



U.S. Department of Energy
Office of River Protection

P.O. Box 450, MSIN H6-60
Richland, Washington 99352

RECEIVED

SEP 24 2007

Department of Ecology
NWP - Richland

SEP 21 2007

07-TPD-050

Central Files *TWRS*
File Name: *DBV*
Cross Reference: _____

Ms. Jane A. Hedges, Program Manager
Nuclear Waste Program
Washington State
Department of Ecology
3100 Port of Benton Blvd
Richland Washington 99354

Dear Ms. Hedges:

**MODIFICATION OF THE EXPIRATION DATE FOR THE RESEARCH, DEVELOPMENT,
AND DEMONSTRATION (RD&D) PERMIT FOR THE DEMONSTRATION BULK
VITRIFICATION SYSTEM (DBVS)**

Reference: Ecology letter from M. A. Wilson to R. J. Schepens, ORP; K. A. Klein, RL; and E. S. Aromi, CH2M HILL; "Final Dangerous and/or Mixed Waste Research, Development, and Demonstration Permit for the Demonstration Bulk Vitrification Facility," dated December 13, 2004.

Permit Modification Requested: Modify the expiration date of the RD&D Permit from December 13, 2007, to December 13, 2013.

This letter requests a modification to the expiration date for the RD&D Permit for the DBVS, currently set to expire on December 13, 2007. The RD&D Permit was issued to the U.S. Department of Energy (DOE), Office of River Protection (ORP) and CH2M HILL, Hanford Group, Inc. (CH2M HILL) as co-permittees, by the Washington State Department of Ecology (Ecology). The RD&D Permit has an effective date of January 12, 2004, through December 13, 2007. The Permit was issued for 365-operating days with a maximum permit renewal for a duration of 35-operating days (400-operating days total), or for 3 years, whichever is earlier. The RD&D Permit is a stand alone Permit, and not a part of the Hanford Site Wide Permit. No activity authorized by the RD&D permit, with dangerous waste or simulant, has been initiated at the DBVS.

ORP and CH2M HILL are requesting a modification of the expiration date for the RD&D Permit that will be consistent with the DOE approved schedule and baseline of May 2007. My staff has worked with your staff to determine the regulatory process for modification of the RD&D Permit. WAC 173-303-830(4)(d) provides that a Permittee may request a Director's Determination that a proposed modification be reviewed and approved as a Class 1 or Class 2 permit modification, if the request does not fit the classifications detailed in Appendix I in this part of the regulations.

Ms. Jane A. Hedges
07-TPD-050

-2-

SEP 21 2007

It is on this basis that we are requesting a Director's Determination that an expiration date of December 13, 2013, be approved as a Class 1 prime modification in accordance with the Ecology regulations at WAC 173-303-830(4)(d).

A Class 1 prime modification is appropriate because there are no substantive changes proposed to the permit conditions that would reduce the capacity of the facility to protect human health or the environment (WAC 173-303-830(4)(d)(ii)(A)). Modifying the permit expiration date still provides the same operating time frame and time limits Ecology originally provided in the Permit to allow sufficient time for completion of DBVS testing. No other changes are being requested for the Permit at this time. There still exists a need to demonstrate the feasibility of the technology for treatment of Hanford Tank LAW. As required by WAC 173-303-830(4)(d), enclosed is the necessary information to support the requested classification.

The schedule for the RD&D activities at the DBVS has been extended to provide time to address independent expert review panel recommendations and to be consistent with expected congressional funding allocations. Off-site testing utilizing simulants has indicated that the desired waste form can be produced, and that the desired waste form performance can be achieved. A series of "hot" runs to be conducted at the permitted DBVS must still be performed to obtain data on system and waste form performance using Hanford Tank waste.

If you have any questions, please contact me, or your staff may contact Mr. Ben J. Harp, (509) 376-1462.

Sincerely,



Shirley J. Olinger, Acting Manager
Office of River Protection

TPD:BJH

Enclosures (2)

cc w/encls:

S. Harris, CTUIR
K. A. Conaway, Ecology
S. L. Dahl, Ecology
J. J. Lyon, Ecology
S. L. Leckband, HAB
G. Bohnee, NPT
K. Niles, ODOE
A. Conklin, WDOH
J. Martell, WDOH

R. Jim, YN
Administrative Record
CH2M HILL Correspondence
Environmental Portal, LMSI

Enclosure 1
07-TPD-050

INFORMATION IN SUPPORT OF MODIFICATION OF THE
EXPIRATION DATE FOR THE FINAL DANGEROUS AND/OR
MIXED WASTE RESEARCH, DEVELOPMENT, AND
DEMONSTRATION PERMIT (RD&D) FOR THE DEMONSTRATION
BULK VITRIFICATION SYSTEM (DBVS)

(7 pages including coversheet)

INFORMATION IN SUPPORT OF MODIFICATION OF THE EXPIRATION DATE FOR
THE FINAL DANGEROUS AND/OR MIXED WASTE RESEARCH, DEVELOPMENT, AND
DEMONSTRATION PERMIT (RD&D) FOR THE DEMONSTRATION
BULK VITRIFICATION SYSTEM (DBVS)

Permittees: U.S. Department of Energy (DOE), Office of River Protection (ORP), (Owner/Operator) and CH2M HILL, Hanford Group, Inc. (CH2M HILL), (Co-Permittee).

Modification Requested: Modify the expiration date of the RD&D Permit from December 13, 2007 to December 13, 2013.

Under the Hanford Federal Facility Agreement and Consent Order (HFFACO or Tri-Party Agreement), DOE has committed to submit a supplemental Treatment Technologies Report to State of Washington Department of Ecology (Ecology). The report will describe the technical, financial, and contractual alternatives which in combination with the Waste Treatment and Immobilization Plant (WTP) and any required additional Low Activity Waste (LAW) vitrification facilities, are needed to treat all of Hanford's tank wastes. Information and data obtained from operation of the DBVS is needed to support this report. The report will identify and describe viable path(s) forward to complete treatment of all Hanford Tank LAW. The report must include a second LAW vitrification facility as an option. The report will also include: the results of waste form performance data (compared against the performance of borosilicate glass) for treatment technologies being considered; evidence that performance data will be adequate to make decisions as to the acceptability of any proposed waste form for the waste being considered; and a description of the considered treatment technologies (including size, throughput, technical viability, and life cycle cost estimates).

Permitting Research, Development, and Demonstration Facilities (RD&D)

RD&D permits are issued to dangerous waste treatment facilities which propose to utilize innovative and experimental dangerous waste treatment technologies or processes for which permit standards for such experimental activities have not been promulgated. The full text of the cited Washington State Dangerous Waste Regulations as they apply to a RD&D Permit are found at WAC 173-303-809 (1) and (4). The regulations provide that operation of an RD&D facility is limited to one year (based on 365 separate "operating days" which may be non-consecutive from the Office of Solid Waste Emergency Response Guidance) unless renewed by Ecology. An issued RD&D permit may not be renewed more than three times, each time for one year.

Each RD&D proposal is unique and there are no rigid sets of procedures and permit application requirements. RD&D Permits are to include the standard terms and conditions and any necessary requirements that assure adequate protection of human health and the environment, e.g. monitoring, training, inspections, and closure.

Demonstration Bulk Vitrification System (DBVS) RD&D

The purpose of this RD&D permit is to allow for the Test and Demonstration of the bulk vitrification facility for treatment of Hanford Site Tank low-activity waste. Under this permit, the Permittees (ORP/CH2M HILL) are to evaluate the ability of bulk vitrification to produce Immobilized Low-Activity Waste (ILAW) that is comparable to that which will be produced at the Hanford Site WTP. RD&D testing is a key step to the design of a full scale bulk vitrification facility if bulk vitrification is selected as the best option for supplementing the low-activity waste vitrification at the WTP. The DBVS is designed, and will be operated to meet the dangerous waste requirements (WAC 173-303) for treatment of hazardous and/or mixed waste including compliance with the Land Disposal Restriction treatment standards for waste disposal.

An RD&D permit application was submitted to Ecology by ORP/CH2M Hill May 2004. A Draft Permit was issued by Ecology with a 45-day public review and comment beginning July 26, 2004. There was a public meeting August 31, 2004, and the comment period ended September 9, 2004. Comments were received from 8 individuals/organizations (Ecology Responsiveness Summary dated November 2004). The RD&D Permit issued date was December 13, 2004, and its effective date January 12, 2005. The Permit was issued for 365-operating days with a maximum permit renewal for a duration of 35-operating days (400- operating days total), or for 3 years, whichever is earlier. The DBVS RD&D Permit is not included in the Hanford Sitewide Dangerous Waste Permit, but is rather a stand-alone Permit and has the same ID No. as the Sitewide Permit.

The tank waste volume proposed for treatment at the DBVS is approximately 300,000 gallons or about approximately ½ the saltcake waste volume of Tank S-109. This volume constitutes less than 1% of total Hanford Tank waste volume of approximately 53M gallons. The Permit includes stringent requirements to protect public health and the environment. The permit is temporary and it limits the quantities of dangerous and/or mixed waste to be treated. Through Permit conditions as specified, the Permittees are required to provide data for waste form qualifications, risk assessments, and performance assessments for treatment and near-surface land disposal of LAW.

In compliance with the requirements of the RD&D Permit, the following DBVS design system packages have been conditionally approved by Ecology:

- | | |
|---------------------------------------|---------------------|
| • Foundations (currently constructed) | February 23, 2005*; |
| • Waste Receipt Tank Systems | May 13, 2005*; |
| • Secondary Waste Systems | October 31, 2005*; |
| • Waste Dryer System+ | November 15, 2005*; |
| • Dried Waste Handling System | April 28, 2006*; |
| • ICV System | July 24, 2006*; |
| • Off-Gas Treatment System+ | July 24, 2006*. |

*Date Ecology approved the design package.

+The Waste Dryer and portions of the Off Gas Treatment Systems have been procured and are being field tested off the Hanford Site.

Delays to Completing RD&D Work Scope Outlined in the RD&D Permit

The delays to completing the RD&D activities at the DBVS have been to provide time to address independent expert review panel recommendations and to be consistent with expected congressional funding allocations. The Defense Nuclear Facility Safety Board (DNFSB) is chartered to review all DOE activities from a nuclear safety perspective. The DNFSB initiated its review in 2005 that resulted in system design changes to improve the nuclear safety operations for the facility. These proposed changes have been incorporated into DBVS design and were a part of the submittals listed in the section above.

In addition, DOE directed an independent expert panel review of the DBVS design in FY06 that resulted in to the need to modify the DBVS design. Preliminary design modifications have been completed in FY07 to address reviewer recommendations. Any changes affecting the design system packages already approved by Ecology (primarily affecting the Offgas Treatment and Dried Waste Handling Systems) will be resubmitted for Ecology review and approval.

Lack of congressional funding in FY08 will delay facility construction and operations. Congressional funding is expected in FY09 to restart procurement and construction for the facility.

Offsite Work Conducted in Support of the DBVS Technology

The technical maturity of the bulk vitrification process has continued to progress by resolution of technical issues through the use of simulant LAW testing at various scales. These tests include laboratory investigations, crucible and Engineering-Scale (ES) melter/dryer tests, and Full-Scale (FS) melter/dryer tests. Testing has been conducted using stable rhenium (Re) spiked LAW simulants as a surrogate for radioactive technetium, and simulant/actual tank waste mixtures at the laboratory scale (under a Pacific Northwest National Laboratory Inc. treatability permit) to validate the results obtained.

Laboratory investigations include tests that refined the understanding of the melt reactions. This understanding helped identify the cause and potential solutions to resolve problems related to Re/Tc migration and Fe metal precipitation.

To date, more than 100 crucible-scale formulation development simulant tests have been conducted to verify an acceptable glass product can be produced from tank S-109 waste. This work lays the groundwork for expanding the envelope to accommodate other Hanford tank wastes. Crucible-scale tests were also developed to screen and select methods of resolving Re/Tc migration via Molten Ionic Salt (MIS).

Seventeen ES melter tests have been conducted to identify possible problem areas with the bulk vitrification melting process. These tests helped select the melt container box materials of construction, establish that there was a meaningful relationship between Re and Tc migration, and established the preferred feed-while-melt operating method. These tests also demonstrated that the bulk vitrification process produced homogenous glass waste forms at larger scales.

Later ES tests were used to refine the MIS migration understanding and to verify that formulation and processing changes would reduce MIS migration at larger scales.

Over fifty 22-liter bench scale and twenty 130-liter dryer tests have been conducted to demonstrate that a range of waste simulants and glass formers can be effectively dried using a dry-batch drying method. These tests helped establish acceptable drying parameters and the best carbohydrate additions that will reduce MIS migration. Several metric tons of feed have been produced in the FS (10,000 liter) dryer. The 10,000 liter dryer is planned for use in the DBVS operations.

Eight FS melter tests have been conducted. These tests have demonstrated that the FS bulk vitrification process produced homogenous glass waste forms with acceptable glass performance properties. The FS tests led to refinements in multiple areas of the box including design for the refractory, the container lid, starter path, and thermo monitoring well. Conducting the FS tests helped identify issues and provided the opportunity to resolve issues, e.g., with Fe metal precipitation and controlling MIS migration.

A FS Integrated Dryer/Melter Test (IDMT) has been conducted and successfully demonstrated that these two main components can be used together as planned in the DBVS operations. Preliminary results from the IDMT indicate that formulation changes and controlled cold cap management effectively reduce MIS migration to acceptable levels, while producing an acceptable glass waste product form.

Schedule for the DBVS

The revised schedule for demonstration of the bulk vitrification treatment technology under the RD&D Permit provides for the following:

- Re-start DBVS construction May 2009, and complete construction by March 2010.
- Conduct melts with simulated tank waste July 2010 to October 2010. These tests will be structured to help optimize the new facility and test its readiness to treat actual radioactive tank waste.
- Begin melt operations with Hanford S-109 Tank waste in early 2011. In compliance with the RD&D Permit, the first melt will not be conducted with the maximum amount of radioactive waste-loading that the containers are designed to treat and vitrify.
- Complete up to 50 melt operations (with S-109 waste) by December 2012. Each melt operation will have an Ecology-approved test plan with a specific set of objectives to be accomplished by the test.
- Submit to Ecology a final Summary Report 120 days after completion and submission of the last individual melt report.

Regulatory Guidance that Supports this Action

- “RD&D permits are limited to a permit term of one year, which is defined as 365 days of **actual operation**” (emphasis added).

The term “**Operating Day**” means any fraction of a calendar day when conducting “RD&D Treatment Activity” at the DBVS. For the purposes of accounting for an “Operating Day,” only “RD&D Treatment Activity” must be considered. The following will not be included when accounting for operating days: DBVS construction; maintenance, repair, adjustment, or subsequent checkout operation of equipment not performed simultaneously with treatment and storage of dangerous and/or mixed waste; operating the DBVS according to procedures and limits for treatability studies in compliance with WAC 173-303-071(3)(s), DBVS ICV® Box Preparation and Hook-up Activities, prior to discharge of dangerous and/or mixed waste feed to the ICV® container, and DBVS activities after ICV® Package disconnect. If more than one “RD&D Treatment Activity” is conducted at the facility on any given calendar day, that calendar day shall be counted as one operating day. (DBVS RD&D Permit, page 14)

- The RD&D permit may be renewed three times, each time for a period of up to 365 operating days.

Operation of an RD&D facility is limited to one year (based on 365 separate “operating days” which may be non-consecutive) unless renewed. Any permit issued under this section may be renewed not more than three times. Each such renewal will be for a period of not more than one year. [WAC 173-303-809(1) and (4)]” (Fact Sheet, DBVS Research, Development and Demonstration Permit, p. 5, dated July 26, 2004.)

- “Because an RD&D permit is intended to develop and test a technology or process, it is inherent in RD&D activities that such a test is temporary, or short-term, in relation to the commercial use of the process.” (U.S. Environmental Protection Agency Guidance Manual for RD&D Permits, EPA/530-SW-86-008, July 1986.)

“The permit application proposes treatment of up to 1,135,500 liters, or about 300,000 gallons, of Tank 241-S-1-9 waste in two phases, or approximately one-half the waste contained in Tank 241-S-109. The 1,135,500 liters (300,000 gallons) is less than 1% of the 53 million gallons of tank waste stored in the Hanford double-shell tanks and single-shell tanks.” (Fact Sheet for Dangerous and/or Mixed Waste Research, Development, and Demonstration Permit, page 4, July 26, 2004.)

M-62 Milestones in the Tri-Party Agreement currently require completion of treatment of all tank wastes by 2028. Ecology and DOE are currently re-negotiating this commitment date and it will likely be moved out due to delays for the WTP.

Review of the WAC 173 regulations, **WAC 173-303-830, Permit Changes**. This section describes the types of permit changes that may be made to all permits issued by the director. WAC 173-303-830 (3) explains modification or revocation and re-issuance of permits. Ecology is not revoking or reissuing the RD&D Permit. We have reviewed the modification criteria found in WAC 173-303-830 (4) for Class 1, Class 2, and Class 3 modifications. Each class description refers the reader to Appendix I, Modifications. Appendix I provides a list of possible permit changes that maybe made to all permits. A pre-determined class is assigned

to each change. Modifying an expiration date to a permit was not explicitly listed in Appendix I. In these cases, WAC 173-303-830 (4) sends the reader to WAC 173-303-830(4)(d); "Other Modifications". This section explains that the Permittee may request a director's determination that the modification be reviewed and approved as a Class 1 or Class 2 permit modification. The Permittee must provide the department with the necessary information to support the requested classification. The director will make a determination and in determining the appropriate class for a specific modification, the director will consider the similarity of the modification to other modifications listed in Appendix I and the Class 1, 2, 3 criteria.

Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval. This is called a Class 1 prime permit modification. Class 2 and 3 modifications apply to substantial changes or alterations to the facility and its operation. Change of the expiration date is not viewed as a substantial change therefore a Class 1 modification is appropriate.

Enclosure 2
07-TPD-050

PERMIT FOR DANGEROUS AND OR MIXED WASTE RESEARCH,
DEVELOPMENT, AND DEMONSTRATION

(2 pages including coversheet)

**PERMIT FOR
DANGEROUS AND OR MIXED WASTE RESEARCH, DEVELOPMENT, AND DEMONSTRATION**

Washington State Department of Ecology
Nuclear Waste Program
3100 Port of Benton Boulevard
Richland, Washington 99354-1670
Telephone: (509) 372-7950

This Permit is issued in accordance with the applicable provisions of the Hazardous Waste Management Act, Chapter 70.105 Revised Code of Washington (RCW), and the regulations promulgated hereunder in Chapter 173-303 Washington Administrative Code (WAC).

ISSUED TO: United States Department of Energy
Office of River Protection
Owner/Operator
P.O. Box 450
Richland, Washington 99354

Co-Permittee: CH2M HILL Hanford Group, Inc.
Co-Operator
P.O. Box 1500
Richland, Washington 99354

This Permit is effective as of January 12, 2005, and shall remain in effect until December 31, 2013, unless modified or revoked and reissued under WAC 173-303-830(3), or terminated under WAC 173-303-809(3) or WAC 173-303-830(5). This Permit shall not exceed four hundred (400) operating days of the Dangerous and or Waste Research, Development, and Demonstration Activity authorized by this permit. The new Permit expiration date of December 13, 2013 supersedes the expiration date as it may be specified in the Permit,

ISSUED BY: WASHINGTON STATE DEPARTMENT OF ECOLOGY

Jane A. Hedges, Program Manager
Nuclear Waste Program
Washington State Department of Ecology

Date Signed _____



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

3100 Port of Benton Blvd • Richland, WA 99352 • (509) 372-7950

December 13, 2004

Mr. Roy J. Schepens, Manager
Office of River Protection
United States Department of Energy
P.O. Box 450, MSIN: H6-60
Richland, Washington 99354-1670

Mr. Keith A. Klein, Manager
Richland Operations Office
United States Department of Energy
P.O. Box 550, MSIN: A7-50
Richland, Washington 99354-1670

Mr. Edward S. Aromi
CH2M HILL Hanford Group, Inc.
P.O. Box 1500, MSIN: H6-08
Richland, Washington 99354-1670

Dear Messrs. Schepens, Klein, and Aromi:

Re: Final Dangerous and/or Mixed Waste Research, Development, and Demonstration
Permit for the Demonstration Bulk Vitrification Facility

Enclosed is the Dangerous and/or Mixed Waste Research, Development, and Demonstration Permit for the Demonstration Bulk Vitrification Facility (DBVS Facility), west of the 241-S Tank Farm in the 200 West Area of the Hanford Site. The Permit has been issued to the United States Department of Energy (USDOE), Office of River Protection (ORP) and CH2M HILL Hanford Group, Inc. (CH2M) in accordance with the applicable provisions of the Hazardous Waste Management Act, Chapter 70.105 Revised Code of Washington (RCW), and the regulations promulgated hereunder in Chapter 173-303 Washington Administrative Code (WAC). Also enclosed is the Fact Sheet for the Permit. Additional copies of the Permit will be provided on CD-ROM, if requested.

RECEIVED

DEC 14 2004

DOE-ORP/ORPCC



Messrs. Schepens, Klein, and Aromi
December 13, 2004
Page 2

This Permit is not a part of the Dangerous Waste Portion of the *Resource Conservation and Recovery Act of 1976* (RCRA) Permit for the Treatment, Storage, and Disposal of Dangerous Waste Permit issued to USDOE March 28, 2000.

This Permit is effective as of January 12, 2004, and shall remain in effect until December 13, 2007. This Permit shall not exceed 400 operating days of the Dangerous and/or Mixed Waste Research, Development, and Demonstration Activity authorized by this Permit.

During the 45-day public comment period of the draft permit, comments were received from eight individuals, Allan Panitch, CH2M HILL, Confederated Tribes of the Umatilla Indian Reservation, Ron Bourgoïn, Allyn Boldt, Floyd E. Ivey, Heart of America Northwest, and Confederated Tribes and Bands of the Yakama Nation. The comments are addressed in the enclosed Responsiveness Summary as required by Washington Administrative Code (WAC) 173-303-840(9).

The final permit package consists of the Responsiveness Summary, Fact Sheet, Permit Conditions, and Permit Attachments 1, AA through LL (the approved Part A Permit Application).

The success of this expedited permitting effort is due in large part to the spirit of teamwork and cooperation exhibited by ORP, CH2M, and Ecology.

This Permit can be appealed. Your appeal must be filed with the Pollution Control Hearings Board, P.O. Box 40903, Olympia, Washington 98504-0903, within thirty (30) days of the receipt of the Permit and in accordance with WAC 173-303-845. At the same time, your appeal must be sent to the Department of Ecology, c/o Enforcement Officer, P.O. Box 47600, Olympia, Washington 98504-7600, and to Ecology's Nuclear Waste Program, 3100 Port of Benton Boulevard., Richland, Washington 99334-6018. The notice of appeal must contain a copy of the order or decision being appealed, and if the order or decision followed an application, a copy of the application. Your appeal alone will not stay the effectiveness of this Permit. Stay requests must be submitted in accordance with RCW 43.21B.320. These procedures are consistent with Chapter 43.21B RCW.

Any appeal must contain the following in accordance with the rules of the Hearings Board:

- A. The appellant's name and address.
- B. The coverage date and number of the permit appealed.
- C. A description of the substance of the permit coverage that is the subject of the appeal.
- D. A clear, separate, and concise statement of each error alleged to have been committed.

Messrs. Schepens, Klein, and Aromi
December 13, 2004
Page 3

- E. A clear and concise statement of facts upon which the requester relies to sustain such statements of error.
- F. A statement setting forth the relief sought.

If you have any questions regarding this action, please call Kathy Conaway at (509) 372-7890 or Suzanne Dahl at (509) 372-7892.

Sincerely,



Michael Wilson
Program Manager
Nuclear Waste Program

KC:nc
Enclosures

cc w/o enclosures: Joel Hebdon, USDOE
Billie Mauss, USDOE
Dennis Hamilton, CH2M
Felix Miera, CH2M
Richard Raymond, CH2M
Ro Vinson, PAC
Stuart Harris, CTUIR
Pat Sobotta, NPT
Russell Jim, YN
Todd Martin, HAB
Ken Niles, ODOE
Environmental Portal

cc/enclosures: Administrative Record: RD&D