maintains a freeboard of 4 feet below the impoundment overflow channel. Auxiliary Operations will take pre-planned manual actions to avert overtopping.

b. Fences and Gates

Ensure that the fence surrounding the perimeter of the surface impoundment is secure, and that the gate is closed and locked. Fences and gates should be inspected weekly.

c. Signs

The warning sign on the perimeter fence should be inspected for deterioration. This sign needs to be visible from 25 feet away.

d. Dike Integrity

Inspect the dike surrounding the surface impoundment weekly, for signs of deterioration, erosion, subsidence, and vegetation.

e. Liner Integrity

Inspect the surface impoundment liner weekly for rips, tears, or punctures in the liner, and for signs of subsidence under the liner.

2. Operating Equipment

a. Drains

Ensure that the drains have not deteriorated or become blocked.

N-REACTOR PROCESS CHANGE AUTHORIZATION

OTHER BLDG. IMPL. 163-N				PCA NO. N-18-87
				ISSUE DATE 3-20-87
(Mgr. Nucl. Safety) [signature]	DATE 3-10-87	Mgr. Environmental Safety [signature]	DATE 3/10/87	EXPIRATION DATE Standard Revision
APPROVED (Mgr. N Plant Operations) [signature] for	DATE 3/19/87		DATE	TS IMPLICATIONS None
REFERENCE Process Standard D-406 "WAC-173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS"				REASON FOR PCA Revise Standard.
TITLE CHANGE IN pH LIMITS AND INSPECTION REQUIREMENTS				

D. INSPECTION REQUIREMENTS (Cont.)

2. Operating Equipment (Cont.)

b. Valves

Ensure that the valves have not deteriorated and are operational.

c. Sample Pumps

Ensure that the sample pumps are in place in the impoundment area and are operational.

d. Air Sparger System

Inspect the air sparger system for any obvious signs of deterioration.

e. Leak Detection System

Inspect the above-ground portions of the leak detection system to check for signs of deterioration.

3. Safety and Emergency Equipment

a. Telephone

Ensure that the telephone in the sample building is operational.

b. Protective Clothing

Verify that protective clothing and gloves are stored at the surface impoundment.

RED DOTS: 406 - 1 @ 15 cm
406 - 1 @ 19 cm
406 - 3 @ 12 cm
406 - 3 @ 13.5 cm
406 - 3 @ 15 cm

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N-REACTOR PROCESS CHANGE AUTHORIZATION

OTHER BLDG. IMPL. 163-N				PCA NO. N-18-87
				ISSUE DATE 3-20-87
APPROVED (Mgr. Nucl. Safety) [signature]	DATE 3-10-87	Mgr. Environmental Safety [signature]	DATE 3/10/87	EXPIRATION DATE Standard Revision
APPROVED (Mgr. N Plant Operations) [signature] for	DATE 3/19/87		DATE	TS IMPLICATIONS None
REFERENCE Process Standard D-406 "WAC-173-303 EFFLUENT DISCHARGE LIMITS AND MONITORING REQUIREMENTS				REASON FOR PCA Revise Standard
TITLE CHANGE IN pH LIMITS AND INSPECTION REQUIREMENTS				

DISCUSSION AND BASIS

The WAC-173-303 establishes pH limits of 2.0 to 12.5 for corrosive wastes and requires the NACE Standard TM-01-69 to be met as well. This test has now been conducted and the new pH limits are 4.0 and 11.0.

The WAC-173-303 also calls for written verification that the inspection requirements outlined in the regulations are conducted on a weekly basis. The attached form will accomplish this record (Attachment 2).

GRC
GRC:cam

:achments (2)

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A-4500-165 (10-86)

DAILY LOG

Date__________

1324-NA Percolation Pond

Requirements: 2 samples/shift when discharge to 1324-NA directly

Graveyard	Days	Swing
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH____ Init:____

Requirements: Sample every 15 minutes when discharge from 1324-N to 1324-NA
Indicate start time of draining 1324-N Neutralization Pond:____________ Init:________

Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____
Time:____ pH:____ Init:____	Time:____ pH:____ Init:____	Time:____ pH:____ Init:____

Shift Supervisor:______________________

BC-5400-328(3-87)

APPENDIX B-2

1324-N OPERATING PROCEDURE
16-76

Class		System	Task No.	Rev.	Supersedes Issue Dated		Issue Date	Page
I		16	76	NEW		163-N	JUN 27 1986	1 of 12

OPERATE DEMIN WASTE NEUTRALIZATION POND

Initiated: Date ____________ Time ____________ Supervisor ____________

Completed: Date ____________ Time ____________ Supervisor ____________

Review for Completeness: Shift Manager ____________________

Introduction

This is a procedure to neutralize the demin waste water by using the 1324-N neutralization pond.

The demin waste water is a combination of sodium hydroxide, sulfuric acid, and demineralized water that was used for the regeneration of resins at the 163-N building. The waste water must be neutralized before it can be dumped to the percolation pond.

References

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DC-86166
Process Standard D-400 and applicable PCAs
UNI-M-38, Industrial Safety Manual.

Safety

Comply with Industrial Safety Control No. 24, "Acid and Caustic Materials."
Avoid contacting sodium hydroxide and sulfuric acid with skin or eyes. Contact with these chemicals may cause severe burns or loss of sight. If contact occurs, flush area with water for 15 minutes and call First Aid immediately.
Avoid breathing chemical mists.
Wear goggles and rubber gloves (as a minimum) when operating valves.
Watch for snakes.
Maintain communication between 163-N control room and operator at 1324-N pond.
Follow all standard and posted building safety rules.

Special Tools, Equipment, and Supplies

Stopwatch
Acid goggles
Rubber gloves
Two-way radio

Prerequisites

Shift Manager's approval before starting job.

Class		System	Task No.	Rev.	Supersedes Issue Dated		Issue Date	Page
I		16	76	NEW		163-N	JUN 27 1986	2 of 12

Procedure | Date | Initial

I. DETERMINE AMOUNT OF CAUSTIC OR ACID NEEDED TO NEUTRALIZE DEMIN WASTE

1. Verify depth of neutralization pond by observing indicator on side of pond. ______ ______

2. Record depth of pond. ______ ______ ______

3. Perform the following substeps to determine pH of neutralization pond:

   a. Verify sample pump switch is on for pump taking sample from bottom of neutralization pond.

   b. Verify water sample valve DCWV-807 is open and a steady stream of water is flowing from hose to pH probe.

   c. Observe pH meter to determine pH of neutralization pond.

   d. Record pH of neutralization pond.

   ______ ______ ______

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4. Compare depth and pH of neutralization pond to charts on pages 10 and 11 to determine amount of caustic or acid needed to neutralize demin water. ______ ______

5. Record amount of caustic or acid needed.

   caustic needed ______________
   acid needed ______________ ______ ______

IF caustic is to be added to neutralization pond, perform section II.

IF acid is to be added to neutralization pond, perform section III.

II. TRANSFER CAUSTIC TO NEUTRALIZATION POND

~~1. Open demin chemical waste valve DCWV-801 to neutralization pond.~~

~~2. Close demin chemical waste valve DCWV-~~ ~~860~~ 800 ~~to percolation pond.~~

1. Operate manual handwheel for demin chemical waste valves DCWV-800 and DCWV-801 until indicator arrow points to O. Valve DCWV-801 to neutralization pond will be open and valve DCWV-800 to percolation pond will be shut (closed). ______ ______

8-21-86
P+I 8-21-86 LJ
P+I 10-6-86 LJ
10-7-86

8M-4300-348.2 (2-80)

Class		System	Task No.	Rev.	Supersedes Issue Dated		Issue Date	Page
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Procedure (contd.) | Date | Initial

3. Perform the following substeps to start diesel air compressor:

    a. Verify fuel tank has adequate supply of fuel.

    b. Verify fuel supply valve on side of fuel tank is open.

    c. Check oil dipstick for adequate supply of lube oil.

    d. Depress START button on side of diesel to start diesel air compressor.

    e. Check that oil pressure gage on side of diesel reads between 50 and 60 psi.

    f. Observer that water temperature gage on side of diesel reads less than 210 degrees.

    g. Adjust air regulating valve inside diesel to maintain 30 to 35 psi on air pressure gage on back of diesel.

    h. Verify air is bubbling from bottom of neutralization pond. ______ ______

4. Verify caustic block valve 976 is closed. ______ ______

5. Set CV-2 and CP-3 control switches to CLOSE. Observe green lights go off and red lights come on. ______ ______

6. Set CP-2 control switch to OPEN. Observe red light comes on and green light goes off. ______ ______

IF secondary cation regen tank is not in service, perform steps 7 and 8.

IF secondary cation regen tank is in service, NA steps 7 and 8, and go to step 9.

7. Set SCR-3 and SCR-1 control switches to OPEN to help transfer caustic. Observe red lights come on and green lights go off. ______ ______

8. Observe flow recorder FR-8 indicates 300 to 400 gpm. ______ ______

IF secondary cation regen tank is not in service, NA steps 9 and 10, and go to step 11.

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I		16	76	NEW		163-N	JUN 27 1986	4 of 12

Procedure (contd.)

	Date	Initial
P+I 7-30-86 LJ 9. Set PCR ~~SC~~-3 and PCR ~~SC~~-1 control switches to OPEN to help transfer caustic. Observe red lights come on and green lights go off.	___	___
editorial 10. Observe flow recorder FR-9 reads 300 to 400 gpm.	___	___
11. Set CAUSTIC PUMP NO. 2 control switch to HAND. Observe red light comes one.	___	___
12. Open caustic drain block valve SULV-490.	___	___
NOTE: Stopwatch needed to perform step 13.		
13. Throttle open caustic regulating valve SULV-491 to desired gpm. Time with stopwatch to determine gallons of caustic being injected.	___	___
WHEN desired gallons of caustic has been injected as determined in section I, go to step 14.		
14. Close caustic regulating valve SULV-491.	___	___
15. Close caustic drain block valve SULV-490.	___	___
16. Set CAUSTIC PUMP NO. 2 control switch to OFF.	___	___
17. Set CP-2 control switch to CLOSE. Observe red light goes off and green light comes on.	___	___
18. Set CV-2 control switch to OPEN. Observe red light goes off and green light comes on.	___	___
19. Record amount of caustic added. ______	___	___
WHEN pH of neutralization pond has stabilized (30 to 45 minutes), go to step 20.		
20. Observe pH meter at 1324-N to determine pH of neutralization pond.	___	___
21. Record pH of neutralization pond. ______	___	___

IF pH is within Process Standard D-400 limits or applicable PCA, go to step 22.

IF pH is NOT within Process Standard D-400 limits or applicable PCA, redo section I.

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Class		System	Task No.	Rev.	Supersedes Issue Dated		Issue Date	Page
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Procedure (contd.) Date Initial

22. Perform the following substeps to test pH of waste water inlet line:

   a. Verify sample pump switch is on for pump taking sample from inlet line.
   b. Verify water sample valve DCWV-808-1 is open.
   c. Transfer pH probe from bottom drain water to inlet water.
   d. Observe pH meter to determine pH of inlet water.
   e. Record pH of inlet water. ________

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WHEN pH of inlet water is within Process Standard D-400 limits or applicable PCA, go to step 23.

23. Operate manual handwheel for demin chemical waste valves DCWV-800 and DCWV-801 until indicator arrow points to S. Valve DCWV-801 to neutralization pond will be shut (closed) and valve DCWV-800 to percolation pond will be open.

~~23. Open DCWV-809 to percolation pond.~~ 800

~~24. Close DCWV-801 to neutralization pond.~~

IF secondary cation regen tank was used to help transfer caustic, perform steps 25 and 26.

Otherwise, NA steps 25 and 26, and go to step 27.

25. Set SCR-3 and SCR-1 control switches to CLOSE. Observe red lights come on and green lights go off.

26. Observe flow recorder FR-8 reads 0 gpm.

IF secondary cation regen tank was used to help transfer caustic, NA steps 27 and 28, and go to step 29.

27. Set ~~SC~~ PCB-3 and ~~SC~~ PCB-1 control switches to CLOSE. Observe red lights come on and green lights go off.

28. Observe flow recorder FR-9 reads 0 gpm.

29. Transfer pH probe from inlet water to bottom drain water.

CAUTION: Demin waste water pH must be within Process Standard D-400 limits or applicable PCA when draining.

30. Monitor pH of neutralization pond throughout the draining process and record. ________

P+I 10-6-86 LJ; P+I 8-21-86 LJ; P+I 7-30-86 LJ editorial

BM-4300-348.2 (2-80)

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Procedure (contd.) Date Initial

steps 31A, 34, 32A + III.1 10/7/86

31. Open DCWV-803 to drain neutralization pond.
31A. open DCWV-814 to drain neutralization pond.
WHEN neutralization pond is empty, go to step 32.

P+I 10-6-86 LJ

32. Close drain valve DCWV-803.
32A. Close drain valve DCWV-814.
33. Pull MANUAL SPEED CONTROL AND STOP handle to stop diesel air compressor.
34. Close air compressor discharge valve

III. TRANSFER ACID TO NEUTRALIZATION POND

1. Operate manual hendwheel for demin chemical waste valves DCWV-800 and DCWV-801 until indicator arrow points to O. Value DCWV-801 to neutralization pond will be open and value DCWV-800 to percolation pond will be shut (closed).

8-21-86 P+I 8-21-86 LJ

~~1. Open demin chemical waste valve DCWV 801 to neutralization pond.~~

~~2. Close demin chemical waste valve DCWV 800 to percolation pond.~~

3. Perform the following substeps to start diesel air compressor:

   a. Verify fuel tank has adequate supply of fuel.

   b. Verify fuel supply valve on side of fuel tank is open.

   c. Check oil dipstick for adequate supply of lube oil.

   d. Depress START button on side of diesel to start diesel air compressor.

   e. Check that oil pressure gage on side of diesel reads between 50 and 60 psi.

   f. Observer that water temperature gage on side of diesel reads less than 210 degrees.

   g. Adjust air regulating valve inside diesel to maintain 30 to 35 psi on air pressure gage on back of diesel.

   h. Verify air is bubbling from bottom of neutralization pond.

4. Verify acid block valve 876 is closed.

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Procedure (contd.)

	Date	Initial
5. Set AV-2 and AP-3 control switches to CLOSE. Observe green lights go off and red lights come on.	____	____
6. Set AP-2 control switch to OPEN. Observe red light comes on and green light goes off.	____	____

IF secondary cation regen tank is not in service, perform steps 7 and 8.

IF secondary cation regen tank is in service, NA steps 7 and 8, and go to step 9.

	Date	Initial
7. Set SCR-3 and SCR-1 control switches to OPEN to help transfer acid. Observe red lights come on and green lights go off.	____	____
8. Observe flow recorder FR-8 indicates 300 to 400 gpm.	____	____

IF secondary cation regen tank is not in service, NA steps 9 and 10, and go to step 11.

LJ P+I 7-30-86 editorial

	Date	Initial
9. Set ~~SC~~ PCR-3 and ~~SC~~ PCR-1 control switches to OPEN to help transfer caustic. Observe red lights come on and green lights go off.	____	____
10. Observe flow recorder FR-9 reads 300 to 400 gpm.	____	____
11. Set ACID PUMP NO. 2 control switch to HAND. Observe red light comes one.	____	____
12. Open acid drain block valve SOHV-490.	____	____

NOTE: Stopwatch needed to perform step 13.

	Date	Initial
13. Throttle open acid regulating valve SOHV-491 to desired gpm. Time with stopwatch to determine gallons of acid being injected.	____	____

WHEN desired gallons of acid has been injected as determined in section I, go to step 14.

	Date	Initial
14. Close acid regulating valve SOHV-491.	____	____
15. Close acid drain block valve SOHV-490.	____	____
16. Set ACID PUMP NO. 2 control switch to OFF.	____	____
17. Set AP-2 control switch to CLOSE. Observe red light goes off and green light comes on.	____	____

Class		System	Task No.	Rev.	Supersedes Issue Dated		Issue Date	Page
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Procedure (contd.) Date Initial

18. Set AV-2 control switch to OPEN. Observe red light goes off and green light comes on.

19. Record amount of acid added.

______

WHEN pH of neutralization pond has stabilized (30 to 45 minutes), go to step 20.

20. Observe pH meter at 1324-N to determine pH of neutralization pond.

21. Record pH of neutralization pond.

______

IF pH is within Process Standard D-400 limits or applicable PCA, go to step 22.

IF pH is NOT within Process Standard D-400 limits or applicable PCA, redo section I.

22. Perform the following substeps to test pH of waste water inlet line:

   a. Verify sample pump switch is on for pump taking sample from inlet line.
   b. Verify water sample valve DCWV-808-1 is open.
   c. Transfer pH probe from bottom drain water to inlet water.
   d. Observe pH meter to determine pH of inlet water.
   e. Record pH of inlet water.

______

WHEN pH of inlet water is within Process Standard D-400 limits or applicable PCA, go to step 23.

23. Operate manual handwheel for demin chemical waste valves DCWV-800 and DCWV-801 until indicator arrow points to S. Valve DCWV-801 to neutralization pond will be shut (closed) and valve DCWV-800 to percolation pond will be open.

~~23. Open DCWV-80 to percolation pond.~~ 800

~~24. Close DCWV-801 to neutralization pond.~~

10/6/86 P+I 10-6-86 LJ 10-7-86
8-21-86 P+I 8-21-86 LJ 8-21-86

IF secondary cation regen tank was used to help transfer acid, perform steps 25 and 26.

Otherwise, NA steps 25 and 26, and go to step 27.

25. Set SCR-3 and SCR-1 control switches to CLOSE. Observe red lights come on and green lights go off.

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Procedure (contd.) Date Initial

26. Observe flow recorder FR-8 reads 0 gpm.

IF secondary cation regen tank was used to help transfer acid, NA steps 27 and 28, and go to step 29.

27. Set ~~SC~~ PCR-3 and ~~SC~~ PCR-1 control switches to CLOSE. Observe red lights come on and green lights go off.

28. Observe flow recorder FR-9 reads 0 gpm.

29. Transfer pH probe from inlet water to bottom drain water.

30. Monitor pH of neutralization pond throughout the draining process and record. ______

CAUTION Demin waste water pH must be within Process Standard D-400 limits or applicable PCA when draining.

31. Open DCWV-803 to drain neutralization pond.
31A. *Open DCWV-814 to drain neutralization pond.*
WHEN neutralization pond is empty, go to step 32.

32. Close drain valve DCWV-803.
32A. *Close drain valve DCWV-814.*
33. Pull MANUAL SPEED CONTROL AND STOP handle to stop diesel air compressor.

34. *Close air compressor discharge valve.*

10-7-86 LJ P+I 7-30-86 editorial

10-7-86 P+I 10-6-86 LJ steps 31A + 32A + 37

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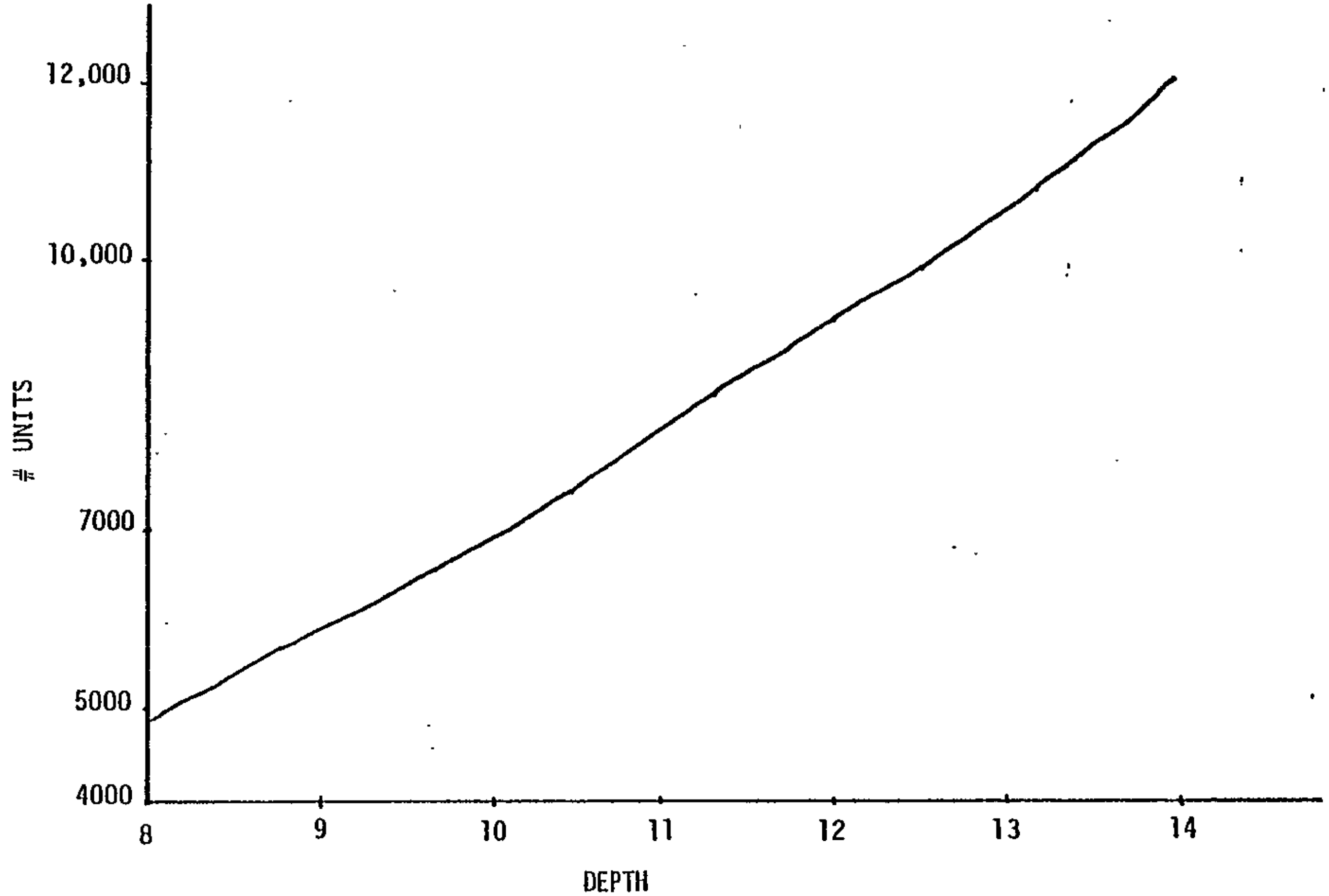
GALLONS OF CAUSTIC TO NEUTRALIZE -- pH UNCONTROLLED COPY

Pond Depth (ft)

pH In Pond	6	7	8	9	10	11	12	13	14
1.4	259	318	384	457	541	625	736	836	939
1.6	163	201	242	289	341	394	464	527	592
1.8	103	128	153	182	215	248	293	332	374
2.0	65	80	96.5	115	136	157	185	210	236
2.2	41	50.5	60.9	725	85.8	99	117	132	149
2.4	25.9	31.8	38.4	45.7	54.1	62.5	73.6	83.6	93.9
2.6	16.3	20.1	24.2	28.9	34.1	39.4	46.4	52.7	59.2
2.8	10.3	12.8	15.3	18.2	21.5	24.8	29.3	33.2	37.4
3.0	.65	8.0	9.6	11.5	13.6	15.7	18.5	21.0	23.6
3.2	.41	5.1	6.1	7.2	8.5	9.9	11.7	13.2	14.9
3.4	.26	3.2	3.8	4.5	5.4	6.2	7.3	8.3	9.4
3.6	.16	2.0	2.4	2.9	3.4	3.9	4.6	5.2	5.9
3.8	.10	1.3	1.5	1.8	2.1	2.4	2.9	3.3	3.7
4.0	.10	.80	.96	1.1	1.3	1.5	1.8	2.1	2.3
4.2	.10	.51	.61	.72	.85	.99	1.1	1.3	1.5
4.4	.10	.32	.38	.45	.54	.62	.73	.83	.94
4.6	.10	.20	.24	.29	.34	.39	.46	.52	.59
4.8	.10	.13	.15	.18	.21	.24	.29	.33	.37
5.0	.10	.13	.15	.11	.13	.15	.18	.21	.23
5.2	.10	.13	.15	.11	.13	.15	.11	.13	.15
5.4	.10	.13	.15	.11	.13	.15	.11	.13	.15
5.6	.10	.13	.15	.11	.13	.15	.11	.13	.15
5.8	.10	.13	.15	.11	.13	.15	.11	.13	.15
6.0	.10	.13	.15	.11	.13	.15	.11	.13	.15
6.2	.10	.13	.15	.11	.13	.15	.11	.13	.15
6.4	.10	.13	.15	.11	.13	.15	.11	.13	.15
6.6	.10	.13	.15	.11	.13	.15	.11	.13	.15
6.8	.10	.13	.15	.11	.13	.15	.11	.13	.15
7.0	.10	.13	.15	.11	.13	.15	.11	.13	.15

.5 gal = 2 qt
.25 gal = 1 qt
.125 gal = 1 pt



To obtain gallons of sulfuric acid:

(1) Determine pH of pond and its depth.

(2) Use graph to determine # units.

(3) Subtract pH value from 14 to determine pOH value (14 - pH = pOH).

(4) Calculate gallons using the following equation.

$$\text{gallons} = \frac{\#\ \text{units}}{10^{x}}$$

where x = pOH

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PROCEDURE DEVIATIONS/DISCREPANCIES

Deviations/Discrepancies

To record deviations this report must include identification of the instruction(s) deviated from, the reason for deviation and the duration of the change. Information must be validated by signature(s) of approver(s).

Deviation Approvers/Date

Deviation Expires

PROCEDURE AUTHORIZATION

PROCEDURE REVIEWERS:

R J Hobold — 6/26/86
Manager, Environmental & Occupational Safety — Date

E. L. Benjamin for — 6/27/86
Manager, Nuclear Safety or Safety Assessment & Analysis — Date

Name — Dept. — Date

DW Roettger — OPS — 6/26/86
Name — Dept. — Date

PREPARED BY:

L. E. Jeralds — 6/24/86
Procedures — Date

Operations — Date

APPROVAL:

John Hagan — 6-27-86
Manager, N-Plant Operations — Date

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WP #18340

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APPENDIX B-3

163-N REGENERATION PROCEDURES
16-44
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REGENERATE PRIMARY CATION RESIN

Introduction

This is a procedure to regenerate the primary cation resin. Regeneration is accomplished by transferring the resin to a regeneration tank and injecting sulfuric acid. The regeneration process can be controlled automatically or manually.

During the demineralization process, filtered water passes through the primary cation resin beds. The cation resin removes ionic impurities by ion exchange. As the cation resin loses its ability for ion exchange, the conductivity increases. When the conductivity increases to a predetermined level, the resin must be regenerated.

References

Drawing No. H-1-29200
Process Standard B-212, B-285, and D-400
CVI-13178, sheets 76 to 104
UNI-M-38, Industrial Safety Manual

Safety

Comply with Industrial Safety Control No. 24, "Acids and Caustic Materials."
Follow all standard and posted building safety rules.

Special Tools, Equipment, and Supplies

Full face shield
Gloves

Prerequisites

None

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I. REGENERATE PRIMARY CATION RESIN

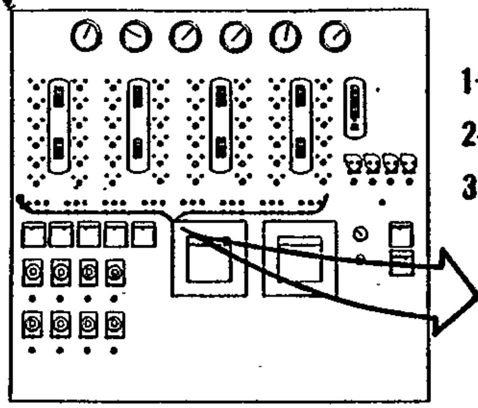
A. Checking Indicators, Controls, and Valving

1. Set the valve switches for primary cation unit needing regeneration to AUTO.

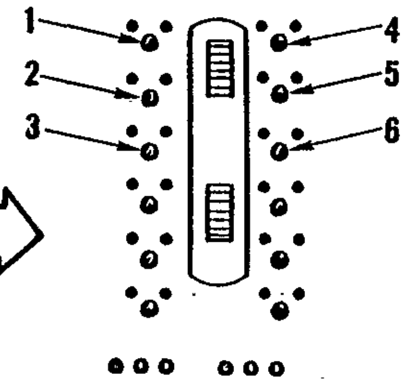
PC-1 (1)	PC-4 (4)
PC-3 (2)	PC-2 (5)
PC-5 (3)	PC-6 (6)

2. Set the valve switches for primary cation regeneration tank to AUTO.

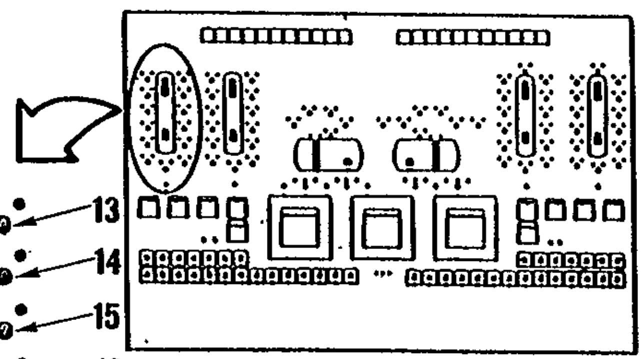
PCR-3 (7)	PCR-1 (13)
PCR-12 (8)	PCR-6 (14)
PCR-5 (9)	PCR-13 (15)
PCR-7 (10)	PCR-8 (16)
PCR-4 (11)	PCR-2 (17)
PCR-11 (12)	PCR-10 (18)
PCR-9 (19)	



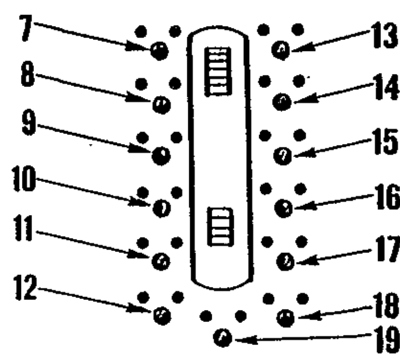
DEMIN WATER MECHANICAL CONTROL BOARD (LEFT SECTION)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY CATION REGENERATION TANK CONTROLS

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I. REGENERATE PRIMARY CATION RESIN

A. <u>Checking Indicators, Controls, and Valving (contd.)</u>

3. Set the following valve switches for acid tank to AUTO:

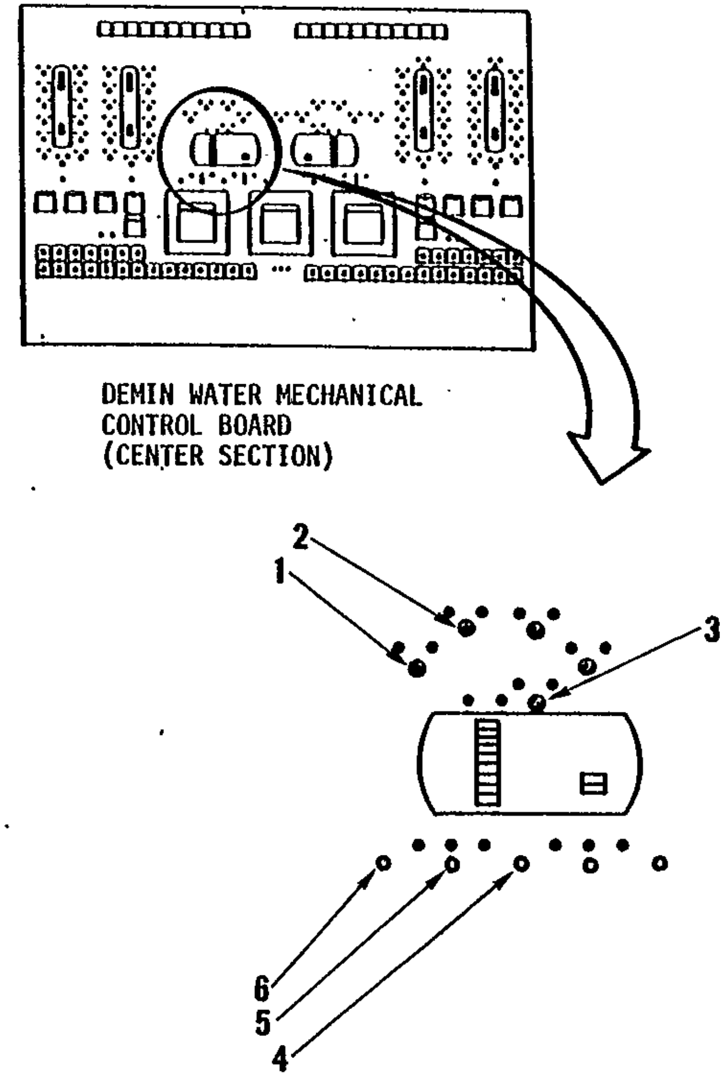
   AP-1 (1)
   AV-1 (2)

4. Verify AP-3 valve switch (3) is set to the CLOSE position.

5. Check that acid pump selector switch (4) is set to POS. 1.

6. Set switch for ACID PUMP NO. 1 (5) to AUTO.

7. Verify ACID CONCENTRATION switch (6) is set to AUTO.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)

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I. REGENERATE PRIMARY CATION RESIN

A. Checking Indicators, Controls, and Valving (contd.)

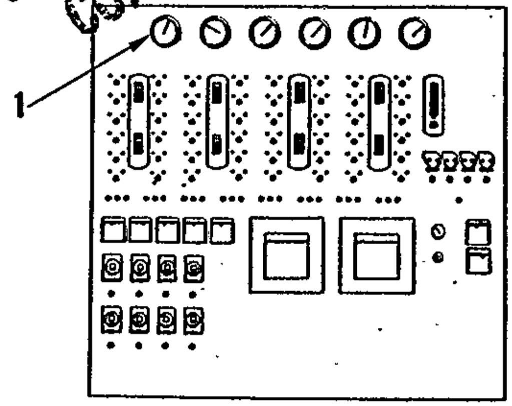
8. Check that timers (**5**) are reset.

9. Check that filtered water pressure gage PI-2 (**1**) reads between 50 and 75 psig.

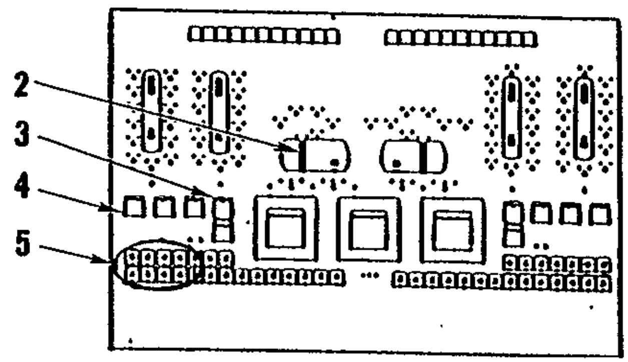
10. Check that acid tank level indicator LI-3 (**2**) reads above 40%.

11. Check that FRC-11 (**4**) setpoint is 250 gpm.

12. Check that FRC-15 (**3**) setpoint is 3.7 gpm.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT SECTION)



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)

I. REGENERATE PRIMARY CATION RESIN

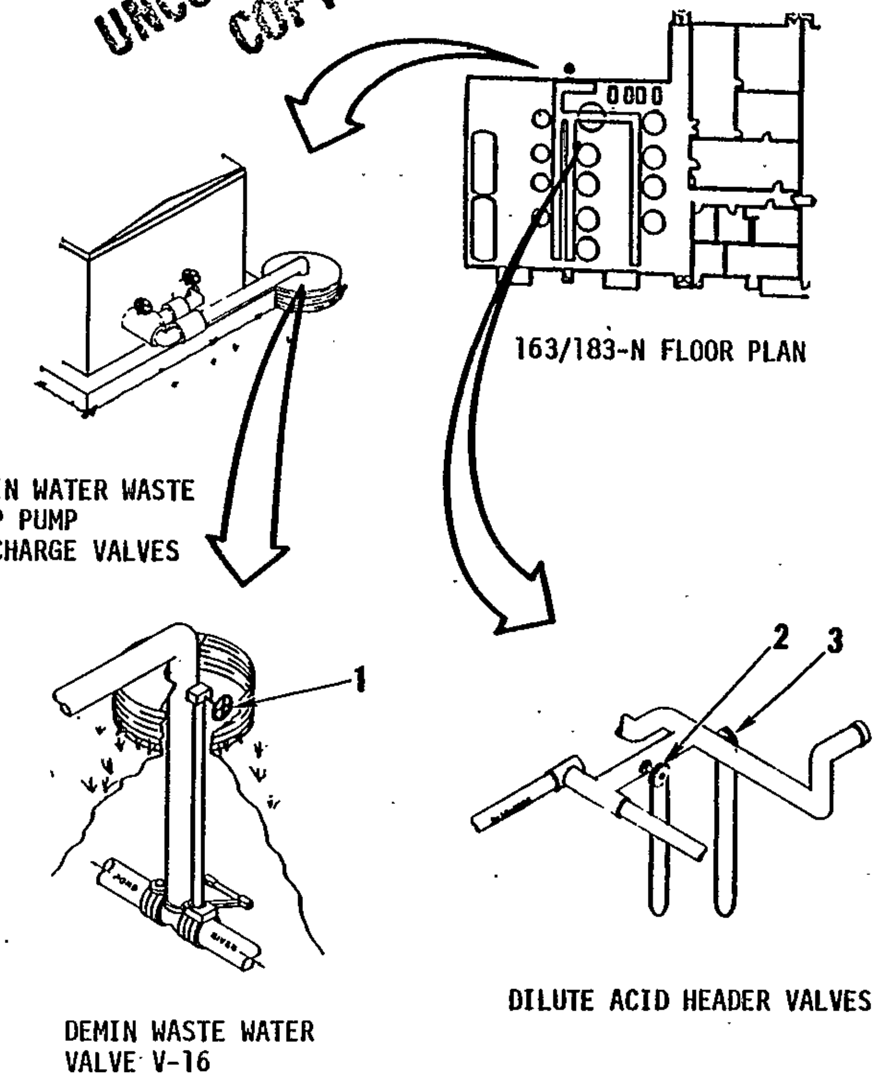
A. Checking Indicators, Controls, and Valving (contd.)

CAUTION	Valving of V-16 to the river could result in a violation of Process Standard D-400.

[redacted]

14. Verify dilute acid header valve 672 (**3**) is open.

15. Verify dilute acid header valve 628 (**2**) is closed.



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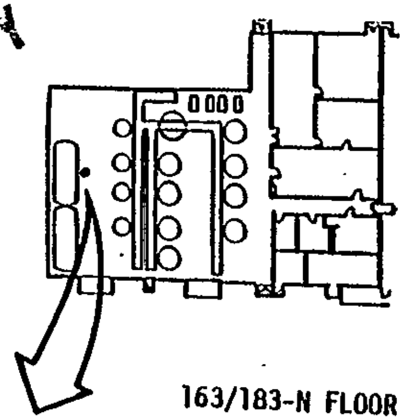
I. REGENERATE PRIMARY CATION RESIN

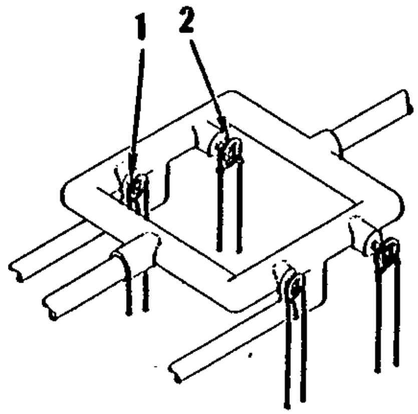
A. Checking Indicators, Controls, and Valving (contd.)

16. Verify primary anion water valve 676 (**1**) is closed.

17. Verify filtered water valve 627 (**2**) is open.



163/183-N FLOOR PLAN



DILUTE ACID
HEADER VALVES

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I. REGENERATE PRIMARY CATION RESIN

B. Removing Primary Cation Unit from Service

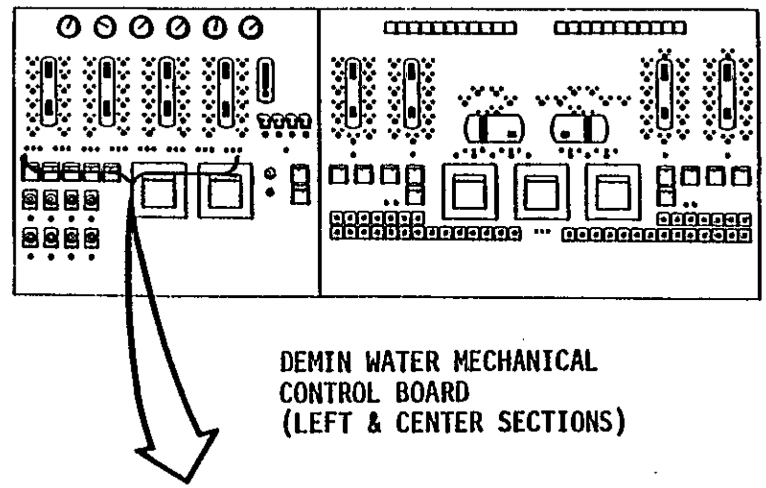
WARNING Maximum flow each PC unit is 600 gpm. Exceeding maximum flow will cause transfer of bad water and holes in the resin bed.

1. Depress REMOVE FROM SERVICE button (**4**) on primary cation unit to be regenerated.

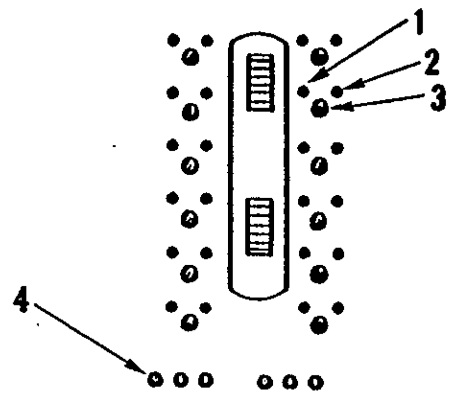
2. Check that PC-2 valve (**3**) closes by observing red light (**2**) goes off and green light (**1**) comes on.

   IF one unit is out of service for regeneration and another tank reaches END OF RUN status, the END OF RUN unit may be left in service if it is producing water within limits.

3. Determine approximate resin bed level using sightglass on side of primary cation unit. Record level in Regeneration Records Log Book.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT & CENTER SECTIONS)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

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I. REGENERATE PRIMARY CATION RESIN

C. Transferring Resin Out of Primary Cation Tank

NOTE: Each RESIN TRANSFER button is interlocked with its regeneration tank so that resin transfer cannot proceed until the previous regeneration is completed.

IF automatic controls fail to operate properly at any time, or resin is found leaking into the trench, or the automatic process needs to be stopped for any reason, operator should take manual control of process as follows:

a. Set all valve switches associated with the regeneration process to CLOSE.

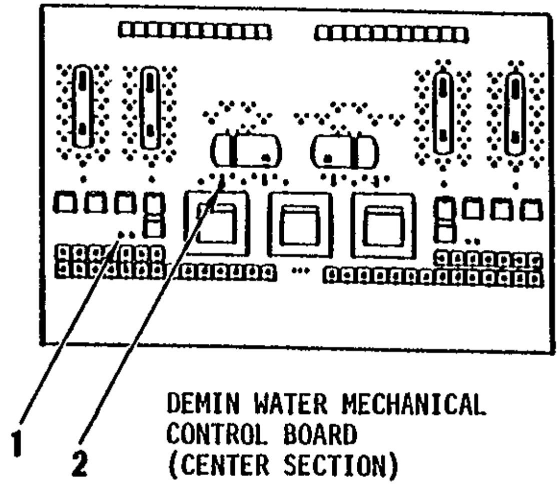
b. Set ACID PUMP NO. 1 switch (**2**) to OFF.

c. Set primary cation timer control switch (**1**) to the OFF (down) position.

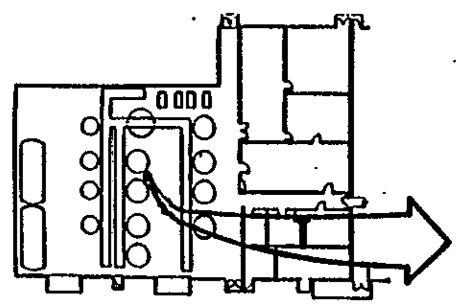
d. Manually operate valve switches as needed.

e. Notify Auxiliary Supervisor of problem.

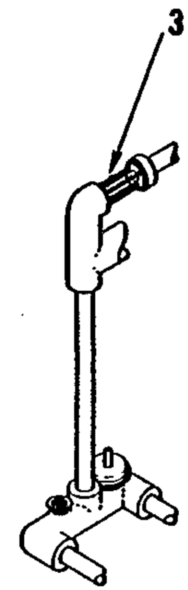
NOTE: During resin transfer, resin flow may be observed through plastic section (**3**) of resin transfer piping.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



163/183-N FLOOR PLAN



PRIMARY CATION RESIN TRANSFER PIPING

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4/24/87, Rev. 0

9-15-86 LJ P+I editorial

C. <u>Transferring Resin Out of Primary ~~Anion~~ cation Tank</u> (contd)

1. Set valve switches PCR-5 (7) and PCR-12 (6) to OPEN. Observe red lights come on and green lights go off.

2. Set valve switches PC-1 (2) and PC-3 (3) to OPEN. Observe red lights come on and green lights go off.

3. Verify resin is being transferred by observing flow recorder (1) associated with PC tank being regenerated shows 300 to 400 gpm.

4. Depress RESIN TRANSFER button (4) to start automatic resin transfer and regeneration cycle.

5. Set the following valve switches to AUTO.

PC-1 (2)	PCR-5 (7)
PC-3 (3)	PCR-12 (6)

6. Check drain trench (8) for resin leakage.

   IF resin is leaking, see IF statement on page 8.

7. Verify PCR RESIN TRANSFER OUT timer (5) has started.

   WHEN resin has been transferring for 15 minutes, proceed to step 8.

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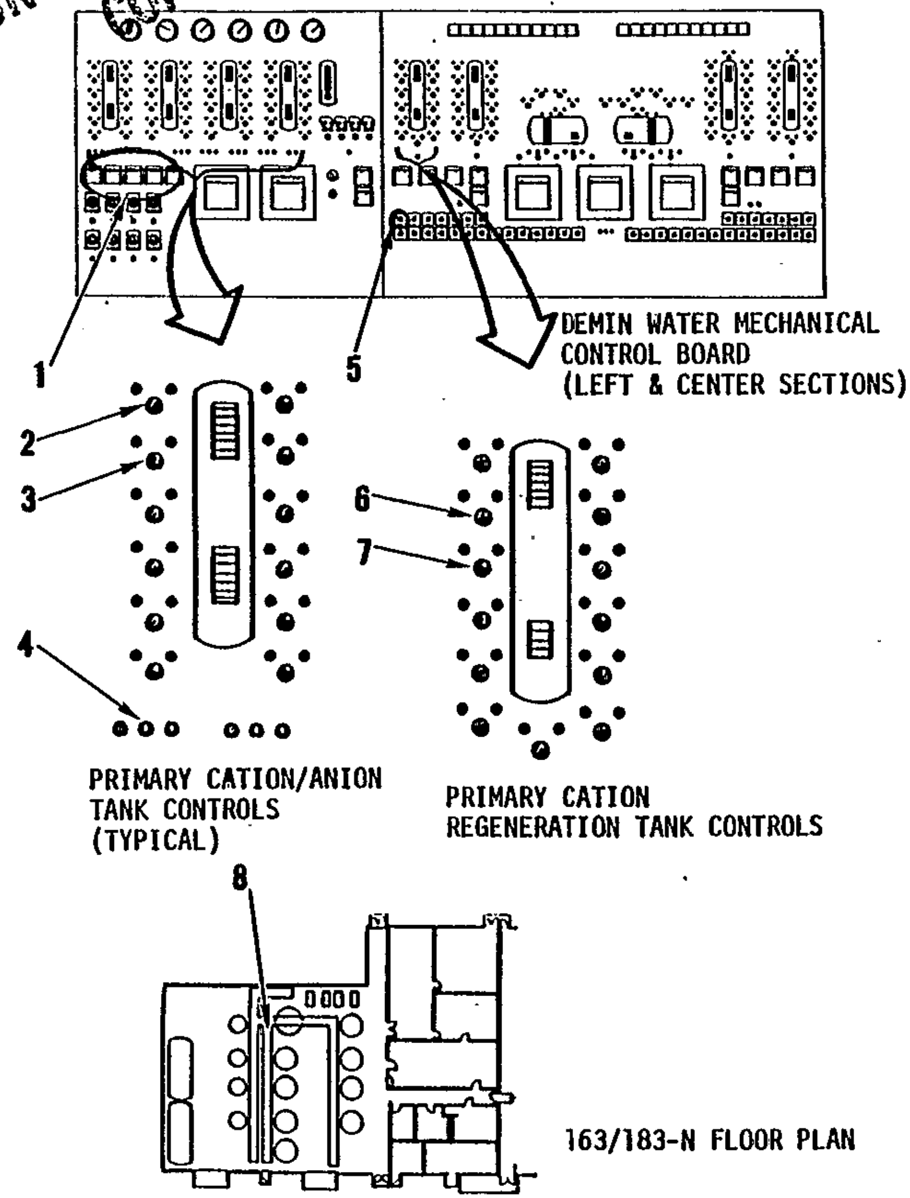

1324-NA

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I. REGENERATE PRIMARY CATION RESIN

C. Transferring Resin Out of Primary Cation Tank (contd)

8. Verify PC-5 (3) opens to bottom-flush PC tank. Observe red light comes on and green light goes off.

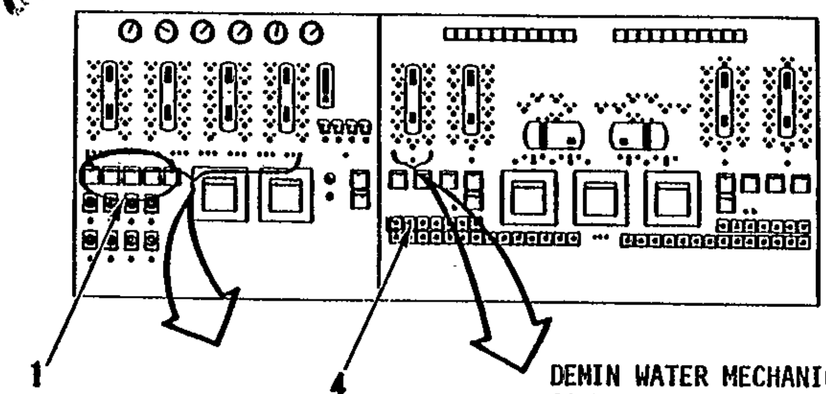
9. Verify PC-1 (2) closes by observing red light goes off and green light comes on.

10. Verify resin is still being transferred by observing flow recorder (1) associated with PC tank being regenerated shows 250 to 350 gpm.

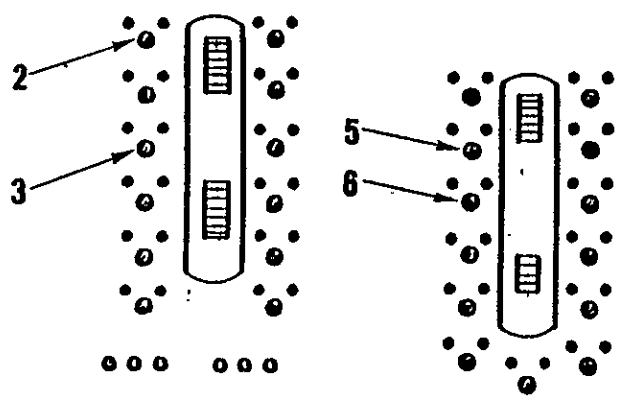
11. Verify PCR BOTTOM FLUSH CATION UNIT timer (4) has started.

WHEN PC tank has been bottom flushed for 18 minutes, proceed to step 12.

12. Verify PC-5 (3), PCR-5 (6), and PCR-12 (5) close by observing red lights go off and green lights come on.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT & CENTER SECTIONS)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY CATION REGENERATION TANK CONTROLS

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4/24/87, Rev. 0

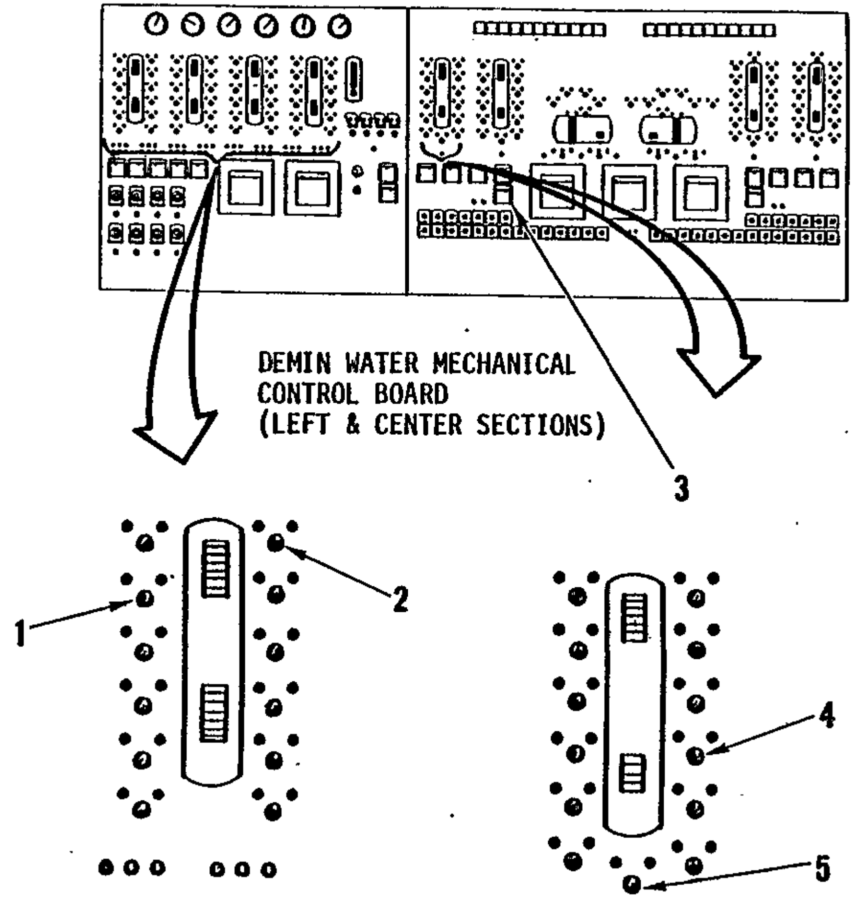
I. REGENERATE PRIMARY CATION RESIN

D. Transferring Resin Into Primary Cation Tank

1. Verify the following valves open by observing red lights come on and green lights go off.

   PC-3 (1)   PCR-8 (4)
   PC-4 (2)   PCR-9 (5)

2. Verify resin is being transferred by observing flow recorder FRC-9 (3) shows 250 to 350 gpm.



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY CATION REGENERATION TANK CONTROLS

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I. REGENERATE PRIMARY CATION RESIN

D. <u>Transferring Resin Into Primary Cation Tank</u> (contd.)

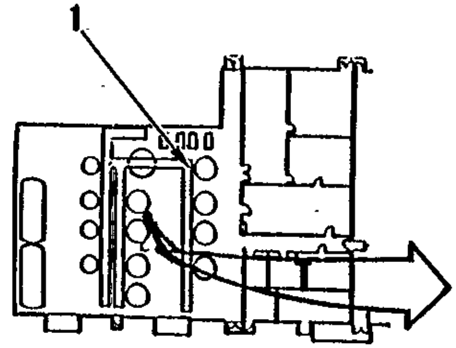
3. Observe clear plastic section of resin transfer piping (2) for resin flow.

4. Check drain trench (1) for resin leakage.

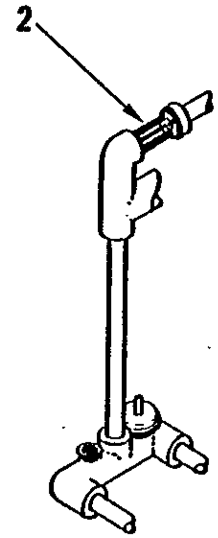
IF resin is leaking, see IF statement on page 8.

5. Verify PCR RESIN TRANSFER IN timer (3) has started.

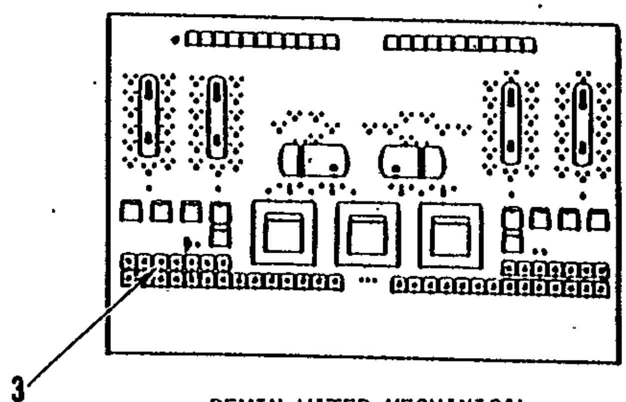
WHEN resin has been transferring to primary tank for 16 minutes, proceed to step 6.



163/183-N FLOOR PLAN



PRIMARY CATION RESIN
TRANSFER PIPING



DEMIN WATER MECHANICAL
CONTROL BOARD
(CENTER SECTION)

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I. REGENERATE PRIMARY CATION RESIN

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D. Transferring Resin Into Primary ~~Anion~~ Cation Tank (contd)

6. Verify PCR-10 (**7**) opens to bottom flush PCR tank. Observe red light comes on and green light goes off.

7. Verify resin is still being transferred by observing FRC-9 (**5**) shows 250 to 350 gpm.

8. Verify PCR BOTTOM FLUSH RESIN STORAGE TANK timer (**4**) has started.

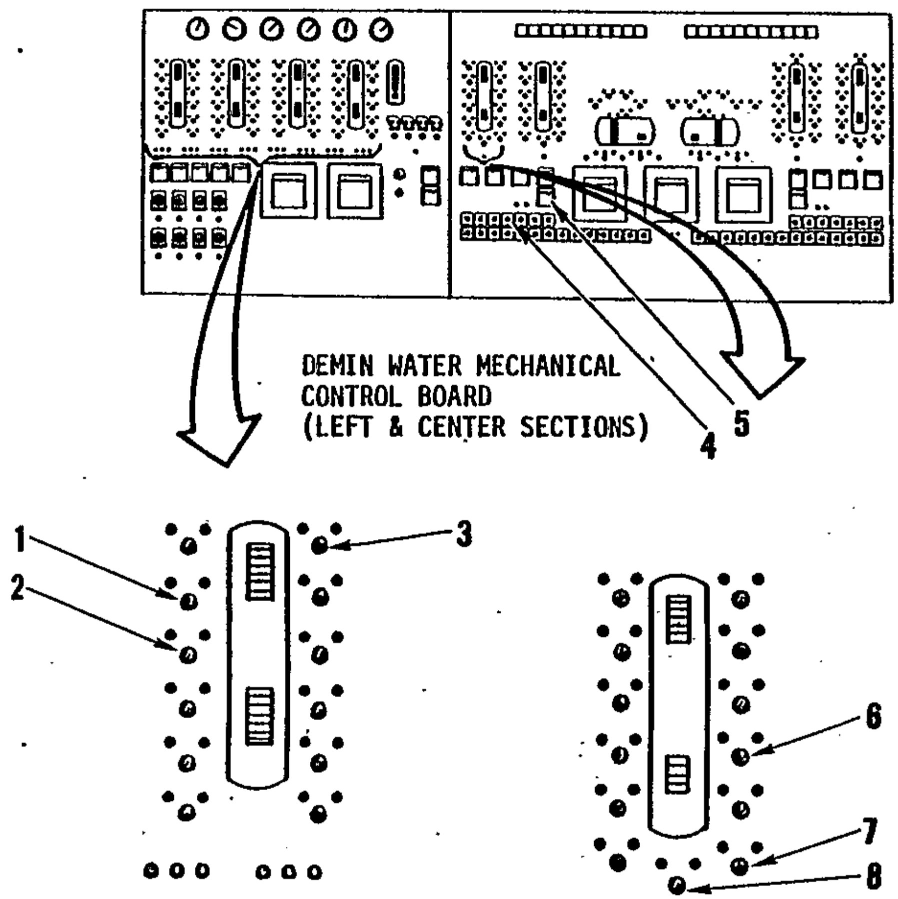
WHEN PCR tank has bottom flushed for 20 minutes, proceed to step 9.

9. Verify PC-5 (**2**) opens to level resin bed. Observe red light comes on and green light goes off.

WHEN PC tank has been on bed level for 2 minutes, proceed to step 10.

10. Verify the following valves close by observing red lights go off and green lights come on.

PC-3 (**1**)	PCR-8 (**6**)
PC-4 (**3**)	PCR-9 (**8**)
PC-5 (**2**)	PCR-10 (**7**)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY CATION REGENERATION TANK CONTROLS

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4/24/87, Rev. 0

I. REGENERATE PRIMARY CATION RESIN

9-15-86 PtI LJ editorial

D. Transferring Resin into Primary ~~Anion~~ Cation Tank (contd)

11. Verify PC-1 (**2**) and PC-6 (**3**) opens to settle resin bed. Observe red lights come on and green lights go off.

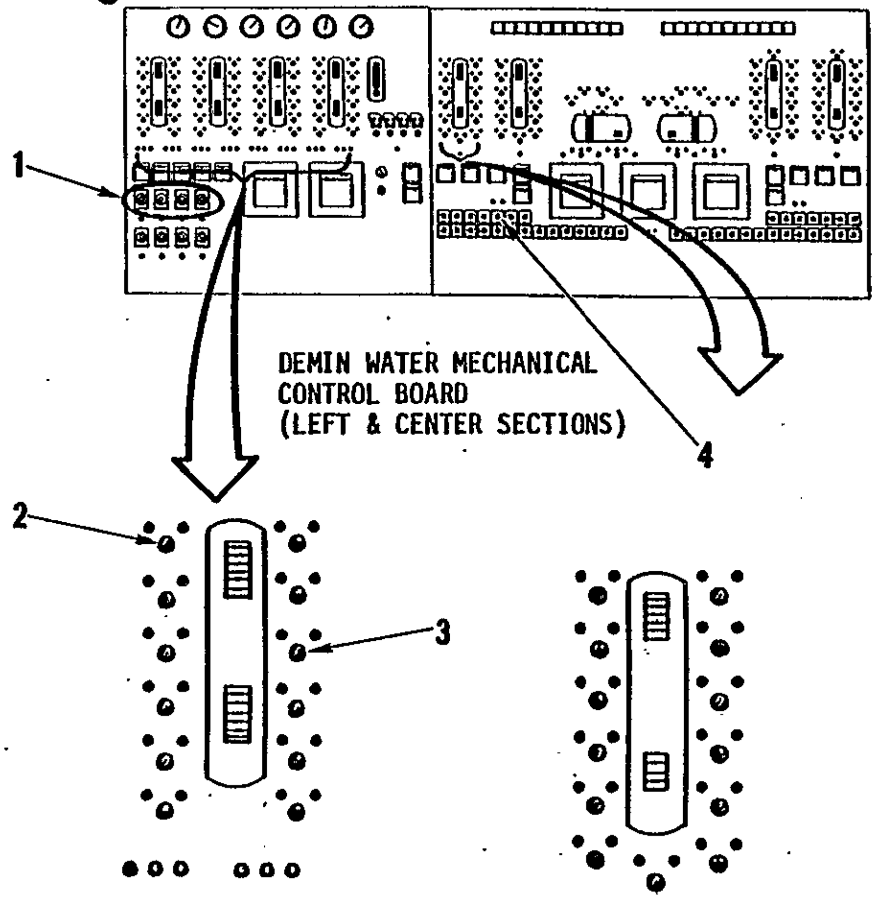
12. Verify PCR BED SETTLE timer (**4**) has started.

WHEN PC tank has been on bed settle for 5 minutes, proceed to step 13.

13. Verify PC-6 (**3**) closes by observing red light goes off and green light comes on.

14. Verify that FLOW INTEGRATOR COUNTER (**1**) for primary cation unit being regenerated is reset.

15. Determine approximate resin bed level using sightglass on side of primary cation tank. Record level in REGENERATION RECORDS LOG BOOK.



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY CATION REGENERATION TANK CONTROLS

9-15-87
P&I
LJ
editorial

I. REGENERATE PRIMARY CATION RESIN

E. Returning Primary ~~Anion~~ Cation Unit to Service

1. Verify PC-1 (**1**) switch is set to AUTO and valve is open. Observe red light is on and green light is off.

2. Set valve switch PC-6 (**4**) to OPEN. Observe red light comes on and green light goes off.

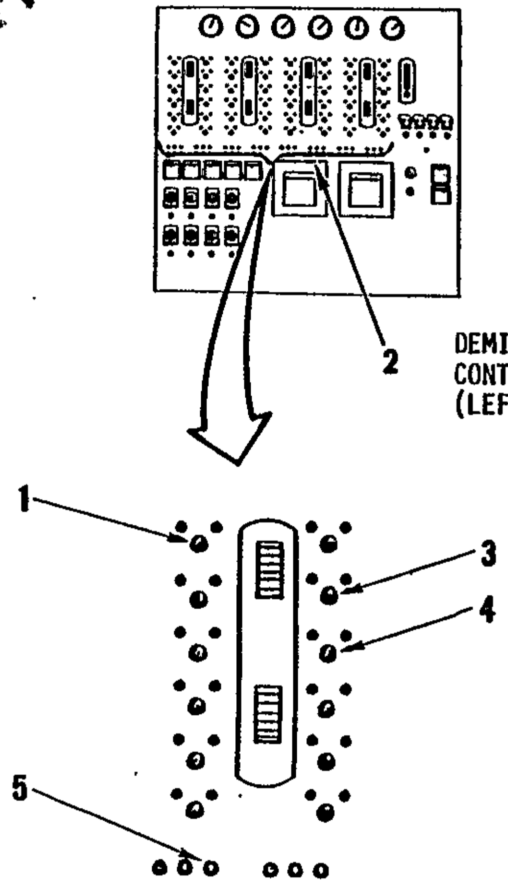
3. Verify CR-1 toggle switch (**2**) is set to ON.

   WHEN CR-1 reads 1.05 micromhos or less for PC tank being rinsed, proceed to step 4.

4. Set valve switch PC-6 (**4**) to AUTO. Verify valve closes by observing red light goes off and green light comes on.

5. Depress RETURN TO SERVICE button (**5**).

6. Verify PC-2 (**3**) opens by observing red light comes on.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT SECTION)

PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

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I. REGENERATE PRIMARY CATION RESIN

F. <u>Regenerating Cation Resin</u>

1. Verify PCR-2 (4) and PCR-3 (2) open to backwash resin in the primary cation regeneration (PCR) tank. Observe red lights come on and green lights go off.

2. Verify water flow of 50 to 150 gpm on FR-9 (3).

3. Check drain trench (5) for resin leakage.

   IF resin is leaking, see IF statement on page 8.

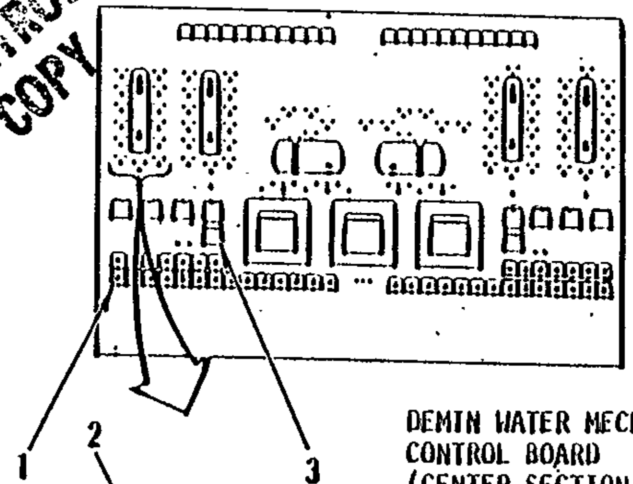
4. Verify PCR BACKWASH timer (1) has started.

VR 6-19-86
6-18-86
P+I [redacted]
LJ
STePS 4a+4b

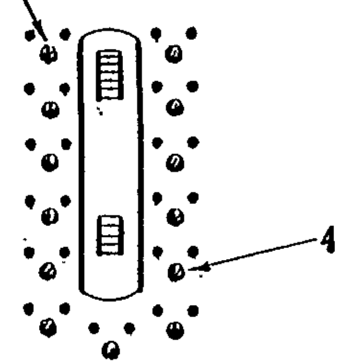
[redacted]

   WHEN PC resin has been backwashed for 15 minutes, proceed to step 5.

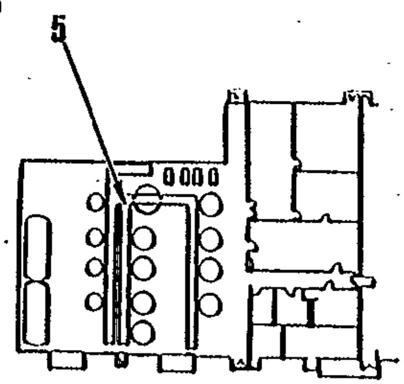
5. Verify PCR-2 (4) and PCR-3 (2) close by observing red lights go off and green lights come on.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY CATION REGENERATION TANK CONTROLS



163/183-N FLOOR PLAN

I. REGENERATE PRIMARY CATION RESIN

F. Regenerating Cation Resin (contd.)

6. Verify AV-1 (**6**) and AP-3 (**7**) close. Observe red lights come on and green lights go off.

7. Set CR-6 toggle switch (**2**) to ON.

8. Verify the following valves open to inject acid. Observe red lights come on and green lights go off.

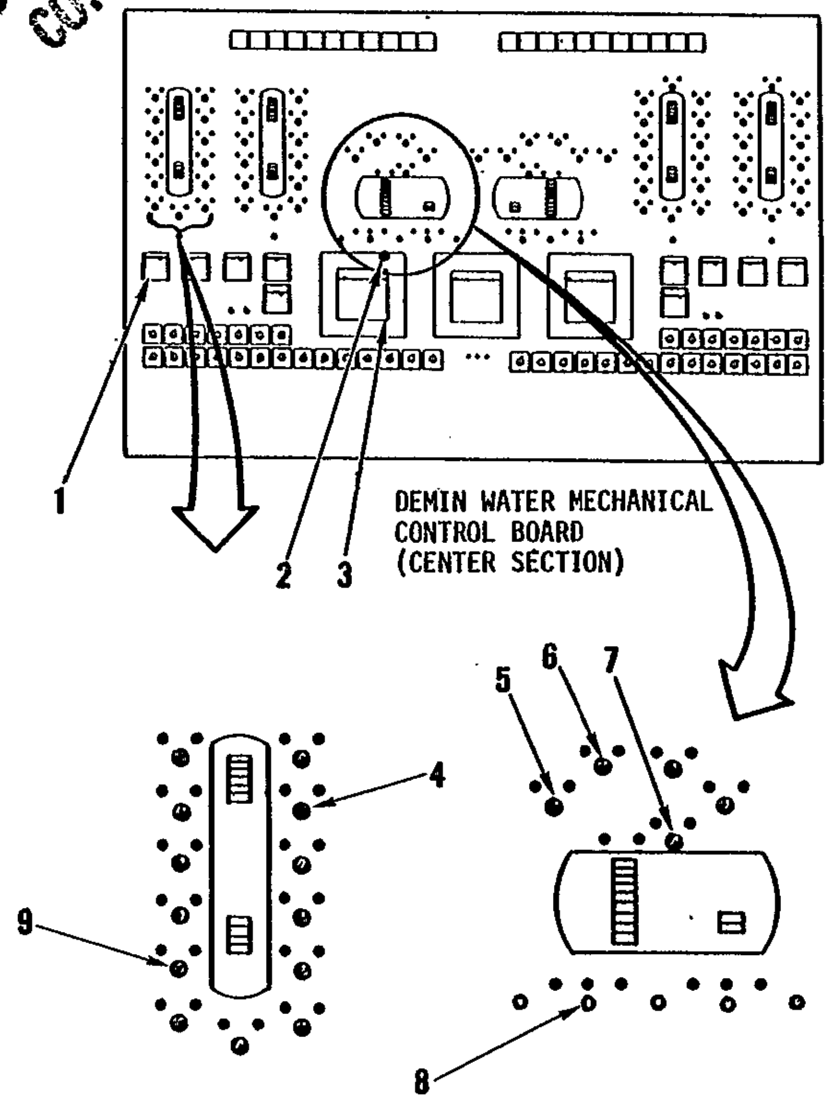
   PCR-4 (**9**)　　AP-1 (**5**)
   PCR-6 (**4**)

9. Verify acid dilution flow of 250 gpm on FRC-11 (**1**).

CAUTION A high concentration of acid can cause damage to regeneration tank and resin.

NOTE: To prevent resin and tank damage, CR-6 (**3**) will stop acid pump if acid concentration is 8% or above.

10. Verify ACID PUMP NO. 1 (**8**) starts by observing red light comes on.



PRIMARY CATION
REGENERATION TANK CONTROLS

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1324-NA

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I. REGENERATE PRIMARY CATION RESIN

F. Regenerating Cation Resin (contd.)

11. Verify acid flow at 3.7 gpm on FRC-15 (**2**).

12. Verify PCR ACID INJECTION timer (**1**) has started.

13. Verify CR-6 (**3**) indicates 1.8 to 2.2% of H_2SO_4.

WHEN PCR tank has been on acid injection for 30 minutes, proceed to step 14.

14. Verify acid flow slowly increases to its maximum of 15.4 gpm as indicated on FRC-15 (**2**).

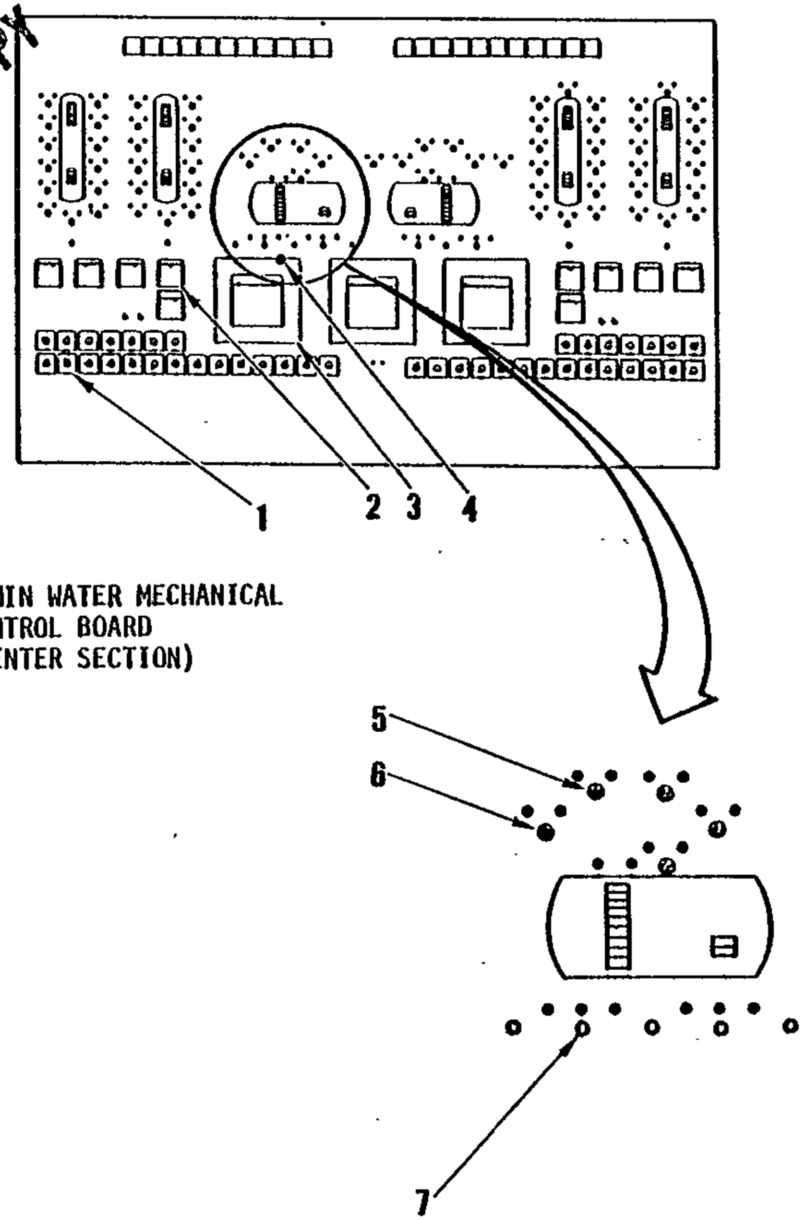
WHEN acid flow has been increasing for 2 minutes or CR-6 recorder indicates 8% of H_2SO_4, go to step 15.

15. Verify ACID PUMP NO. 1 (**7**) stops by observing red light goes off.

16. Set CR-6 toggle switch (**4**) to OFF.

17. Verify AP-1 (**6**) closes by observing red light goes off and green light comes on.

18. Verify AV-1 (**5**) opens by observing red light goes off and green light comes on.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)

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I. REGENERATE PRIMARY CATION RESIN

F. <u>Regenerating Cation Resin</u> (contd.)

19. Verify PCR-6 (**6**) closes by observing red light goes off and green light comes on.

20. Verify PCR-1 (**5**) opens for rinse of resin. Observe red light comes on and green light goes off.

21. Set CR-4 toggle switch (**4**) to ON.

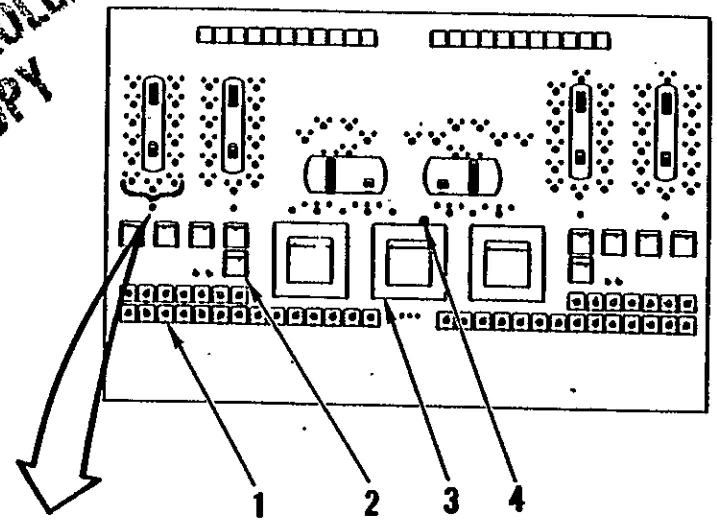
22. Verify FRC-9 (**2**) indicates 250 to 350 gpm.

WARNING Full face shield and gloves required when performing step 23.

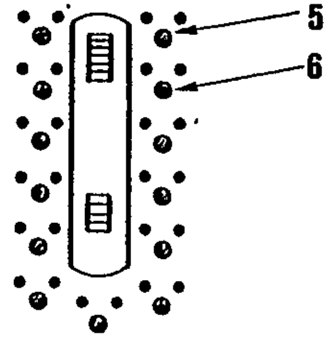
23. Open supply valve for PCR tank conductivity sample cell to provide readout on CR-4 (**3**).

24. Verify PCR RINSE timer (**1**) has started.

WHEN PCR tank has been on rinse for 40 minutes, or CR-4 (**3**) indicates rinse water conductivity of 5 Mmho/cm or less, proceed to step 25.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY CATION REGENERATION TANK CONTROLS

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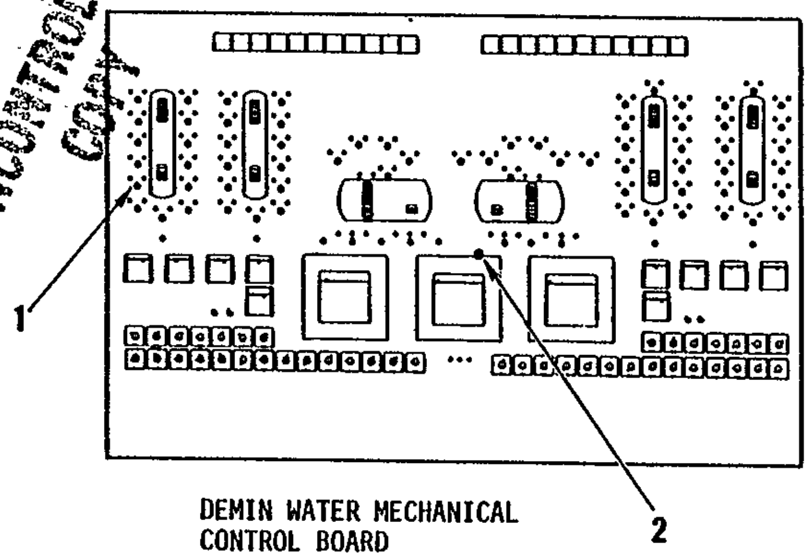
F. Regenerating Cation Resin (contd.)

25. Verify PCR-4 (**1**) closes by observing red light goes off and green light comes on.

26. Set CR-4 toggle switch (**2**) to OFF.

27. Close supply valve for PCR tank conductivity sample cell.



DEMIN WATER MECHANICAL
CONTROL BOARD
(CENTER SECTION)

I. REGENERATE PRIMARY CATION RESIN

G. Transferring Regenerated Resin to Storage

1. Verify the following valves open to transfer regenerated resin to storage. Observe red lights come on and green lights go off.

   PCR-1 (5) PCR-11 (4)
   PCR-7 (3)

2. Verify flow recorder FRC-9 (2) indicates 200 to 300 gpm.

3. Check drain trench (7) for resin leakage.

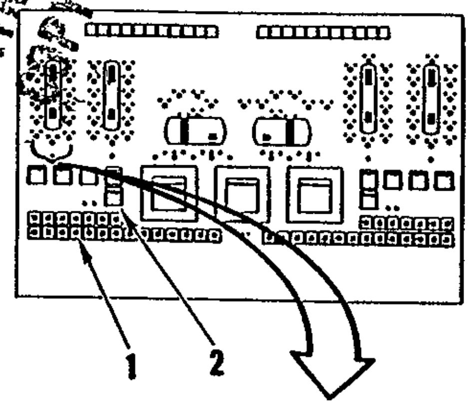
   IF resin is leaking, see IF statement on page 8.

4. Verify PCR RESIN TRANSFER TO STORAGE timer (1) has started.

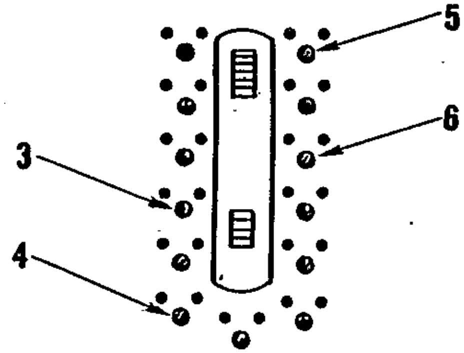
   WHEN resin has been transferring to storage for 15 minutes, proceed to step 5.

5. Verify PCR-13 (6) opens to bottom-flush PCR tank. Observe red light comes on and green light goes off.

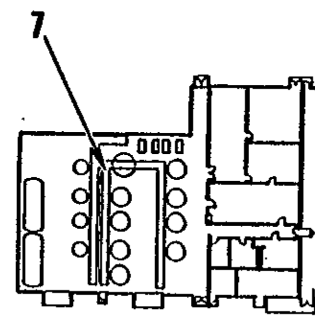
6. Verify resin is still transferring by observing FRC-9 (2) still indicates 200 to 300 gpm.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY CATION REGENERATION TANK CONTROLS



163/183-N FLOOR PLAN

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I. REGENERATE PRIMARY CATION RESIN

G. Transferring Regenerated Resin to Storage (contd)

7. Verify PCR BOTTOM FLUSH REGENERATION TANK timer (1) has started.

   WHEN PCR tank has been bottom flushed for 15 minutes, proceed to step 8.

8. Verify the following valves close:

   PCR-1 (9) PCR-11 (7)
   PCR-7 (5) PCR-13 (11)

9. Set the following valve switches to the CLOSE position.

   PCR-3 (2) PCR-1 (9)
   PCR-12 (3) PCR-6 (10)
   PCR-5 (4) PCR-13 (11)
   PCR-7 (5) PCR-8 (12)
   PCR-4 (6) PCR-2 (13)
   PCR-11 (7) PCR-10 (14)
   PCR-9 (8)

10. Set switch for ACID PUMP NO. 1 (18) to OFF.

11. Set acid tank vent valve AV-1 (16) to OPEN.

12. Set the following valve switches for acid tank to CLOSE:

   AP-1 (15)
   AP-3 (17)

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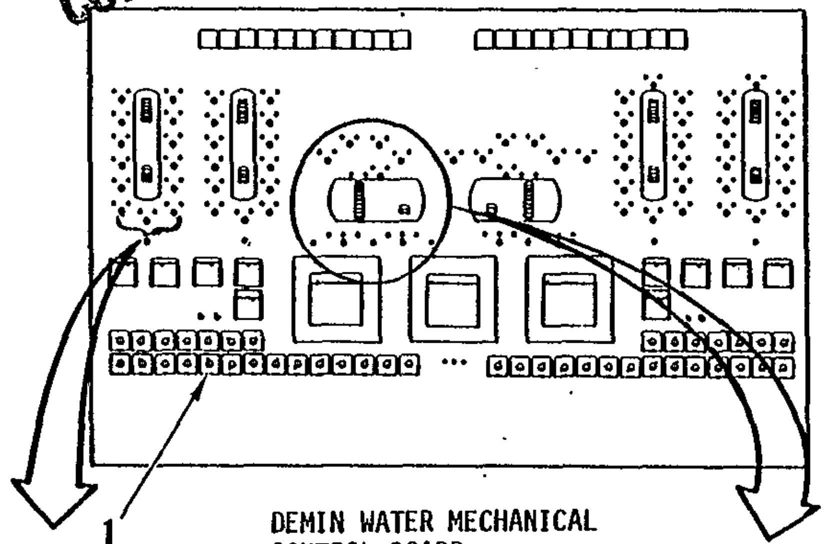
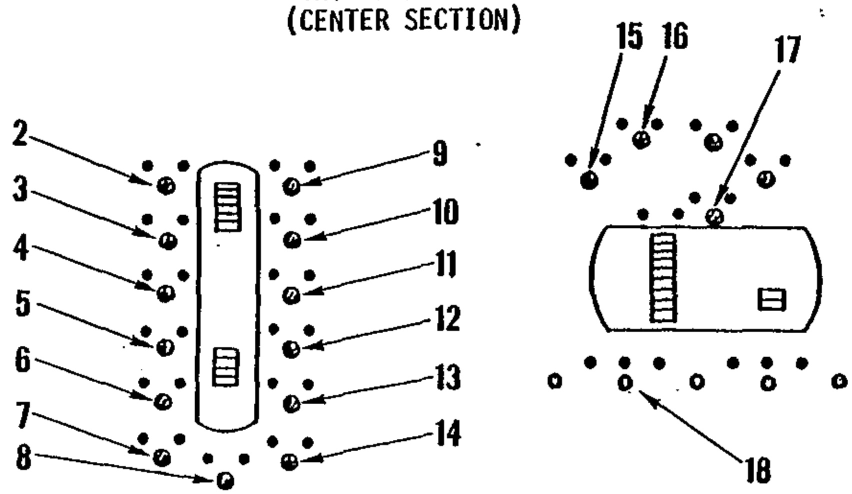


DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY CATION REGENERATION TANK CONTROLS

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STEP 12a, 12b & 12c

6-19-86

6-18-86

P+I

LJ

6/19/86

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PROCEDURE DEVIATIONS/DISCREPANCIES

Deviations/Discrepancies

To record deviations this report must include identification of the instruction(s) deviated from, the reason for deviation and the duration of the change. Information must be validated by signature(s) of approver(s).

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Deviation Approvers/Date — Deviation Expires

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PROCEDURE AUTHORIZATION

PROCEDURE REVIEWERS:

[signature] for RJK — 6/12/86
Manager, Environmental & Occupational Safety — Date

[signature] — 6 17-86
Manager, Nuclear Safety or Safety Assessment & Analysis — Date

[signature] — OPS — 6/11/86
Name — Dept. — Date

Name — Dept. — Date

PREPARED BY:

[signature] — [illegible]
Procedures — Date

Operations — Date

APPROVAL:

[signature] — 6-19-86
Manager, N-Plant Operations — Date

WP #17900

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REGENERATE PRIMARY ANION RESIN

Introduction

This is a procedure to regenerate the primary anion resin. Regeneration is accomplished by transferring the resin to a regeneration tank and injecting caustic (sodium hydroxide). The regeneration process can be controlled automatically or manually.

During the demineralization process, primary cation water passes through the primary anion resin beds. The anion resin removes ionic impurities by ion exchange. As the anion resin loses its ability for ion exchange, the conductivity increases. When the conductivity increases to a predetermined level, the resin must be regenerated.

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References

Drawing No. H-1-29200
Process Standard B-212, B-285, and D-400
CVI-13178, sheets 76 to 104
UNI-M-38, Industrial Safety Manual

Safety

Comply with Industrial Safety Control No. 24, "Acids and Caustic Materials."
Follow all standard and posted building safety rules.

Special Tools, Equipment, and Supplies

Full face shield
Gloves

Prerequisites

None

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I. REGENERATE PRIMARY ANION RESIN

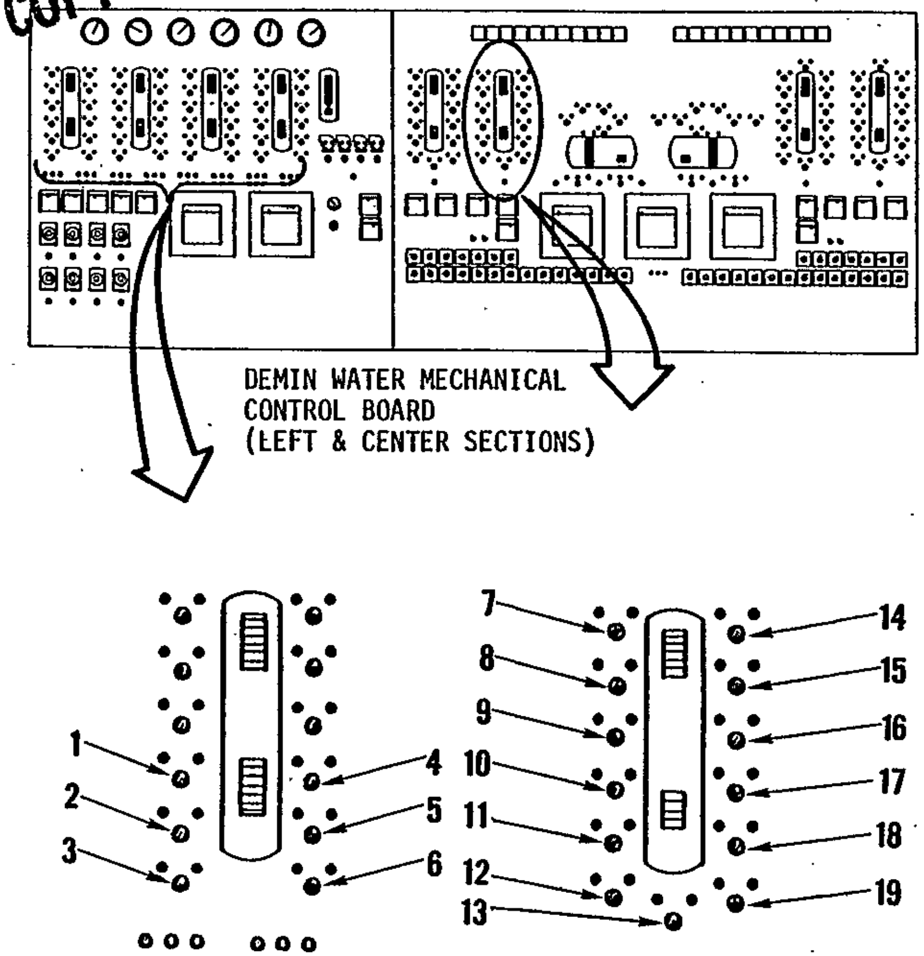
A. Checking Indicators, Controls, and Valving

1. Set the valve switches for primary anion unit needing regeneration to AUTO.

PA-1 (1)	PA-4 (4)
PA-3 (2)	PA-2 (6)
PA-5 (3)	PA-6 (5)

2. Set the valve switches for primary anion regeneration tank to AUTO.

PAR-3 (7)	PAR-1 (14)
PAR-12 (8)	PAR-6 (15)
PAR-5 (9)	PAR-13 (16)
PAR-7 (10)	PAR-8 (17)
PAR-4 (11)	PAR-2 (18)
PAR-11 (12)	PAR-10 (19)
PAR-9 (13)	



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT & CENTER SECTIONS)

PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY ANION REGENERATION TANK CONTROLS

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I. REGENERATE PRIMARY ANION RESIN

A. Checking Indicators, Controls, and Valving (contd.)

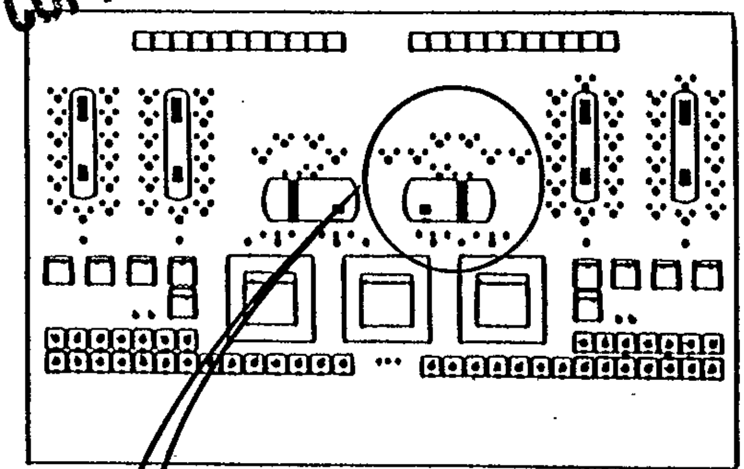
3. Set the following valve switches for caustic tank to AUTO:

   S-1 (1)
   CP-1 (2)
   CV-1 (4)

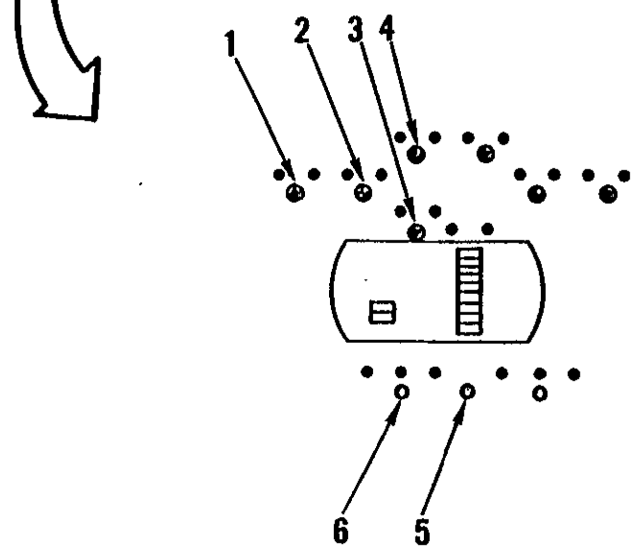
4. Verify valve switch CP-3 (3) is in the CLOSE position.

5. Check that caustic pump selector switch (5) is set to POS. 1.

6. Set switch for CAUSTIC PUMP No. 1 (6) to AUTO.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



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I. REGENERATE PRIMARY ANION RESIN

A. <u>Checking Indicators, Controls, and Valving</u> (contd.)

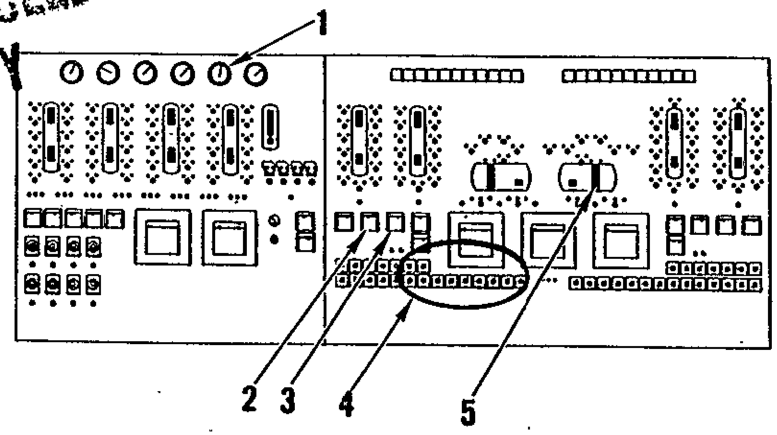
7. Check that timers (**4**) are reset.

8. Check that booster pump discharge pressure gage PI-6 (**1**) reads between 100 and 104 psig.

9. Check that caustic tank level indicator LI-2 (**5**) reads above 40%.

10. Check that FRC-13 (**2**) setpoint is 40.5 gpm.

11. Check that FRC-17 (**3**) setpoint is 2.75 gpm.



DEMIN WATER MECHANICAL
CONTROL BOARD
(LEFT & CENTER SECTIONS)

I. REGENERATE PRIMARY ANION RESIN

A. <u>Checking Indicators, Controls, and Valving</u> (contd.)

CAUTION Valving of V-16 to the river could result in a violation of Process Standard D-400.

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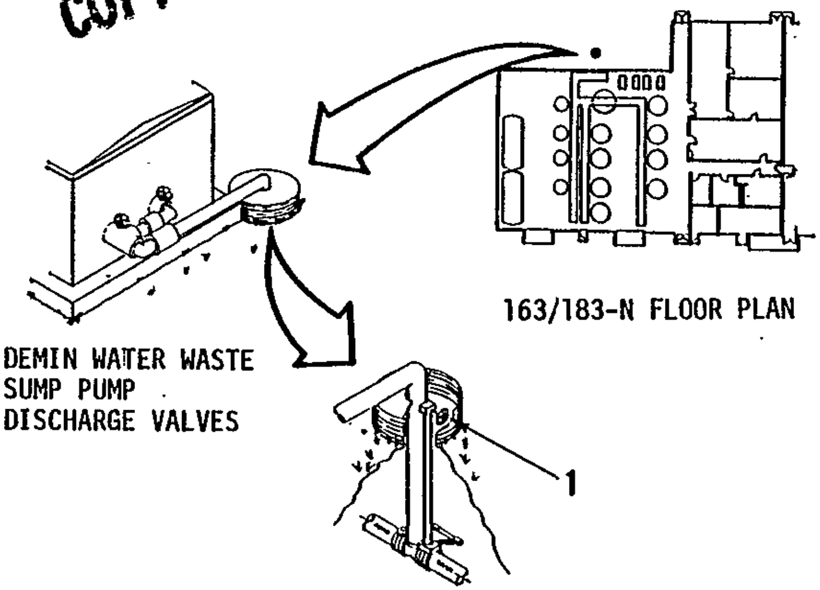

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I. REGENERATE PRIMARY ANION RESIN

A. Checking Indicators, Controls, and Valving (contd.)

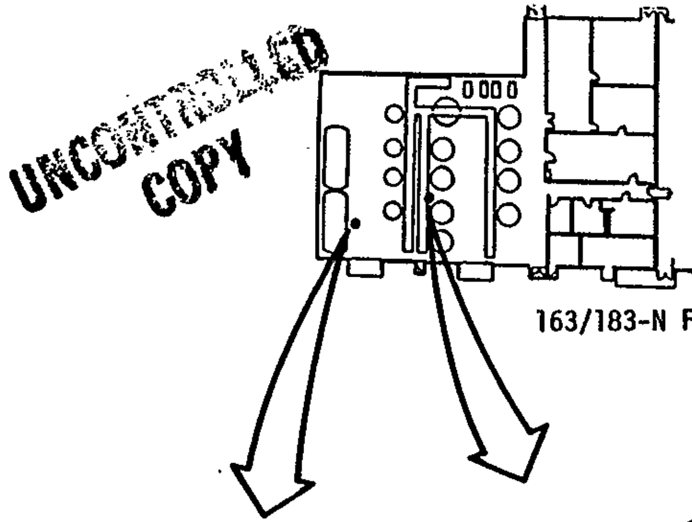
13. Verify dilute caustic header valve 772 (**2**) is open.

14. Verify dilute caustic header valve 629 (**1**) is closed.

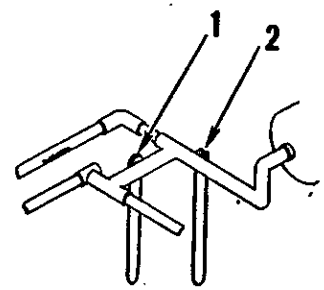
15. Verify steam valve 708 (**4**) is open.

16. Verify primary anion water valve 776 (**3**) is open.

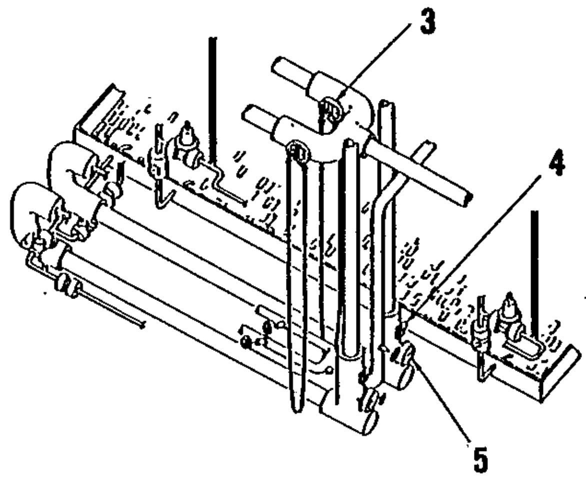
17. Verify temperature controller (**5**) is set at 150.



163/183-N FLOOR PLAN



DILUTE CAUSTIC HEADER VALVES



CAUSTIC INJECTION SYSTEM

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I. REGENERATE PRIMARY ANION RESIN

B. <u>Removing Primary Anion Unit from Service</u>

WARNING Maximum flow for each PA unit is 600 gpm. Exceeding maximum flow will cause transfer of bad water and holes in the resin bed.

1. Place another primary cation unit in service (if available) before starting regeneration process to compensate for water being used during resin transfer.

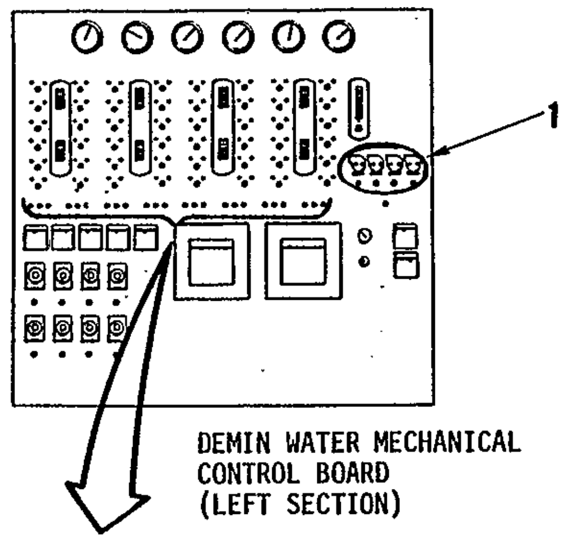
2. Place another booster pump (**1**) in service if booster pump pressure drops below 100 psig.

3. Depress REMOVE FROM SERVICE button (**5**) on primary anion unit to be regenerated.

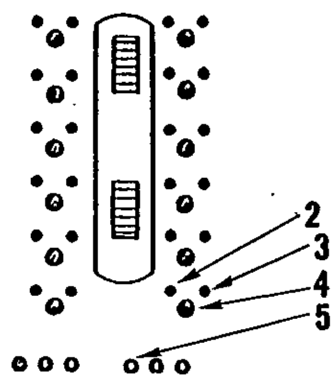
4. Check that PA-2 valve (**4**) closes by observing red light (**3**) goes off and green light (**2**) comes on.

   IF one unit is out of service for regeneration and another tank reaches END OF RUN status, the END OF RUN unit may be left in service if it is producing water within limits.

5. Determine approximate resin bed level using sightglass on side of primary anion unit. Record level in Regeneration Records Log Book.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT SECTION)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

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I. REGENERATE PRIMARY ANION RESIN

C. Transferring Resin Out of Primary Anion Tank

NOTE: Each RESIN TRANSFER button is interlocked with its regeneration tank so that resin transfer cannot proceed until the previous regeneration is completed.

IF automatic controls fail to operate properly at any time, or resin is found leaking into the trench, or the automatic process needs to be stopped for any reason, operator should take manual control of process as follows:

a. Set all valve switches associated with the regeneration process to CLOSE.

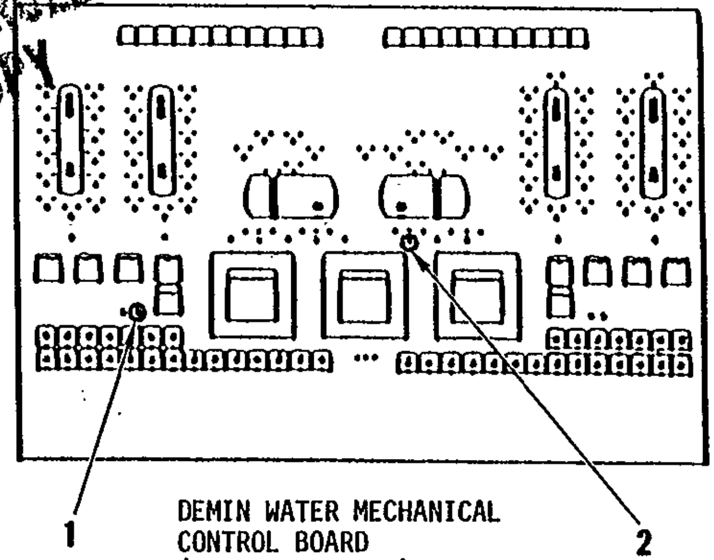
b. Set caustic pump No. 1 switch (**2**) to OFF.

c. Set primary anion timer control switch (**1**) to the OFF (down) position.

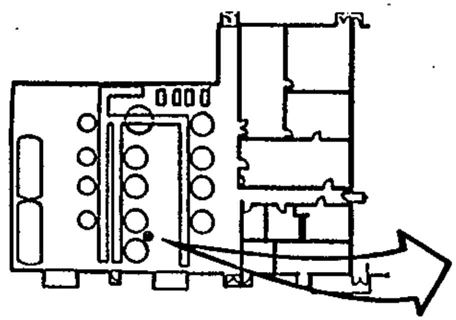
d. Manually operate valve switches as needed.

e. Notify Auxiliary Supervisor of problem.

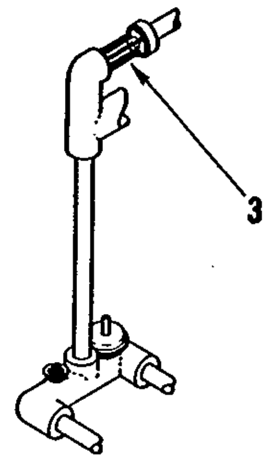
NOTE: During resin transfer, resin flow may be observed through plastic section (**3**) of resin transfer piping.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



163/183-N FLOOR PLAN



PRIMARY ANION RESIN TRANSFER PIPING

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4/24/87, Rev. 0

I. REGENERATE PRIMARY ANION RESIN

C. Transferring Resin Out of Primary Anion Tank (contd)

1. Set valve switches PAR-5 (**4**) and PAR-12 (**3**) to OPEN. Observe red lights come on and green lights go off.

2. Set valve switches PA-1 (**8**) and PA-3 (**7**) to OPEN. Observe red lights come on and green lights go off.

3. Verify resin is being transferred by observing flow recorder (**1**) associated with PA tank being regenerated shows 300 to 400 gpm.

4. Depress RESIN TRANSFER button (**5**) to start automatic resin transfer and regeneration cycle.

5. Set the following valve switches to AUTO.

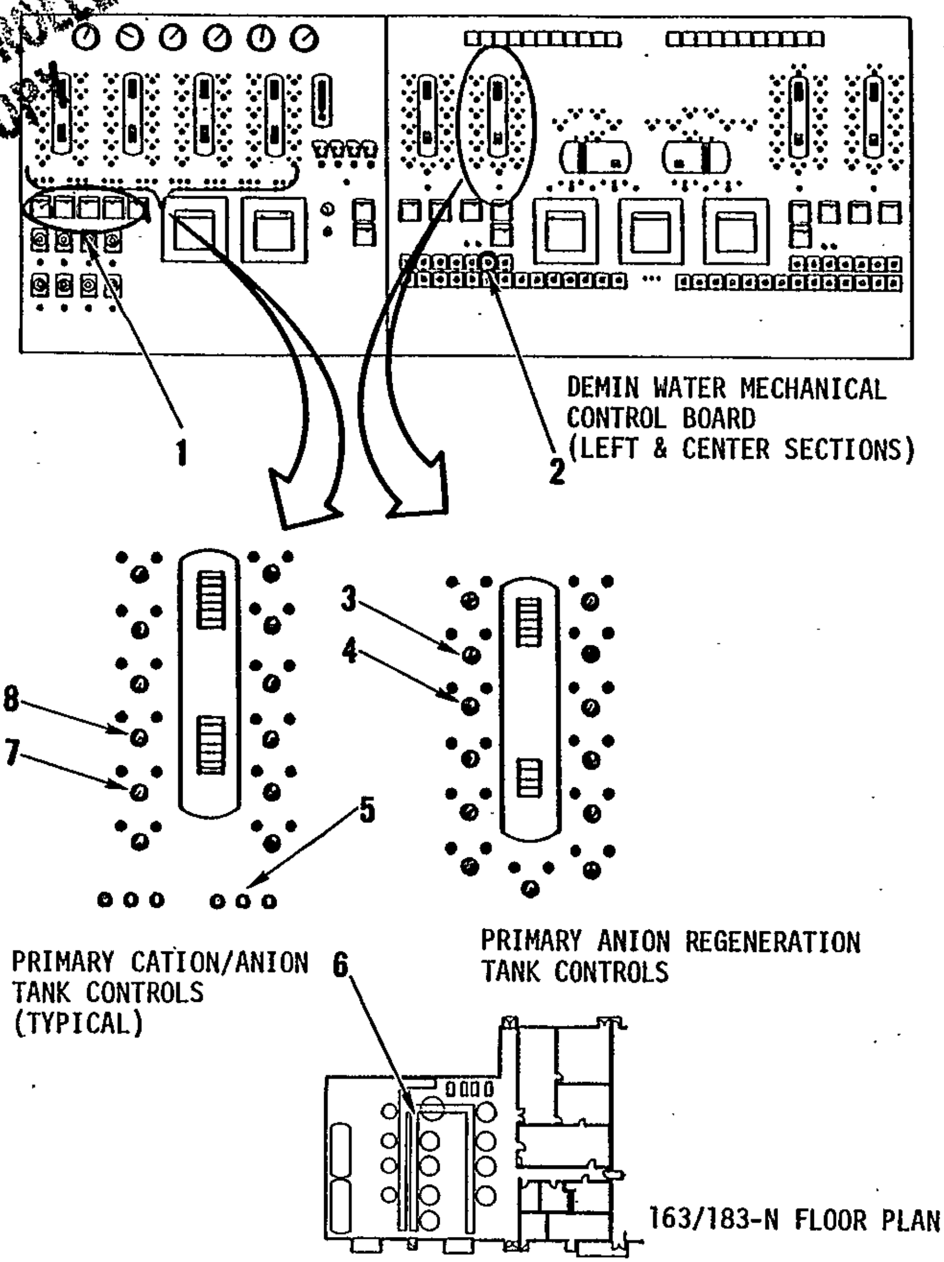
PA-1 (**8**)	PAR-5 (**4**)
PA-3 (**7**)	PAR-12 (**3**)

6. Check drain trench (**6**) for resin leakage.

IF resin is leaking, see IF statement on page 7.

7. Verify PAR RESIN TRANSFER OUT timer (**2**) has started.

WHEN resin has been transferring for 15 minutes, proceed to step 8.



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4/24/87, Rev. 0

I. REGENERATE PRIMARY ANION RESIN

C. Transferring Resin Out of Primary Anion Tank (contd)

8. Verify PA-5 (**5**) opens to bottom-flush PA tank. Observe red light comes on and green light goes off.

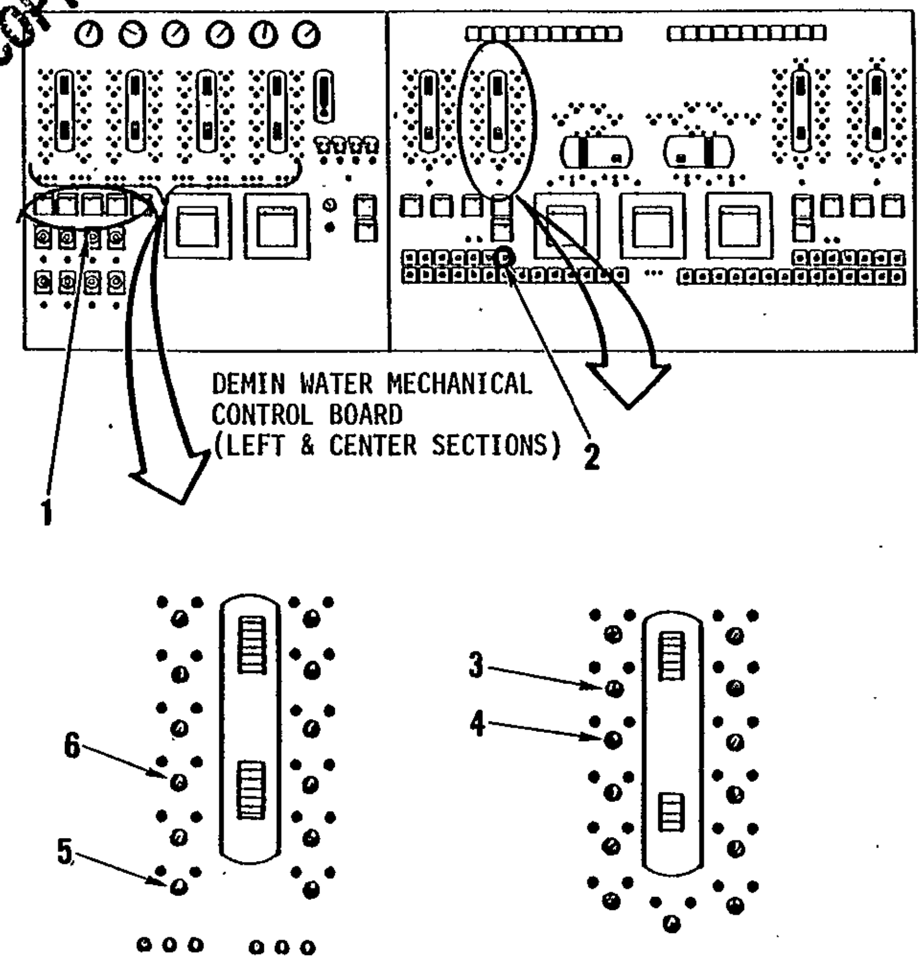
9. Verify PA-1 (**6**) closes by observing red light goes off and green light comes on.

10. Verify resin is still being transferred by observing flow recorder (**1**) associated with PA tank being regenerated shows 250 to 350 gpm.

11. Verify PAR BOTTOM FLUSH ANION UNIT timer (**2**) has started.

WHEN PA tank has been bottom flushed for 20 minutes, proceed to step 12.

12. Verify PA-5 (**5**), PAR-5 (**4**), and PAR-12 (**3**) close by observing red lights go off and green lights come on.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT & CENTER SECTIONS)

PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY ANION REGENERATION TANK CONTROLS

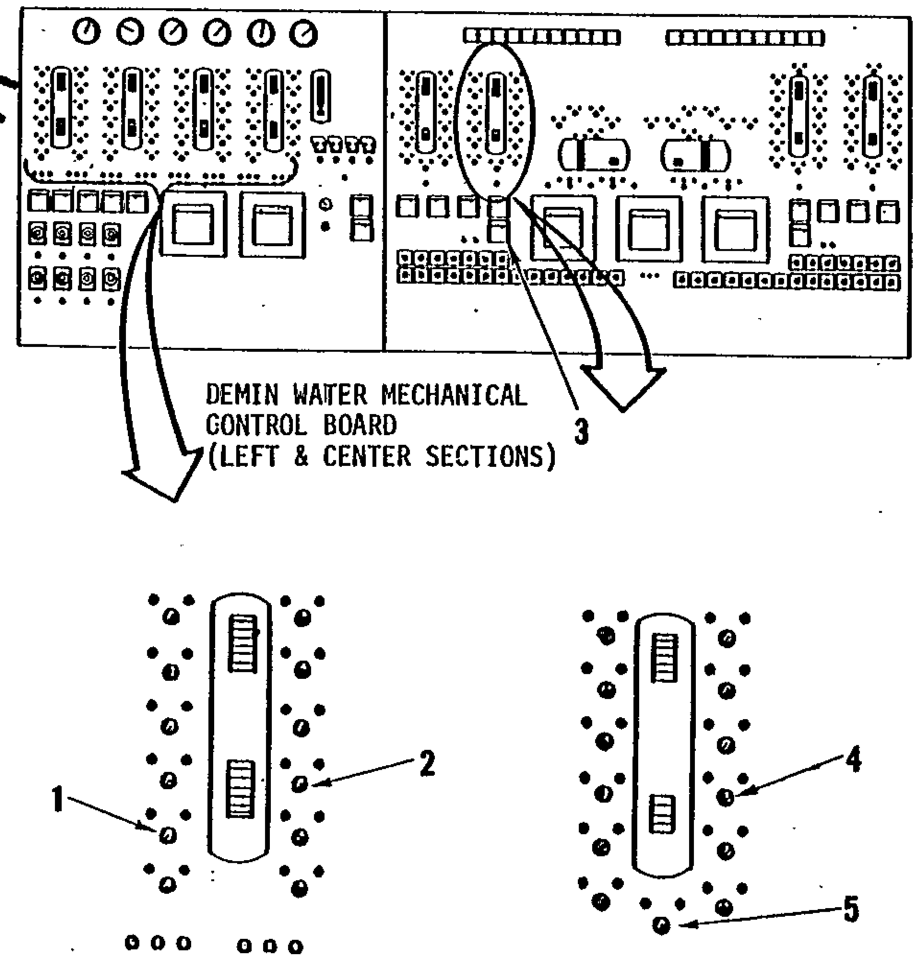
I. REGENERATE PRIMARY ANION RESIN

D. <u>Transferring Resin into Primary Anion Tank</u>

1. Verify the following valves open by observing red lights come on and green lights go off.

PA-3 (1)	PAR-8 (4)
PA-4 (2)	PAR-9 (5)

2. Verify resin is being transferred to observing flow recorder FRC-9 (3) shows 250 to 350 gpm.



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY ANION REGENERATION TANK CONTROLS

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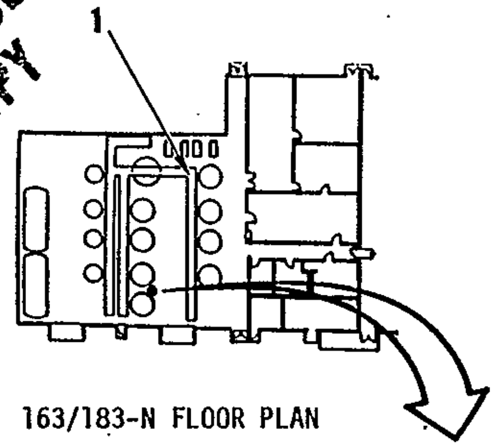
I. REGENERATE PRIMARY ANION RESIN

D. <u>Transferring Resin into Primary Anion Tank</u> (contd.)

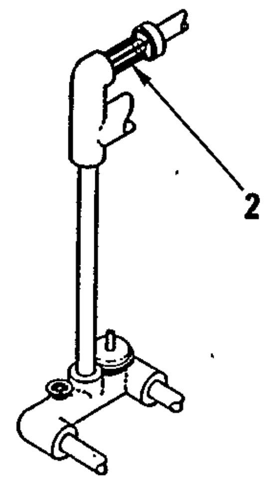
3. Observe clear plastic section of resin transfer piping (**2**) for resin flow.

4. Check drain trench (**1**) for resin leakage.

> IF resin is leaking, see IF statement on page 7.



163/183-N FLOOR PLAN



PRIMARY ANION RESIN TRANSFER PIPING

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I. REGENERATE PRIMARY ANION RESIN

D. Transferring Resin into Primary Anion Tank (contd)

5. Verify PAR RESIN TRANSFER IN timer (**2**) has started.

   WHEN resin has been transferring to primary tank for 15 minutes, proceed to step 6.

6. Verify PAR-10 (**6**) opens to bottom flush PAR tank. Observe red light comes on and green light goes off.

7. Verify resin is still being transferred by observing FRC-9 (**1**) shows 250 to 350 gpm.

8. Verify PAR BOTTOM FLUSH RESIN STOR TA timer (**3**) has started.

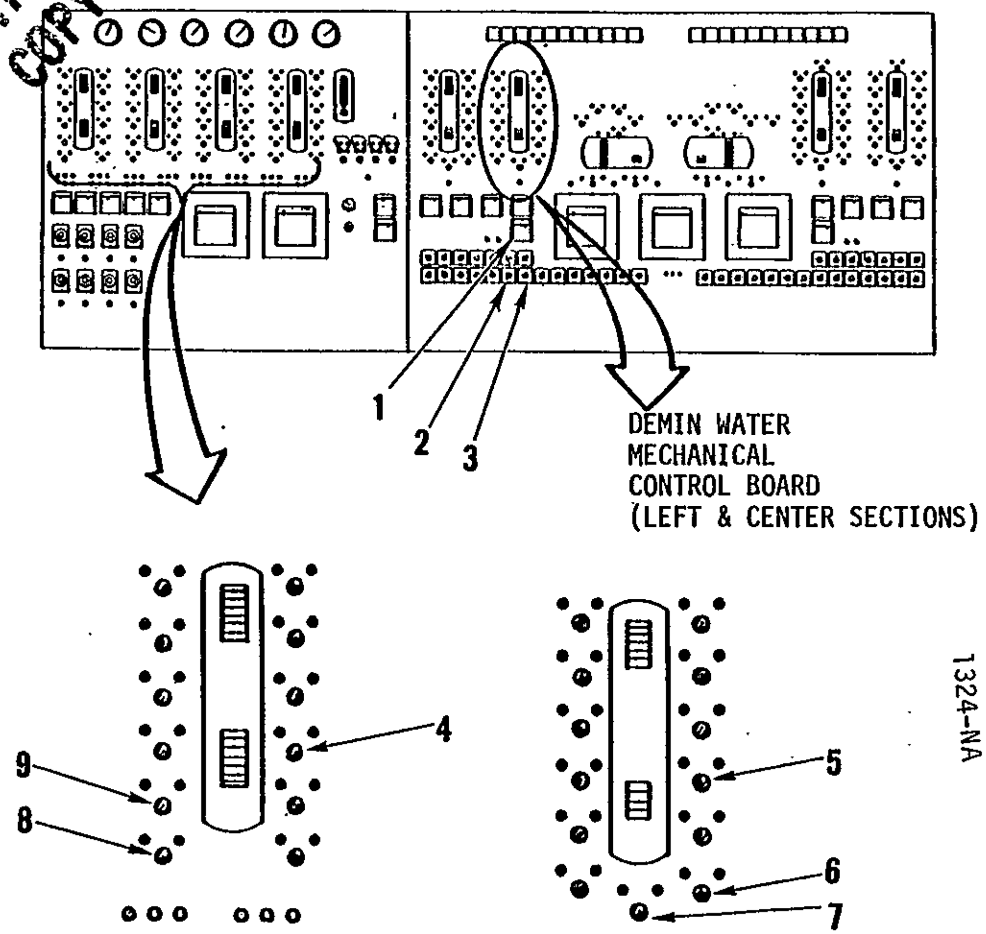
   WHEN PAR tank has bottom flushed for 13 minutes, proceed to step 9.

9. Verify PA-5 (**8**) opens to level resin bed. Observe red light comes on and green light goes off.

   WHEN PA tank has been on bed level for 2 minutes, proceed to step 10.

10. Verify the following valves close by observing red lights go off and green lights come on.

PA-3 (**9**)	PAR-8 (**5**)
PA-4 (**4**)	PAR-9 (**7**)
PA-5 (**8**)	PAR-10 (**6**)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

PRIMARY ANION REGENERATION TANK CONTROLS

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UNCONTROLLED COPY

I. REGENERATE PRIMARY ANION RESIN

D. Transferring Resin into Primary Anion Tank (contd)

11. Verify PA-1 (**4**) and PA-6 (**3**) opens to settle resin bed. Observe red lights come on and green lights go off.

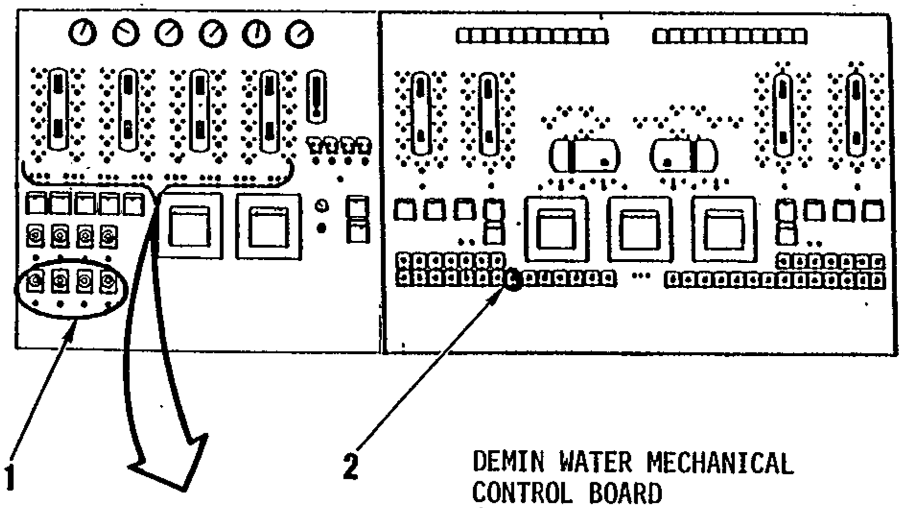
12. Verify PAR BED SETTLE timer (**2**) has started.

    WHEN PA tank has been on bed settle for 5 minutes, proceed to step 13.

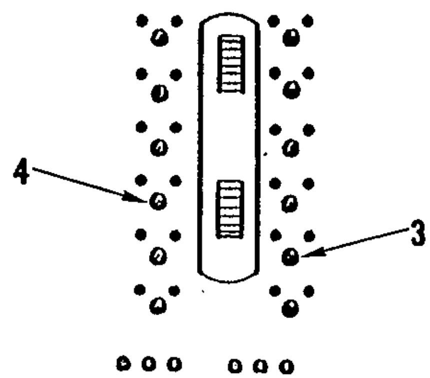
13. Verify PA-6 (**3**) closes by observing red light goes off and green light comes on.

14. Verify that FLOW INTEGRATOR COUNTER (**1**) for primary anion unit being regenerated is reset.

15. Determine approximate resin bed level using sightglass on side of primary anion tank. Record level in REGENERATION RECORDS LOG BOOK.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT & CENTER SECTIONS)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

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I. REGENERATE PRIMARY ANION RESIN

E. Returning Primary Anion Unit to Service

1. Verify PA-1 (**5**) is OPEN by observing red light is on and green light is off.

2. Set valve switch PA-6 (**2**) to OPEN. Observe red light comes on and green light goes off.

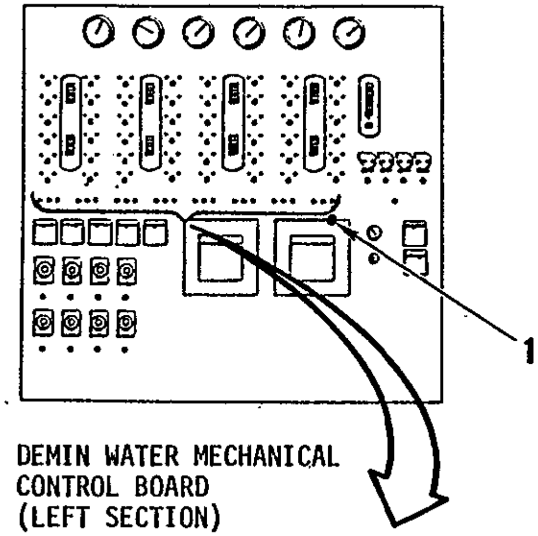
3. Verify CR-2 toggle switch (**1**) is set to ON.

   WHEN CR-2 reads 2.0 micromhos or less for PA tank being rinsed, proceed to step 4.

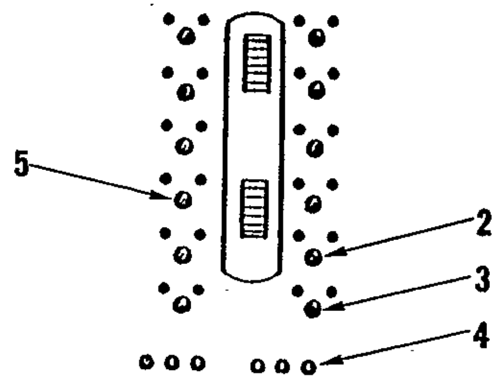
4. Set valve switch PA-6 (**2**) to AUTO. Observe valve closes by observing red light goes off and green light comes on.

5. Depress RETURN TO SERVICE button (**4**).

6. Verify PA-2 (**3**) opens by observing red light comes on.



DEMIN WATER MECHANICAL CONTROL BOARD (LEFT SECTION)



PRIMARY CATION/ANION TANK CONTROLS (TYPICAL)

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1324-NA

4/24/87, Rev. 0

F. <u>Regenerating Anion Resin</u>

1. Verify PAR-2 (4) and PAR-3 (1) open to backwash resin in the primary anion regeneration (PAR) tank. Observe red lights come on and green lights go off.

2. Verify water flow of 50 to 150 gpm on FR-9 (2).

3. Check drain trench (5) for resin leakage.

IF resin is leaking, see IF statement on page 7.

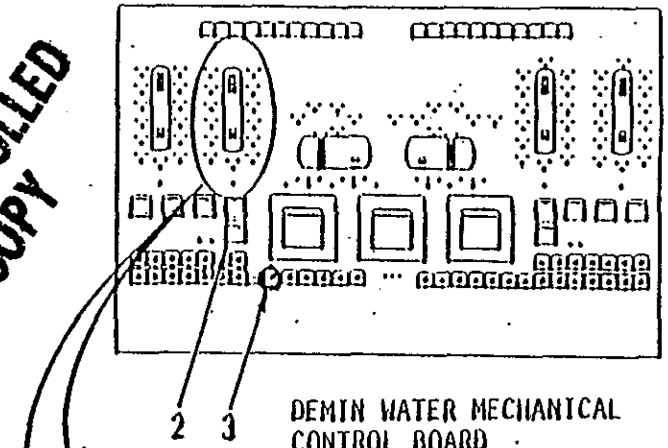
4. Verify PAR BACKWASH timer (3) has started.

[redacted]

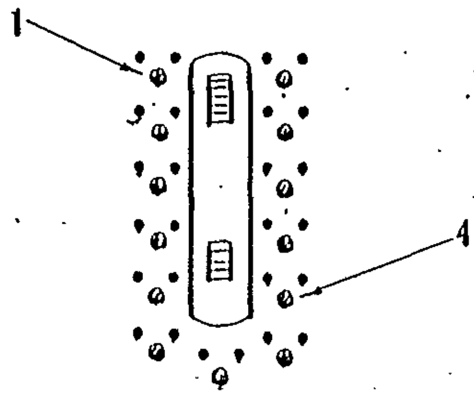
6-19-86 6/18/86 P+I J steps 4a+4b

WHEN PA resin has been backwashed for 10 minutes, proceed to step 5.

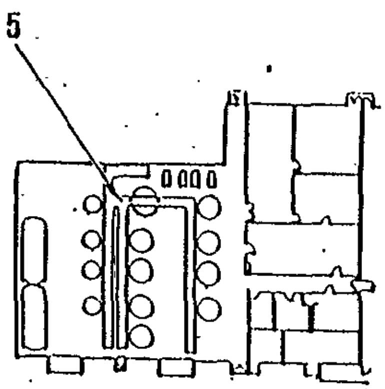
5. Verify PAR-2 (4) and PAR-3 (1) close by observing red lights go off and green lights come on.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY ANION REGENERATION TANK CONTROLS



163/183-N FLOOR PLAN

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I. REGENERATE PRIMARY ANION RESIN

F. Regenerating Anion Resin (contd.)

6. Verify CV-1 (**5**) and CP-3 (**4**) close. Observe red lights come on and green lights go off.

7. Set CR-5 toggle switch (**3**) to ON.

8. Verify the following valves open to inject caustic. Observe red lights come on and green lights go off.

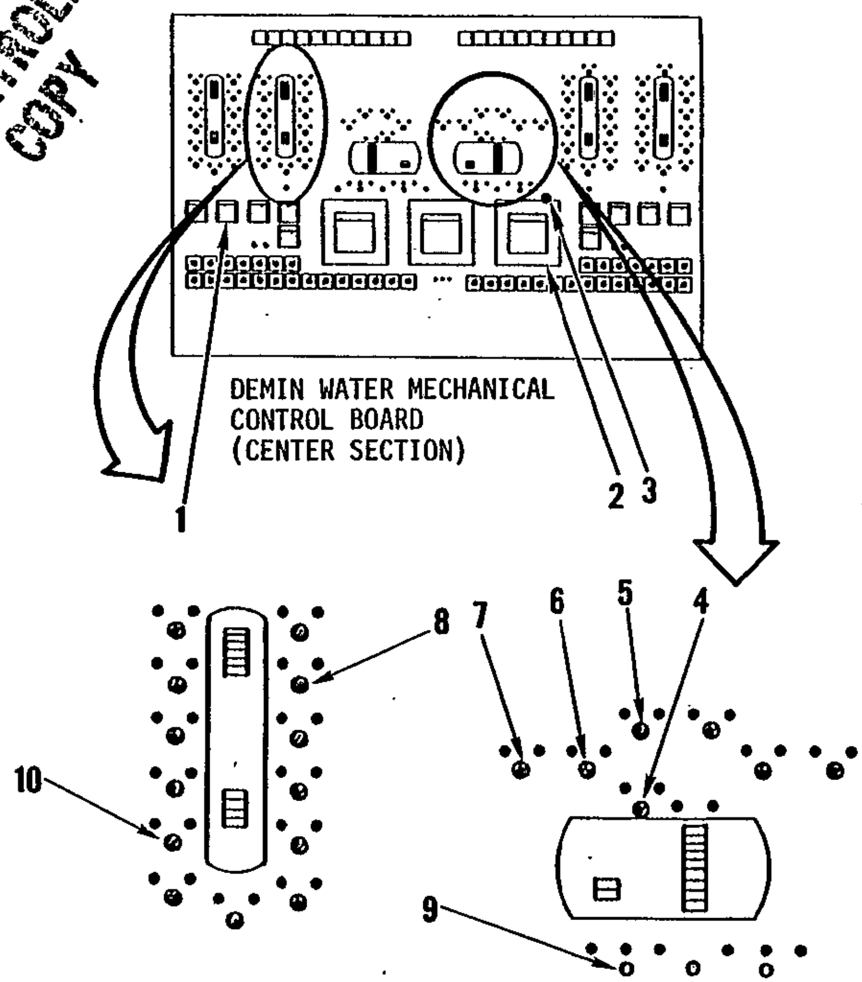
PAR-4 (**10**)	S-1 (**7**)
PAR-6 (**8**)	CP-1 (**6**)

9. Verify caustic dilution flow of 40 gpm on FRC-13 (**1**).

CAUTION A high concentration of caustic can cause damage to regeneration tank and resin.

NOTE: To prevent resin and tank damage, CR-5 (**2**) will stop caustic pump if caustic concentration is 5% or above.

10. Verify CAUSTIC PUMP NO. 1 (**9**) starts by observing red light comes on.



PRIMARY ANION REGENERATION TANK CONTROLS

1324-NA

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I. REGENERATE PRIMARY ANION RESIN

F. Regenerating Anion Resin (contd.)

11. Verify caustic flow at 2.7 gpm on FRC-17 (**2**).

12. Verify PAR CAUSTIC INJECTION timer (**3**) has started.

13. Verify CR-5 (**5**) indicates 2.5 to 3.5% of NAOH.

> WHEN PAR tank has been on caustic injection for 70 minutes, proceed to step 14.

14. Verify CAUSTIC PUMP NO. 1 (**10**) stops by observing red light goes off.

15. Set CR-5 toggle switch (**6**) to OFF.

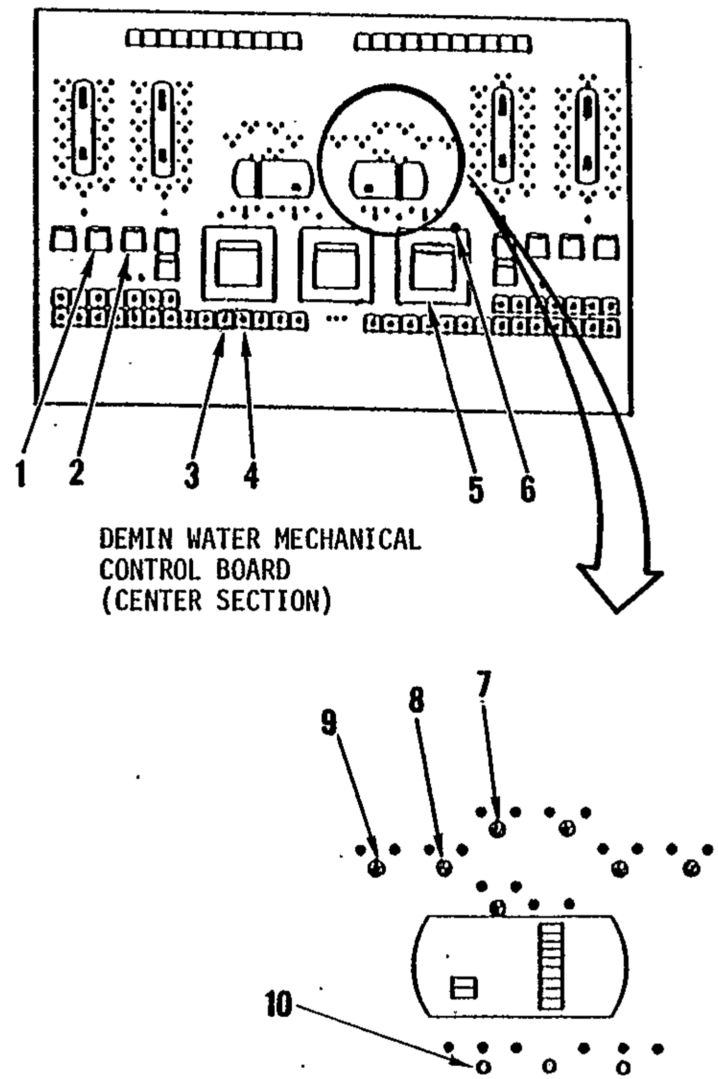
16. Verify CP-1 (**8**) and S-1 (**9**) close by observing red lights go off and green lights come on.

17. Verify CV-1 (**7**) opens by observing red light goes off and green light comes on.

18. Verify FRC-13 (**1**) still indicates 40 gpm for slow rinse of resin.

19. Verify PAR SLOW RINSE timer (**4**) has started.

> WHEN PAR tank has been on slow rinse for 25 minutes, proceed to step 20.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)

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I. REGENERATE PRIMARY ANION RESIN

F. Regenerating Anion Resin (contd.)

20. Verify PAR-6 (**6**) closes by observing red light goes off and green light comes on.

21. Verify PAR-1 (**5**) opens for fast rinse of resin. Observe red light comes on and green light goes off.

22. Set CR-4 toggle switch (**4**) to ON.

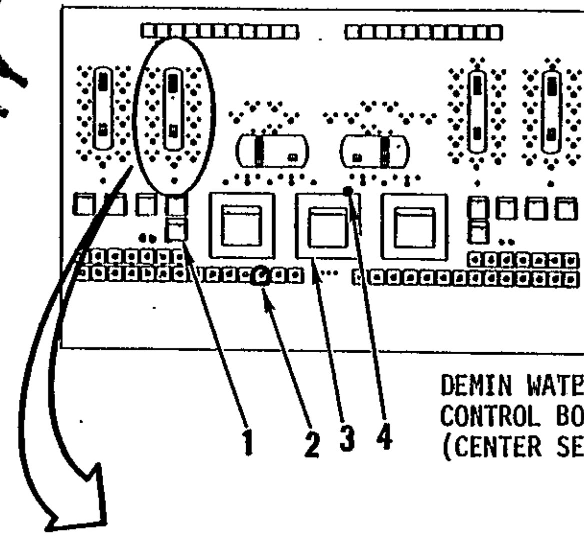
23. Verify FRC-9 (**1**) indicates 250 to 350 gpm.

WARNING Full face shield and gloves required when performing step 24.

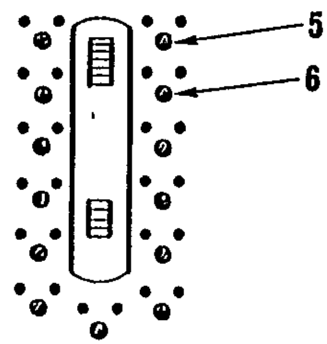
24. Open supply valve for PAR tank conductivity sample cell to provide readout on CR-4 (**3**).

25. Verify PAR FAST RINSE timer (**2**) has started.

WHEN PAR tank has been on fast rinse for 40 minutes or CR-4 ( ) indicates rinse water conductivity of 5 Mmho/cm or less, proceed to step 26.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY ANION REGENERATION TANK CONTROLS

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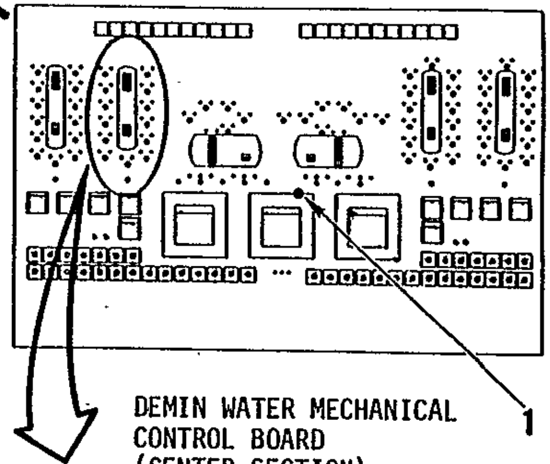
I. REGENERATE PRIMARY ANION RESIN

F. Regenerating Anion Resin (contd.)

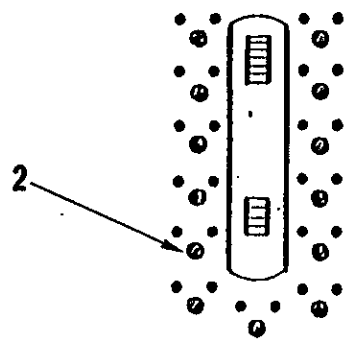
26. Verify PAR-4 (2) closes by observing red light goes off and green light comes on.

27. Set CR-4 toggle switch (1) to OFF.

28. Close supply valve for PAR tank conductivity sample cell.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY ANION REGENERATION TANK CONTROLS

I. REGENERATE PRIMARY ANION RESIN

G. Transferring Regenerated Resin to Storage

1. Verify the following valves open to transfer regenerated resin to storage. Observe red lights come on and green lights go off.

   PAR-1 (3) PAR-11 (6)
   PAR-7 (7)

2. Verify flow recorder FRC-9 (1) indicates 200 to 300 gpm.

3. Check drain trench (5) for resin leakage.

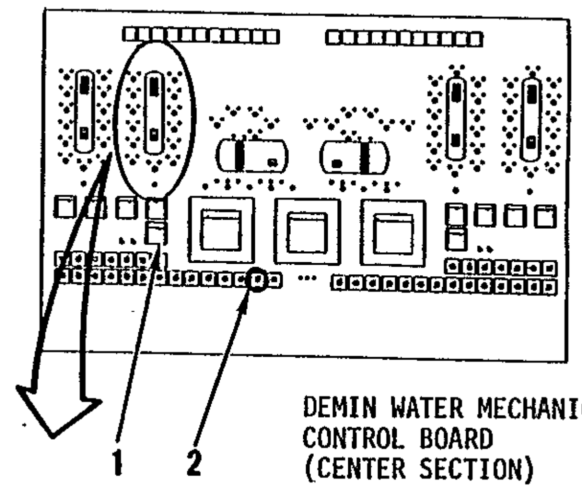
   IF resin is leaking, see IF statement on page 7.

4. Verify PAR RESIN TRANSFER TO STORAGE timer (2) has started.

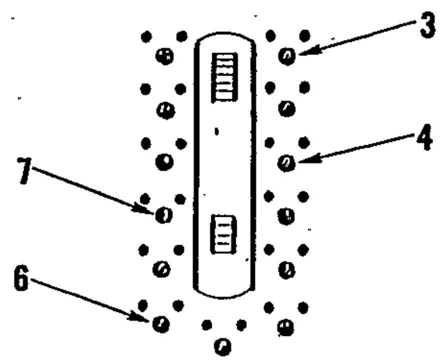
   WHEN resin has been transferring to storage for 13 minutes, proceed to step 5.

5. Verify PAR-13 (4) opens to bottom-flush PAR tank. Observe red light comes on and green light goes off.

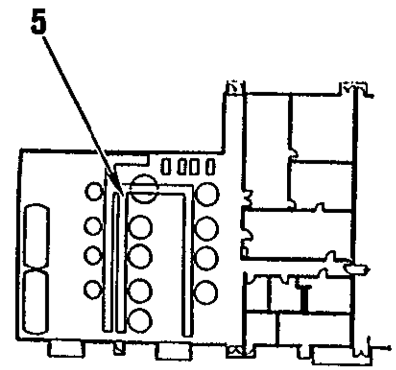
6. Verify resin is still transferring by observing FRC-9 (1) still indicates 200 to 300 gpm.



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY ANION REGENERATION TANK CONTROLS



163/183-N FLOOR PLAN

I. REGENERATE PRIMARY ANION RESIN

G. Transferring Regenerated Resin to Storage (contd.)

7. Verify PAR BOTTOM FLUSH REGENERATION TANK timer (1) has started.

WHEN PAR tank has been bottom flushed for 20 minutes, proceed to step 8.

8. Verify the following valves close:

PAR-1 (8)	PAR-11 (7)
PAR-7 (5)	PAR-13 (10)

9. Set the following valve switches to the CLOSE position.

PAR-3 (2)	PAR-1 (14)
PAR-12 (3)	PAR-6 (13)
PAR-5 (4)	PAR-13 (12)
PAR-7 (5)	PAR-8 (11)
PAR-4 (6)	PAR-2 (10)
PAR-11 (7)	PAR-10 (9)

PAR-9 (8)

10. Set switch for CAUSTIC PUMP NO. 1 (15) to OFF.

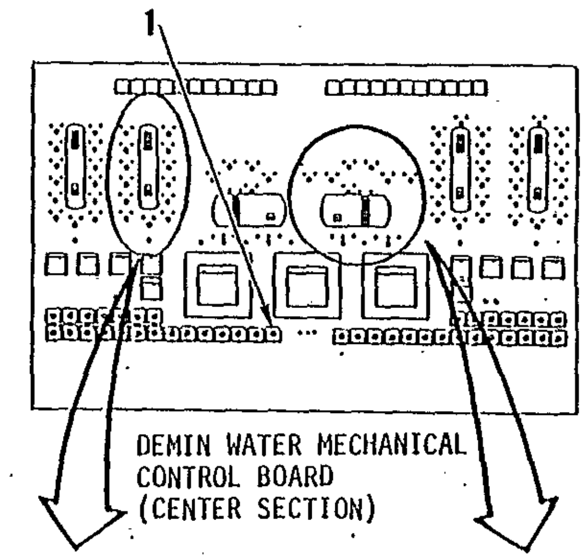
11. Set caustic tank vent valve CV-1 (18) to OPEN.

12. Set the following valve switches for caustic tank to CLOSE:

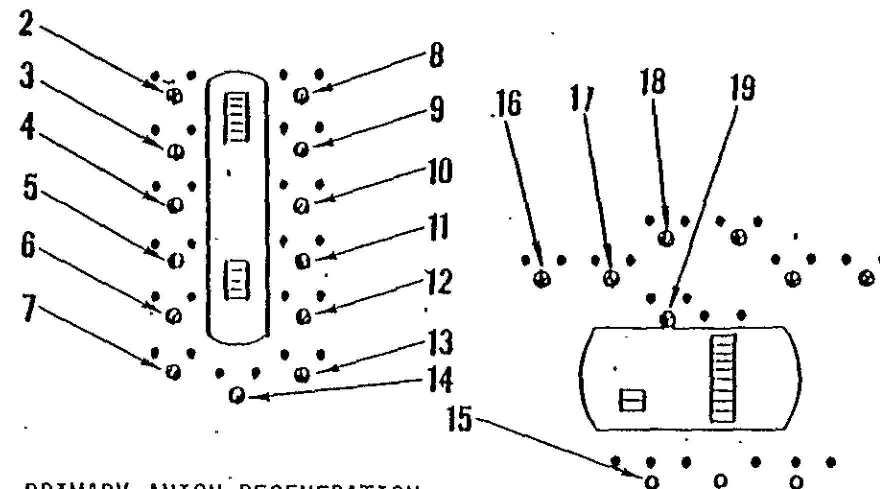
S-1 (16)
CP-1 (17)
CP-3 (19)

12a. Verify pH of demin waste water is within limits of Process Standard D-400.
12b. Open DCWV-800 to the percolation pond.
12c. Close DCWV-801 to the [illegible]

[illegible] 6-18-86 P+I DE 6/19/86 STEPS 12a, 12b + 12c [illegible]



DEMIN WATER MECHANICAL CONTROL BOARD (CENTER SECTION)



PRIMARY ANION REGENERATION TANK CONTROLS

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PROCEDURE DEVIATIONS/DISCREPANCIES

Deviations/Discrepancies

To record deviations this report must include identification of the instruction(s) deviated from, the reason for deviation and the duration of the change. Information must be validated by signature(s) of approver(s).

UNCONTROLLED COPY

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Deviation Approvers/Date | Deviation Expires

1324-NA

PROCEDURE AUTHORIZATION

PROCEDURE REVIEWERS:

[signature] 6/16/86
Manager, Environmental & Occupational Safety — Date

[signature] R. Warner 6/17/86
Manager, Nuclear Safety or Safety Assessment & Analysis — Date

[signature] OPS 6/11/86
Name — Dept. — Date

Name — Dept. — Date

PREPARED BY:

[signature] 5-[illegible]
Procedures — Date

Operations — Date

APPROVAL:

[signature] Nolan Dugan 6-19-86
Manager, N-Plant Operations — Date

4/24/87, Rev. 0

WP #07520

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APPENDIX C

1324-NA FUNCTIONAL DESIGN CRITERIA
AND
CONCEPTUAL DESIGN REPORT

APPENDIX C-1

FUNCTIONAL DESIGN CRITERIA
1324-N PERCOLATION POND

FUNCTIONAL DESIGN CRITERIA

NON-RADIOACTIVE WASTE WATER CONTROL

(N PLANT FILTERED AND DEMINERALIZED WATER PLANT MODIFICATIONS)

A. DESCRIPTION OF OPERATION

The N Plant filter backwash, ion exchange resin regenerative wastes and the coagulator sludge sump wastes discharge into the Columbia River in a manner which could possibly affect the environment. The filtered water plant utilizes gravity flow filters in its filtered water production. The six filters are backwashed on the average a total of nine times daily to remove filtered out solids. The 163-N demineralized water plant utilizes ion exchange resins to produce demineralized water. The cation resins are regenerated with a sulfuric acid solution and the anion resins with a sodium hydroxide solution. The 183-N sludge sump receives sediment and water from the bottom of the coagulator ponds and discharges into the 66-inch RWR. The filter backwash wastes, the resin regeneration wastes and the coagulator sludge sump wastes discharge approximately 8000 pounds of chemicals in their 425,000 gal/day discharge to the river via the 102-inch and 66-inch raw water return lines.

The purpose of these design criteria is to describe functionally the modifications required to eliminate the discharge of the 183-N filter backwash wastes, the 163-N resin regenerative wastes and the coagulator sludge sump wastes to the river.

B. DESIGN PARAMETERS

The structural design requirements of the modifications described in these functional design criteria shall be based on seismic considerations as defined in Hanford Plant Standards, SDC-4.1, 10-1-73 for Category II facilities.

The discharges to the Columbia River shall comply with the effluent limitations specified in the draft permit for Application No. WA-000374-3 for authorization to discharge under the National Pollutant Dischange Elimination System. This will apply to dischange Nos. 008 (66-inch RWR) and 009 (102-inch outfall). (REV1)

C. FEATURES

The filter backwash wastes from Building 183-N, the ion exchange regenerative wastes and the coagulator sludge sump wastes will be pumped to a new settling pond system.

D. CHARACTERISTICS

The effluent transport system and settling pond system shall have a concurrent capability of carrying and receiving the following wastes:

1. 163-N Resin Regenerative Wastes

Regeneration Chemical	Resin Regenerated	Gallons Max Per Min	Gallons Max Per Day
H_2SO_4	Cation	350	90,000
NaOH	Anion	350	70,000

Regeneration Chemical	Max Temp	Concentration	pH
H_2SO_4	120°F	4-8%	0-1
NaOH	138°F	4%	14

2. 183-N Filter Backwash

Maximum Flowrate	pH
6000 $\frac{\text{Gallon}}{\text{Minute}}$	7.2 ± 1
540,000 $\frac{\text{Gallon}}{\text{Day}}$	7.2 ± 1

3. 163-N Coagulator Sludge Sump

Maximum Flowrate
500 $\frac{\text{Gallon}}{\text{Min}}$
27,000 $\frac{\text{Gallon}}{\text{Day}}$

The settling pond system shall be located to prevent adverse affects on existing N Plant structures, the N Plant tile field, the N Plant radioactive crib, WPPSS electrial transmission lines, underground piping and cables, railroad tracks and roadways.

The ion exchange resin regenerative waste sump and all discharge lines to the settling pond system exposed to the ion exchange resin regenerative wastes shall be chemically resistant to all chemicals specified in item 1 above.

Provisions shall be made to insure that ion exchange resin regenerative wastes are not allowed to enter the new backwash sump and the existing 183-N coagulator desludger sump.

The capability shall be maintained to valve the ion exchange resin regenerative wastes, the filter backwash, and the coagulator desludger wastes through existing discharge lines should discharge to the settling pond system be stopped.

The settling pond system shall be enclosed by fencing in accordance with Hanford Plant Standards. Sufficient space shall be provided between the settling ponds and the fence for vehicle traffic and maintenance requirements. (REV1)

All modifications shall be designed for a 10 year life. (REV1)

E. PRINCIPAL RISKS AND HAZARDS

The filter backwash and coagulator sludge sump wastes present no special hazards. The ion exchange resin regeneration wastes contain highly caustic (sodium hydroxide) and acidic (sulfuric acid) chemicals requiring proper precautionary measures, as required in UNI-M-38, Control No. 24.

F. MAINTENANCE REQUIREMENTS

The sump pump and its controls and instrumentation for the filter backwash will require routine maintenance and shall be positioned to be easily assessible. The sump will require periodic cleaning to remove sediment. The settling pond system will require periodic scraping and dredging to break up and remove sludge deposits at the pool bottom.

G. SITE LOCATION

All modifications will be made in the 100-N Area. The effluent transport system will originate in Buildings 163-N and 183-N. The effluent will be piped to a settling pond system to be located southeast of Building 183-N outside of the present security fence.

H. CRITERIA AND STANDARDS

1. AEC Manual Chapter Appendix 6301, General Design Criteria.
2. AEC Manual Appendix 6101, Management of Construction Projects.
3. AEC Manual Chapter 0550, Operational Safety Standards.
4. Document No. UNI-M-38, Industrial Safety.
5. Occupational, Safety and Health Standards.

6. Draft of authorization to discharge under the National Pollutant Discharges Elimination System, Application No. WA-000374-3.
7. Hanford Plant Standards, "Design Loads for Structures", SCD-4.1.
8. HPS-556-AC, Standard Specification for Steel Chain Link Security Fence, 5-20-75. (REV1)
9. DG-503-M, Guide for Selection of Coatings for Chemical and Decontamination Service, 2-21-74.
10. DG-110-M, Guide for Plastic Piping, 4-15-76, REV5.
11. ASTM-D-2321-72, Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
12. ASTM-D-2996-71, Standard Specification for Filament-Wound Reinforced Thermosetting Resin Pipe.
13. ASTM-D-2997-71, Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe.
14. ASTM-D-3262-73, Standard Specification for Reinforced Plastic Mortar Sewer Pipe.
15. ANSI B31.1-1973, Power Piping.
16. MIL-P-22245A(DOCKS), Military Specification, Pipe and Pipe Fittings, Glass Fiber Reinforced Plastic, March 12, 1973.
17. Deleted. (REV1)
18. Deleted. (REV1)
19. National Electric Code, 1976 Edition. (REV1)

I. <u>QUALITY ASSURANCE REQUIREMENTS</u>

The quality assurance program requirements are defined in UNI-340 REV1, "Quality Assurance Program Plan for CPFF Construction Projects", by D. A. Snyder, dated June 18, 1975 and as defined below.

For AII-Vitro design control purposes, the facilities to be provided on this project, except the perimeter fencing and electrical power additions, are classified Type II, as defined in Vitro-MA-5, "Quality Assurance Manual," revised May 24, 1976. The perimeter fencing and the electrical power additions are classified Type III. The quality assurance elements in Table V-7-1 of Vitro-MA-5 which are identified as required (R) for Type II or III components as applicable are to be applied with the following clarification and exception: (REV1)

1. The determination of requirements for physical and chemical certifications shall be on the same basis as specified for "certified materials".

J. ACCEPTANCE TESTING

An acceptance test procedure shall be prepared and testing shall be performed for the modified systems to prove the adequacy of the systems, the operating capability of the modifications to the system, and conformance of the completed work to the design requirements stated herein. The acceptance testing shall include operational tests at design conditions of the discharge systems for the filter backwash and ion regenerative wastes.

K. AS-BUILT DRAWINGS

All drawings prepared for this project shall be corrected to as-built conditions following completion of construction.

L. REFERENCE DOCUMENTS AND DRAWINGS

1. DUN-7364, Liquid Waste Disposal Review 100-N Plant, G. W. Wells, November 11, 1970.

2. HWS-6933, Water Treatment Facility.

3. HWS-6641, Piping Instrumentation and Mechanical Installation for Water Treatment Facilities.

4. CVI-11138, Pages 279 and 280, July 11, 1962.

5. H-1-29200, Flow Diagram Demineralized Water System, SHT 1, REV7.

6. H-1-20201, General Arrangement, Demineralization Equipment Area Plan, REV3.

7. H-1-29210, Flow Diagram Water Pretreatment System, SHT 1, REV7.

8. H-1-29213, Composite Piping Pretreatment Area Plans, SHT 1, REV7.

9. H-1-29214, Composite Piping Pretreatment Area Sections, SHT 1, REV9.

10. H-1-29257, Composite Yard Piping Plan and Sections, REV3.

11. H-1-29881, Conduit and Cable Plan, Demineralizer Area, REV3.

12. H-1-29891, Conduit and Cable Plan, Sections and Details, REV10.

13. H-1-30790, Structural Miscellaneous Yard Details, REV4.

14. H-1-20807, Structural Demineralization Plant, Finished Floor Plan, REV9.

D. M. Diediker, Manager
Facilities Design

DST:bbn

APPENDIX C-2

CONCEPTUAL DESIGN REPORT
1324-NA PERCOLATION POND

UNI-594

CONCEPTUAL DESIGN REPORT
NON-RADIOACTIVE WASTE WATER CONTROL

A. PROJECT SYNOPSIS

Five 100-N Plant discharges and one 100-KE Plant discharge to the Columbia River will be modified to eliminate shoreline discharges during normal operation, to reduce the amount of chemicals and suspended solids discharged, and eliminate the return of extracted debris to the river. These modifications are intended to reduce the possiblity of environmental effects on Columbia River aquatic life in conformance with the National Pollution Discharge Elimination System.

The 66-inch raw water return line discharge will be diverted into the 102-inch outfall by the installation of a wall in the 1908-N spillway. The N Plant filter backwash will be diverted to a new concrete sump and pumped to a new settling pond system. The 163-N ion exchange resin regenerative wastes and the 183-N coagulator sump wastes will be pumped by their existing sump pumps to the new settling pond system. The 183-KE filter backwash will be diverted to an existing empty sedimentation basin. The backwash will be allowed to settle and water containing less than 30 mg/ℓ suspended solids will be drained to the river. A bar screen will be installed in the 181-N Building traveling screen wash water discharge sump pit to remove floating debris from returning to the river.

B. JUSTIFICATION

N Plant discharges and the KE Plant discharge to the Columbia River require modifications to obtain authorization to discharge under the National Pollutant Discharge Elimination System. (Tentative effluent limitations have been established in discharge application WA-000374-3.)

All thermal discharge dilution zone boundaries are required to be a minimum of 100 feet out from the water line at the rivers low flow (36,000 cfs). Presently the 66-inch RWR discharges at the shoreline through a concrete flume in violation with the above policy.

The filter backwash waste discharges are limited to an average of 30 mg/ℓ of suspended solids. Initial filter backwash wastes and coagulator desludger wastes can reach 100-200 mg/ℓ of $A\ell(OH)_3$ and suspended river solids, several times the allowed limit.

The ion exchange regenerative wastes from Building 163-N discharge sodium hydroxide and sulfuric acid into the 102-inch outfall. Requirements for the 102-inch outfall are for a pH of six to nine. During a reactor outage sodium hydroxide discharges can produce a final pH of 9.2, and the sulfuric acid can produce a final pH of 3.3.

The EPA requires that floating debris once removed cannot be returned to the river. Debris from the traveling screen is returned to the river via the 16-inch fishline in conflict with the above requirement.

C. SITE SELECTION

Modifications to the 66-inch raw water return, the 183.3 KE filter backwash discharge and the traveling screen wash water discharge will be made to existing structures and no alternate site is available.

The site for the new settling pond system for the 183-N filter backwash ion exchange resin regeneration wastes and coagulator desludger wastes was selected approximately 500 feet southeast of Building 183-N. An alternate location in the southeast corner of 100-N Area was discarded due to insufficient space. Roadways, pipelines and concrete slabs limit the available space.

D. CONSTRUCTION

1. 66-Inch RWR Diversion into 102-Inch Outfall

a. Improvements to Land

Not applicable.

b. Buildings

Not applicable.

c. Other Structures

The 66-inch RWR discharges into a spillway prior to its entry into the concrete flume to the river. A steel wall with a supporting structure will be constructed in the spillway to backup the 66-inch RWR discharge and divert it into the 102-inch outfall. The wall will have a capacity to divert 125,000 gpm from the 66-inch RWR. In an emergency condition (the 102-inch outfall blocked) the wall will allow the combined flow of both the 108-inch RWR and the 66-inch RWR (325,000 gpm) to flow over the wall into the concrete flume. The wall will be of sufficient strength to hold a 20 foot head of water.

d. Special Facilities

Not applicable.

e. Utilities

Not applicable.

f. Operating Contractor Work

The operating contractor will perform the engineering and design of the diversion wall. The operating contractor has the expertise and personnel to design the wall. The onsite engineering personnel are familiar with the seal well structure, the operating personnel and the onsite construction contractor enabling the wall to be constructed during the 1976 summer reactor outage.

2. Traveling Screen Wash Water Discharge Bar Screen

a. Improvements to Land

Not applicable.

b. Buildings

Not applicable.

c. Other Structures

A three-foot wide, five-foot long bar screen will be fabricated and installed in the traveling screen wash water discharge sump pit at Building 181-N.

d. Special Facilities

Not applicable.

e. Utilities

Not applicable.

f. Operating Contractor Work

The operating contractor will fabricate and install the bar screen. The bar screen will be identical to an existing bar screen located at 181-KE and does not require additional design or engineering.

3. 183.3-KE Filter Plant Backwash

a. Improvements to Land

Not applicable.

b. Buildings

Not applicable.

c. Other Structures

A 30-inch piping header will be installed in the 183.3-KE waste flume to transport the backwash water from the backwash waste gullets, numbers 9 and 10, to sedimentation basin number 6. A branch line will be routed through the existing 24-inch square sluice gate into the sedimentation basin. The clarified water will be allowed to drain through a weir box structure and out another existing 24-inch sluice gate. The piping will require hangers and a supporting structure.

d. Special Facilities

Not applicable.

e. Utilities

Not applicable.

f. Operating Contractor Work

Not applicable.

4. 183-N Plant Backwash, 163-N Ion Exchange Resin Regenerative Wastes and 183 Coagulator Sump Wastes

a. Improvements to Land

New 75' x 125' x 10' settling ponds will be excavated south of the existing 100-N A Bus switchyard. The ponds will be fed by a 12-inch pipe with riprap at the west end of the settling ponds to prevent erosion. The ponds will be as excavated using no liners or reinforcement. Perimeter fencing and lighting will be required.

b. Buildings

Not applicable.

c. Other Structures

A new reinforced concrete sump approximately 25' x 25' x 10' deep will be constructed on the south side of Building 183-N. Flow to the north side of the 183-N Building will be stopped by installing a valve in the existing line, allowing it to be used in the future if needed. Two sump pumps will be installed in the backwash sump to pump discharges to the settling ponds. Water level in the sump will be regulated by a float switch which will turn the pumps on and off at prescribed levels. Indicators will be provided in the control room showing whether or not the pumps are running.

Eight-inch acid resistant pipe will be used to carry ion regenerative wastes from the existing 183-N sump pumps in sump number 1 to a point east of the filter backwash sump where it will tie into the 12-inch backwash waste line to the settling ponds. A check valve will be installed in the 12-inch line between the tie and the new backwash sump to prevent ion exchange regenerative wastes from entering the sump.

Four-inch pipe will be used to carry the coagulator sump wastes from the east end of Building 183-N to the 12-inch backwash lines. A check valve will be installed in this line to prevent ion exchange regenerative wastes from entering the coagulator sump.

d. Special Facilities

Not applicable.

e. Utilities

Electrical supply will be required for the filter backwash modification. The filter backwash sump pump with instrumentation and controls will require a 460 volt, 130 ampere electrical supply. The settling pond lighting will require a 240 volt, 35 ampere electrical supply.

f. Operating Contractor Work

Not applicable.

E. EQUIPMENT DESCRIPTION AND FUNCTIONS

The filter backwash discharge sump will be equipped with two single stage vertical turbine pumps, Gould model VIT 18 HMD with a rated capactiy of 3000 gpm at a 50 foot head. The pumps will be of all stainless steel construction and powered by a 50 hp motor at 1200 RPM, 460V, 30, 60 Hz TEFC. Upon actuation by a float switch they will discharge to the settling ponds.

F. PROCUREMENT AND CONSTRUCTION PLANS

The engineering for the N Plant filter backwash, ion exchange resin regenerative wastes and coagulator sump waste modifications, and for the KE Plant filter backwash modifications will be accomplished by the architect-engineer contractor. Procurement for these modifications will be iniiated following approval of Title II engineering in FY 1977. The construction will be performed by construction contractor forces during the period from June 1977 to November 1977. These modifications are not dependent upon reactor operation or shutdown.

The engineering for the 66-inch RWR diversion wall will be accomplished by the operating contractor. The wall will require primarily common structural materials requiring no long lead times. Procurement will be initiated upon completion of the engineering. The construction will be performed by construction contractor forces during the 1976 summer outage because the installation of the 66-inch diversion wall requires the N Plant reactor and boilers shutdown and the reactor at low flow recirculation.

The engineering and design of the 181-N traveling screen wash water bar screen will be accomplished by the operating contractor. The screen materials will be procured upon completion of the engineering. No long lead time items are required. The construction and installation will be performed by the operating contractor. The work is not dependent on reactor operational status.

G. SAFETY PROVISIONS

1. Personnel Safety

The settling ponds for the filter backwash, ion exchange resin regenerative wastes and coagulator sump wastes will be enclosed by perimeter fencing and protective lighting to reduce the possibility of personnel injury.

2. Radiation Control

Not applicable.

3. Fire Loss

Not applicable.

4. Environmental Control

The modifications described in this conceptual design report are intended to improve the effects on the environment by certain N Plant and KE Plant effluent discharges. The new diversion wall's height is designed to allow 322,000 gpm to flow over the wall should the 102-inch outfall become plugged. This will prevent erosion of the riverbank. No environmental problem will occur if the traveling bar screen should fail. The ion regenerative wastes contain high concentrations of sulfuric acid and sodium hydroxide. Chemically resistant piping and a stainless steel pump will be used to prevent leakage to the environment.

H. QUALITY ASSURANCE PROGRAM

UNI-340 REV1, "Quality Assurance Program Plan for CPFF Construction Projects," is to be used for construction projects for which design is performed by Vitro and construction is performed by J. A. Jones Company. The necessity for this quality assurance is justified by the fact that failure of these systems could jeopardize the improved environmental control to be provided by these facilities.

I. ENERGY IMPACT STATEMENT

1. Availability and Cost of Energy

This project will require an approximate electrical energy supply of 2400 KW-hrs/month for the settling pond lighting and two sump pumps with instrumentation, controls and float switches. Electrical power in adequate supply is available from the N Plant, 163-N motor control center. The electricity is available at an average cost of $0.003137/KW-hr.

2. Short Term and Long Term Bases for Energy Selection

In both a long and short term basis electrical energy proved to be less expensive and the most practical source of energy.

3. Existing and Proposed Government Regulations

Not applicable.

4. Optimization of Energy Requirements for the Project and the Total Site

The settling pond lighting will utilize the minimum amount of lights to provide adequate illumination in accordance with AEC Appendix 2401, Part III.

The sump pumps have been sized to provide a flowrate equal to the plant's output to prevent possible flooding of the sump, this provides a safe but not excessive capacity.

J. ESTIMATED COSTS

1. The N-Plant filtered and demineralized water plant modifications and the KE filtered water plant modification costs have been estimated by the Architect Engineer contractor.
2. The 66-inch RWR diversion wall cost has been estimated by the construction contractor.

3. The 181-N bar screen cost has been estimated by the operating contractor.

4.

MODIFICATION	YEAR FUNDED	CLASSIFICATION	COST ESTIMAT
a) N-Plant Filter and Demineralized Water Plant	Mini FY 76	General Plant Project	445,000
b) KE-Filtered Water Plant	FY 77	General Plant Project	*
c) 66-Inch RWR Diversion Wall	Mini FY 76	Capital Work Order	40,000
d) 181-N Bar Screen	Mini FY 76 or FY 77	Expense	1,000

* Cost estimate to be furnished in a later supplement.

D. M. Diediker, Manager
Facilities Design

DST:bbn

APPENDIX D

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REFERENCES

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WP #9131A

APPENDIX E

LOCATION OF OFFICIAL COPIES OF THE CLOSURE AND POST-CLOSURE PLAN

APPENDIX E

LOCATION OF OFFICIAL COPIES OF THE CLOSURE AND POST-CLOSURE PLAN

Two copies of the 100 Area 1324-NA Percolation Pond and 1324-N South Settling Pond Closure/Post-Closure Plan are official copies of the closure plan. These official copies are located at the following office:

U.S. Department of Energy-Richland Operations Office
Federal Building
825 Jadwin Avenue
P.O. Box 550
Richland, WA 99352

APPENDIX F

PERSON RESPONSIBLE FOR STORAGE AND UPDATING COPIES OF THE CLOSURE/POST-CLOSURE PLAN

APPENDIX F
PERSON RESPONSIBLE FOR STORAGE AND UPDATING COPIES OF THE CLOSURE/POST-CLOSURE PLAN

The following office will be responsible for updating the official copies of the Closure/Post-Closure Plan for the 100 Area 1324-NA Percolation Pond and 1324-N South Settling Pond:

Chief
Radiological and Environmental Safety Branch
Environment, Safety and Health Division
U.S. Department of Energy - Richland Operations Office
Federal Building - Room 619
825 Jadwin Avenue
P.O. Box 550
Richland, WA 99352
(509) 376-7387

APPENDIX G

CERTIFICATION OF CLOSURE FOR THE 100 AREA 1324-NA PERCOLATION POND AND 1324-N SOUTH SETTLING POND

APPENDIX G

CERTIFICATION OF CLOSURE FOR THE 100 AREA 1324-NA PERCOLATION POND AND 1324-N SOUTH SETTLING POND

When closure is completed, DOE-RL will submit to the regulating authority both a self-certification and a certification by an independent registered professional engineer that the 100 Area 1324-NA Percolation Pond and 1324-N South Settling Pond have been closed in accordance with the specification of the approved plan.

Owner/Operator Closure Certification

The DOE-RL will self-certify with the following document or a document similar to it:

> I, (name), an authorized representative of the U.S. Department of Energy-Richland Operations Office located at the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby state and certify that the 100 Area 1324-NA Percolation Pond and 1324-N South Settling Pond, to the best of my knowledge and belief, have been closed in accordance with the attached approved closure plan, and that the closure was completed on (date). (Signature and date)

Professional Engineer Closure Certification

The DOE-RL will engage an independent registered professional engineer to certify that the facility has been closed in accordance with this approved closure plan. The DOE-RL will require the engineer to sign the following document or a document similar to it:

> I, (name), a certified professional engineer, hereby certify, to the best of my knowledge and belief, that I have made visual inspection(s) of the 100 Area 1324-NA Percolation Pond and 1324-N South Settling Pond and that closure of the aforementioned facilities has been performed in accordance with the attached approved closure plan. (Signature, date, state professional engineer license number, business address, and phone number)

WP #9129A

APPENDIX H

TECHNICAL MEMORANDUM (TM) 87-INJFP-01

C. A. RICHARDSON TO E. M. GREAGER, MARCH 11, 1987

"CORROSIVITY OF 163-N BUILDING CATION EXCHANGER REGENERATION WASTES"

UNC NUCLEAR INDUSTRIES

A UNC RESOURCES Company P.O. Box 490 Richland, Washington 99352 Telephone 509/376-7411

TM-87-1NJFP-01

Memorandum

To: E. M. Greager Date: March 23, 1987

From: C. A. Richardson / CA Ecott for

Subject: CORROSIVITY OF 163N BUILDING CATION EXCHANGER REGENERATION WASTE

As per your request, corrosivity testing of 163N Building cation exchanger regeneration waste has been completed. Results of three tests (two at pH 3.0 and one at pH 3.5) are provided in Table 1. Preliminary testing at pH 2.0 using AISI C-1018 instead of AISI C-1020 carbon steel coupons indicated excessive corrosivity (results not herein reported). Conversely, no test was performed at pH 4.0 after acceptable corrosivity was measured at pH 3.5. Washington Administrative Code, 173-303-090, "Dangerous Waste Characteristics, No. 6, Characteristics of Corrosivity", specifies that maximum corrosion of AISI C-1020 carbon steel shall not exceed 250 mils/per/year. Each test was performed in accordance with NACE Standard TM-01-69, "Test Method - Laboratory Corrosion Testing of Metals For Process Industries," 1976 Revision.

The 163N Building cation exchanger regeneration waste transport system was sampled during three different regeneration cycles and the samples delivered to the 1706KE Corrosion Testing Laboratory. The pH of the waste samples was 1.06, 0.72 and 0.75. These solutions were used in the two pH 3.0 tests and the pH 3.5 test, respectively. Three grams of NaCL were added to each test solution to simulate high chloride concentration commonly measured in anion exchanger regeneration waste. The pH of the respective test solutions was adjusted by adding 50 percent-liquid NaOH (used to regenerate anion exchangers). At the end of each test an identical pH of 4.54 was measured. The volume of each test solution was three liters.

No attempt was made to adjust or control test solution oxygen concentrations in the glass reaction flask test vessel; however, a reflux condenser was utilized to minimize evaporation losses, see Figure 1, TM-01-69. Each test solution was constantly stirred at approximately 1-1 1/2 ft/sec with a magnetic stir-bar. The temperature of each test was maintained at $130^{\circ}F \pm 2^{\circ}F$.

During the first pH 3.0 test, tripicate 1 1/2"OD x 5/16"ID x 1/8" thick AISI C-1020, cold rolled - annealed, carbon steel coupons (material certification available) were horizontally suspended in the test solution on a teflon rod with separation maintained by

E. M. Greager
Page 2
March 23, 1987

TM-87-1NJFP-01

1/2" teflon spacers. As can be seen on Table 1, 1st pH 3.0 test, considerably different corrosion was experienced by the three coupons. The difference was determined to be the result of particulates in the waste precipitating onto the top of each coupon, especially the upper coupon. Therefore, the pH 3.0 test was repeated with the coupons mounted vertically (also pH 3.5 test). With the coupons mounted vertically, very little particle precipitation onto the coupons was observed and the corrosion rates were considerably more uniform. No localized corrosion, such as pitting or crevice corrosion from the holding rod or spacers, was observed on any test coupon.

Each test coupon was prepared as per Section 2, NACE Standard TM-01-69 (using acetone as a degreaser and moisture remover). After each exposure period, each coupon was cleaned as per Section 5, sub-section 5.3.1, 5.3.2 and Section 5.4 of the above referenced standard. To ensure that all corrosion products were removed, each coupon was also dipped in an inhibited (2-Propyn-1-ol) 50 percent HCL solution for 10 seconds. Three separate AISI C-1020 carbon steel coupons were dipped in the inhibited HCL solution for 10 seconds to determine coupon weight loss - corrosion resulting from the 10 second immersion. Each coupon experienced 0.0006 mils corrosion. Even though each coupon was immersed two times, for 10 seconds each time, the resulting corrosion was not considered significant enough to be included as part of the overall corrosivity of each test solution.

CAR/cab

Attachments

cc: GR Cox
TN Draper
[redacted]
WK Krazter
AP Larrick
KC Oberg
GL Smith
TM-File
CAR-File/LB #6

CORROSIVITY OF 163N BUILDING CATION EXCHANGER REGENERATION WASTE TM-87-1NJFP-01

Prepared by: C A Richardson 3-24-87
C. A. Richardson, Engineer Date
Chemistry and Waste Treatment Technology

Reviewed by: [signature] [date]
W. K. Kratzer, Principal Engineer Date
Chemistry and Waste Treatment Technology

Approved by: A P Larrick 3-25-87
A. P. Larrick, Manager Date
Chemistry and Waste Treatment Technology

TABLE 1

163 N-Building Ion Exchange
Regeneration Waste
Corrosivity Test Results

Exposure Time	1st pH 3.0 Test 1					
	Coupon No. 1 Sur. Area 4.0663 in^2		Coupon No. 2 Sur. Area 4.0848 in^2		Coupon No. 3 Sur. Area 4.0644 in^2	
	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy
4 Hours	48.27	202	58.20	242	90.66	379
24 Hours	49.05	34	67.90	47	87.26	59

1 Coupons mounted horizontally

Exposure Time	2nd pH 3.0 Test 2					
	Coupon No. 7 Sur. Area 4.0671 in^2		Coupon No. 8 Sur. Area 4.0497 in^2		Coupon No. 9 Sur. Area 4.0473 in^2	
	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy
4 Hours	62.80	263	59.45	250	70.40	296
24 Hours	67.97	47	74.87	52	68.89	48

1 Coupons mounted vertically

Exposure Time	pH 3.5 Test 2					
	Coupon No. 10 Sur. Area 4.0575 in^2		Coupon No. 11 Sur. Area 4.0581 in^2		Coupon No. 12 Sur. Area 4.0581 in^2	
	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy	Wt. Loss mg	Corr. Rate mpy
4 Hours	34.49	145	36.07	151	38.94	163
24 Hours	47.50	33	47.02	33	47.47	33

1 Coupons mounted horizontally
2 Coupons mounted vertically