



Statement of Basis

For the Modification of Waste Treatment and Immobilization Plant-Specific Conditions in the Dangerous Waste Portion of the Hanford Resource Conservation and Recovery Act Permit

October 2006

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STATEMENT OF BASIS FOR MODIFICATION OF
THE DANGEROUS WASTE PORTION OF THE
RESOURCE CONSERVATION AND RECOVERY ACT PERMIT
FOR THE TREATMENT, STORAGE, AND DISPOSAL
OF DANGEROUS WASTE, PART III, OPERATING UNIT 10 (WA7890008967),
WASTE TREATMENT AND IMMOBILIZATION PLANT

Permittees

United States Department of Energy
(Owner/Operator)
Office of River Protection/Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Bechtel National, Inc.
(Co-Operator)
2535 Stevens Center Place
Richland, Washington 99354

The Washington State Department of Ecology (Ecology) has developed this Statement of Basis in accordance with the requirements of Washington Administrative Code (WAC) 173-303-840(2)(f)(iv). Its purpose is to present information on Ecology's tentative decision to modify Part III, Operating Unit 10, Waste Treatment and Immobilization Plant (WTP) of the Hanford Facility's Dangerous Waste Portion of the Resource Conservation and Recovery Act (RCRA) Permit for the Treatment, Storage, and Disposal (TSD) of Dangerous Waste, hereafter called "the Permit". This modification includes supporting technical information and engineering drawings for construction on the regulated portions of the WTP Pretreatment Building, Low-Activity Waste (LAW) Building, High-Level Waste (HLW) Building, and Analytical Laboratory. In addition, this modification incorporates format changes to the Permit Appendices and changes to supporting information. Pursuant to WAC 173-303-830(3), only the conditions that are subject to this modification are reopened for comment.

Ecology has elected to prepare a Statement of Basis pursuant to WAC 173-303-840(2)(f)(iv) rather than a Fact Sheet. A Statement of Basis was prepared for previous major WTP Permit modifications. This process is being followed for permit modifications initiated by Ecology to incorporate similar design package information and other changes to the WTP Permit conditions. The September 25, 2002, Fact Sheet is available from Ecology upon request (Ecology Publication Number 01-05-006).

This Statement of Basis is divided into four sections, which include:

1.0 Hanford Facility Permit Background

- 2.0 The WTP Permitting Process
- 3.0 Procedures for Reaching a Final Decision on the Draft Permit
- 4.0 Proposed Modifications to the Hanford Facility Permit

1.0 Hanford Facility Permit Background

Ecology initially issued the Permit for the Hanford Facility in 1994. The Permit provides standard and general facility conditions, as well as unit-specific conditions for the operation, closure, and post-closure care of mixed and dangerous waste TSD units at Hanford.

The Permit is normally modified annually to incorporate newly permitted units, reflect Class 1/2/3 Modifications, and include minor changes in grammar, consistency, and presentation. The Washington State Dangerous Waste Regulations in WAC 173-303-830 describe the types of changes or modifications that may be made to a dangerous waste permit issued by Ecology.

Approximately 50 TSD units at Hanford are operating or closing under RCRA final status standards.

Conditions of the Permit are presented in six parts:

- Standard Conditions (Part I)
- General Facility Conditions (Part II)
- Unit-Specific Conditions for Final Status Operations (Part III)
- Corrective Action for Past Practices (Part IV)
- Unit-Specific Conditions for Units Undergoing Closure (Part V)
- Unit-Specific Conditions for Units in Post-Closure (Part VI)

The WTP TSD Unit was added to the Unit-Specific Conditions for Final Status Operations (Part III) portion of the Permit on September 25, 2002. The Permit modification was effective on October 25, 2002. The WTP Unit is currently being constructed under final status standards.

2.0 The WTP Permitting Process

The permitting of the WTP Unit is using a phased (or stepped) approach. The first phase was completed on September 25, 2002, with issuance of a final Permit allowing construction of the WTP LAW, Pretreatment (PT), and HLW Buildings to commence, and a compliance schedule to provide additional detailed information to Ecology. The compliance schedule addresses submittal of information necessary for construction of the rest of the WTP Unit, and eventual operation.

The second phase of permitting is implementation of the compliance schedule, which requires design and other information be submitted for Ecology approval before regulated portions of the WTP Unit are constructed. The third phase of permitting is implementation of the last portion of the compliance schedule, which requires updating portions of the Dangerous Waste Permit Application prior to facility start of operations. These portions of the Permit are administrative in

nature, and cannot be completed before the design is nearly complete (e.g., Contingency Plan, Closure Plan, and Training Plan). At the completion of the three phases, the WTP Unit will comply with all the applicable requirements of WAC 173-303, and after receiving written permission from Ecology, can begin treatment and/or storage of dangerous and/or mixed waste. For more details on the WTP permitting process, see the September 25, 2002, Fact Sheet (Ecology Publication Number 01-05-006).

The design submittals (second phase described above) have been structured to allow the Permittees to provide design information in roughly the same order as the buildings are constructed. Therefore, the packages start at the lowest level of the building (i.e., below-grade levels) and are submitted for regulated areas of each level of the building before construction begins. This process has been adjusted for some design packages. If the process system in the design package is located on more than one level in a WTP Building, the design package can address components on more than one building level. This will prevent the confusion caused by one process system description being segmented into multiple design packages.

The Permit breaks out design packages into three general groups by the type of regulated equipment: (1) secondary containment; (2) primary containment (e.g., tanks, miscellaneous units [i.e., evaporators and melters], containment buildings); and (3) other associated, regulated equipment (e.g., ancillary equipment, equipment associated with miscellaneous units). Using tank systems as an example, secondary containment packages include details of the design of secondary containment that must be in place in regulated areas when the floors and walls are built for that level of the building (e.g., floor slope, sump location). The installation of tanks and other large equipment usually follows construction of the floors and walls. Therefore, a tank package on that level will be included in the Permit before installation (e.g., structural details for those tanks or miscellaneous units showing nozzle locations, unit volumes, and tank shell thickness). The last equipment usually installed on a level for a tank system is the ancillary equipment (e.g., piping, pumps, process instrumentation, and electrical equipment). Therefore, the ancillary equipment package that provides details for equipment on that level will be included in the Permit before installation (e.g., materials of construction, pipe support details, pump types and their operating limits).

With each WTP Building consisting of multiple levels, the total number of design packages is large. The Permittees estimate about 150 packages will have to be incorporated into the Permit. This could potentially trigger 150 public comment periods. Ecology intends to group packages, where possible, to reduce the number of public comment periods.

The secondary containment, primary containment, and other associated, regulated equipment packages for different levels require repetitive information submittals in each package. Again, using tank systems as an example, the method of installation of secondary containment liners on each level should be the same and most tanks will use the same construction specifications. The Permit allows the Permittees to reference the previously submitted design information. Therefore, some design packages may consist mostly of references to information already provided.

Ecology is authorized, pursuant to WAC 173-303-830(4)(e), to grant temporary authorizations for the Permittees to start construction on a design package after Ecology approval, but before the draft permit modification process is complete. A Permittee is allowed to request a Temporary

Authorization (TA) to implement a modification prior to public notice and comment, pursuant to WAC 173-303-830(4)(e)(ii)(A). To issue a TA, Ecology must find it meets the criteria as described in WAC 173-303-830(4)(e)(ii)(A) and -830(4)(e)(iii). The term of a TA is limited to 180 days with the potential for Ecology approval of two terms, with a maximum combined duration of 360 days, provided that the Permittee has requested a Class 2 or 3 modification for the activity covered in the TA (WAC 173-303-830(4)(e)(iv)). The purpose of a TA is to allow the timely implementation of a permit modification. Construction that takes place under a TA is at the Permittees' risk because public comment may require the Permittees to modify something they have already built. The submittal schedule developed by the Permittees will allow most design packages to undergo public comment and be incorporated into the Permit prior to construction of those areas.

3.0 Procedures for Reaching a Final Decision on the Draft Permit Modification

The Washington State Hazardous Waste Management Act, Chapter 70.105 Revised Code of Washington (RCW), and the rules promulgated in Chapter 173-303 of the WAC, regulate the management of dangerous waste in Washington. In accordance with WAC 173-303-800, facilities that treat, store, and/or dispose of dangerous waste must obtain a permit for these activities.

On March 29, 2004, the Permittees submitted a Class 2 modification request to Ecology in accordance with WAC 173-303-830(4)(b). Pursuant to this regulation, the modification request was distributed for a 60-day public review from March 31 to June 1, 2004. One Tribal Nation, one individual and three groups commented. The comments received were similar, and contained significant public concerns about the proposed modification.

On June 29, 2004, Ecology notified the Permittees that, as a result of significant public comments, the modification will follow the Class 3 modification process contained in WAC 173-303-830(4)(c) pursuant to WAC 173-303-830(4)(b)(vi)(A)(III)(AA). In addition, Ecology also asked for additional information¹ from the Permittees to justify two of the proposed Permit modifications. Additional information was submitted to Ecology on August 4, 2004. After evaluating the information submitted by the Permittees, as required by WAC 173-303-840(2) Ecology has decided to issue a draft Permit indicating a tentative decision by Ecology to modify the WTP Permit to eliminate one LAW melter from the LAW Building design, add one HLW melter to the HLW Building design, and keep the Technetium Ion Exchange Process System (TXP) and the Technetium Eluant Recovery Process System (TEP) in the PT Building design. In addition, this draft Permit modification includes the addition of detailed design information for the HLW melters submitted in Permit Design Packages HLW-018 and HLW-019, flooding volume calculations and sump data submitted in PT Building design package PTF-065, several Class 1 and Class 1¹ Permit modifications, and several new Permit conditions.

As required by WAC 173-303-840(3)(d) draft permit modifications to Part III, Operating Unit 10, WTP, of the Permit will have a 45-day public comment period. It begins on October 9, 2006, and ends on November 27, 2006. All comments received during the public comment period will be considered and responded to before final decisions are made on the proposed modifications.

¹ Letter 04-ED-068, dated August 4, 2004, Roy J. Schepens to Michael A. Wilson titled: "Re: Additional information Requested for the Waste Treatment and Immobilization Plant (WTP) Class 2 Dangerous Waste Permit (DWP) Modification Facility"

Regulatory requirements for public notice and involvement (for this Permit modification) are described in WAC 173-303-840(3) and (4). Comments must be post-marked or received by e-mail no later than close of business November 27, 2006. Comments hand-delivered by November 27, 2006, to the address below will be accepted. Direct all written comments to:

Ms. Brenda Becker-Khaleel
Department of Ecology
3100 Port of Benton Blvd.
Richland, Washington 99354
E-mail address: Bbec461@ecy.wa.gov

A public hearing will be held at the Department of Ecology, Richland Office on the evening of November 9, 2006. A presentation and short question and answer period will begin at 7:00 pm and formal comments will follow.

Ecology will consider and respond to all written comments submitted by the deadline and verbal comments submitted at the public meeting. Ecology will then make a final permit decision, which will become effective 30 days after Ecology provides notice of the decision to the Permittees and all who commented. If Ecology's decision includes substantial changes to the Permit because of public comment, Ecology will initiate a new public comment period.

All commenters and the Permittees will receive a copy of the Responsiveness Summary and a notification of the final permit decision. Ecology's final permit decision may be appealed within 30 days after notice of the final permit decision has been provided.

Copies of the Permit for the Hanford Facility, including the proposed draft permit modifications are available for review at the Hanford Public Information Repositories listed below. [For additional information, call the Hanford Cleanup Hotline toll-free at (800) 321-2008].

HANFORD PUBLIC INFORMATION REPOSITORIES

Portland

Portland State University
Branford Price Millar Library
1875 SW Park Ave
Portland, Oregon 97201-3220
(503) 725-3690
Attn: Michael Bowman/Jocelyn Kramer
E-mail: bowman@lib.pdx.edu

Richland

Public Reading Room
2770 University Drive
Consolidated Information Center, Rm. 101L
Richland, Washington 99352
(509) 372-7443
Attn: Terri Traub
E-mail: readingroom@pnl.gov

Spokane

Gonzaga University
Foley Center
East 502 Boone
Spokane, Washington 99258-0001
(509) 323-3839
Attn: Connie Scarpelli
E-mail: carter@its.gonzaga.edu

Seattle

University of Washington Suzzallo Library
Government Publication Division
Seattle, Washington 98195
(206) 543-4664
Attn: Eleanor Chase
E-mail: echase@u.washington.edu
Public Service: (206) 543-4664

This Statement of Basis for the proposed draft Permit modification is also available on the World Wide Web at <http://www.ecy.wa.gov/programs/nwp/>.

If special accommodations are needed for public comment, please contact Madeleine Brown, Department of Ecology, Nuclear Waste Program, at (509) 372-7936 (voice), or (360) 407-6006 (TDD).

4.0 Proposed Permit Modification to Part III, Operating Unit 10, WTP of the Permit

This draft modification to the WTP Permit consists of the following changes:

- Deletion of one LAW melter and addition of one HLW melter.
- Updates to Chapters 4 and 6 in Appendix 51 of the Permit to reflect current design.
- Addition of flooding volume calculations and sump data submitted in PT Building design package PTF-065.
- Addition of detailed HLW melter design information submitted in Permit Design Packages HLW-018 and HLW-019.
- Incorporation of several Class 1 and Class ¹1 Permit modifications.
- Addition of several new Permit Conditions.

In addition to the changes discussed above, the March 29, 2004, Class 2 modification request also, included a revised Part A Permit application, and a proposal to eliminate the Technetium Ion Exchange (TXP) and Technetium Eluant Recovery Process Systems (TEP) from the PT Building.

Ecology is denying these requested changes and did not incorporate these changes into this draft Permit modification.

The draft Permit modification shows all significant changes to the Permit. To communicate changes, the text to be deleted will be struck-out with a single line and the new text will be double-underlined. Only the text being changed in the current modification will be highlighted by underlines and strikeouts. At issuance of the next permit modification, clean page changes will be issued to the Permittees and Administrative Record for the previous modification.

The following sections put the modification in historical context, describe each of the major changes to the WTP Permit, and present the justifications for the modifications.

4.1 Historical Context

The current effort by the U. S. Department of Energy (USDOE) to vitrify the Hanford tank waste began in 1995, when USDOE decided to pursue a “privatization” approach for waste vitrification. The overall approach was to select two private companies to each build competing pilot-scale vitrification facilities. USDOE would then select the “best” technology after evaluating the pilot-scale results. The winning contractor would construct a full-scale vitrification plant to vitrify at least 25 percent of the waste by radioactivity and 10 percent of the waste by mass by 2018. The winning contractor would be responsible for financing, constructing, and operating the vitrification plant. USDOE would pay the contractor based on the number of glass canisters produced, within a certain chemical constituent envelope.

It is critical to understand that the original configuration of the vitrification plant was never intended to process all of the tank waste. By 2018, a second LAW vitrification facility needs to be constructed and a second melter added to the HLW Building to provide enough capacity to finish vitrifying all the tank waste by 2048. This is considerably later than the Hanford Facility Agreement and Consent Order (also known as the Tri-Party Agreement or TPA) milestone of 2028.

It became apparent early in the design process for the pilot-scale plants that the amount of radioactive shielding required to construct a pilot-scale plant was very large. The shielding requirements were expected to drive up the cost of the pilot-scale plant so much that it would not be much more expensive to build one full-scale plant rather than building two pilot-scale plants. USDOE decided to abandon the dual pilot-plant competition approach and subsequently selected British Nuclear Fuels Limited (BNFL) to build the full-scale vitrification plant following the privatization concept. As the design progressed, the cost of the plant, using the privatization approach, became too high for a private company to finance. In 1999, the USDOE cancelled the BNFL contract and put the design and construction of the vitrification plant out for bid as a traditional government-owned facility.

In 2000, the USDOE-Office of River Protection (ORP) awarded the design/construction contract to Bechtel National Inc. (BNI). The contract required BNI to meet the TPA milestones for first glass to be produced in 2007 and 25 percent of the waste by radioactivity and 10 percent of the waste by mass to be treated by 2018. Before BNI could receive complete payment for constructing the vitrification plant, BNI must meet certain glass production requirements specified in the contract before USDOE acceptance of the plant. The vitrification plant, now named the WTP, was to be

designed following the basic approach started by BNFL. At the time the BNI contract was awarded, the design of the WTP was less than 10 percent complete.

The original contract required that the LAW Building be designed to produce an average of 30 metric tons of glass per day using three melters with a nominal production rate of 10 metric tons per melter per day. The original HLW Building design was for an average of 1.5 metric tons of glass per day for the one melter with an open bay to add a second HLW melter later. When the 2000 contract was established, it was believed that a 30 metric ton per day LAW Building and 1.5 metric ton per day HLW Building could complete vitrification of 25 percent of the waste by radioactivity and 10 percent by mass by the TPA milestone date of 2018. The BNI contract does not extend to operation of the WTP after USDOE acceptance. The USDOE will solicit a separate contract for operation of the WTP.

During strategic planning for preparation of the Hanford Performance Management Plan (DOE/RL-2002-47, Rev D), USDOE decided to accelerate the tank waste treatment and vitrification. During this planning, it was determined that the one HLW melter (1.5 metric tons per day) would not provide enough capacity to meet the 10 percent and 25 percent requirements of 2018 in the TPA. A total six metric ton-per-day HLW capacity would be needed to meet 2018 requirements. It was also determined that a total capacity of 90 metric tons per day of LAW treatment would be needed to meet 2028. As a result of these revelations, the previous concept of deciding the details of additional tank waste treatment facilities in 2014 was abandoned. Instead, a second HLW melter was added to the design, both HLW melter capacities were increased to 3 metric tons each, and the additional LAW treatment brought on line sooner, around 2011. The type of treatment would be selected from supplemental treatment options or a second LAW vitrification facility. Regardless of the type of additional LAW treatment, the capacity would need to approach 60 metric tons per day. Because more waste would be treated sooner, this acceleration of the mission was projected to meet the TPA milestone date for completion of tank vitrification by 2028. USDOE contends that implementing a supplemental treatment will be less expensive than building a second LAW vitrification facility. Although many of the details are yet to be resolved, and the supplemental technologies have not been demonstrated to work on Hanford tank waste, USDOE believes that this acceleration will be successful and will result in considerable cost savings to the government. The selection of a supplemental treatment technology or a second LAW vitrification facility is part of TPA milestones M-62-08 and M-62-11.

The vast majority of the waste in the Hanford waste tanks fall under the classification of 'HLW' as defined in the Nuclear Waste Policy Act. All HLW must be disposed of at the national high-level waste repository (designated to be Yucca Mountain, Nevada). Primarily because of the cost of disposal and the limit on the amount of HLW waste the national repository will be able to accept, USDOE has developed a process to pretreat the waste to separate out key radionuclides, vitrify the waste, and reclassify a portion of the waste as "Immobilized Low-Activity Waste" (ILAW). This dramatically reduces the amount of HLW going to the national repository. ILAW that has been processed for permanent onsite disposal must meet the waste acceptance criteria for the Integrated Disposal Facility (IDF), and specific requirements spelled out in the United States Nuclear Regulatory Commission (USNRC) letter to USDOE in 1997 (the process which allows reclassification of waste as ILAW) (Paperiello, USNRC to Kinzer, USDOE, June 9, 1997).

In 2005, USDOE issued the Estimate at Completion showing significant increases in the estimated cost of designing and constructing the WTP, as well as significant delays in the facility startup and commissioning. Again, in 2006 USDOE issued another Estimate at Completion showing additional cost increases and schedule delays for the WTP. USDOE has indicated that current TPA milestones are unrecoverable. However, those milestones have not yet been renegotiated.

4.2 Removal of a LAW Melter and Addition of a HLW Melter

When first proposed by the Permittees, this change was greeted with a great deal of skepticism by Ecology. After several months of discussions with the Permittees about the potential impacts to the vitrification efforts, both positive and negative, Ecology decided to support this modification request. The discussion below addresses the major questions brought forward by Ecology, Tribes, and the stakeholders during the first public review of this modification request.

Two factors were involved in the decision to add one HLW melter and remove one LAW melter. One factor was the decision by USDOE to accelerate the tank waste vitrification effort to meet the requirements of TPA milestone M-62-00 and to finish the mission by 2028 (mentioned above). The other factor was the results of a research and development effort funded by USDOE.

As design of the WTP proceeds, there is an extensive research and development project being conducted to test various pieces of treatment equipment and optimize their design and operation. One of the most significant activities is research at two pilot-scale melters. One melter is located in Columbia, Maryland. This melter has been used to optimize LAW melter performance. This melter is one third the size of the planned LAW melter. The other research melter is located at Vitreous States Laboratory (VSL) in Washington D.C. The VSL melter has been used to optimize HLW melter performance. The VSL melter is about one third the size of the planned HLW melter, the VSL melter has been used to test certain melter components and melter off gas treatment equipment.

One of the most important results of the melter research and development efforts was the demonstration in the Columbia melter that a significant increase in glass output could be achieved if bubbler tubes were installed in the melter. Bubbling is simply a method to inject gas into the melt pool near the bottom, resulting in significant increases in glass production in the LAW and HLW melters. A considerable amount of testing went into optimizing the number of bubblers, bubbler spacing, and bubbler materials of construction.

As a result of testing in the Columbia melter, the glass production rate (the name plate rating) for the HLW melters increased from 1.5 metric tons per day for each melter to 3 metric tons per day for each melter. WTP LAW melters increased from 10 tons of glass per day to 15 metric tons per day (nameplate rating). In addition, it was determined that LAW melters may be able to attain a glass production rate of 20 metric tons of glass per day or more.

Ecology thought that the increased melter production rates from the original 30 tons of glass per day for three melters to a production rate of 45 to 60 tons of glass per day for three melters could reduce the vitrification schedule. However, in addition to melter production rates, there are other limitations to glass production that Ecology was not aware of when the change was originally proposed. The two main issues are container handling and heat removal.

Container handling after filling includes:

- Canister cooling.
- Adding sand to fill the canister (if necessary).
- Sealing the lid on the canister.
- Decontamination.
- Smear testing to ensuring external contamination is at acceptable levels.
- Storing the canisters before shipment out of the LAW Building.

The LAW Building has been designed for a production throughput of 30 metric tons of glass per day. The capacity of the LAW canister handling system appears to be limited to six containers per day, which is equivalent to a production capacity of 36 metric tons of glass per day.

The ventilation system in the LAW Building is also sized for 30 metric tons per day glass production rate. Air is chilled and introduced into the melter rooms and the storage areas for cooling and into the container handling lines to keep the building internal wall temperature below the design maximum of 104° F. (Excessive heat loads are known to damage concrete and could lead to a reduction in the structural integrity of the building's walls and floor.) While the system can handle up to a peak production rate of 45 tons per day, it is not designed to sustain this rate. The limiting factors in the ventilation system are ventilation duct size and High Efficiency Particulate Air (HEPA) filter flow capacity.

The container handling problem and the ventilation problem can be mitigated. However, there is not enough space in the existing LAW Building to add another container handling line or to add more HEPA filter housings. Following generally accepted good engineering practice, BNI has designed a building sized to hold the equipment needed to produce the contracted design production rate of 30 metric tons of glass per day. The changes needed to mitigate the container storage and ventilation sizing problems would require an expansion of the footprint of the LAW Building and considerable redesign work. The cost could be substantial, possibly more than \$100 Million. The proposed change in melter configuration (two LAW melters and two HLW melters) would result in a relatively small change in the project cost, but it would allow meeting the contract requirement to deliver 30 metric tons of LAW glass per day. In addition, one HLW melter does not provide enough capacity to meet the 2018 and 2028 milestones. Substantially more LAW treatment capacity (an additional 60 metric tons) will still be needed.

Effective treatment of the tank waste requires that the output from the PT Building be carefully balanced with the treatment capabilities of the LAW and HLW process systems to ensure that all treatment processes are fully utilized. With the two LAW and two HLW melter configuration, the following production rates have been estimated:

- PT Building will process sufficient tank farm waste to yield approximately 90 metric tons/day total of HLW or LAW glass.

- HLW melters, at full capacity, can produce 3 metric tons/day each for a total of 6 metric tons per day.
- LAW melters can operate at 15 metric tons/day each for a total of 30 metric tons per day.

The two-LAW and two-HLW melter configuration will only be able to process a little more than one-third of the output from the PT Building; therefore, more LAW treatment will be required. USDOE believes that a less costly supplemental technology may be used, rather than building the second LAW vitrification facility as they originally planned. USDOE and Ecology have entered into a multi-year effort to determine how the additional LAW treatment will be provided. Ecology's baseline remains addition of a second LAW vitrification facility.

Ecology is requiring that if a supplemental treatment technology is selected, that supplemental treatment must produce primary and secondary waste forms that are as protective of human health and the environment as WTP LAW vitrification. If it appears that the supplemental technology waste form is not as protective, or it must be abandoned for any other reason, Ecology will require that a second LAW vitrification facility be constructed.

In the event that two LAW melters do not meet the combined production rate of 30 metric tons of glass per day, Ecology is adding the following Permit condition. This Permit condition is intended to ensure that if the two LAW melters do not perform as expected, a third melter will be added to the LAW Building. However, Ecology is not proposing addition of a third LAW melter that would exceed the capacity of the container handling system or the ventilation system in the LAW Building.

III.10.I.1.a.xxiii. The existing LAW Building will retain capability to install the third melter before or after hot start up. No melter support vessels or support systems should be deleted from "process cell design" that could preclude later melter installation.

4.3 Updates to Chapters 4 and 6 in Appendix 51

In the March 29, 2004, Class 2 modification request the Permittees included updated versions of Chapters 4 and 6 to reflect requested design changes. Ecology has incorporated the majority of requested changes into the draft Permit modification. The draft Permit modification shows all Permittee requested changes to the current Permit, new text is double-underlined, and deleted text is struck-out with a single line. The major basis for the requested changes include removal of one LAW melter from LAW Building design, addition of one HLW melter to HLW Building design, and updates to building and system descriptions. Information contained in Chapters 4 and 6 has not been revised since the original Permit application was submitted in December 2001. The equipment and room numbers in the current Permit use a numerical system established by the previous contractor. This modification revises the equipment and room numbers to the current contractors numbering system. Any Permittee requested changes related to the TXP or TEP Systems were not incorporated into this draft Permit modification.

4.4 Addition of Flooding Volume Calculations and Sump Data

WAC 173-303-640(4) requires that secondary containment be provided for all new tank systems or components, prior to their being put into service. In November 2005, the Permittees submitted Permit

Design Package PTF-065. This was the final submittal for Permittee compliance with Compliance Schedule Item 12 in Attachment 51, Appendix 1.0 of this Permit, “*Submit Engineering Information for Each Secondary Containment and Leak Detection System for the WTP Permit System to be Included in the Permit.*” This package included: *Flooding Volume for Room P-0150 in the Pretreatment Facility*, 24590-PTF-PER-M-04-0008, Revision 1; *Sump Data for Pretreatment Facility Room P-0150*, 24590-PTF-PER-M-04-0009, Revision 0; and the *IQRPE review of the Pretreatment Facility (PTF) Elevation (-) 2’-0” Secondary Containment of Radioactive Liquid Waste Disposal System (RLD) Tanks (RLD-TK-00006 A/B)*, Revision 0.

The *Flooding Volume for Room P-0150 in the Pretreatment Facility*; 24590-PTF-PER-M-04-0008, specifically addresses flooding scenarios for Room P-0150, a tank containment area located outside the PTF, which contains the RLD tanks RLD-TK-00006A and RLD-TK-00006B. The flooding scenarios addressed in the document established the minimum requirements for secondary containment in Room P-0150. Because the tank system is in an outdoor uncovered area, containment of rainfall is also included.

The *Sump Data for Pretreatment Facility Room P-0150*; 24590-PTF-PER-M-04-0009, specifically addresses sump data for Room P-0150. The *IQRPE review of the Pretreatment Facility (PTF) Elevation (-) 2’-0” Secondary Containment of Radioactive Liquid Waste Disposal System (RLD) Tanks (RLD-TK-00006 A/B)*, Revision 0 includes as independent review of the current design for the *Pretreatment Facility Elevation (-) 2’- 0” Secondary Containment of RLD Tanks (RLD-TK-00006 A/B)* as required by WAC 173-303-640(3)(a) through (g).

Ecology has reviewed each of these submittals and did not have any comments. Therefore, they have been included in this draft Permit modification for incorporation into Attachment 51, Appendices 8.8, 8.5, and 8.11, respectively.

4.5 Addition of detailed HLW Melter Design Information

On June 16, 2006, the Permittees submitted Permit Design Packages HLW-018 and HLW-019, *Miscellaneous Treatment Unit for the HLW Facility HMP System*, and *Miscellaneous Treatment Unit Sub-system Equipment for HLW Facility HMP System*, respectively. These two Design Packages are the final packages scheduled for submittal under Compliance Schedule Items 28 and 29 in Attachment 51, Appendix 1 of the WTP Permit. Prior to submittal of these design packages, Ecology had requested the Permittee remove ghosting from portions of the HLW Melter Process (HMP) System. Ecology also requested the addition of two design drawings depicting portions of the HMP system that were not included in the submittal. The Permittee did not incorporate Ecology’s requests; as a result, the design packages did not meet our expectations. However, Ecology has included the information from these design packages in this draft Permit modification with the following changes:

- Ecology added ‘bubbles’ to affected Permit drawings to identify non-regulated portions of the design. Non-regulated portions of the design are located inside ‘bubbles’. These modifications are consistent with Ecology’s comments provided on draft documents.
- Ecology added a note indicating that portions of this drawing that are enclosed by a ‘bubble’ are non-regulated. All other portions of the drawing are regulated.

- Ecology added ‘bubbles’ to non-regulated notes and references. This is consistent with guidance Ecology provided to the Permittee on September 27, 2005, that all notes and references on the source documents should appear on the Permit-version drawings, but may be ghosted if they are administrative in nature or refer only to ghosted portions of a drawing.
- Ecology populated Table III.10.J.C. – *HLW Vitrification System Process and Leak Detection System Instruments and Parameters* using the *System Description for HLW Melter Process System (HMP)*, and information provided in Permit Design Packages HLW-018 and HLW-019, and design drawings.
- Ecology added source equipment assembly drawings to meet Permit condition III.10.J.5.c.ii., which requires submittal of HLW melter mechanical drawings. Permit versions of these drawings were not provided in the design package submittal. Ecology selected five drawings to fulfill this Permit condition, HLW Melter Assembly Drawing WTP-M-21951-3, Sheets 8, 9, 10, and 11, Revisions 3, and HLW Melter Assembly Drawing WTP-M-21951-1, Sheet 5, Revision 3.
- Ecology added two Process and Instrument Diagrams (P&IDs), *HLW Melter 1 System Film Cooler Utilities* 24590-HLW-M6-HMP-00012 and *HLW Melter 2 System Film Cooler Utilities* 24590-HLW-M6-HMP-20012. These P&IDs show the design configuration, instrumentation, pressure and flow signals, and control valves for instrument air and demineralized water supply lines to the film coolers of each HLW melter. The operation of these air and water supply lines is essential to proper HLW melter operation.

The drawings added by Ecology have not been reviewed and stamped by an Independent Qualified Registered Professional Engineer. Ecology has determined that the incorporation of these drawings into the Permit will not affect the proper design and installation of the HLW melters. In accordance with Permit Condition III.10.J.1.a.ix., the Permittees will prepare a certification of proper design and installation prior to receipt of dangerous and/or mixed waste.

This permitting approach falls outside the ‘normal’ permitting process. In a normal permitting situation, with nearly complete design, the Permittee and the regulators would sift through the drawings, select a small subset for demonstrating compliance with the regulations, and incorporate these drawings into the Permit. One of the most difficult issues for Ecology during construction of the WTP is how to balance need for design approval against the sheer volume of technical information being generated during the design process. The project has generated tens of thousands of drawings.

Because of the WTP’s design and construct strategy, the permitting process has been uniquely customized to support the WTP construction process. In May 15, 2002, the Fact Sheet for the *Hanford Facility Resource Conservation and Recovery Act Draft Permit for the Treatment, Storage, and Disposal of Dangerous Waste* (Fact Sheet), Publication Number 01-05-0006, Ecology described the significant factual, legal, methodological, and policy questions considered in preparing the draft Permit modification. Ecology “reviewed the application and found it to be ‘incomplete.’” BNI submitted a demonstration that certain information needed for the Permit application was not available at the time the draft Permit was issued; Ecology accepted the demonstration and made allowances for the submission of additional information to supplement

material that had already been provided in the application. Ecology's decision to proceed in this manner was based on the threat posed by highly radioactive mixed waste stored in outdated underground storage tanks and the time it would take to follow a traditional permitting process.

The original draft Permit was based on overall design of less than 30% complete and much of the detailed design information usually included in a Permit application was not yet available. Ecology wrote conditions that require compliance with the regulations in WAC 173-303 and described, in as much detail as possible at this time, the information that must be submitted to supplement the Permit to allow construction and operations to begin. As design proceeds and new issues arise, Ecology continues to modify this Permit to include new conditions or modify existing conditions, as described in WAC 173-303-830(3) and WAC 173-303-840(2) and (3).

This permitting approach allowed for modification of the Hanford Facility RCRA Permit to allow construction to start without a complete design being available, subject to Ecology's review and approval authority over future, more detailed design submittals. Through this process, Ecology does not require a Permit modification for a design change until construction on that portion of the WTP is ready to proceed. Before construction on any portion of the WTP can proceed, the Permit must be modified in accordance with WAC 173-303-830(4) to incorporate the changes into the Permit. As originally intended, changes to the drawings incorporated into the Permit that do not affect a regulated area or activity in the building are considered Class 1 modifications and are incorporated into the Permit following the Hanford Site permit process. "For example, if a general arrangement drawing in the Permit has one regulated cell on a level in the plant, changes to non regulated areas (moving a stair well, increasing the size of a change room, etc.) on that level would trigger a Class 1 modification." This language led to the origination of ghosting (showing non-regulated portions of the facility design in a lighter font than the regulated portions). Although this process of ghosting is not used elsewhere in Washington State, Ecology believed that the use of ghosting as described above is legitimate.

Because many of the drawings were not available and were being issued continually during the concurrent design and construction process, Ecology could not determine in advance all the drawings that needed to be incorporated into the Permit. As design proceeds, Ecology reviews drawing types identified in Attachment 51, Appendix 3.0 for compliance with the Permit. Ecology will select appropriate drawings to be incorporated into the Permit, in addition to those supplied by the Permittees, which will best demonstrate compliance with the regulations.

Originally, ghosting was intended for non-regulated portions of the facility (e.g., stairwells, restrooms, change rooms, utilities, raw chemical storage, non-contact cooling waters, service air, electrical systems, etc., for non-waste management operations). In addition, Ecology allowed instrumentation (other than level indicators and leak detectors) to be ghosted until enough information was available to determine their regulatory status. Over the past four years, the Permittees have expanded the use of ghosting to more of the facility design with each Permit submittal. The Permittees have submitted documents to Ecology with ghosting applied to portions of the facility, which include:

1. Melter and offgas internal systems.
2. Tank internals.

3. Cooling systems needed for safe operations of certain tanks or systems.
4. ILAW containers/waste conveyors.
5. Mechanical handling systems for transporting waste/waste products.

Ecology has determined that too much of the design affecting the operation of regulated systems has been ghosted, or been requested to be ghosted, by the Permittee. Ecology and the Permittees have held numerous meetings over the past two years to discuss the use of ghosting on Permit drawings. Ecology and the Permittees have been unable to reach a mutually agreeable resolution to this issue; as a result, Ecology has determined that continuing the use of ghosting as we have in the past is not acceptable.

Permit drawings with ghosting contain the note: "The portions of this drawing shown in phantom are considered non-permit affecting and are not subject to the regulatory requirements of the WAC for the dangerous waste permit to the extent that those portions do not impact dangerous waste areas/operations." Ecology's position is that ghosted portions generally do affect dangerous waste areas/operations, and therefore the standard note is misleading. As a result, Ecology has added 'bubbles' and notes to the drawings in Design Packages for HLW-018 and HLW-019 to indicate the regulatory status of equipment shown on the drawings. The effect of this is to maintain design configuration control in the Permit for regulated systems and equipment, by requiring Permit modifications whenever design of those portions is modified. This is especially important for the phased design/build and permitting process in effect for WTP. In conjunction with the addition of 'bubbles,' Ecology populated Permit Table III.10.J.C. (*HLW Vitrification System Process and Leak Detection System Instruments and Parameters*) so that the Permittees will know which specific pieces of equipment are included in the Permit. It is important to note that not all instruments in un-ghosted portions of the P&IDs in Design Packages HLW-018 and HLW-019 appear in Permit Table III.10.J.C. Ecology's intent in populating that table is to identify only those instruments important to maintaining and monitoring confinement and containment of dangerous waste, and meeting performance standards for melter offgas treatment.

In accordance with WAC 173-303-806(4)(i)(v), the owner or operator must provide "Any additional information determined by the department to be necessary for evaluation of compliance of the unit with the environmental performance standards of WAC 173-303-680(2)." In addition, Permit conditions III.10.C.9.f, III.10.E.9 (b.ii, c.ii, d.ii), III.10.G.10 (b.ii, c.ii, d.ii), III.10.H.5 (b.ii, c.ii, d.ii), and III.10.J.5 (b.ii, c.ii, d.ii) require submittal of design drawings and specifications to Ecology for incorporation into the Permit. Information requested by Ecology regarding ghosting and addition of P&IDs not presently in the Permit apply to critical systems, per the critical systems list in Attachment 51, Appendix II. The additional information requested is important to the design and operation of critical systems. In accordance with WAC 173-303-830(3)(a)(i), during review of the permit file Ecology may determine that a permit modification is necessary, if "There are material and substantial alterations or additions to the permitted facility or activity which occurred after Permit issuance which justify the application of Permit conditions that are different or absent in the existing Permit." Ecology will continue to systematically review and evaluate the drawings in the Permit for inappropriate application of ghosting. Ecology has tentatively identified 45 additional drawings which need to be added to the Permit.

In addition, Ecology will revise Permit Condition III.10.J.5.e.ix. as follows:

Permit Table III.10.J.C and III.10.K.C shall be revised and/or completed for HLW Vitrification System process and leak detection system monitors and instruments (to include, but not be limited to: instruments and monitors measuring and/or controlling flow, pressure, temperature, density, pH, level, humidity, and emissions) to provide the information as specified in each column heading. Process and leak detection system monitors and instruments for critical systems, as specified in Attachment 51, Appendix 2.0 and as updated pursuant to Permit Condition III.10.C.9.b., and for operating parameters as required to comply with Permit Condition III.10.C.3.e.iii., shall be addressed. Process monitors and instruments for non-waste management operations (e.g., utilities, raw chemical storage, non-contact cooling waters, etc.) are excluded from this Permit condition [WAC 173-303-680, WAC 173-303-806(4)(i)(i)(A) through (B), and WAC 173-303-806(4)(i)(v)]

4.3 Incorporation of Several Class 1 and/or Class 1 Permit Modifications

This draft Permit modification incorporates several Class 1 and/or Class 1 Permit modifications including changes to Part III, Chapter 10 and Appendix 51 which were approved by Ecology in accordance with WAC 173-303-830(4)(a) and include:

- **24590-HLW-PCN-ENV-05-009** Class '1 Modification: Update Mechanical Data Sheet for the Canister Decon Vessel 2 (HDH-VSL-00002), 24590-HLW-MVD-HDH-P0012, Rev. 0 in Appendix 10.6.
- **24590-HLW-PCN-ENV-05-011** Class '1 Modification: Update Mechanical Data Sheet, Canister Decon Vessel 1, 24590-HLW-MVD-HDH-P0006, Rev. 1; Material Selection Data Sheet, Canister Decon Vessels (HDH-VSL-00002 AND 00004) 24590-HLW-N1D-HDH-P0003, Rev. 1; and Mechanical Assembly Drawing, 24590-HLW-MV-HDH-P0006, Rev. 0 in Appendix 10.6.
- **24590-LAB-PCN-ENV-05-002** Class '1 Modification: Update Plant Item Material Selection Data Sheet for Hot cell Drain Collection Vessel (RLD-VSL-00165) in Appendix 11.9.
- **24590-LAB-PCN-ENV-06-001** Class '1 Modification: Update Material Selection Data Sheet for the Lab Area Sink Drain Collection Vessel (RLD-VSL-00164) in Appendix 11.9.
- **24590-LAW-PCN-ENV-05-004** Class 1 Modification: Editorial changes to "Flooding Volume for LAW Facility" (24590-LAW-PER-M-02-002) in Appendix 9.8.
- **24590-LAW-PCN-ENV-06-001** Class '1 Modification: Updates LAW Plant Item Material Selection Data Sheet for LAW concentrate receipt vessels LCP-VSL-00001/00002 in Appendix 9.9.
- **24590-LAW-PCN-ENV-06-005** Class 1 Modification: Update Material Selection Data Sheets for LOP-SCB-00001/-00002 (LAW) Melter 1 and Melter 2 Submerged Bed

Scrubbers (SBS) and LOP-VSL-00001/-00002 (LAW) Melter 1 and Melter 2 SBS Condensate Vessels in Appendix 9.9.

- **24590-PTF-PCN-ENV-05-002** Class '1 Modification to Update Equipment Assembly Drawing for Pretreatment Ultrafiltration Feed Preparation Vessel (UFP-VSL-00001B) in Appendix 8.6.
- **24590-PTF-PCN-ENV-05-011** Class 1 Modification: Update the Mechanical Data Sheet and Material Selection Data Sheet for the Vessel Vent Caustic Scrubber (PVP-SCB-00002) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-012** Class '1 Modification: Update Mechanical Data Sheet and Material Selection Data Sheet for the Plant Wash Vessel (PWD-VSL-00044) in Appendix 8 of the Dangerous Waste Permit Appendix 8.9.
- **24590-PTF-PCN-ENV-05-013** Class '1 Modification: Update PTF Plant Item Material Selection Data Sheet for HLW Feed Receipt Vessel (HLP-VSL-00022) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-014** Class '1 Modification: Update Permit specification 24590-PTF-3PS-MEVV-TP001, ENGINEERING SPECIFICATION FOR FORCED CIRCULATION VACUUM EVAPORATOR SYSTEM in Appendix 8.7.
- **24590-PTF-PCN-ENV-05-016** Class 1 Permit Modification to the Ultrafilter Permeate Collection Vessel, UFP-VSL-00062A/B/C, Plant Item Material Selection Data Sheet 24590-PTF-N1D-UFP-P0008, Rev. 1 in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-018** Class 1 Modification to the Plant Item Material Selection Data Sheet (24590-PTF-N1D-UFP-P0001) for the Pretreatment Facility Ultrafiltration Recycle Breakpot UFP-BRKPT-00001A/B) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-019** Class 1 Permit Modification to the Treated LAW Evaporator Separator Vessel TLP-SEP-00001 Mechanical Data Sheet 24590-PTF-MVD-TLP-P0005, Rev. 2 in Appendix 8.6.
- **24590-PTF-PCN-ENV-05-020** Class 1 Permit Modification to the Pretreatment Facility Waste Feed Evaporator Separator Vessel FEP-SEP-00001A Mechanical Data Sheet 24590-PTF-MVD-TLP-P0006, Rev. 3 in Appendix 8.6.
- **24590-PTF-PCN-ENV-05-021** Class 1 Permit Modification to the Pretreatment Facility Waste Feed Evaporator Separator Vessel FEP-SEP-00001B Mechanical Data Sheet 24590-PTF-MVD-FEP-P0007, Rev. 2 in Appendix 8.6.
- **24590-PTF-PCN-ENV-05-024** Class '1 Modification: Update Existing TCP-Vessel-00001 (PTF) information provided in Part III, Chapter 10, Attachment 51, Appendix 8.9.

- **24590-PTF-PCN-ENV-05-025** Class '1 Modification: Update PTF Plant item Material Selection Data Sheet for the PTF ultimate overflow vessel (PWD-VSL-00033) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-026** Class '1 Modification: Update Material Selection Data Sheet for the alkaline effluent vessels (RLD-VSL-00017-A/B) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-027** Class 1 Modification: Update PTF Plant Item Material Selection Data Sheets for Cs Concentrate Break-pot and Cs Eluate Break-pot (CNP-BRKPT-00001/2) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-030** Class 1 Modification: Update Material Selection Data Sheet for Ultrafiltration Feed Preparation Vessels (UFP-VSL-00001A/B) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-031** Class 1 Modification: Update Mechanical System Data Sheet 24590-PTF-MVP-PWD-P0001 Rev. 3 for the Pretreatment Facility ultimate overflow vessel 24590-PTF-MV-PWD-VSL-00033 in Appendix 8.6.
- **24590-PTF-PCN-ENV-05-032** Class '1 Modification: Update PTF Plant Item Material Selection Data Sheet for PTF Spent Resin Slurry Vessels (RDP-VSL-00002A/B/C) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-033** Class '1 Modification: Update PTF Plant Item Material Selection Data Sheet for PTF C3 Floor Drain Collection Vessel (PWD-VSL-00046) Appendix 8.9.
- **24590-PTF-PCN-ENV-05-034** Class '1 Modification: Update Plant Item Material Selection Data Sheet for FEP-VSL-00005 (Waste Feed Evaporator Condensate Vessel) in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-035** Class '1 Modification: Cancel Pretreatment General Arrangement (GA) sections 24590-PTF-P1-P0008 through P0017 in Appendix 8.4.
- **24590-PTF-PCN-ENV-05-036** Class 1 Modification: Update Material Selection Data Sheets for CNP-VSL-00001, CNP-VSL-00003, CNP-VSL-00004, CNP-EVAP-00001 in Appendix 8.9.
- **24590-PTF-PCN-ENV-05-039** Class 1 Modification: Updated Material Selection Data Sheet for Cs Ion exchange feed, rinsate collection and reagent vessels CXP-VSL-00001, -00004, and 0005 respectively in Appendix 8.9.
- **24590-PTF-PCN-ENV-06-001** Class 1 Modification: Update Material Selection Data Sheet for PWD-BRKPT-00015/16 and PWD-VSL-00015/16 Appendix 8.9.
- **24590-PTF-PCN-ENV-06-002** Class 1 Modification: Update material selection data sheet for PVP-VSL-00001 in Appendix 8.9

- **24590-PTF-PCN-ENV-06-005** Class 1 Modification: Plant Item Material Selection Data Sheets for filters and pulse pots UFP-FILT-00001 A/B, 2A/B & 3 A/B, and UFP-PP-00001 A/B, 2 A/B & 3A/B, respectively in Appendix 8.9.
- **24590-PTF-PCN-ENV-06-008** Class 1 Modification: Update MSDS for the Cs Evaporator Primary Condenser, CNP-HX-00002, Cs Evaporator Inter-Condenser, CNP-HX-00001, Cs Evaporator Concentrate Reboiler and Cs Evaporator After-Condenser, CNP-HX-00004 in Appendix 8.9.
- **24590-PTF-PCN-ENV-06-009** Class 1 Modification: Update Pretreatment General Arrangement P1-P01T-P0002 (El. 28') in Appendix 8.4.
- **24590-PTF-PCN-ENV-06-015** Class 1 Modification: Update PTF RLD vessels (RLD-VSL-00017 A & B) Mechanical Data Sheets 24590-PTF-MVD-RLD-P0005 and -P0006 in Appendix 8.6.
- **24590-WTP-PCN-ENV-05-007** Class '1 Modification: Update Permit specification 24590-WTP-3PS-MCE0-TP002, rev. 2 ENGINEERING SPECIFICATION FOR PROCESS EJECTOR/EDUCTOR in Appendix 7.7.
- **24590-WTP-PCN-ENV-05-012** Class 1 Modification: Modification of Permit Conditions III.10.c.3.e.ii to refer to Regulatory DQO optimization Report (24590-WTP-RPT-MGT-04-001, Rev 0) (not in Appendices).
- **24590-PTF-PCN-ENV-05-022** Class 1 Modification: Update Material Selection Data Sheets for TLP Plant Items in Appendix 8.9.
- **24590-PTF-PCN-ENV-06-003** Class '1 Modification: Update GA for El. 0 and Section A-A in 8.4

4.4 Addition of Several New Permit Conditions

As the Permit for the WTP Unit is implemented, Ecology will modify the Permit conditions for many reasons including: to clarify text, add new conditions, delete existing conditions, or to correct errors

This Class 3 modification adds several new Permit conditions:

The following systems were added to the Critical System List in Attachment 51, Appendix 2.0 of this Permit.

Mnemonic System Locator	System Name
RWH	Radioactive Solid Waste Handling System
LEH	LAW Canister Export Handling System
LMH	LAW Melter Handling System
HEH	HLW Canister Export Handling System
PVV	Process Vessel Vent System (for HLW)

A critical system as defined in Part I of the Hanford Facility’s Dangerous Waste Portion of the RCRA Permit, as applied to determining whether a Permit modification is required, means those specific portions of a TSD unit’s structure, or equipment, whose failure could lead to the release of dangerous waste into the environment, and/or systems which include processes which treat, transfer, store, or dispose of regulated wastes.

Addition of the Mechanical Handling Systems to the Critical Systems List

The RWH, LEH, LMH, and HEH systems are used to transfer containers of dangerous waste from one part of the WTP to another. Mobile transfer equipment, such as fork lifts or dollies,, is not usually included in a RCRA Permit as regulated equipment. However, the mechanical handling systems listed above are stationary systems built into the WTP facility, all of which are essential to the transfer of regulated waste within the facility. The portion of the Permit for Operating Unit 10 does not currently address any information needs for mechanical handling systems; therefore, Ecology is proposing addition of the following Permit condition and associated compliance schedule items.

III.10.C.15 Support Systems

III.10.C.15.a. Mechanical Handling Systems

III.10.C.15.a.i. The Permittees will submit to Ecology, pursuant to Permit condition III.10.C.9.f., in accordance with the Compliance Schedule, as specified in Operating Unit 10, Appendix 1.0 of this Permit, engineering information as specified below, for incorporation into Attachment 51, Appendices 9.6, 9.10, 10.6, and 10.10 of this Permit, or into the Administrative Record where noted.

- A. System Descriptions for each Mechanical Handling system identified in Permit Table III.10.C.A, for incorporation into the Administrative Record (Compliance Schedule Item 36).
- B. Mechanical Handling Diagrams and Mechanical Handling Data Sheets for the following pieces of equipment (Compliance Schedule Item 37):
 - a. HDH-CRN-00005
 - b. HEH-CRN-00003
 - c. HPH-CRN-00001
 - d. HPH-CRN-00002
 - e. HSH-CRN-00001
 - f. HSH-CRN-00014
 - g. LEH-CRN-00003
 - h. LPH-CRN-00002
 - i. HEH-CRN-00001

III.10.C.15.a.ii. The Permittees will submit to Ecology, pursuant to Permit condition III.10.C.9.f., prior to initial receipt of dangerous waste and/or mixed waste in the WTP Unit, engineering information as identified below for incorporation into Attachment 51, Appendices 9.13, 9.18, 10.13, and 10.18 of this Permit.

- A. Equipment instrument logic narrative description related to safe operation of equipment covered by III.10.C.15.a.i.B, including but not limited to allowed travel path for bridge and trolley, upper and lower hook travel limits, two-blocking prevention, hook load limits, wire rope misreeling, and overspeed protection
- B. Descriptions of operational procedures and inspection schedules demonstrating appropriate controls and practices are in place to ensure equipment covered by III.10.C.15.a.i.B will be operated in a safe and reliable manner that will not result in damage to regulated tank systems, miscellaneous unit systems, or canisters of vitrified waste.

III.10.C.15.a.iii Prior to initial receipt of dangerous and/or mixed waste in the WTP Unit, the Permittee will submit to Ecology, pursuant to Permit condition III.10.C.9.f., the following for incorporation into Attachment 51, Chapter 4.0: updated Narrative Description and figures for all Mechanical Handling Systems identified in Permit Table III.10.C.A., to include but not limited to travel path, fail safe conditions, fail safe logic control, safety features and controls that minimize the potential for release of dangerous/mixed waste during normal operations, and lifting and/or load capabilities of each crane specified in III.10.C.15.a.i.B,

Tables III.10.C.A – Mechanical Handling Systems		
Pretreatment Building		
	Pretreatment Filter Cave Handling System	PFH
	Pretreatment In-Cell Handling System	PIH
	Radioactive Solid Waste Handling System	RWH
Low-Activity Waste Building		
	Radioactive Solid Waste Handling System	RWH
	LAW Melter Equipment Support Handling System	LSH
	LAW Container Pour Handling System	LPH
	LAW Container Finishing Handling System	LFH
	LAW Melter Handling System	LMH
	LAW Canister Export Handling System	LEH
High-Level Waste Building		
	HLW Melter Cave Support Handling System	HSH
	HLW Canister Export Handling System	HEH
	HLW Filter Cave Handling System	HFH
	HLW Canister Pour Handling System	HPH
	HLW Canister Decontamination Handling System	HDH
	HLW Melter Handling System	HMH
	Radioactive Solid Waste Handling System	RWH

Interim Compliance Schedule- WTP Facility		
	Compliance Schedule Submittal	Interim Compliance Date
	III.10.C.16	
36.	Submit system descriptions for mechanical handling systems identified in Permit Table III.10.C.A.	12/31/2009
37.	Submit mechanical handling diagrams and mechanical handling data sheets for mechanical handling equipment identified in Permit condition III.10.C.16.a.i.B.	12/31/2007
38.	Submit equipment instrument logic narrative description for mechanical handling equipment, as specified in Permit condition III.10.C.16.a.ii.A.	Prior to initial receipt of dangerous waste.
39.	Submit descriptions of operational procedures for mechanical handling systems, as specified in Permit condition III.10.C.16.a.ii.B.	Prior to initial receipt of dangerous waste.

III.10.C.9.f. For each Critical System identified in Attachment 51, Appendix 2.0 or meets the definition of Critical System as defined in this Permit, the Permittees shall submit to Ecology for review and approval, following the schedule in Attachment 51, Appendix 1.0 of this Permit, the information identified in Permit conditions III.10.C.16., III.10.D.10., III.10.E.9., III.10.F.7., III.10.G.10., III.10.H.5., and III.10.J.5. Information Ecology determines to incorporate into the Permit will follow the Permit condition III.10.C.2.g. process unless stated otherwise within the specific Permit condition. Information Ecology determines necessary to support design basis will be incorporated into the Administrative Record.

Addition of the HLW Process Vessel Vent (PVV) system to the Critical Systems List

Ecology added the HLW PVV system to the critical systems list (Appendix 2.0). The HLW PVV system ventilates various dangerous waste tanks in the HLW Building. The Permit defines a critical system as "those specific portions of a TSD unit's structure, or equipment, whose failure could lead to the release of dangerous waste into the environment, and/or systems which include processes which treat, transfer, store, or dispose of regulated wastes." Systems identified as critical cannot be modified without Ecology review, and if necessary, a Permit change.

The HLW PVV system is designed to contain and transfer gaseous emissions to control devices in the HLW melter offgas system, where the emissions are treated prior to release. The gaseous emissions originate from tanks used for: preparing and transferring tank waste feed to the melter; neutralizing waste; storing acid waste; and for collecting liquids from plant wash, drains and offgas condensate. This tank waste contains organic dangerous constituents with the potential to volatilize, designates for both toxic and persistent dangerous criteria waste (WAC 173-303-100), and is considered toxic upon inhalation. Proper design, construction, and operation of the HLW PVV system is critical to ensuring the emissions are contained until they have been treated for release.

The Permit requires proper design and operation to ensure releases of toxic vapors, fumes, or other emissions are prevented (Permit conditions III.10.E.5.m. and III.10.E.9.c.xii.). A leak from the HLW PVV system would result in emissions being released to the HLW Building structure, which would be ventilated through HEPA filters and then to the environment (atmosphere), without the benefit of treatment to remove volatilized organics and other dangerous constituents.

Gaseous emissions from dangerous wastes in the WTP tanks are subject to control under dangerous waste regulations since they are emitted from a dangerous waste *after* the point at which the waste *first* designated as a solid and a dangerous waste. Gaseous emissions from a solid waste stream *already* identified as dangerous do not stop being subject to control under dangerous waste rules because the waste form has changed from a solid or liquid to a gas. Such gases remain subject to controls under the dangerous waste regulations until the point of final discharge to the environment (atmosphere), capture, or destruction (after such emissions controls as necessary to protect human health and the environment). The analysis presented above in support of defining the HLW PVV system as a critical system is consistent with the regulation of organic vapor emissions from tanks, surface impoundments, and containers under WAC 173-303-690 through -692 (which incorporate by reference 40 CFR 264/265 Subparts AA, BB, and CC). The U.S. Environmental Protection Agency established RCRA 40 CFR 264/265 Subparts AA, BB, and CC regulations, to provide RCRA air standards for controlling organic emissions from TSD units.

The HLW PVV system is an integral part of the tank system and is classified as ancillary equipment. The design package for the HLW PVV system (Package HLW-023, Rev. 0) was submitted to Ecology on November 8, 2004, (USDOE-ORP Letter # 04-ED-093) as a tank system ancillary equipment package for the HLW Building. The HLW PVV system should have been added to the critical systems list at that time. This is consistent with both the Pretreatment and LAW Buildings, which currently have their vessel ventilation piping system design in the Permit, and their vessel ventilation systems listed in Appendix 2.0 as critical systems.

In addition to our intent to ensure adequate containment and control of gaseous emissions from dangerous waste management units, Ecology must also ensure appropriate management of condensate formation within the ventilation system. P&ID design drawings 24590-HLW-M6-PVV-P0001 and 24590-HLW-M6-PVV-P20001 "HLW Process Vessel Vent Exhaust System" show the vessel vent lines are sloped toward the down stream HEME's. Notes 11 and 9 require "As a minimum all pipelines on this drawing shall be free draining with no pockets. In addition, pipelines within C5/R5 areas shall be sloped at 2% unless constrained by layout limitations. If a portion/section of a pipeline's slope must be limited, the slope may be reduced within the affected section as necessary, provided that the minimum slope is 0.5% or greater." These notes point to the possible collection of condensate within the piping, were it not sloped. Any condensates formed in this instance are derived from listed dangerous wastes (40 CFR Part 261.3(c)(2)(i)).

Since containment and transfer of gaseous emissions from dangerous waste (and any associated condensate) between the tanks and the HLW melter off-gas treatment system are the primary functions of the HLW PVV system, Ecology has concluded it meets the definition of a critical system, and has added it to the WTP critical systems list. This will ensure information relating to system design, construction and operation cannot be modified without Ecology review, and if necessary, a Permit change.

Additional Permit Modifications

Ecology has held multiple meetings and exchanged several letters regarding the erosion-corrosion estimates for tanks. On June 28, 2006, Ecology issued a letter to USDOE-ORP/BNI, informing them that additional wear allowances are required for vessels with Pulse Jet Mixers (PJM)s, or they would need to demonstrate the adequacy of the current design for erosion-corrosion. In addition, Ecology will require an opportunity to review and comment on the test plan and objectives for the demonstration. USDOE-ORP/BNI responded by requesting time to allow independent experts to review the method and data used to estimate erosion wear, a reassessment of tank waste particulate characteristics, and a determination if additional testing is required. Ecology approved the requested delay and is proposing the following Permit condition to ensure tank fabrication and assembly does not preclude any modifications to wear plates inside the tanks.

III.10.E.2.d. Fabrication and assembly of vessels HLP-VSL-00022, HLP-VSL-00027A, HLP-VSL-00027B, HLP-VSL-00028, UFP-VSL-00002A, UFP-VSL-00002B, and their internal components will be suspended until Ecology has provided written approval of the revised structural integrity assessment reports addressing adequacy of erosion allowance for those vessels.

In accordance with Permit condition III.10.E.9.d., the Permittees are required to submit, prior to installation of ancillary equipment for each tank system, engineering information that includes:

III.10.E.9.d.ii. Design drawings (Process Flow Diagrams, Piping and Instrumentation Diagrams [including pressure control systems], etc.) specifications (including required performance warranties), and other information specific to ancillary equipment (these drawings should include all equipment such as pipe, valves, fittings, pumps, instruments, etc.) [WAC 173-303-640(3)(WAC 173-303-806(4)(c)(i), (iii), (iv)];

III.10.E.9.d.iii. The Permittees will provide the design criteria (references to codes and standards, load definitions, and load combinations, materials of construction, and analysis/design methodology) and typical design details for the support of the ancillary equipment [WAC 173-303-640(3)(a), WAC 173-303-640(3)(f), WAC 173-303-806(4)(c)(i)];

In January 2005, Ecology requested submittal of BNI's pipe stress criteria for incorporation into the WTP Permit. During review of document, Ecology identified that BNI's pipe stress criteria allow stress limits for occasional (seismic) loads for some DWP regulated piping (e.g., C3 floor drains) that exceed American Society Mechanical Engineers limits. Ecology commented on the document and is still waiting for the document to be issued so it can be incorporated into this Permit. As a result, Ecology has added the following Compliance Schedule Item that requires submittal of the requested document.

Interim Compliance Schedule- WTP Facility		
	Compliance Schedule Submittal	Interim Compliance Date
	TANK SYSTEMS	
40.	Submit WTP Permit version of <i>Pipe Stress Design Criteria including "Pipe stress Criteria" and "Span Method Criteria,"</i> 24590-WTP-DC-PS-01-001, including a commitment to meet ASME B31.3 for DWP regulated piping.	4/30/2007

4.5 Denial of the Permittees' Request to Remove Technetium Treatment from the PT Building Design

Technetium-99 (Tc-99) is a fission product that was generated in Hanford production reactors. Tc-99 is a low energy Beta emitter with a half-life of 211,100 years. USDOE estimates the total quantity of Tc-99 produced at Hanford to be 33,500 Ci. The total quantity of Tc-99 remaining in immobilized tank waste is estimated to be approximately 25,500 Ci after accounting for Tc-99 transferred to Fernald, Ohio with uranium oxide, and transfers to cribs and past tank leaks. However, Tc-99 is one of the major constituents of concern in relationship to potential impacts to groundwater beneath the site due to its high mobility and long half-life.

The USDOE estimates are largely based on process knowledge. There is very little tank characterization data available for Tc-99 to verify these estimates. Part of the reason for the lack of data is difficulty in developing reliable analytical methods to measure technetium concentrations. Because of the lack of information on isotopic abundances in Hanford tank waste, all the technetium has been assumed to be Tc-99.

The fate of Tc-99 is a major concern for Ecology. As a radionuclide subject to regulation under the Atomic Energy Act, Tc-99 is not specifically regulated under the Dangerous Waste Regulations in WAC 173-303. Tc-99 has a significant potential to impact the ground water and is a constituent addressed in the Federal safe drinking water standards. For this reason, the Tc-99 must be disposed in a waste form with long term-stability (thousands of years).

Under the performance standards in the Dangerous Waste Regulations [WAC 173-303-283(3)], a dangerous waste facility must in part, to the maximum extent practical given the limits of technology, prevent:

- Degradation of ground water quality.
- Destruction or impairment of flora and fauna outside the active portion of the facility.
- Use processes that treat, detoxify, reclaim, and recover waste material to the extent economically feasible.
- Not endanger the health of employees, or the public near the facility.

Furthermore, Ecology must consider all the impacts of the operations of a facility when issuing a Permit, not just regulated activities. If a facility cannot meet these performance standards for any reason, a permit should not be issued. Ecology can also apply more stringent facility standards than required in WAC 173-303 [WAC 173-303-283(2)].

To estimate the future consequences of disposal of a waste, mathematical models are routinely used to predict contaminant concentrations at different times and locations. USDOE used performance assessment models for the proposed disposal facilities to predict long-term impacts to human health and the environment. USDOE conducted Performance Assessments for the disposal of WTP Immobilized LAW for 1000 years based on DOE Order 435.1 and 10,000 years based on 10 CFR 61 and the Nuclear Regulatory Commission “waste incidental to reprocessing” ruling.

The USDOE performance assessment found that Tc-99 is a predominant radionuclide in LAW disposal performance assessment impacts (DOE/ORP-2000-24). USDOE assumes that the LAW immobilized waste produced from WTP will not exceed applicable concentration limits for Class C Low-Level Waste (< 3 Curies/cubic meter [Ci/m^3]). The average Tc-99 concentration for all tank waste immobilized as glass is projected to be approximately $0.2 \text{ Ci}/\text{m}^3$. The performance assessment takes no credit for the stainless steel container or landfill barriers and assumes the waste canisters will be disposed of at the Integrated Disposal Facility (IDF) in the 200 East Area, near the Plutonium-Uranium Extraction (PUREX) Plant

The results of this performance assessment show that without Tc-99 removal, the impacts to Drinking Water and All-path Dose would be far below the maximum allowable dose under USDOE regulations at both 1,000 and 10,000 years. These results have led USDOE to conclude that Tc-99 removal is not required for LAW glass produced from WTP to meet performance objectives.

Where the Tc-99 will be disposed and what the waste form will be are the main concerns Ecology has with regard to removing Tc-99 treatment. In the supplemental information provided on August 4, 2004, the Permittees provided Tc-99 mass balances that showed the expected fate of the Tc-99 in the following situations:

- Tc-99 treatment in the Pretreatment Building (original design).
- Tc-99 treatment removed from the design.
- Tc-99 treatment removed and a LAW supplemental treatment process in place.

The flow sheets show a marked difference in the fate of Tc-99 depending on whether Tc-99 treatment was or was not used. When Tc-99 treatment was used, the amount of Tc-99 expected to be found in the HLW glass was 90.4 percent, with 8.8 percent being tied up in the LAW glass. A small amount (0.7 percent) would be expected in the PT Building liquid effluents and an even smaller amount (0.07 percent) would be trapped on the HEPA filters.

Without Tc-99 treatment, the situation becomes reversed. The amount of Tc-99 in the LAW glass would be expected to increase to 97.0 percent. Only 2.2 percent of the Tc-99 would end up in the HLW glass, 0.3 percent would be expected in the PT Building liquid effluents and 0.5 percent would be trapped on the HEPA filters.

In the case with no Tc-99 treatment and use of the supplemental LAW treatment, some changes are observed. In this case, the amount of Tc-99 contained in the HLW glass does not change (2.2 percent). The expected amount of Tc-99 in the LAW vitrification plant glass would be 26.0 percent and the amount in the supplemental LAW treatment waste form would be about 71.5 percent. The remaining 0.3 percent would be present in effluents sent to the Effluent Treatment Facility. This change reflects the mass (roughly two-thirds) of pretreated LAW expected to be treated through supplemental treatment. The remainder of the Tc-99 would be split between an estimated high of 0.4 percent as liquid effluent, with very little in the off gas or HEPA filters. However, the fate of Tc-99 in the supplemental LAW treatment primary and secondary waste cannot be determined because the technology and its integration with the WTP have not been established.

The Tc-99 treatment question becomes primarily one of whether it matters if the bulk of the Tc-99 ends up in HLW glass or LAW glass. Secondly, does it matter if the bulk of the Tc-99 ends up in a LAW supplemental waste form versus LAW glass from the WTP? How much Tc-99 ends up in secondary waste under either scenario?

After evaluating additional information, e.g. the Flowsheet Bases, Assumptions, and Requirements Document (24590-WTP-RPT-PT-02-005, Rev 3) dated June 29, 2005, provided by USDOE in support of this modification request, Ecology has decided to deny removal of the TXP system and the TEP system from the PT Building design until a suitable supplemental treatment technology or second LAW vitrification facility has been selected by USDOE and approved by Ecology. Ecology's decision is based on the following:

- Development of a suitable supplemental treatment technology is not far enough along to develop a good estimate of how much Tc-99 will be effectively retained in its primary waste form.
- There are a variety of alternatives currently under consideration for treating the large volume of low activity waste that cannot be processed through the existing LAW Building in the time frame required. Characteristics of secondary waste streams and impacts on secondary waste disposal facilities for these alternatives are not well understood. Until the appropriate treatment technology is selected, a decision on eliminating Tc-99 removal from WTP is premature.

Although the WTP is not responsible for the operation of the IDF, Ecology is responsible for protection of human health and the environment. Until Ecology has been provided with assurance that the supplemental treatment selected for LAW waste performs as well as ILAW, at immobilizing Tc-99 in glass and minimizing Tc-99 in the secondary waste streams, Ecology will require the WTP to maintain the capability to separate Tc-99 in the PT Building. The intent of this condition is to preserve the ability to add the process (e.g., the capability of adding a room to the external wall of the building for the Tc-99 separation process to occur).

In support of this decision, the following Permit condition will be added:

III.10.E.2.e. The existing PT Building will retain the capability to install the Technetium Ion Exchange System (TXP). This includes adequate provision of space for all related TXP equipment, vessels, and evaporator systems, and placement of floor embedments and wall penetrations. This capability will be maintained until a suitable supplemental treatment technology or second LAW vitrification facility has been selected by the Permittee and approved by Ecology.

Ecology's approval will require demonstration by the Permittees that:

- The waste form produced by the selected Supplemental Treatment performs as well as or better than borosilicate glass from the LAW Building.
- A scientifically defensible understanding of the distribution of Tc-99 within the mass balance of the WTP, Waste form from the Supplemental Treatment, and secondary waste streams.
- The fraction of technetium-99, iodine-129, and mercury in secondary waste streams from the Supplemental Treatment do not exceed those from the WTP.
- Technically defensible modeling showing that onsite disposal of primary and secondary waste forms from Supplemental Treatment or a second LAW vitrification facility will not cause a violation of federal and state drinking water standards.

This Permit condition is consistent with TPA Milestone M-62-08, which requires the USDOE to provide Ecology all supplemental treatment technology waste form performance data compared with borosilicate glass.

From a dangerous waste regulatory viewpoint, Ecology can require that the waste regulated under this Permit be disposed of in a manner that is protective of human health and the environment, meets the requirements of WAC-173-303-665 (permitted landfills), and the waste acceptance criteria for IDF. ILAW that has been processed for permanent onsite disposal must meet the IDF waste acceptance criteria and specific requirements spelled out in the USNRC letter to USDOE in 1997.

In addition, Ecology wants to ensure that any of the waste forms resulting from WTP treatment will meet the exposure and ground water performance criteria. Ecology has added a proposed Permit Condition III.10.C.15, which requires that any waste form from the WTP Treatment process meet performance assessment ground water and exposure limits, not result in a substantial groundwater impact, and not approach Federal drinking water standard, which is defined as 900 picoCuries per liter for Tc-99.

III.10.C.2.m Waste streams generated at the WTP, when combined with the related impacts from other waste forms disposed of in IDF, will not cause an exceedence of the requirements dictated in the IDF's Permit waste acceptance criteria.

This condition is intended to ensure that, if the performance assessment shows that the Tc-99 in any waste form may pose a threat to human health or the environment, the treatment of the waste for Tc-99 will be required.

4.6 Denial of the Permittees Revised Part A Permit Application

In the March 29, 2004, Class 2 modification request, the Permittees included a revised Part A Permit Application in support of this modification request. During its review of the Part A Permit Application, Ecology requested documentation to support the *Process Design Capacity* values in Section XII and *Estimated Annual Quantity of Waste* values in Section XIV of the Part A form. USDOE-ORP/BNI provided Ecology with a copy of Engineering Calculation 24590-WTP-U0D-50-00001, Revision B. During review of these calculations, Ecology identified the use of contingency factors that erroneously increased the quantity of waste at the WTP facility. Ecology is denying revision of the Part A Permit Application until USDOE-ORP/BNI and Ecology discuss the assumptions used when completing the Part A Form.