Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

JUN 22 1993

TA 35

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Benito J. Garcia, Acting Bureau Chief
Hazardous and Radioactive Waste Bureau
New Mexico Environment Department
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87503

Dear Mr. Garcia:

Enclosed for your review and approval is a revised application for a Research, Development, and Demonstration permit. This revised application is being submitted in response to a Notice of Deficiency (NOD) received from the New Mexico Environment Department (Administrative Review: NOD NM0890010515). For clarity, the submittal consists of two parts: an errata sheet reiterating the State's concerns and explaining where changes or additions were made; and a revised copy of the permit application which reflects all of the changes.

Pending approval of the permit application, Los Alamos National Laboratory (LANL) plans to test a hydrothermal processing unit for destruction of several types of hazardous wastes commonly generated by LANL operations. If you have any questions or comments concerning this submittal, please call Jon Mack of my staff at 665-5026.

Sincerely,

Jerry L. Bellows
Area Manager

LESH:3JM-053

Enclosures

cc:
See Page 2

5117

JUN 2 2 1993

cc w/enclosures:
J. Mack, ES&H, LAAO

cc w/o enclosures:
K. Sisneros
New Mexico Environment Department
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87503

A. Tiedman, ADO, LANL,
MS-A120
T. Gunderson, EM-DO, LANL,
MS-K491
K. Hargis, EM-8 (EM-8:93-1655-1),
LANL, MS-K490
T. Grieggs, EM-8, LANL,
MS-K490
D. Hjeresen, EE-AETO, LANL,
MS-F641

RESPONSE TO NOTICE OF DEFICIENCY

Los Alamos National Laboratory
Research,Development and Demonstration Permit Application
Hydrothermal Processing Unit

The following information is provided in response to the Notice of Deficiency (NOD) issued to LANL on April 5, 1993 by the State of New Mexico Environment Department (NMED) for the RD&D permit application dated March 1993. Any additional information provided here in response to the NOD has been incorporated into the permit application revised June 18, 1993.

I. GENERAL FACILITY STANDARDS

A. Provide the location of the unit by longitude and latitude [Part V; 40 CFR 264.13(b)].

Response: The location of the Hydrothermal Processing unit has been changed since the original RD&D permit application was submitted. Instead of being located in Building 43 at Technical Area 9 (TA-9), the unit is to be located in Building 38 at TA-9. Building 38, like Building 43, is specially designed for management of explosive materials. The safety features described in Section 8.0 of the permit application are identical. The layout of Building 38 is only very slightly different. The location of Building 38 at TA-9 is shown on Figure 3 to the revised permit application. A new building layout diagram is provided as Figure 4 in the revised permit application.

Building 38 is located at latitude 35.8558 and longitude -106.3421. This information has been added to Section 2.3 of the permit application. Additionally, Figure 2 (RD&D Unit Key Map) is a new drawing provided to show the location of TA-9 relative to other areas, including TA-35. Another RD&D permit application has been submitted for a research unit located at TA-35.

A topographic map covering the RD&D unit location has also been developed and included in the revised permit application as Figure 5. The topographic map has been prepared at a scale of 1 inch equal to 200 feet and with contour intervals of 2 feet. The map shows a 1000 foot radius around the RD&D unit. The nearest seismic fault lines have been superimposed on the topographic map to show that the unit is not located near any fault traces.

B. Provide an assessment of seismic vulnerability [Part IX; 40 CFR 270.11].

Response: The RD&D unit is located in Los Alamos County, New Mexico, which is listed in 40 CFR Part 264 Appendix VI. The seismicity of LANL is discussed in detail in the Part B Application submitted to acquire the existing facility-wide RCRA permit. As shown in Figure 6, adapted from LANL's 1988 Part B Permit Application, no faults or fault traces with Holocene (or other) displacements have been located within 200 feet of the location of the RD&D unit.

Additionally, seismic fault traces have been superimposed on the topographic map prepared for the unit and provided as Figure 5 to the revised permit application. Figure 5 clearly shows that the RD&D unit is not located within 200 feet of a known fault. A discussion of seismicity relative to the location of the RD&D unit has been included in Section 2.3 of the revised permit application.

C. Provide an assessment of the vulnerability of the unit to a 100-year flood [Part IX; 40 CFR 270.14(b)(11)].

Response: In accordance with 40 CFR 270.14(b)(11)(iii) and HWMR-7 Part IX, the Hydrothermal Processing unit is not located in the 100 year floodplain. As required under the Hazardous and Solid Waste Amendment Module VIII of LANL's RCRA Permit, LANL has mapped all 100-year floodplain boundaries within the LANL complex. The mapping procedures used techniques that comply with 40 CFR 270.14(b)(11)(iii). A report documenting these floodplain mapping procedures has been published. Final floodplain maps were submitted to NMED in June 1992. Attachment 8 to the revised permit application includes a copy of the letter sent to NMED with the floodplain maps. A discussion of the location of the RD&D unit relative to existing floodplains has been included in Section 2.3 of the revised permit application.

D. Provide the telephone number of the operator and the owner of the facility [Part IX; 40 CFR 270.13(b)(11)].

Response: The names and telephone numbers of the facility owner and operator contacts are provided below.

Facility Operator Contact:
Allen J. Tiedman, Associate Director for Support
Los Alamos National Laboratory
505-667-9390

Facility Owner/Operator Contact:
Jerry Bellows, Area Manager, Los Alamos Area Office
U.S. Department of Energy, Albuquerque Operations
505-667-5105

This information has been added to Section 2.1 of the permit application.

E. Explain why the proposed activity is experimental or innovative, and how it will qualify for a Research, Development and Demonstration Permit [Part IX; 40 CFR 270.65(a)]

Response: Hydrothermal Processing has been successfully used to treat many kinds of materials, but application of the technology to treat wastes containing explosive constituents is experimental. Hydrothermal Processing involves adapting an existing technology to treat wastes containing explosive constituents that are difficult to treat by other existing technologies and have few treatment options. Currently, the primary existing technologies for the treatment of wastes containing explosive constituents are open burning and open detonation (OB/OD). During OB/OD treatment, wastes are simply ignited or detonated with no means available to control atmospheric emissions of waste constituents or their by-products of combustion. The EPA has long encouraged the development of alternate technologies to treat explosive wastes in controlled treatment processes. Hydrothermal processing offers distinct advantages over OB/OD. The treatment technology offers a high degree of destruction efficiency, and all effluent from the treatment process can be captured and sampled for proper subsequent disposal. It is hoped that RD&D permitting of the Hydrothermal Processing unit and eventual full-scale development of the system could provide distinct improvements over current treatment methods. Information supporting the applicability of a RD&D permit to the unit is found in Sections 2.4 and 2.5 of the application.

F. Specify the quantity of waste to be treated at the unit [Part IX; 40 CFR 270.13(j)].

Response: The maximum amount of waste anticipated to be treated in the unit is 110 gallons (two 55 gallon containers) per month. The rate of treatment will vary between 0.5 gallons and 1.5 gallons per hour. A typical experiment will last for 1.5 to 3 hours. Two experiments may be performed per day. This would correspond to a projected maximum daily waste treatment volume of 9 gallons. Up to two 55-gallon containers of waste awaiting treatment may be in storage in Building 38. This information is found in Sections 3.1 and Section 5.3 of the revised permit application.

G. Provide a written assessment reviewed and certified by an independent, qualified registered professional engineer [40 CFR 270.16(a), 40 CFR 191(a)].

Response: As discussed with NMED personnel during an on-site meeting on June 2, 1993, manufacturer certification and available testing information on the reactor tubing and the effluent collection vessel has been included in the revised permit application as Attachment 9. In February 1993, LANL conducted tests on the Iconel reactor tubing to evaluate its safety and integrity under pressurized conditions. These tests demonstrated that the tubing could successfully withstand pressures and temperatures up to 25,000 pounds per square inch (psi) at 650°C. Operating pressures and temperatures during the RD&D experiments will not exceed 4000 psi or 600°C. Also included in Attachment 9 is a certification from the effluent collection canister manufacturer. This certification indicates that the vessel meets ASME Code for Pressure Vessels and can withstand pressures up to 180 psi. The working pressure of the effluent collection vessel during the RD&D experiments will not exceed 120 psi. Information on the testing and certification of the pressurized components of the RD&D system has been added to Section 4.1.2 of the revised application.

II. GENERAL WASTE ANALYSIS

A. Describe the parameters for which each hazardous waste, or non-hazardous waste will be analyzed and the rational for the selection of these parameters [Part V; 40 CFR 264.13(b)(1)].

Response: The research objective of the work to be conducted under this permit is to determine if process data for a real waste stream is comparable with data produced for surrogates of that waste stream. The answer will determine if the present technology is worth pursuing on a more complex and hazardous waste in future research. All components of the waste have been tested individually in the unit as surrogate (i.e., non-waste) materials. These tests have demonstrated 99.99% destruction of the surrogates.

The main purpose of obtaining a permit at this time is to allow the research to continue into a phase where an actual waste may be processed by the unit. If it can be successfully demonstrated that similar destructive efficiencies with the real waste can be achieved as those with the surrogate work, then modifications to this application may be made to deal with different and more complex waste than those proposed at this time.

The types of wastes to be tested are wastes containing explosive constituents. All wastes to be tested will originate from operations at the LANL facility. Constituent content of the waste is based on process knowledge, and selection of particular waste containers will be based upon their components having already been tested in the Hydrothermal Processing unit as surrogates. Descriptions of the waste streams are provided in Section 3.1 of the application.

The parameters of interest for liquid input wastes and liquid effluent wastes are summarized below.

PEP Constituents: (one or more of which may be found in a particular waste stream)

- PBX 9502,
- PBX 501,
- PBX 9404,
- TNT,
- RDX,
- HMX, and
- Calcitol.

Organic Solvent Constituents: (one or more of which may be found in a particular waste stream)

- Isopropyl Alcohol,
- Ethyl Acetate, and
- Methyl Ethyl Ketone.

The waste parameters of interest for the gas effluent waste are summarized below.

- Volatile Organic Constituents

Tests previously conducted using surrogate compounds have shown the treatment effluents generated from the hydrothermal processing to be non-hazardous liquids and gases. Similar liquid and gas effluents are expected from the wastes to be processed under an RD&D permit. The by-products of PEP treatment include gaseous and liquid effluents, which experience has shown to be:

- Water,
- Carbon Dioxide,
- Hydrogen,
- Nitrogen,
- Nitrate,
- Nitrite,
- Methane,
- Methanol,
- Carbon monoxide, and
- Nitrous oxide.

In order to fulfill the research objectives and to perform a mass balance, these non-hazardous constituents will be analyzed using in-house methods. The effluent constituents listed above will be monitored in the same way they were previously monitored during the surrogate experiments as described in Section 3.3 and Attachment 2 of the permit application. Additionally, EPA Methods will be performed to tes for PEP and organic constituents (see NOD responses below).

Information on waste parameters has been added to Section 3.3.1 of the revised permit application.

B. Describe the test methods which will be used to test for the selected parameters [Part V; 40 CFR 264.13(b)(32)].

Response: Test methods for confirmatory chemical analysis of the parameters will be performed according to procedures documented in SW-846, Test Methods for Evaluating Solid Waste: Physical Chemical Methods, U.S. EPA Office of Solid Waste and Emergency Response, Third Edition, November 1986 and November 1990.

Minimum calibration, operation, and quality control (bias, precision, blank, and matrix effects) requirements for laboratory analyses shall be performed as listed in the individual analytical methods of SW-846.

Waste to be treated in the unit will be selected for testing based upon expected waste constituents gathered from process knowledge. Prior to treatment in the Hydrothermal Processing unit, each container of waste selected will be sampled and analyzed one time using EPA Methods 8330, 8240, and 8270 to verify the process knowledge for the waste stream.

Following treatment, the liquid effluent will be periodically sampled and analyzed using EPA Methods 8330, 8240, and 8270. Following treatment the gas effluent will be periodically collected for analysis by EPA Method 0030 and analyzed using EPA Method 8240 for organic constituents. Section 3.3.4 of the permit application details sampling frequencies.

Following each experiment, in-house analytical techniques using diagnostic equipment described in Attachment 2 to the permit application will be used to test effluent constituents, in order to support the research objective of comparing RD&D results to previous surrogate treatment results. The research analyses will be performed for explosive constituents and treatment by-products.

Summary descriptions of the EPA analytical methods are provided below.

- High Performance Liquid Chromatography (HPLC) SW-846 Method 8330 is intended for the analysis of explosives residues. This method is used to determine the concentration of compound used in the manufacture of explosives or that are the degradation products of compounds used for that purpose. The method can be used to determine the level of explosives constituents in a water, soil or sediment matrix.

- Gas Chromatography/Mass Spectrometry (GC/MS) SW-846 Methods 8240 and 8270 determine volatile and extractable organic compounds, respectively, using chromatographic sample separation and mass spectrometric compound identification. Samples for volatiles may be directly purged onto absorbent materials, then desorbed and introduced into a chromatography column; or first extracted. Extraction methods are referenced and detailed in SW-846.

- Volatile Organic Sampling Train (VOST) SW-846 sample collection procedures at a reduced flow rate (referred to as SLO-VOST) is intended to collect volatile organic constituents. Volatile organics are purged onto absorbent materials, desorbed and then analyzed by gas chromatography/mass spectrometry (see EPA Method 8240). Initially, six pairs of sorbent traps will be used to collect the volatiles from the waste stream. As the research progresses, fewer traps may be warranted.

The analytical laboratory performing the EPA Methods will submit summary reports of analytical results to the research project manager. At a minimum the summary reports shall contain (1) laboratory review/approval date and signature (2) date sample received; (3) sample preparation date; (4) sample analysis date; (5) preparation and analysis method reference; (6) sample identification number; (7) laboratory sample identification number; (8) sample reporting or detection limit; (9) laboratory quality control sample results including calculated percent recoveries, relative percent differences and self-imposed control limits, if applicable; and (10) dilution factors, if required for sample analysis.

Information on analytical methods has been added to Section 3.3.2 of the revised permit application.

C. Describe the sampling methods which will be used to obtain a representative sample of the waste to be analyzed [Part V; 40 CFR 264.13(b)(3)].

Response: Representative samples from the waste container and effluent containers will be obtained by using those techniques outlined in the various SW-846 analytical methods to be used or in Chapter 9 of "Test Methods for Evaluating Solid Waste" EPA, Third Edition SW-846, November 1986. Samples will be collected using a systematic sample strategy described below.

Waste to be treated in the unit will be selected for testing based upon expected waste constituents gathered from process knowledge. Prior to treatment in the Hydrothermal Processing unit, each container of waste selected will be sampled one time and analyzed by EPA Methods 8330, 8240, and 8270. A grab sample using a coliwasa or glass tube from the mid-depth area of the barrel will be considered representative for the purpose of this phase of the research. All samples will be kept on cold packs until they are ready for laboratory analysis.

Following completion of each experiment, samples from the effluent collection container will be collected for analysis related to the research demonstration. Waste is discharged directly from the treatment equipment into a canister that may be transported to the on-site laboratory for analysis. Research level analyses will be performed for effluent parameters described in Section 3.3.2 using diagnostic equipment described in Attachment 2 to the permit application. Only the FTIR, gas chromatograph, ion chromatograph, and carbon analyzer will be operated as part of each RD&D experiment. Other diagnostic equipment will be operated intermittently to provide supplemental and confirmatory data on the composition of the effluents.

Additionally, during the first two experimental runs from each new 55-gallon container of waste treated, a sample of the liquid effluent will be collected and analyzed by EPA Methods 8330, 8240, and 8270 for explosive and organic constituents. This analytical data will supplement the research data collected using non-EPA methods to verify that the hazardous constituents are being destroyed by the hydrothermal treatment process. Similarly, during the first two experimental runs from each new 55-gallon container of waste treated, one sample of gaseous effluent will be collected and analyzed by EPA Method 0030 (SLO-VOST) followed by EPA Method 8240 for volatile organic constituents. This data will also serve to supplement the research data collected using non-EPA methods to verify that hazardous constituents are not present in the gaseous effluent.

A sample of the gaseous effluent from the pressurized canister will be obtained using those techniques outlined in SW-846 Method 0030 and or Method 8240, and the sample from the liquid effluent container will be taken with a coliwasa or glass tube from the mid-depth area of the container. Since the effluent container is under positive pressure, a needle valve and flow meter will control flow into the VOST rather than a vacuum pump. This method does allow for the changes in flow rates and sampling times that may be necessary to improve detection limits during present work, since very low levels, if any, of organic constituents are expected in the gaseous effluent. All samples will be kept on cold packs until they are ready for laboratory analysis.

Each sample collected shall have a unique sample identification number assigned and recorded on an attached sample label. Also recorded on the label will be the sample collection date/time, collector's initials, and analysis requested. Since all samples will be analyzed at LANL, at a minimum, the laboratory shall document the sample numbers accepted and provide this information to the research project manager on a weekly basis.

The analytical laboratory performing the EPA Methods will submit summary reports of analytical results to the research project manager. At a minimum the summary reports shall contain (1) laboratory review/approval date and signature (2) date sample received; (3) sample preparation date; (4) sample analysis date; (5) preparation and analysis method reference; (6) sample identification number; (7) laboratory sample identification number; (8) sample reporting or detection limit; (9) dilution factors, (10) laboratory quality control sample results including calculated percent recoveries, relative percent differences and self-imposed control limits (if applicable), as specified in the SW-846 Method being used.

Information on sampling has been added to Sections 3.3.3 and 3.3.4 of the revised permit application.

III. PREPAREDNESS AND PREVENTION

A. Describe how unknowing entry will be prevented and how the possibility for unauthorized entry onto the active portion of the unit will be minimized [Part V; 40 CFR 264.14(a)].

Response: The Hydrothermal Processing unit and associated waste storage area are located inside Building 38, which is located at Technical Area 9 (TA-9). TA-9 is in a controlled area with a guarded security checkpoint through which all personnel must enter and exit. TA-9 itself is completely fenced with a monitored entry/exit gate. The area is also regularly patrolled 24-hours per day by LANL's security

force. Building 38 is dedicated to operation of the Hydrothermal Processing Unit and is actively monitored by research personnel during daytime hours. No unauthorized personnel or unescorted visitors are allowed into the building. During off-hours and non-operational hours, Building 38 is kept locked.

This information has been added to Section 8.0 of the revised permit application.

B. Describe the security procedures and equipment used to provide 24 hour surveillance of the active portion of the unit [Part V; 40 CFR 264.14(b)(1)] or describe the barrier(s) and means to control entry [Part V; 40 CFR 264.14(b)(2)].

Response: See response to NOD comment III.B above.

C. Describe the warning signs at the unit [Part V, 40 CFR 264.14(c)].

Response: The doors to Building 38 will be posted with warning signs reading "Danger - Unauthorized Personnel Keep Out." This information has been added to Section 8.0 of the revised permit application.

D. Describe how aisle space will be maintained to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment to any area of the unit [Part V; 40 CFR 264.35].

Response: Aisle space is maintained around the Hydrothermal Processing unit to allow unobstructed movement of personnel and any fire protection equipment, spill control equipment, or decontamination equipment that may needed to respond to an emergency at the treatment unit. The actual size of the unit is relatively small and occupies only a small portion of the building in which it is located, and the building is dedicated to operation of the unit. Figure 4 in the revised application provides the layout of Building 38 and indicates the treatment unit's relative size, location, and its associated work areas. Aisle space will be actively maintained through inspections of the area to be performed each day that the unit is operated. This information has been added to Section 5.5 of the permit application.

IV. RECORDKEEPING, REPORTING, AND DOCUMENTS TO BE KEPT AT THE FACILITY

A. Describe the availability, retention, and disposition of records [Part V; 40 CFR 264.73(a)(1)].

Response: As agreed during the meeting between LANL and New Mexico State representatives on May 28, 1993, this NOD comment has been deleted and does not need to be addressed.

B. Describe the records on location of hazardous wastes within the facility [Part V; 40 CFR 264.73(a)(2)].

Response: As agreed during the meeting between LANL and New Mexico State representatives on May 28, 1993, this NOD comment has been deleted and does not need to be addressed.

REVISED RD&D PERMIT APPLICATION
CORRECTIONS AND ADDITIONS

The RD&D permit application for the Hydrothermal Processing unit has been resubmitted in its entirety. New material and corrections are clearly highlighted in the revised application. Strike-out of material that is no longer applicable or incorrect as a result of changes required by NOD comments is also clearly marked in the revised permit application. Changes found in the 6/18/93 revision of the application are summarized below.

New information and new material has been added to the following permit application sections:

- Section 1.0
- Section 2.1
- Section 2.3
- Section 2.4
- Section 3.0
- Section 3.1
- Section 3.2
- Section 3.3.1 (new section)
- Section 3.3.2 (new section)
- Section 3.3.3 (new section)
- Section 3.3.4 (new section)
- Section 4.1.2
- Section 4.1.4
- Section 5.0
- Section 5.4.2
- Section 5.5
- Section 8.0
- Section 9.0
- Figure 2 (new figure)
- Figure 5 (new figure)
- Figure 6 (new figure)
- Attachment 8 (new attachment)
- Attachment 9 (new attachment)

Minor corrections and deletions necessitated have been made in the following permit application sections:

- Section 3.2
- Section 3.3
- Section 4.1.4
- Section 4.3
- Throughout application - reference to Building 43 has been changed to Building 38
- Former Figure 2 has been relabelled as Figure 3
- Former Figure 3 has been relabelled as Figure 4
- Former Figure 4 has been relabelled as Figure 7.