DOE/MC/29105 -- 5199
(DE96004480)

Conceptual Design for a Full-Scale VAC*TRAX^{SM} Vacuum Thermal Desorption Unit

Final Report
September 1992 - December 1995

Carl R. Palmer

April 1996

Work Performed Under Contract No.: DE-AC21-92MC29105

For

U.S. Department of Energy
Office of Environmental Management
Office of Technology Development
Washington, DC

U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Rust Federal Services, Inc.
Anderson, South Carolina

DISCLAIMER

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April 1996

FINAL REPORT ON THE CONCEPTUAL DESIGN FOR A FULL-SCALE VAC*TRAX[SM] VACUUM THERMAL DESORPTION UNIT

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FINAL REPORT ON THE CONCEPTUAL DESIGN FOR A FULL-SCALE VAC*TRAX^{SM} VACUUM THERMAL DESORPTION UNIT

EXECUTIVE SUMMARY

Rust Federal Services is pleased to present this topical report on the results of our Phase II conceptual design work of the PRDA VAC*TRAX^{SM} mobile vacuum thermal desorption technology demonstration program. Through the present Phase II conceptual design activities, Rust has developed an equipment design and permitting strategy that retains the flexibility of a mobile treatment system with the long term value and ease of access of a central facility. These benefits are made possible by the construction of trailer mounted equipment that can be rapidly mobilized to any DOE site as required by a specific project's needs, with attention paid to minimizing the site's infrastructure requirements, as well as minimizing the difficulty of decontamination of the equipment. Rust recommends the initial siting of this unit at a Company owned commercial facility. This will allow the RCRA and TSCA operating permits that are acquired for the demonstration to become available to all sites within the DOE Complex in the shortest possible time frame by eliminating lengthy permitting delays at multiple remote sites to afford rapid progress toward treatment of the mixed waste backlog.

This report includes a review of candidate DOE sites to provide the demonstration material. Oak Ridge is recommended by Rust because of the ability to demonstrate both RCRA and TSCA contaminants in a single material, but a number of other sites meet all of the program objectives. A detailed review of the required permits is provided, as well as draft RCRA part B permit text. A NEPA documentation report is provided as an appendix for use by DOE.

The conceptual design is presented through a narrative description as well as an artist's rendering of the unit. A minimum batch size of 7.6 m^3 (10 yd^3) is easily achievable within the transportation envelope for the unit. This will allow for the economy of scale of production rates in excess of 50 ton/day on soil, which will drive unit operating costs well below those associated with existing mixed waste solids treatment facilities ($16,000-$44,000/ton at the Oak Ridge TSCA incinerator). High level construction drawings were prepared (P&IDs and General Arrangements) to facilitate the preparation of a construction cost estimate. The result of this estimate supports earlier projections for the capital requirements, as well as confirm that reasonable operating costs are achievable.

The VAC*TRAX technology is broadly applicable to multiple waste streams across the DOE Complex. This encompasses organic contaminants ranging from solvents to PCBs, and also includes the most common form of mercury. Radioactivity is retained with the treated solids, allowing for non-radioactive disposal of the condensed liquids. This process feature, along with the demonstrated absolute control of emissions, makes for ready acceptance by local stakeholders. This benefit has already been experienced by Rust's operation of the highly similar X*TRAX technology. Based on

the demonstrated effectiveness of the technology during Phase I of this program, as well as the broad application of this embodiment of thermal desorption to the DOE's mixed waste problems, success for Phase III, as measured by the contract criteria, is essentially assured. Progression to Phase III is strongly recommended by Rust.

1. INTRODUCTION

The patented VAC*TRAX℠ technology is an outgrowth of the six year X*TRAX® development program, which resulted in a large transportable thermal desorber in 1989 and culminated in successful commercialization in 1992 at a Superfund site cleanup. This development program was the result of an independent research and development effort by WMX Technologies, Inc. (aka "The Company). Rust is a subsidiary of the Company.

The development of the VAC*TRAX technology has been performed in collaboration with DOE-METC since early 1992. Through the assistance of the Program for Research and Development Announcement (PRDA), as well as independent testing, Rust has performed over 50 test runs on the VAC*TRAX system, on RCRA, TSCA, and mixed wastes, proving the technology at the pilot scale. Based on this success, PRDA has funded the second phase of the project, a phase that involves the conceptual design of the full-scale system, with associated research required for site selection and permitting. The conceptual design of a full-scale system has been completed, as well as compilation of information required for NEPA and for the acquisition of required permits and approvals. Cost estimates and predicted schedule requirements have also been developed as part of this phase. This report documents the results of the Phase II work effort. The issues regarding the basic application of the VAC*TRAX technology are not addressed. These were presented in large part in the topical report for Phase I, technical report number CTC-TR94-014, dated September 30, 1994.

2. SITE SELECTION

One of the major work tasks performed during this phase of the program was to identify a demonstration site, perform the NEPA review for that site, assess the permits required to conduct the demonstration, and to begin to draft the permits.

2.1 Potential DOE Waste Materials

In order to establish both the design basis for the VAC*TRAX unit, as well as to identify potential demonstration sites, Rust systematically reviewed the mixed wastes presented in the Mixed Waste Inventory document. Furthermore, we reviewed the site treatment plans for the major DOE Complex sites to identify those sites that had already selected thermal desorption as the remedy for their mixed wastes. Rust further applied a specific set of selection criteria to identify sites at which a demonstration of highest value could be performed, as well as with maximum probability for success. These criteria included the appropriateness of the waste matrix and contaminants for VAC*TRAX treatment, the existence of a minimum of 45 m^3 of material in a single waste stream, the lack of coincidental toxic metal contamination (which would complicate the demonstration objectives), and perhaps most importantly, the responsiveness of the site to the prospect of performing the demonstration.

The following sites met these criteria and were considered:

- PADUCAH GASEOUS DIFFUSION PLANT (OHIO)
- ARGONNE NATIONAL LABORATORY - EAST (ILLINOIS)
- SANDIA NATIONAL LABORATORY (NEW MEXICO)
- LOS ALAMOS NATIONAL LABORATORY (NEW MEXICO)
- ROCKY FLATS PLANT (COLORADO)
- SAVANNAH RIVER SITE (SOUTH CAROLINA)
- IDAHO NATIONAL ENGINEERING LABORATORY (IDAHO)
- FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (OHIO)
- PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO)
- OAK RIDGE RESERVATION (TENNESSEE)

Based on this initial review, it became obvious to Rust that there was no single site that had sufficient quantity of waste materials in inventory to justify the difficult and costly process of permitting the treatment facility under RCRA. Since there is no such thing as a transportable RCRA permit, it became obvious that the most favorable situation that could result from this demonstration project would be the siting of the VAC*TRAX unit at an appropriately permitted fixed facility allowing multiple DOE sites access to treatment without having to overcome the significant barriers to initial operation posed by the permitting process. To that end, Rust identified three Company owned sites having existing operations and permits that could be modified or expanded to allow for installation and operation of the VAC*TRAX unit. The site selection process was then transformed into a parallel review of both DOE sites that would be capable of and willing to transport waste material to a Company owned

demonstration site, and selection of the Company owned facility at which to conduct the demonstration.

From the list of DOE sites, the candidates were ranked based on a number of criteria. These criteria were:

- A defined and documented need for the technology - If the DOE facility either had no applicable feed material or already had plans in place to remediate that material, the site would not adequately address the project's needs.

- The feasibility and applicability of the system - A given site must have waste that can be successfully remediated by the VAC*TRAX system. The degree to which a given waste stream is applicable is an important factor in site selection. A radioactive waste stream containing regulated volatile organics, for example, would be directly applicable to the system. A radioactive waste stream containing solely RCRA metals would not be applicable, since the VAC*TRAX system would not be able to treat the RCRA metals.

- Technical/commercial/operational factors - The probability of getting appropriate quality and quantity of material is influenced by the number and quantity of applicable waste stream(s) at a given site. Sites with large waste volumes of mixed wastes containing organic constituents are favored for this reason.

- Publicity/Audience - Based on public perception, certain DOE locations would be preferable for supplying material for the VAC*TRAX demonstration. Good public perception translates to a higher probability of obtaining the required permits/authorizations for shipment of the material in a timely fashion, as well as a smoother and more efficient demonstration.

- Demonstration costs - Rust is aware of the extensive costs associated with performing a full-scale demonstration. Through Rust's investment in time and capital, as well as PRDA's assistance in providing funding for the demonstration, a large portion of the demonstration costs are covered. The selected DOE site will, however, be required to support the project. Since the demonstration is going to be performed at a Company facility, the DOE site would be responsible for the shipping costs associated with transporting the test material to the site and shipping the treated material back to the DOE facility or to an appropriate disposal location including the disposal cost, as well as any oversight or management required by the DOE facility to oversee these shipping operations. The ability of the site to support these costs is a crucial part of site selection.

- Site's ability to provide resources - similar to demonstration costs, the ability of a site to provide assistance is important to the success of the project. In this case, the primary requirement for the DOE site is that they provide the test material in a safe and efficient manner, and allow for the return of the treated material with a minimum of difficulty.

Based on these criteria, each site was given a rating in terms of its technical ability to provide the material required for testing and a strategic rating in terms of its ability to provide the resources and responsiveness required for conducting this demonstration in a timely manner. From these evaluations, the top five candidates were selected. These are:

OAK RIDGE (TENNESSEE)
ROCKY FLATS (COLORADO)
PORTSMOUTH GASEOUS DIFFUSION PLANT (OHIO)
INEL (IDAHO)
LANL (NEW MEXICO)

The evaluation matrix is presented below as Table 1. Longer descriptions of each of these sites' materials are presented in Appendix A.

Table 1. Candidate DOE Sites for Demonstration Waste Material

Site	Matrix	RCRA Codes	Volume	Tech. Rating	Strat. Rating	Overall Rank
Argonne-East (Illinois)	1. Tank Clean-out sludge 2. Scintillation vial waste 3. PCB Contaminated Sludge	1. D005-011; F001,003,005 2. D001, F003, F005 3. TSCA (PCBs)	1. 17.7m^3 2. 32.4m^3 3. 300 drums	2	2	2
Fernald	1. Biodenitrification lagoon sludge 2. Filter material: sand, gravel, flyash 3. Oily sludge 4. Filter cake 5. Oily Sludge 6. Discard process residue, sludge 7. Roasted, Ca precipitated filtercake	1. D018, 039; F001, 002 2. F001, 002 3. D029, 039, 040, F001 4. F002 5. D001, 019; F001, F003, 005 6. D039, D040, D043; F002 7. F001	1. 423 m^3 2. 239 m^3 3. 73.4 m^3 4. 26.4 m^3 5. 16.4 m^3 6. 145.4 m^3 7. 33.9 m^3	2	1	2
SRS	Booties, labcoats, floor sweepings, etc. cont. with solvents (Not all codes apply to all of stream)	D001,003,004,006-9,011,018-19, 022-26; F001-3,005	1688 m^3	2	1	2
Rocky Flats	1. Saltcrete; cement with organics and sludge 2. Rags/debris contaminated with PCBs/TCE 3. Cemented composite chips cleaned with solvents 4. Combustibles; paper, cloth, and plastics 5. Roaster oxide (powder) with solvents 6. Portland cement & Sludge waste 7. Drill cuttings, blacktop, and concrete	1. F001-3, 005-7, 009 2. F001, TSCA 3. F001-002 4. F001, 002, 005 5. F001, 002 6. D006,008; F001, 002, 005 7. F001, 002	1. 3279 m^3 2. 10.5 m^3 3. 90.6 m^3 4. 410.4 m^3 5. 82.7 m^3 6. 457.8 m^3 7. 43.6 m^3	1	2	2
INEL	1. Debris 2. Insulation 3. Sludge	1. F001, 002 2. F001, 002; D001 3. F001, 002, 004	1. 200 m^3 2. 1,400 m^3 3. 1,000 m^3	2	1	2
Paducah, KY	Spent Solvent Solids (Rags, wood pellets, sludge, and PPE all contaminated with solvents	F001-005	16.0m^3 (16000kg)	3	2	3
Hanford (Washington)	PCB Contaminated waste	PCBs	5000 m^3	2	2	2
Sandia (New Mexico)	Decontamination debris; paper, plastic, decon rags, etc. Combo of perhaps a dozen Sandia streams	F001, F003	27 m^3	3	2	3

TABLE 1 Cont'd. Candidate DOE Sites for Demonstration Waste Material

Site	Matrix	RCRA Codes	Volume	Tech. Rating	Strat. Rating	Overall Rank
LANL (New Mexico)	1. Dewatered sludge 2. Decontamination waste (paper, rags, plastic) 3. Solvent Contaminated Debris	1. F001, 002, 005 2. F001, 002 3. F002	1. 139 m^3 2. 61.8 m^3 3. 15.8 m^3	2	2	2
Oak Ridge K-25	1. Organic sludge from the wastewater treatment facility 2. Solids cont. with solvents	1. F001-003 2. D006-9, D011; F001, 002, 006, 007	1. 27.8 tons 2. 351 m^3			
Oak Ridge Y-12	1. TCLP organic solids 2. Cont. soil, sediments, and spoil 3. Solvent cont. spoil/sludges	1. D018, 019, 035, 037, 039, 040, 043, F001-003, F039, U151 2. D004-011, F001-005, F007, F039, PCB 3. F001-003, F005-12, F-027, F-039, P-029, P-030, P033, P098, P104, P106, U002, U080, U151	1. 25.5 m^3 2. 7,808 tons 3. 8,038 tons	1	1	1
Portsmouth Gaseous Diffusion (Ohio)	1. Rags, gloves, wipes, sorbent materials 2. PPE and miscellaneous debris 3. Soil w/ TCE, TCA, halogenated solvents	1. D004, 006-9, 011; F001, 002, 004, 005 2. F001 3. F001	1. 63 tons 2. 142 tons 3. 4,970 tons	2	1	2

1 Yes
2 Maybe
3 No

2.2 NEPA Documentation

In order to facilitate the DOE site's assessment of the environmental impacts for the demonstration test activities, Rust has performed an initial impacts review and prepared a NEPA documentation report. Since Rust recommends the performance of the demonstration at a Company facility and not at a DOE site, the impacts to the DOE site are minimal. It is likely that DOE will be able to employ a categorical exclusion and easily find that there are no impacts to the proposed demonstration. Rust will accept full responsibility for the elimination of environmental impacts at our site and will commit to assuring full compliance with applicable regulations governing the test activities. DOE will need to review the issues at the site regarding the packaging and transportation of the waste materials to Rust's site. Also, issues regarding the final disposal of the treated solids and recovered aqueous and organic condensate liquids, as well as secondary wastes such as contaminated PPE, spent filters and decontamination fluids will require review. However, since all of these activities will be conducted in off-site, appropriately permitted facilities, the impacts to the DOE site should be insignificant.

The NEPA documentation is provided as Appendix B to this topical report. DOE will certainly require evidence that Rust has secured all required permits and intends to use appropriately permitted facilities for the disposal of the products and residuals. For this reason, Rust has included additional information on the impacts of the VAC*TRAX treatment at our facility in the NEPA documentation, such that DOE can independently assess Rust's claim that the permits can be acquired and that the impacts are acceptable, even though they will not occur at the DOE site. Clearly, Rust believes this or we would not be proposing that the activities be conducted at our site. However, for a successful project, DOE should also concur with Rust's assessment of the environmental impacts of our demonstration activities.

2.3 Potential Demonstration Sites

Rust is a subsidiary of WMX Technologies, Inc. (aka the "Company"). The Company presently operates radioactive waste or mixed waste treatment facilities in three locations, which are:

- Diversified Scientific Services, Inc. (DSSI) in Kingston, Tennessee near DOE's Oak Ridge Reservation,

- Defense Consolidation Facility (DCF) in Barnwell, South Carolina near the DOE's Savannah River Plant, and

- Clemson Technical Center (CTC) in Anderson, South Carolina, 45 miles southwest of Greenville, SC.

All of these facilities presently possess radioactive materials licenses that allow for sufficient radioactivity such that the VAC*TRAX treatment operations can be conducted at the site. Furthermore, waste treatment activities are presently

conducted on these sites that are similar to or have greater environmental impact than the VAC*TRAX technology, making the initiation of VAC*TRAX operations reasonable and consistent with existing activities. Furthermore, the DSSI facility presently possesses a RCRA part B license which would require a only major modification to allow the VAC*TRAX treatment activities. This modification process is significantly more straightforward than the process of receiving an initial Part B permit, and should require the shortest timeframe of the three sites. Based on the permitting factors, as well as its location relative to the balance of the DOE sites, Rust prefers the DSSI facility at this time. However, the final demonstration site selection decision has not yet been made, and all three sites remain candidates for the demonstration.

A key activity for the site selection process was a review of permit requirements for the demonstration facility. This activity was performed by an affiliate company, Rust Environment & Infrastructure. Based on RE&Is review, the following permits/licenses will be required for operation of the full-scale VAC*TRAX system:

- Radioactive materials license - CTC, DSSI, and DCF all have radioactive materials licenses. These licenses are all fairly liberal and would encompass the majority of the streams that are applicable to VAC*TRAX treatment.

- TSCA permit for PCB waste - If the demonstration is performed on PCB contaminated material, a TSCA permit is required. CTC presently has a TSCA permit for the pilot VAC*TRAX system; the treatment limits are too low for full-scale usage, however. Experience with PCBs at CTC, however, may make permitting easier. In any event, an R&D permit would take approximately 6 months to acquire for any of the choices, and a national permit would take approximately a year.

- Part B permit for RCRA waste - In order to test RCRA regulated material, a Part B permit will be required. An RD&D permit will allow for treatment of up to 1000 lb. of material/day. The full scale system will run approximately 15 tons of soil/batch making an R&R Permit impractical. Thus, a Part B is required. DSSI presently has a Part B, but not for this application. Modifications would be required, which could take approximately 6 months to a year. Neither DCF nor CTC has a Part B permit. Acquiring one has been estimated by RE&I to take one to three years. This is the longest lead-time item for the project. Expediting this may be possible. DSSI has a significant advantage here in the amount of time required for permitting.

- Water permit - A construction and operation permit will be required for a pretreatment system used to treat condensate prior to being mixed with the treated soil or put down a POTW. South Carolina Department of Health and Environmental Control (SCDHEC) has implied that the industrial water will more than likely not be approved for disposal at the POTW. Disposal at a POTW in Tennessee, in the case of DSSI, was not explored.

- Air Permit - State air permits are required for construction and operation of the hot oil system and the VAC*TRAX exhaust by South Carolina DHEC. Similar requirements are expected in Tennessee for DSSI, but this has not been confirmed to date.

- NESHAPS - Based on 40 CFR 61 Subpart I, the Company will have to obtain a construction permit unless it can demonstrate that it is exempt by showing a < 1 mrem/year exposure to the public from the ambient air for the facility or < 0.1 mrem/ year exposure from the new construction. Based on other work conducted at DSSI and DCF, the Company would most likely not be exempt and would have to get a construction permit. CTC has a low enough radioactivity emissions level that the < 1 mrem/year exposure limit may be met, exempting CTC from having to obtain a construction permit. NESHAPs regulations for mercury and benzene do not apply to the VAC*TRAX system, based on their specific reference to certain industrial applications.

Based on these requirements, the longest lead-time item is the RCRA Part B permit. This, as stated, makes DSSI the most favored choice for siting the equipment.

3. CONCEPTUAL DESIGN OF THE FULL-SCALE VAC*TRAX SYSTEM

The VAC*TRAX process is designed to remove volatile components from solid matrices by thermal desorption: indirectly heating the solids and volatilizing the components, removing them from the dryer by means of vacuum and nitrogen carrier gas, and condensing the volatile components in a gas handling system for separate disposal. The basic process flow is shown in Figure 1. The system is designed to be mobile, with low mobilization, demobilization, and decontamination costs so that it provides economical treatment for small project sizes as compared with conventional transportable thermal treatment equipment. The system is furthermore designed with superior emissions controls, making the system ideal for the treatment of radioactive

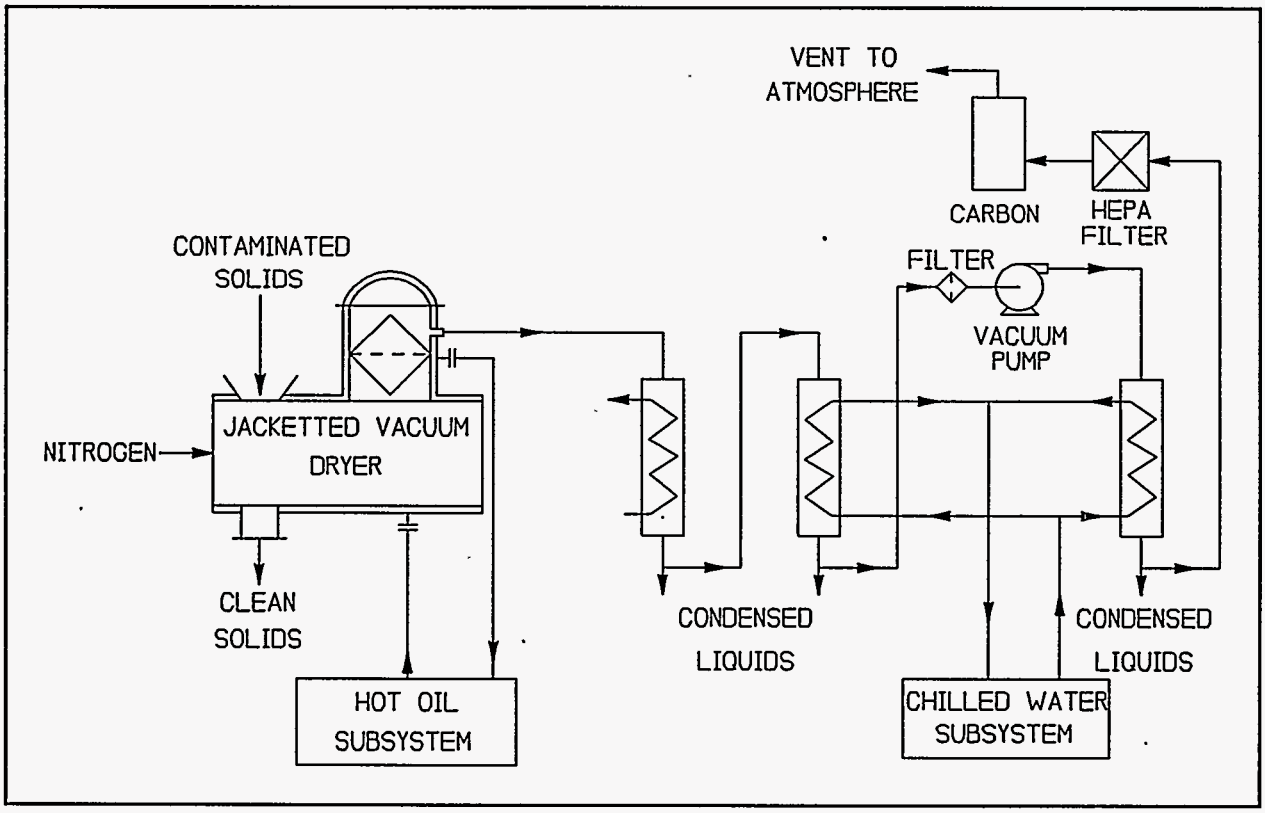

Fig. 1. VAC*TRAX[SM] Process Flow Diagram

materials. Selection of the largest readily transportable vacuum dryer provides unit operating costs that are competitive or lower than other solid waste treatment technologies that are applicable to organic and mercury contaminated mixed wastes.

The primary applications for the VAC*TRAX system are (1) mixed waste solids containing volatile components as the hazardous (RCRA or TSCA) constituent and (2) applicable hazardous wastes that, due to a small waste volume (< 5000 cu. yards), are best handled by a small system with low start-up and shut-down costs. These problems encompass a large volume of waste, representing a significant portion of the mixed waste inventory, and extend to include environmental restoration of areas with radioactive and volatile RCRA and/or TSCA regulated materials. Application has also

been identified to a variety of small volume hazardous waste materials that cannot presently be handled using permitted facilities such as materials that are contaminated by both organic chemicals and mercury. Presently identified wastes from the mixed waste inventory indicate 30,000 yd^3 of applicable material. Environmental restoration projects are estimated to be much larger, perhaps an order of magnitude higher than those applicable streams on the mixed waste inventory.

At the present time, the pilot VAC*TRAX unit has successfully treated soil, sludge and trash (PPE, job control waste, contaminated articles). Volatile contaminants removed have included RCRA regulated solvents (F001-F005), certain RCRA regulated semi-volatile organic compounds, and TSCA regulated PCBs. Screening tests have indicated a strong application to the removal of elemental mercury as well. Radioactive contaminants have included uranium, mixed fission products and mixed activation products. In all cases the radioactivity was contained in the dryer and the recovered condensate was non-radioactive and easily disposed. The solids met EPA requirements and could be disposed in presently permitted facilities. These results provide a complete solution of the mixed waste problem and eliminate wastes that are currently in perpetual storage at the sites at which they were generated. In summary, VAC*TRAX provides a complete and permanent, economical solution to a problem that presently has no answer.

The VAC*TRAX system is a two-trailer mobile treatment unit designed for ease of mobilization, operation, decontamination, and demobilization. The only site requirements for this system are a power supply, a propane or natural gas fuel source, a nitrogen source, and any housekeeping pads and/or facilities required by the site for containment and ES&H concerns. The two main components of the VAC*TRAX unit are: (1) the VAC*TRAX dryer system, and (2) the gas handling system. An artist's rendering of the full-scale VAC*TRAX unit is shown in Figure 2.

3.1 Design Basis

The key factors affecting the major component sizing were the size of expected projects within the DOE and the transportation envelope that is acceptable for the trailers. The single largest factor affecting specific component selection and design was the requirement for easy decontamination requiring minimum time and resulting volume of decontamination solution. Finally, absolute containment of the radioactive and hazardous constituents was a must considering both employee exposure issues and control of release to the environment.

The transportation envelope established for this project was trailers with a maximum width of 10'6", a height of less than 13'6" and a overall vehicle length of less than 85'. The maximum tractor and trailer weight allowed is 80,000 lb gross vehicle weight. This will allow for transport anywhere in the continental US, without routing restrictions, and with only limited time of day restrictions. Furthermore, it is desirable to restrict the trailer length to less than 55' for ease of maneuvering at the operating site, however, this may not be possible for the dryer trailer.

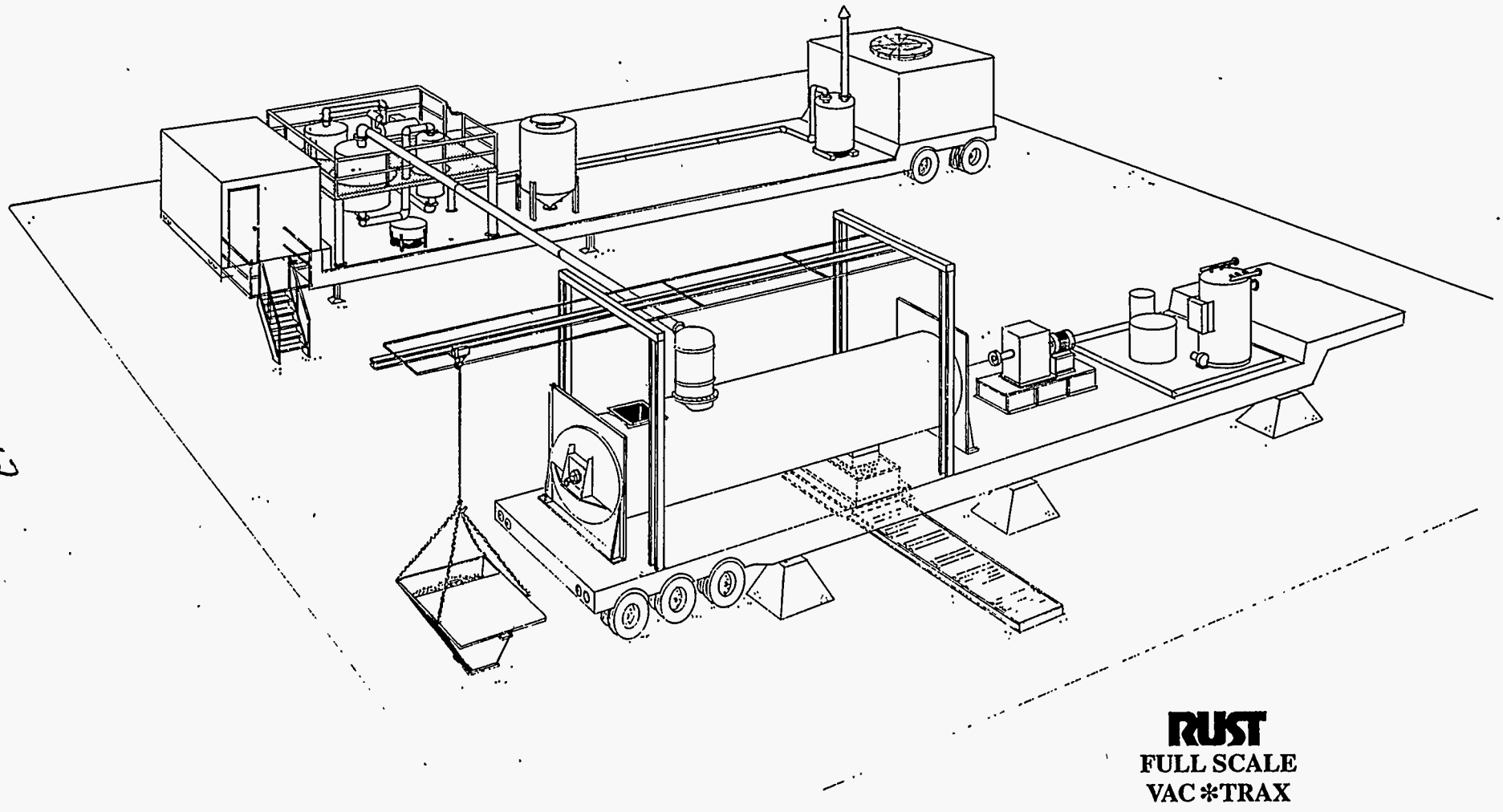

Figure 2. VAC*TRAX Artist's Rendering

The data regarding DOE's stored mixed waste was reviewed and summarized into four categories. These data are presented in Table 2. The size range of commercial vacuum dryers that are feasible for trailer mounting is from 2.5 m^3 to 12.8 m^3. Based on the desire to perform the larger projects in a reasonable time period, and minimize the unit operating costs, the largest vacuum dryer is desirable. However, based on feed and product handling issues, a dryer sized for the largest common waste container is best, which is the smallest listed above. A compromise is recommended by Rust at approximately 7.6 m^3 to achieve good operating economy with reasonable material handling.

Table 2. Stored DOE Mixed Waste Applicable to Thermal Desorption

Waste Stream Size	Mixed Waste Inventory (m^3)	Operating Days with 7.6 m^3 VAC*TRAX unit
Less than 6 m^3	73	n/a
6 to 20 m^3	93	12
20 to 750 m^3	2,164	290
750 to 4,000 m^3	11,260	1,500
TOTAL	13,590	

The gas system must be designed to condense the water vaporized during the initial drying phase for soils and sludges. The rate of water vaporization is limited by the area for heat transfer in the dryer and the temperature of the hot oil unit. Based on these constraints, the gas system was sized to provide sufficient condenser capacity to remove the water from soil at 15% moisture content in a 30 to 60 minute period. This will allow for overall cycle times on the order of two to three hours for heating the solids to maximum temperature, which again should provide for economical operation. The internal wetted parts of the dryer and gas system are all stainless steel.

3.2 The VAC*TRAX Dryer System

3.2.1 Vacuum Dryer

The VAC*TRAX vacuum dryer is designed to be the largest batch dryer that is readily transportable over commercial highways. It was deemed impractical to break the dryer into two trailers, which would require extensive construction upon arrival at a site.

The dryer trailer, which includes the dryer and hot oil unit, is 13½ feet high, 10 feet wide, and 60 feet long. The dryer capacity is approximately 10 yd^3, with a heat transfer area of approximately 2,000 ft^2. Heat is provided to the dryer by passing a synthetic heat transfer oil through jackets in the dryer and agitator, allowing a maximum solids temperature of approximately 600°F. The internal surfaces of the dryer, as well as the agitator, are made of stainless steel for ease of decontamination.

3.2.2 Loading Operations

Material to be treated is first loaded into a custom-made loading hopper. This hopper is loaded using a front-end loader or forklift with rotating forks, and then the lid is placed securely on top, for contamination and spill control. Next, the hopper is hoisted and moved to the loading port of the VAC*TRAX dryer, using a monorail crane assembly. A proximity switch indicates when the hopper is successfully in place over the loading port. The volume of this hopper is slightly greater than 90 ft^3, which is a standard size for waste containers (CPC's B-25 steel box).

When the hopper is in place, the vacuum valve over the loading port is electronically opened. This valve cannot be opened unless a feed hopper is sensed at the loading position. When the valve at the bottom of the hopper is opened, the material to dumps into the dryer. The hopper capacity is approximately 5 tons of soil, allowing the dryer to be loaded in three charges. Throughout this loading step, the gas system is operated at low vacuum (0.5" Hg.) to provide controlled ventilation and eliminate fugitive emissions and worker exposure.

After the dryer has been charged, the valve at the loading port is resealed, allowing the system to pull 26+" Hg vacuum on the dryer.

A maximum particle size of 6" has been selected for non-friable particles placed in the VAC*TRAX dryer. This size was selected to prevent jamming of the agitator within the dryer, as well as to prevent the plugging of the discharge port. Other than this restriction, solids of all types may be placed within the dryer.

While loading the material, the VAC*TRAX agitator will be operated to help distribute the solids throughout the dryer. The agitator will additionally provide approximately 1/2 of the dryer's soil/steel contact heat exchange area for later heating operations. After the dryer is loaded, full vacuum is pulled on the system, and the dryer is purged with nitrogen to inert the system.

3.2.3 Heating Operations

Material is treated in the VAC*TRAX dryer at a temperature appropriate to the matrix; soil can be treated at the maximum temperature, but PPE, plastic, and similar debris are treated at lower temperatures to prevent the material from melting and adhering to the internal surfaces of the dryer. Full vacuum is used in all cases at the end of the heating cycle; there is no technological or economic benefit to running at less than full vacuum. Additionally, as with the pilot system, an intermediate temperature may be initially used when treating material with a significant moisture content; this will prevent overloading of the condensers. Volatilized water and contaminants are swept up with the nitrogen carrier gas, passing through a particle filtration system that is integral with the dryer prior to travelling to the condensing train. This filtration system, has a particle size rating of 5 microns, absolute. Based on data for filters of this type, the filter should rate as a high efficiency particulate air (HEPA) filter (i.e. > 99.7% removal at 0.3 micron).

After the material in the dryer has been sufficiently treated, the material is sprayed with water by means of spray nozzles located in the dryer, while the flow of the hot oil is blocked from the dryer. Spraying water on the material serves two purposes. First, the material is cooled rapidly, transferring the thermal energy from the heated soil to the heating and boiling of the water, which is then removed and handled by the gas treatment system. Second, after the material has been cooled to 200°F, slight water addition is used to de-dust the treated matrix, adding moisture to aid in contamination control. Depending on the material treated, water addition could vary from a few gallons to several hundred gallons. The gas treatment system is designed to handle the heaviest of loads expected during this operation.

3.2.4 Unloading Operations

After de-dusting, the material is dumped out of the dryer by means of a motorized vacuum valve located at the bottom of the dryer. Like the loading valve, this valve is designed to allow the dryer to operate under a 26" Hg. vacuum with only minimal in-leakage.

The solids are dropped into an appropriately sized container which is fastened and sealed to the bottom of the dryer. A proximity switch is located on the dryer to sense the presence of the product container. The valve will not open unless the switch indicates the presence of the unloading container. Additionally, a level switch is provided to indicate when the container is nearly full and, automatically, causes the discharge valve to close. As a backup, a lighted camera is mounted in the collection vessel, allowing an operator to observe the loading of the container. The operator can then manually close the product valve when the product container is filled.

After a product container is loaded, it is removed from under the dryer and then moved by forklift to an appropriate location. An empty product container is then placed under the product port, and unloading is continued. The dryer agitator is kept running during unloading operations, sweeping the material into the container

positioned beneath the dryer. If B-25 boxes are used, three boxes are required for complete unloading of the dryer. After a given container is filled the dumping door will be resealed, the container moved out and replaced by an empty one, and the system reloaded for the next batch. Typically, feed preparation and material handling will be performed during the heating and treatment cycle, minimizing the time required to load and unload the system. This will allow a quick turnaround between batches, significantly increasing the effective treatment rate (tons or m^3/day) of the system. When switching to a different waste stream, the system may be accessed for complete decontamination, by opening several small doors on the dryer side wall to allow personnel to access and clean the inside of the dryer. Upon completion of cleaning, the VAC*TRAX dryer will be less than 0.3% full, qualifying as a RCRA empty container.

3.3 The Gas Treatment System

After the gas stream passes the filtration system in the dryer, it is essentially particulate free, and contains nitrogen, water vapor, and volatile contaminants removed from the treated material. It is the function of the gas treatment system to condense and recover the water vapor and bulk of the contaminants, as well as to prevent uncontrolled emissions to the atmosphere. The gas system also provides the vacuum for the dryer, facilitating treatment as well as controlling fugitive emissions.

3.3.1 Condensing Train

The first stage of the VAC*TRAX gas treatment system is a shell and tube heat exchanger, cooled by a fin-fan cooler. This condenser is designed to reject the bulk of the heat in the gas stream, condensing the majority of the water (>80%) as well as cooling the gas stream to approximately 100-150°F. Tap water is the cooling side fluid. Based on the nature of the system, the ability of the primary condenser to reject heat will vary with local weather conditions, notably surrounding air temperature.

The second stage of the VAC*TRAX gas treatment system is a refrigerated shell and tube heat exchanger. For this heat exchanger, a 50/50 propylene glycol/water solution is used as the cooling side fluid, with the fluid cooled by means of a refrigeration unit. The gas stream is cooled to 50-100°F in this stage, depending on the viscosity of the organic liquid with a fraction of the water vapor and volatile contaminants being condensed.

The third stage of the VAC*TRAX gas treatment system is also a refrigerated shell and tube heat exchanger. Like the second condenser, the cooling fluid is chilled to 32°F by means of a refrigeration unit. It should be noted that this stage of condensation is located after the vacuum pump; the gas stream passing through this heat exchanger is therefore at atmospheric pressure. The gas exiting this condenser has been cooled to less than 45°F and is primarily nitrogen, with a trace of organic compounds. The condensers all contain small tanks at the bottom portion that drain into the condensate transfer tank.

3.3.2 Process Vent

After exiting the third condenser, the majority of the gas stream is reheated, by passing it through a hot oil heat exchanger, and then recirculated to the dryer. A small fraction of the carrier gas is vented, to allow make-up nitrogen to be introduced into the system to prevent oxygen buildup. The vented gas stream passes through a series of filtration and monitoring steps before being released to the atmosphere. These steps include pre- and post-filtration, carbon adsorption, and monitoring.

Final-filtration consists of passing the process vent stream through a DOP tested HEPA filter with a bag-out housing, allowing for ease of filter replacement for the system. When used in combination with the pre-filter and the dryer filter elements, the VAC*TRAX system provides absolute containment of radioparticulates. Radioactivity emissions should be negligible.

After the particle filtration system, the gas stream next passes through an activated carbon bed. The activated carbon is designed to remove any trace organic constituents that were not removed by the condensation train. Based on previous testing using the pilot VAC*TRAX system, as well as pilot and full-scale X*TRAX testing, organic removals using this setup are excellent, achieving BACT standards prior to atmospheric emission. By placing the granular activated carbon (GAC) after the HEPA filtration systems, the GAC is unlikely to become radioactive in normal service.

3.3.3 Monitoring

The process vent is monitored using a continuous emission monitoring system (CEMS) prior to atmospheric discharge. While the process controls will ensure that these will all be within predicted and acceptable levels, monitoring will verify this. Audio and visual alarms warn of off- specification operation. If not corrected, the system initiates an automatic shutdown. The CEMS consists of:

- Total flow rate (lb/hr)
- Total Hydrocarbon Content (lb/hr)
- Oxygen Content (%)
- Total radioactivity, alpha and beta, gamma (curies/hr)

3.3.4 Control Room

The VAC*TRAX control room is the focal point for observing and controlling the operations of the VAC*TRAX process. From the control room, temperatures and pressures of each unit operation can be monitored, valves can be opened or closed, and the heat supplied to the VAC*TRAX dryer can be controlled. A PLC, located at the control room, provides the programming for the routine operations of the system.

4. SUMMARY AND CONCLUSIONS

The technical issues surrounding the design of the full-scale VAC*TRAX unit have been sufficiently addressed by this conceptual design effort. Only limited work remains for the final design effort. The key design features of the unit are summarized below.

- The full-scale VAC*TRAX unit design meets both the transportability and productivity goals envisioned at the beginning of the PRDA program.

- By sizing the dryer for a batch size of 7.6 m^3, daily treatment rates for soil can be in excess of 50 tons, achieving excellent operating economy required for projects at the upper end of the size range.

- The components of the full scale VAC*TRAX unit will fit on two processing trailers, with the primary condenser's ultimate heat sink shipping on a third flat bed trailer.

- Feed and product handling will be performed using containers, allowing for high instantaneous transfer rates, minimal capital cost for material handling systems, simple installation and short mobilization and demobilization periods, and absolute containment of the hazardous constituents. This is preferable to the use of continuous screw or belt conveyors that are used in conventional high capacity commercial thermal desorption systems.

- Construction will be feasible in a three day schedule.

The other major conclusion of this conceptual design effort regards the permitting strategy and location for the demonstration project. Based on review of the range and type of projects within the DOE Complex, and the length of time and expense associated with securing a RCRA Part B treatment permit, the highest value can be achieved by initially locating the VAC*TRAX unit at a fixed facility and using the permits that are obtained for the demonstration to perform follow on waste treatment for multiple DOE sites.

APPENDIX A

Site Selection Waste Log Cut Sheets

State: Kentucky | ID #: 0000000038

Site: PADUCAH GASEOUS DIFFUSION PLANT

Waste Stream Name: SPENT SOLVENT SOLIDS

Matrix: Organic Debris | Waste Type: MLLW

Waste Stream Description and Source:

This stream consists of solids containing spent solvents or mixed with spent solvents. This stream will consist of rags, wood pellets, sludge, and PPE, all contaminated with solvents. The waste stream results from uses of solvents (solvent rags) or spill cleanups or recovery of TCE at C-400. The stream can also include dirt resulting from spill cleanup activities.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
1.5	1,516.0	16.0	16,000.0	17.5	17,516.0	90.9	90,910.0

Treatability Group:

MLLW CH, Organic Debris, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. The K-25 TSCA Incinerator currently will not accept solids and is therefore not permitted to treat this stream.

Technology Status:

Technology assessment has not started.

Radiation Characteristics:

1) Contact-handled
2) Beta/gamma emitter
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.
2) High beta or gamma levels in contact with organics can result in radiolysis, with production of hydrogen gas and formation of free radicals that attack structural materials, particularly steel. The buildup of hydrogen gas and embrittlement of structural materials are important considerations, in storage, design, and operation of treatment facilities, and in stabilization of the final waste form.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Product change: product substitution and conservation; and change in product composition.

State: Kentucky ID #: 0000000038

Site: PADUCAH GASEOUS DIFFUSION PLANT

Waste Stream Name: SPENT SOLVENT SOLIDS

Matrix: Organic Debris Waste Type: MLLW

General Comments:

This stream has the potential to contain heavy metals that have not yet been identified, in addition to those waste codes already listed.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F004	Conc.	Incineration
F005A	Conc.	Incineration
F005B	Tech.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Illinois ID #: 2072

Site: ARGONNE NATIONAL LABORATORY - EAST

Waste Stream Name: TANK CLEAN-OUT SLUDGE

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:

Retention tanks and sewer lines cleaned of sludge.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	17.7	17,700.0	17.7	17,700.0	12.6	12,600.0

Treatability Group:

MLLW CH/AL, Inorganic Sludges/Particulates, Toxic Organics and Metals w/ Mercury

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams. The Environmental Waste Management Technical Staff has just begun to assess technologies which may be used to treat this waste. Any assessment to date should be considered in its infancy stage with no timetable yet developed to complete said assessment.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Alpha emitter, < 10 nCi/g
3) Radionuclides or radiation level unknown
4) Transuranic contaminants
5) Beta/gamma emitter
6) Contact-handled
7) Volatile radionuclide

Waste-Specific Radiation Effects on Treatment:

1) High alpha activity in contact with organics or water can result in radiolysis, with production of hydrogen gas, methane and other degradation products. The buildup of hydrogen gas and radiation interaction with the waste form can affect storage, design and operation of treatment facilities, and stability of the final waste form.
2) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.
3) Daughter products of alpha emitters may cause problems, i.e., production of radon gas,

State: Illinois ID #: 2072

Site: ARGONNE NATIONAL LABORATORY - EAST

Waste Stream Name: TANK CLEAN-OUT SLUDGE

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D005	Conc.	Chemical Precipitation; or Stabilization
D006B	Conc.	Stabilization
D007	Conc.	Chemical Reduction followed by Stabilization
D008B	Conc.	Stabilization
D009C	Conc.	Thermal Recovery of Metals; Acid Leaching; Stabilization; or Incineration
D010	Conc.	Stabilization
D011	Conc.	Stabilization
F001	Conc.	Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration

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emissions from short-lived daughter products, and potential chemical incompatibility of daughter products.

4) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.
5) High beta or gamma levels in contact with organics can result in radiolysis, with production of hydrogen gas and formation of free radicals that attack structural materials, particularly steel. The buildup of hydrogen gas and embrittlement of structural materials are important considerations, in storage, design, and operation of treatment facilities, and in stabilization of the final waste form.
6) Treatment must consider containment of radioactive off-gases to protect treatment facility personnel and the public. Safeguard issues may be a concern. Treatment involves tritium release, which must be reported.
7) Treatment must consider radioactive off-gases to protect the public and treatment facility personnel from releases.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.

General Comments:

The amount of clean-out sludge can change dramatically depending on the clean-up activities, building rehab projects, and decontamination/decommissioning activities.

State: Illinois ID #: 854

Site: ARGONNE NATIONAL LABORATORY - EAST

Waste Stream Name: SCINTILLATION VIALS

Matrix: Lab Packs without Metals Waste Type: MLLW

Waste Stream Description and Source:

Scintillation Vial waste was and is being generated through various biological and chemical research at the Lab. These vials are organic based (xylene, toluene, acetone) and contain various radio-isotopes. The radio-isotopes are not known in all cases.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	32.4	35,046.0	32.4	35,046.0	2.1	22.1

Treatability Group:

MLLW CH/AL, Lab Packs without Metals, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Assessing technologies to determine if the technology exists, and if so, whether it needs modification. The Environmental Waste Management Technical Staff has just begun to assess technologies which may be used to treat this waste. One possibility is a system which will evaporate the hazardous constituents. Any assessment of available technologies made by the ANL-E Environmental and Waste Management Technical Staff to date should be considered in its earliest stage with no timetable yet developed to complete said assessment.

Radiation Characteristics:

1) Transuranic contaminants
2) Contact-handled
3) Volatile radionuclide
4) Beta/gamma emitter
5) Alpha emitter, 10-100 nCi/g
6) Alpha emitter, < 10 nCi/g
7) Radionuclides or radiation level unknown

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.
2) High beta or gamma levels in contact with organics can result in radiolysis, with production of

State: Illinois	ID #: 854
Site: ARGONNE NATIONAL LABORATORY - EAST	
Waste Stream Name: SCINTILLATION VIALS	
Matrix: Lab Packs without Metals	Waste Type: MLLW

hydrogen gas and formation of free radicals that attack structural materials, particularly steel. The buildup of hydrogen gas and embrittlement of structural materials are important considerations, in storage, design, and operation of treatment facilities, and in stabilization of the final waste form.

3) Treatment must consider containment of radioactive off-gases to protect treatment facility personnel and the public. Safeguard issues may be a concern. Treatment involves tritium release, which must be reported.
4) Treatment must consider radioactive off-gases to protect the public and treatment facility personnel from releases.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Raw material changes: raw material purification; and substitution.
3) Product change: product substitution and conservation; and change in product composition.

General Comments:

Some wastes (labpacks) with inadequate documentation will be sampled and characterized.
The inventory amounts are based on the size and weight of the drums including the sorbent material (vermiculite).
This waste stream has been reduced greatly by education of researchers to hazardous materials and RCRA law.

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D001A	Tech.	Fuel Substitution; Organics Recovery; or Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration

The alternate LDR treatment standards for labpacks is incineration as a method of treatment and a requirement for the incinerator residues to meet the treatment standards for the TC toxic metals (i.e., D004-D008, and D010-D011).

State: New Mexico | ID #: 0000002140

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: HEPA FILTERS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

HEPA filters absorbed mixed fission products, uranium, beryllium, and proton-activated products. Solvents, principally Freon-TF. Assume Bldg. 983, High Bay, Pulsed Beam Fusion Accelerator. [DR 890040-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	1.4	45.4	1.4	45.4	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Other (explain in Comments section)
3) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Mixed fission products, U-238, Zn-65, Mn-54, Co-56, Co-57.

State: New Mexico | ID #: 0000002138

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

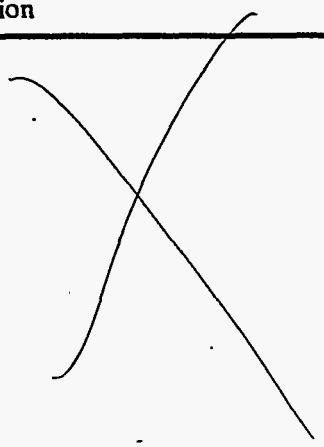
Waste Stream Name: EXPERIMENTAL DEBRIS

Matrix: Other | Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F003	Conc.	Incineration



State: New Mexico | ID #: 0000002139

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Rags and paper absorbents used in decon with Freon-TF and alcohol (assume methanol). From Bldg. 983, High Bay, Pulsed Beam Fusion Accelerator [DR 890039-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	8.2	454.0	8.2	454.0	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.
2) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.

Waste Minimization Activities:

Waste minimization activities unknown.

General Comments:

Co-56, Co-57, Mn-54; induced activity.

State: New Mexico ID #: 0000002139

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002129

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: FILTERS AND PPE

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Sandia Pulsed Reactor (Bldg. 6591) exhaust system prefilters, associated booties, coveralls, may include acetone and methanol. [DR 890011-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.450	4.5	0.450	4.5	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Beta/gamma emitter
2) Other (explain in Comments section)

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Waste minimization activities unknown.

General Comments:

Cs-137; fission products.

State: New Mexico | ID #: 0000002183

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Gloves, rags, smocks contaminated with alcohol (assume methanol). Tritium contaminated at low levels. Used for working with metal tritides. From Bldg. 891, Room 1023. [DR 910015-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.060	2.3	0.060	2.3	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Volatile radionuclide

Waste-Specific Radiation Effects on Treatment:

1) Treatment must consider containment of radioactive off-gases to protect treatment facility personnel and the public. Safeguard issues may be a concern. Treatment involves tritium release, which must be reported.

Waste Minimization Activities:

Unknown.

General Comments:

Tritium.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002184

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Decon debris including barbeque cloth, towels, lab coats, cloves, petri dishes, plastic containers, tape, wiring and filter debris. Contaminated with methanol, ethanol, acetone. From Bldg. 6580, Rooms 105 (Scanning Electron Microscope), 106 (Hood), and 112 (Hood and Glove Box Line). [DR 910017-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.420	9.1	0.420	9.1	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Other (explain in Comments section)
2) Activation Products
3) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.
2) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.

Waste Minimization Activities:

Unknown.

General Comments:

Contaminated by mixed fission and activation products, U and enriched U and irradiated reactor fuel. Mainly Cs-137.

State: New Mexico	ID #: 0000002184
Site: SANDIA NATIONAL LABORATORY - NEW MEXICO	
Waste Stream Name: DECON DEBRIS	
Matrix: Other	Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002156

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: EXPERIMENTAL DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Paper, plastic, possibly solder contaminated with alcohol (assume methanol). Generated during routine Sandia Pulsed Reactor (SPR) operations. From Bldg. 6593, SPR. [DR 900036-2]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	3.7	90.7	3.7	90.7	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics and Metals w/o Mercury

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Other (explain in Comments section)

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Mixed fission products.

State: New Mexico ID #: 0000002156

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: EXPERIMENTAL DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D008C	Tech.	Macroencapsulation
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002152

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Mostly wipes and decon waste using alcohol (assume methanol) from cleanup and decon of the Pulsed Beam Fusion Accelerator (PBFA) II parts. From Bldg. 983, High Bay [DR 890107-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.510	9.1	0.510	9.1	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-57, Co-58, Mn-54. Induced activity.

State: New Mexico ID #: 0000002152

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002150

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON RAGS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Mostly rags from cleanup of Pulsed Beam Fusion Accelerator II (FBFA) using alcohol (assume methanol). From Bldg. 983, High Bay. [DR 890104-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	1.1	36.3	1.1	36.3	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-58, Mn-54. Induced activity.

State: New Mexico ID #: 0000002150

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON RAGS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F003	Conc.	Incineration

State: New Mexico ID #: 0000002128

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D008B	Conc.	Stabilization
F003	Conc.	Incineration

State: New Mexico | ID #: 0000002149

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON RAGS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Rags from Pulsed Beam Fusion Accelerator II (PBFA) material and euqipment decon. Freon used in the decon. From Bldg. 983, High Bay. [DR 890103-1].

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	2.4	47.6	2.4	47.6	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.
2) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.

Waste Minimization Activities:

Unknown.

General Comments:

Co-58, Mn-54; induced activity.

State: New Mexico	ID #: 0000002149
Site: SANDIA NATIONAL LABORATORY - NEW MEXICO	
Waste Stream Name: DECON RAGS	
Matrix: Other	Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002236

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: PERSONAL PROTECTIVE EQUIP/DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Paper and plastic generated during handling of fresh and irradiated U-235-containing reactor fuels. Organic solvents (alcohols), Freon have been in contact with these materials. From Bldg. 6580, Hot Cell Facility [DR 920023-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.850	45.4	0.850	45.4	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Other (explain in Comments section)

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Uranium, U-235, mixed fission products.

State: New Mexico ID #: 0000002236

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: PERSONAL PROTECTIVE EQUIP/DECON DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002182

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Decon debris (wipes, absorbents, anti-C gear); Freon used as solvent to clean Pulsed Beam Fusion Accelerator (PBFA) II parts. From Bldg. 983, PBFA. [DR 900312-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.540	11.3	0.540	11.3	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-56, Co-57, Co-58, Mn-54.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002181

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Decon debris from cleanup and decon of Pulsed Beam Fusion Accelerator II parts. From Bldg. 983, High Bay. [DR 900309-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	1.8	79.4	1.8	79.4	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Beta/gamma emitter
2) Activation Products

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-56, Co-57, Co-58, Mn-54; induced activity.

State: New Mexico ID #: 0000002181

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002180

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Mostly wipes and anti-C's from cleanup and handling of Pulsed Beam Fusion Accelerator (PBFA) II parts. Freon used as solvents. From Bldg. 893, PBFA-II. [DR 900302-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	3.2	68.0	3.2	68.0	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Be-7, Co-56, Co-57, Mn-54; induced activity.

State: New Mexico	ID #: 0000002180
Site: SANDIA NATIONAL LABORATORY - NEW MEXICO	
Waste Stream Name: DECON DEBRIS	
Matrix: Other	Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002179

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Mostly wipes and rags from cleaning and deconning the Pulsed Beam Fusion Accelerator II parts. Freon used as solvent. From Bldg. 983, High Bay. [DR 900301-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	1.4	29.5	1.4	29.5	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-57, Co-58, Mn-54 are the principal long-lived isotopes; induced activity.

State: New Mexico ID #: 0000002179

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON DEBRIS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico ID #: 0000002153

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER

Matrix: Other Waste Type: MLLW

Waste Stream Description and Source:

Mostly wipes and decon waste. Freon used as a solvent. From cleanup of Pulsed Beam Fusion Accelerator (PBFA) II parts. From Bldg. 983, High Bay [DR 890108-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	1.000	18.1	1.000	18.1	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-57, Co-58, Mn-54. Induced activity.

State: New Mexico ID #: 0000002153

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: New Mexico | ID #: 0000002151

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER AND RAGS

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Paper absorbents used in the cleanup of the Pulsed Beam Fusion Accelerator (PBFA) II. May contain some small metal debris. Freon used as solvent. From Bldg. 983, High Bay [DR 890106-1]

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	0.850	23.6	0.850	23.6	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Activation Products
2) Beta/gamma emitter

Waste-Specific Radiation Effects on Treatment:

1) Many activation products are short-lived and treatment could be delayed to allow radiation levels to subside.
2) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

Unknown.

General Comments:

Co-58, Mn-54. Induced activity.

State: New Mexico ID #: 0000002151

Site: SANDIA NATIONAL LABORATORY - NEW MEXICO

Waste Stream Name: DECON PAPER AND RAGS

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: South Carolina ID #: 910

Site: SAVANNAH RIVER SITE

Waste Stream Name: SOLVENT WASTE <100 NCI/G TRU RAD

Matrix: Organic Debris Waste Type: MLLW

Waste Stream Description and Source:

200 Areas (F and H Separations Facilities). This waste is primarily solids consisting of mainly booties, lab coats, floor sweepings, and rags.

This waste is generated primarily through separation activities in the course of plutonium production, includes small amounts of TRU waste from on site laboratories.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
1,103.5	253,805.0	1,687.6	389,505.0	2,791.1	643,310.0	0.000	0.000

Treatability Group:

MLLW CH/AL, Organic Debris, Toxic Organics and Metals w/ Mercury

Treatment Status:

Have not identified a planned facility for this waste stream at this time. No treatment identified.

Technology Status:

Technology assessment has not started.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Contact-handled
3) Transuranic contaminants

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.
2) Radioactive decay may produce significant amounts of heat that needs to be considered during treatment and disposal.

Waste Minimization Activities:

1) Product change: product substitution and conservation; and change in product composition.

State: South Carolina ID #: 910

Site: SAVANNAH RIVER SITE

Waste Stream Name: SOLVENT WASTE <100 NCI/G TRU RAD

Matrix: Organic Debris Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D001A	Tech.	Fuel Substitution; Organics Recovery; or Incineration
D003D	Tech.	Deactivation
D004	Conc.	Vitrification
D006B	Conc.	Stabilization
D007	Conc.	Chemical Reduction followed by Stabilization
D008B	Conc.	Stabilization
D009C	Conc.	Thermal Recovery of Metals; Acid Leaching; Stabilization; or Incineration
D011	Conc.	Stabilization
D018		Not currently prohibited under the LDR Program.
D019		Not currently prohibited under the LDR Program.
D022		Not currently prohibited under the LDR Program.
D023		Not currently prohibited under the LDR Program.
D024		Not currently prohibited under the LDR Program.
D025		Not currently prohibited under the LDR Program.
D026		Not currently prohibited under the LDR Program.
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration

State: South Carolina ID #: 910

Site: SAVANNAH RIVER SITE

Waste Stream Name: SOLVENT WASTE <100 NCI/G TRU RAD

Matrix: Organic Debris Waste Type: MLLW.

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
P012	Conc.	Vitrification
P015	Tech.	Metals Recovery; or Thermal Recovery of Metals
P048	Conc.	Incineration
P113	Tech.	Thermal Recovery of Metals; or Stabilization
P120	Tech.	Stabilization
U002	Conc.	Incineration
U032	Conc.	Chemical Reduction followed by Chemical Precipitation
U052	Conc.	Incineration
U080	Conc.	Incineration
U133	Tech.	Fuel Substitution; Chemical Oxidation; Chemical Reduction; or Incineration
U134	Tech.	Adsorption followed by Neutralization; or Neutralization
U144	Conc.	Incineration followed by Stabilization
U151	Tech.	Amalgamation
U154	Tech.	Fuel Substitution; or Incineration
U161	Conc.	Incineration
U209	Conc.	Incineration
U211	Conc.	Incineration
U220	Conc.	Incineration
U226	Conc.	Incineration
U239	Conc.	Incineration

State: New Mexico | ID #: 0000002144

Site: LOS ALAMOS NATIONAL LABORATORY

Waste Stream Name: DEWATERED TREATMENT SLUDGES

Matrix: Other | Waste Type: MLLW

Waste Stream Description and Source:

Sludge containing toluene, 1,1,1-trichloroethane, methylene chloride, trichloroethylene, chlorinated hydrocarbons. May include mixtures of organic and inorganic sludges. Source elimination activities have effectively eliminated the RCRA regulated constituents in this waste stream, so the stream is no longer generated as a mixed waste.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
130.8	-	139.0	-	269.9	-	0.000	0.000

Treatability Group:

MLLW CH, Other, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. Onsite stabilization and chemical oxidation are the proposed methods of treatment technology.

Technology Status:

Technology assessment has not started. Technology options have not been analyzed.

Radiation Characteristics:

1) Radionuclides or radiation level unknown
2) Contact-handled

Waste-Specific Radiation Effects on Treatment:

Not reported.

Waste Minimization Activities:

1) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.

Source elimination activities have effectively eliminated the RCRA regulated constituents in this waste stream, so the stream is no longer generated as a mixed waste.

State: New Mexico ID #: 0000002144

Site: LOS ALAMOS NATIONAL LABORATORY

Waste Stream Name: DEWATERED TREATMENT SLUDGES

Matrix: Other Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F005A	Conc.	Incineration

State: New Mexico | ID #: 0000002159

Site: LOS ALAMOS NATIONAL LABORATORY

Waste Stream Name: DECONTAMINATION WASTE - F001, F002

Matrix: Heterogeneous Debris | Waste Type: MTRU

Waste Stream Description and Source:

Waste stream may include packages containing combustible solids (paper, rags, plastic, rubber, etc.) which may also contain a small fraction of non-combustible solids. May also include packages containing chemical treatment sludge.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
214.6	-	61.8	-	276.3	-	258.9	-

Treatability Group:

MTRU CH/AL, Heterogeneous Debris, Toxic Organics

Treatment Status:

Treatment of most mixed transuranic waste to meet LDR treatment standards is not applicable because DOE plans to ship these wastes to the Waste Isolation Pilot Plant (WIPP), pending issuance of a No-Migration Determination of the operational phase. Pretreatment to meet the WIPP Waste Acceptance Criteria may be required.

Technology Status:

Not Applicable.

Radiation Characteristics:

1) Contact-handled
2) Transuranic contaminants

Waste-Specific Radiation Effects on Treatment:

Not reported.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Product change: product substitution and conservation; and change in product composition.

State: New Mexico ID #: 0000002159

Site: LOS ALAMOS NATIONAL LABORATORY

Waste Stream Name: DECONTAMINATION WASTE - F001, F002

Matrix: Heterogeneous Debris Waste Type: MTRU

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: New Mexico | ID #: 0000002175

Site: LOS ALAMOS NATIONAL LABORATORY

Waste Stream Name: SOLVENT CONTAMINATED DEBRIS - F002

Matrix: Heterogeneous Debris | Waste Type: MLLW

Waste Stream Description and Source:

Decontamination debris contaminated with 1,1,1-trichloroethane and trichloroethylene.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
6.0	-	15.8	-	21.8	-	28.3	-

Treatability Group:

MLLW CH, Heterogeneous Debris, Toxic Organics

Treatment Status:

Plan to treat on-site at the existing Controlled Air Incinerator facility. Treatment at the Controlled Air Incinerator pending DOE NEPA; DETOX at the Hazardous Waste Treatment Facility is pending issuance of a RCRA operating permit.

Technology Status:

Technology exists. No modifications are necessary.

Radiation Characteristics:

1) Radionuclides or radiation level unknown
2) Contact-handled

Waste-Specific Radiation Effects on Treatment:

Not reported.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F002	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical,

or thermal), macro/microencapsulation or sealing.

State: Colorado

ID #: 340

Site: ROCKY FLATS PLANT

Waste Stream Name: SALTCRETE

Matrix: Inorganic Sludges/Particulates

Waste Type: MLLW

Waste Stream Description and Source:

This waste stream consists block(s) of cement which could fill an entire box (pouring into box directly). In the past it was repackaged, so it could include some large chunks. IDC No. 804 Saltcrete is generated by solidifying the concentrate from an evaporation process at the Liquid Waste Treatment Facility in Building 374. Wastewater treatment in Building 374 is processed by evaporation, flocculation/ precipitation and sludge dewatering and drying.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	3,279.3	-	3,279.3	-	1,745.0	-

Treatability Group:

MLLW CH/AL, Inorganic Sludges/Particulates, Toxic Organics and Metals w/o Mercury

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, < 10 nCi/g
2) Alpha emitter, 10-100 nCi/g
3) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.
3) Raw material changes: raw material purification; and substitution.
4) Change in operations status; process interruptions; work stoppages; mission changes; and new processes.

State: Colorado ID #: 340

Site: ROCKY FLATS PLANT

Waste Stream Name: SALTCRETE

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration
F006	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization; or Incineration; or High Temperature Metals Recovery
F007	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F009	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization

State: Colorado | ID #: 107

Site: ROCKY FLATS PLANT

Waste Stream Name: PCB (SOLIDS)/LLW MIXED

Matrix: Multiple | Waste Type: MLLW

Waste Stream Description and Source:

This waste is primarily rags. PCB solid waste refers to items such as contaminated equipment and cleanup materials that have been generated during removal of PCB equipment. During the cleanup of PCB oil, 1,1,1-trichloroethane was used to remove the oil. The rags containing the PCB/solvent residue were packaged in 55-gallon drums with multiple bag liners. This waste stream includes inorganic debris, and inorganic sludges/particulates.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.010	-	10.5	-	10.5	-	0.000	0.000

Treatability Group:

MLLW CH/AL, Multiple, Toxic Organics

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Contact-handled
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Not Applicable.

No longer generated.

State: Colorado	**ID #: 107**
Site: ROCKY FLATS PLANT	
Waste Stream Name: PCB (SOLIDS)/LLW MIXED	
Matrix: Multiple	**Waste Type: MLLW**

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Colorado ID #: 108

Site: ROCKY FLATS PLANT

Waste Stream Name: CEMENTED COMPOSITE CHIPS/LLW MIXED (327)

Matrix: Cemented Solids Waste Type: MLLW

Waste Stream Description and Source:

This waste stream is cemented chips of stainless steel, depleted uranium, aluminum, beryllium, and copper. Composite metals are machined in Building 444 and normally consist of stainless steel and depleted uranium with some aluminum, beryllium and copper. During machining, oils and solvents are applied. The resultant chips are cemented with Portland cement. Cementation takes place in a drum which is packaged in a plywood box or the cementation takes place in a PVC-lined wooden box. This waste is identified by IDC 327.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	90.6	-	90.6	-	0.000	0.000

Treatability Group:

MLLW CH/AL, Cemented Solids, Toxic Organics

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Alpha emitter, < 10 nCi/g
3) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Improved operating practices: materials handling and inventory procedures; waste segregation; or changes in production scheduling.

State: Colorado ID #: 108

Site: ROCKY FLATS PLANT

Waste Stream Name: CEMENTED COMPOSITE CHIPS/LLW MIXED (327)

Matrix: Cemented Solids Waste Type: MLLW

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration

State: Colorado | ID #: 111

Site: ROCKY FLATS PLANT

Waste Stream Name: COMBUSTIBLES/LLW MIXED

Matrix: Inorganic Debris | Waste Type: MLLW

Waste Stream Description and Source:

Combustibles are generated at numerous locations throughout the RFP and are generally composed of such materials as paper, cloth, and plastics. The material is contaminated at low concentrations with depleted uranium or plutonium through contact during manufacturing and related processes. The materials making up this waste are items that have been used to wipe off products being machined, cleaned, or otherwise handled. The waste is packaged in 55-gal. drums with multiple bag liners. In addition, combustibles can be packaged in plywood boxes with PVC liners. This waste is identified by IDCs 325, 330, 336, 851, 852, and 853. Some containers may contain small amounts of glass and metal waste.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	410.4	-	410.4	-	263.1	-

Treatability Group:

MLLW CH/AL, Inorganic Debris, Toxic Organics

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Alpha emitter, < 10 nCi/g
3) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) High alpha activity in contact with organics or water can result in radiolysis, with production of hydrogen gas, methane and other degradation products. The buildup of hydrogen gas and radiation interaction with the waste form can affect storage, design and operation of treatment facilities, and stability of the final waste form.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Technology changes: process changes; equipment, piping, or layout changes; automation;

State: Colorado	ID #: 111
Site: ROCKY FLATS PLANT	
Waste Stream Name: COMBUSTIBLES/LLW MIXED	
Matrix: Inorganic Debris	Waste Type: MLLW

changes in operational settings; and energy, water conservation.

3) Change in operations status; process interruptions; work stoppages; mission changes; and new processes.

General Comments:

Basis of estimate past 3 year generation history.
Generation includes waste expected from Bldg 771 Duct Remediation (assuming full funding).

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F005A	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Colorado ID #: 112

Site: ROCKY FLATS PLANT

Waste Stream Name: ROASTER OXIDE/LLW MIXED (069)

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:

This waste stream contains roaster oxide, which is a powder. Waste stream was previously named "Roaster Oxide/LLW Mixed." RF-IDC No. 069 The waste was generated as a result of roasting depleted uranium chips to an oxide in Building 447 to remove pyrophoric nature of the uranium. Uranium chips are generated primarily through the machining of uranium metal in Buildings 444, 865 & 883. After roasting, the uranium oxide was packaged in a 30-gal. drum and then overpacked in a 55-gal. drum. This waste is identified as IDC 069. No further generation of this waste as a MIXED waste is anticipated due to elimination of solvents in uranium machining operations.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	82.7	-	82.7	-	0.000	0.000

Treatability Group:

MLLW CH/AL, Inorganic Sludges/Particulates, Toxic Organics

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Alpha emitter, < 10 nCi/g
3) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.

State: Colorado ID #: 112

Site: ROCKY FLATS PLANT

Waste Stream Name: ROASTER OXIDE/LLW MIXED (069)

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration

State: Colorado ID #: 115

Site: ROCKY FLATS PLANT

Waste Stream Name: SOLIDIFIED BYPASS SLUDGE/LLW MIXED

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:

This waste stream is in solidified form containing Portland cement and wastewater treatment sludge. IDC NO. 007, 807 Waste is generated as a result of process wastewater treatment in Building 374. Solidified bypass sludge is produced by vacuum filtration of precipitated solids from pretreated aqueous waste slurry. The filter medium is an inert diatomaceous earth medium that accumulates on a rotating drum. Solids are trapped on the surface of the filter medium as the pretreated solution passes through. Entrapped solids on the surface of the filter medium are skimmed off as wet sludge. The precipitated solids are chiefly hydroxide with pH levels of 10-12. The final waste form is obtained by mixing the sludge with approximately 30% Portland cement. The waste is packed in one or two bag liners and a rigid polyethylene liner inside a 55-gal. drum. This waste is also generated as a TRU waste.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	457.8	-	457.8	-	89.0	-

Treatability Group:

MLLW CH/AL, Inorganic Sludges/Particulates, Toxic Organics and Metals w/o Mercury

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Alpha emitter, 10-100 nCi/g
2) Alpha emitter, < 10 nCi/g
3) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.
2) Waste avoidance due to recycling/reuse: solvent, oil, and metals recycling; chemical exchange and reuse; and packaging material reuse.

State: Colorado ID #: 115

Site: ROCKY FLATS PLANT

Waste Stream Name: SOLIDIFIED BYPASS SLUDGE/LLW MIXED

Matrix: Inorganic Sludges/Particulates Waste Type: MLLW

3) Change in operations status; process interruptions; work stoppages; mission changes; and new processes.

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D006B	Conc.	Stabilization
D008B	Conc.	Stabilization
F001	Conc.	Incineration
F002	Conc.	Incineration
F005A	Conc.	Incineration

State: Colorado

ID #: 116

Site: ROCKY FLATS PLANT

Waste Stream Name: AQUEOUS SLUDGE/TRU MIXED

Matrix: Inorganic Sludges/Particulates

Waste Type: MTRU

Waste Stream Description and Source:

This waste stream consists of aqueous sludge from wastewater treatment mixed with 30% Portland cement. IDC NO. 800, 803, 807 The waste is generated as a result of process waste water treatment in Building 374 and 774. Aqueous sludge is produced by vacuum filtration of precipitated solids from pretreated aqueous waste slurry. Entrapped solids are skimmed off the surface of the filter medium of the rotating drum as wet sludge. The precipitated solids are chiefly hydroxides with pH of 10-12. The final waste form is obtained by mixing the wet sludge with approximately 30% Portland cement. RFD has several drums of aqueous sludge that were returned by INEL. These old drums were packaged by alternating the layers of cement and wet sludge or by adding cement to the top and bottom of a drum containing wet sludge. This older waste is described by IDC's 001, 002, and 007.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	143.4	-	143.4	-	2.8	-

Treatability Group:

MTRU CH/AL, Inorganic Sludges/Particulates, Toxic Organics and Metals w/o Mercury

Treatment Status:

Treatment of most mixed transuranic waste to meet LDR treatment standards is not applicable because DOE plans to ship these wastes to the Waste Isolation Pilot Plant (WIPP), pending issuance of a No-Migration Determination of the operational phase. Pretreatment to meet the WIPP Waste Acceptance Criteria may be required.

Technology Status:

Not Applicable.

Radiation Characteristics:

1) Contact-handled
2) Transuranic contaminants

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.

State: Colorado ID #: 116

Site: ROCKY FLATS PLANT

Waste Stream Name: AQUEOUS SLUDGE/TRU MIXED

Matrix: Inorganic Sludges/Particulates Waste Type: MTRU

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D006B	Conc.	Stabilization
D008B	Conc.	Stabilization
F001	Conc.	Incineration
F002	Conc.	Incineration
F005A	Conc.	Incineration

State: Colorado ID #: 2044

Site: ROCKY FLATS PLANT

Waste Stream Name: SOIL AND CLEANUP DEBRIS-LLW MIXED (374)

Matrix: Inorganic Debris Waste Type: MLLW

Waste Stream Description and Source:

This waste stream consists of soil, drill cuttings, blacktop and concrete. The waste stream was previously named "Soil and Cleanup Debris-LLW Mixed." IDC No. 374 This waste is generated from soil/debris removal from areas contaminated with RCRA constituents and radioactivity. The waste in inventory at RFP at this time is believed to be from the 903 Pad area. This waste was generated from soil.removal near the pad or well drilling debris generated from groundwater wells drilled near the pad. It also contains materials generated from construction and demolition sites. The waste is packaged in plywood boxes with a PVC bag liner.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	-	43.6	-	43.6	-	57.5	-

Treatability Group:

MLLW CH/AL, Inorganic Debris, Toxic Organics

Treatment Status:

Plan to treat at a planned facility. Plans are described in the Comprehensive Treatment and Management Plan dated June 9, 1992.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled
2) Alpha emitter, 10-100 nCi/g
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.

State: Colorado ID #: 2044

Site: ROCKY FLATS PLANT

Waste Stream Name: SOIL AND CLEANUP DEBRIS-LLW MIXED (374)

Matrix: Inorganic Debris Waste Type: MLLW

General Comments:

Basis of estimate past 3 year generation history.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Idaho | ID #: ID-EGG-158

Site: IDAHO NATIONAL ENGINEERING LABORATORY

Waste Stream Name: UNCEMENTED ORGANIC SLUDGE (A-LLW)

Matrix: Organic Sludges/Particulates | Waste Type: MLLW

Waste Stream Description and Source:

Miscellaneous organic setups. Waste stream generated from production. This waste stream is no longer generated. This waste contains alpha emitters, 10-100 nCi/g.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
1,009.0	1,016,261.0	0.000	0.000	1,009.0	1,016,261.0	0.000	0.000

Treatability Group:

MLLW CH/AL, Organic Sludges/Particulates, Toxic Organics. The INEL has not completed an adequate evaluation of the described chemical and hazardous matrix to identify a specific treatability group.

Treatment Status:

Plan to treat at a planned facility. While the technology required to treat this waste stream is available, treatment facilities are not available. Planning for the design and construction of the Idaho Waste Processing Facility (IWPF) anticipates treatment to be available.
Waste Characterization Facility (WCF), will be used to characterize waste for treatment or disposal. As necessary, the WCF may pre-treat wastes during this process to facilitate treatment or disposal.

Technology Status:

Technology exists. No modifications are necessary.

Radiation Characteristics:

1) Contact-handled
2) Beta/gamma emitter
3) Alpha emitter, 10-100 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) Unknown.

Waste Minimization Activities:

This waste stream is no longer generated.

State: Idaho ID #: ID-EGG-158

Site: IDAHO NATIONAL ENGINEERING LABORATORY

Waste Stream Name: UNCEMENTED ORGANIC SLUDGE (A-LLW)

Matrix: Organic Sludges/Particulates Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F004	Conc.	Incineration

State: Ohio ID #: 0000001532

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: BIODENITRIFICATION SURGE LAGOON SLUDGE

Matrix: Organic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:

Biodenitrification surge lagoon sludge; 721 Waste Management, Chemical Pits.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	423.0	386,391.0	423.0	386,391.0	0.000	0.000

Treatability Group:

MLLW CH, Organic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

ID #: 0000001532

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: BIODENITRIFICATION SURGE LAGOON SLUDGE

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D018		Not currently prohibited under the LDR Program.
D039		Not currently prohibited under the LDR Program.
F001	Conc.	Incineration
F002	Conc.	Incineration

State: Ohio ID #: 0000001537

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: FILTER MATERIAL - SAND, GRAVEL, FLYASH

Matrix: Inorganic Debris Waste Type: MLLW

Waste Stream Description and Source:

Filter material - sand, gravel, flyash; 721 Waste Management, Chemical Pits.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	239.2	186,537.0	239.2	186,537.0	0.000	0.000

Treatability Group:

MLLW CH, Inorganic Debris, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

All future waste generation is due to environmental restoration activities. ER activities are being conducted according to good operating practices.

State: Ohio
ID #: 0000001537
Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
Waste Stream Name: FILTER MATERIAL - SAND, GRAVEL, FLYASH
Matrix: Inorganic Debris
Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Ohio | ID #: 0000010010

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: SLUDGES, OILY

Matrix: Organic Sludges/Particulates | Waste Type: MLLW

Waste Stream Description and Source:

Sludges, oily; 655 Plant 6, Water Treatment Area.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
36.2	25,911.0	73.4	51,860.0	109.6	77,771.0	0.000	0.000

Treatability Group:

MLLW CH, Organic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

ID #: 0000010010

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: SLUDGES, OILY

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D029		Not currently prohibited under the LDR Program.
D039		Not currently prohibited under the LDR Program.
D040		Not currently prohibited under the LDR Program.
F001	Conc.	Incineration

State: Ohio ID #: 0000020006

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: OIL CONTAMINATED WET SUMP OR FILTER CAKE

Matrix: Organic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:

Oil contaminated wet sump or filter cake from VXB.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	26.4	16,417.0	26.4	16,417.0	0.000	0.000

Treatability Group:

MLLW CH, Organic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

ID #: 0000020006

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: OIL CONTAMINATED WET SUMP OR FILTER CAKE

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F002	Conc.	Incineration

State: Ohio

ID #: 0000030005

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: OILY SLUDGES

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

Waste Stream Description and Source:

Oily sludges; 853 Plant 8, Oxidation System, Oil Decantation.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	16.4	15,563.0	16.4	15,563.0	0.000	0.000

Treatability Group:

MLLW CH, Organic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

ID #: 0000030005

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: OILY SLUDGES

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D001A	Tech.	Fuel Substitution; Organics Recovery; or Incineration
D019		Not currently prohibited under the LDR Program.
F001	Conc.	Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration

State: Ohio

ID #: 0000050101

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: DISCARD PROCESS RESIDUES

Matrix: Organic Sludges/Particulates

Waste Type: MLLW

Waste Stream Description and Source:

Discard process residues; 765 Building 45, Water Treatment.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	145.4	160,076.0	145.4	160,076.0	0.000	0.000

Treatability Group:

MLLW CH, Organic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: DISCARD PROCESS RESIDUES

Matrix: Organic Sludges/Particulates

ID # [illegible]

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D039		Not currently prohibited under the LDR Program.
D040		Not currently prohibited under the LDR Program.
D043		Not currently prohibited under the LDR Program.
F002	Conc.	Incineration

State: Ohio

ID #: 000005015

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: ROASTED CALCIUM-PRECIPITATED SUMP OR

Matrix: Inorganic Sludges/Particulates

Waste Type: MLLW

Waste Stream Description and Source:

Roasted Calcium-precipitated sump or filter cakes; 811 Plant 8, Wet-Chemical System, Primary Calciner.

Current Inventory as of December 31, 1992						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	33.9	21,092.0	33.9	21,092.0	0.000	0.000

Treatability Group:

MLLW CH, Inorganic Sludges/Particulates, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. All waste streams are being evaluated for appropriate treatment under CERCLA.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

1) Not Applicable.

The waste stream is no longer being generated.

State: Ohio

ID #: 0000050154

Site: FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

Waste Stream Name: ROASTED CALCIUM-PRECIPITATED SUMP OR

Matrix: Inorganic Sludges/Particulates

Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: Ohio

ID #: 0000010080

Site: PORTSMOUTH GASEOUS DIFFUSION PLANT

Waste Stream Name: RAGS, GLOVES, WIPES, ABSORBENT MATERIAL,

Matrix: Heterogeneous Debris

Waste Type: MLLW

Waste Stream Description and Source:

This is a site-wide waste stream. Operations at PORTS involve the use of rags, gloves, wipes, absorbent materials, PPE, disposable lab equipment, etc. The materials are used in general cleaning, spill clean-up and various maintenance activities.

Current Inventory as of February 28, 1993						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
-	0.000	-	56,837.8	-	56,837.8	-	86,505.0

Treatability Group:

MLLW CH, Heterogeneous Debris, Toxic Organics and Metals w/ Mercury

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

Many RCRA hazardous solvents are being substituted with nonhazardous products. This generates less rags, wipes, etc. Also, cleaning techniques are being modified to replace vapor degreasers. These new techniques will also generate less RCRA hazardous rag, wipes.

State: Ohio

ID #: 0000010062

Site: PORTSMOUTH GASEOUS DIFFUSION PLANT

Waste Stream Name: PPE AND MISC DEBRIS

Matrix: Organic Debris

Waste Type: MLLW

Waste Stream Description and Source:

Personal Protective Equipment (PPE) and other similar debris that was in contact with soil and water during RCRA Facility Investigation and closure activities.

Current Inventory as of February 28, 1993						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
-	0.000	-	129,111.0	-	129,111.0	-	14,508.0

Treatability Group:

MLLW CH, Organic Debris, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.

General Comments:

CODE BASIS: Medium high confidence level based on process knowledge. No sampling results are available.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: Ohio II

ID #: 0000010062

Site: PORTSMOUTH GASEOUS DIFFUSION PLANT

Waste Stream Name: PPE AND MISC DEBRIS

Matrix: Organic Debris

Waste Type: MLLW

The alternate LDR treatment standard for debris is treatment prior to land disposal using any of the following technologies: extraction (physical, chemical or thermal), destruction (biological, chemical, or thermal), macro/microencapsulation or sealing.

State: Ohio

Site: PORTSMOUTH GASEOUS DIFFUSION PLANT

Waste Stream Name: SOILS

Matrix: Soils

ID #: 0000010063

Waste Type: MLLW

Waste Stream Description and Source:

Environmental Restoration activities generate soil as a result of investigation and clean-up work. Soils contain low levels of TCE, TCA, and other halogenated solvents.

Current Inventory as of February 28, 1993						Projected Generation 1993 through 1997	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
-	0.000	-	4,506,787.0	-	4,506,787.0	-	166,616.0

Treatability Group:

MLLW CH, Soils, Toxic Organics

Treatment Status:

Have not identified a planned facility for this waste stream at this time. Several treatment technologies, including peroxidation and thermal vapor extraction, are being investigated for this waste. Waste may be treated in situ.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled

Waste-Specific Radiation Effects on Treatment:

1) None.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.

General Comments:

CODE BASIS: High level of confidence for determining the EPA code.

State: Ohio ID #: 0000010063

Site: PORTSMOUTH GASEOUS DIFFUSION PLANT

Waste Stream Name: SOILS

Matrix: Soils Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Sampling/Analysis

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration

State: Tennessee ID #: 2458

Site: OAK RIDGE K-25 SITE

Waste Stream Name: K-1232 SPENT CARBON FILTER AGENT, WID 52

Matrix: Organic Sludges/Particulates Waste Type: MLLW

Waste Stream Description and Source:
Wastewater treatment facility.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.100	36.0	42.0	25,248.0	42.1	25,284.0	0.000	0.000

Treatability Group:
MLLW CH/AL, Organic Sludges/Particulates, Toxic Organics

Treatment Status:
Plan to treat on-site at the planned Oak Ridge Reservation Mixed Waste Treatment Facility. Pretreatment is required to process organic solids at the TSCA incinerator following completion of the proposed modifications to the incinerator feed system. The resulting ash will be stabilized at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility.

Technology Status:
Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:
1) Transuranic contaminants

Waste-Specific Radiation Effects on Treatment:
1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:
1) Not Applicable.

Waste no longer generated.

State: Tennessee ID #: 2458

Site: OAK RIDGE K-25 SITE

Waste Stream Name: K-1232 SPENT CARBON FILTER AGENT, WID 52

Matrix: Organic Sludges/Particulates Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration

State: Tennessee

ID #: 0000002562

Site: OAK RIDGE K-25 SITE

Waste Stream Name: Y-12 HAZARDOUS WASTE SOLID/ORM-E

Matrix: Organic Solids

Waste Type: MLLW

Waste Stream Description and Source:

Solids contaminated with spent solvents from operation of the Y-12 plant.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	351.0	527,246.0	351.0	527,246.0	0.000	0.000

Treatability Group:

MLLW CH/AL, Organic Solids, Toxic Organics and Metals w/ Mercury

Treatment Status:

Plan to treat on-site at the planned Oak Ridge Reservation Mixed Waste Treatment Facility. Stabilization at the proposed Mixed Waste Treatment Facility was identified as the treatment for inorganic solids. Thermal treatment may be required for organics before stabilization.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Transuranic contaminants

Waste-Specific Radiation Effects on Treatment:

1) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.

Waste Minimization Activities:

Waste stream not generated on K-25 site. Waste minimization activities are unknown. Waste information is limited as waste streams are historical and characterization is not complete.

State: Tennessee ID #: 0000002562

Site: OAK RIDGE K-25 SITE

Waste Stream Name: Y-12 HAZARDOUS WASTE SOLID/ORM-E

Matrix: Organic Solids Waste Type: MLLW

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D006B	Conc.	Stabilization
D007	Conc.	Chemical Reduction followed by Stabilization
D008B	Conc.	Stabilization
D009C	Conc.	Thermal Recovery of Metals; Acid Leaching; Stabilization; or Incineration
D011	Conc.	Stabilization
F001	Conc.	Incineration
F002	Conc.	Incineration
F006	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization; or Incineration; or High Temperature Metals Recovery
F007	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization

State: Tennessee

ID #: 0000002107

Site: OAK RIDGE Y-12 PLANT

Waste Stream Name: TCLP ORGANIC SOLIDS

Matrix: Organic Solids

Waste Type: MLLW

Waste Stream Description and Source:

Development, Engineering Research, Lithium Operations, Fusion Energy Research, Fabrication, Maintenance, Waste Management, Quality Assurance, Uranium Recovery, Plant Engineering, MK-Ferguson, and Plant Laboratory Analytical Processes.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	25.5	25,482.0	25.5	25,482.0	110.0	111,063.0

Treatability Group:

MLLW CH, Organic Solids, Toxic Organics and Metals w/ Mercury

Treatment Status:

Have not identified a planned facility for this waste stream at this time. Pretreatment would be required to process organic solids at the K-25 Site TSCA Incinerator following completion of the proposed modifications to the incinerator feed system. The resulting ash will be stabilized at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility. Organic solids may be treated at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled
2) Beta/gamma emitter
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) High alpha activity in contact with organics or water can result in radiolysis, with production of hydrogen gas, methane and other degradation products. The buildup of hydrogen gas and radiation interaction with the waste form can affect storage, design and operation of treatment facilities, and stability of the final waste form.
2) Treatments using chemical separation could result in concentration of certain isotopes of uranium and plutonium to form a critical mass; concentration of polonium or plutonium in contact with beryllium could result in production of neutrons.
3) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level

State: Tennessee	ID #: 0000002107
Site: OAK RIDGE Y-12 PLANT	
Waste Stream Name: TCLP ORGANIC SOLIDS	
Matrix: Organic Solids	Waste Type: MLLW

waste to a TRU waste.

4) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.
3) Waste avoidance due to recycling/reuse: solvent, oil, and metals recycling; chemical exchange and reuse; and packaging material reuse.

General Comments:

Process Knowledge is used when available. Sampling and Analysis is used to compliment process knowledge or for off-site shipments.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D018		Not currently prohibited under the LDR Program.
D019		Not currently prohibited under the LDR Program.
D035		Not currently prohibited under the LDR Program.
D037		Not currently prohibited under the LDR Program.
D039		Not currently prohibited under the LDR Program.
D040		Not currently prohibited under the LDR Program.
D043		Not currently prohibited under the LDR Program.
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F039	Conc.	Incineration; or Fuel Substitution (Organics) followed by Stabilization (Metals)
U151	Tech.	Amalgamation

State: Tennessee | ID #: 0000002112

Site: OAK RIDGE Y-12 PLANT

Waste Stream Name: CONTAMINATED SOIL, SEDIMENTS, AND SPOIL

Matrix: Soils | Waste Type: MLLW

Waste Stream Description and Source:
Closure-related activities.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	4,722.0	7,082,400.0	4,722.0	7,082,400.0	0.000	0.000

Treatability Group:
MLLW CH, Soils, Toxic Organics and Metals w/ Mercury

Treatment Status:
Plan to treat on-site at the planned Oak Ridge Reservation Mixed Waste Treatment Facility. Soils contaminated with nonvolatile constituents will be stabilized at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility. Organic contaminants will be removed using low temperature thermal desorption.

Technology Status:
Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:
1) Contact-handled
2) Beta/gamma emitter
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:
1) High alpha activity in contact with organics or water can result in radiolysis, with production of hydrogen gas, methane and other degradation products. The buildup of hydrogen gas and radiation interaction with the waste form can affect storage, design and operation of treatment facilities, and stability of the final waste form.
2) Treatments using chemical separation could result in concentration of certain isotopes of uranium and plutonium to form a critical mass; concentration of polonium or plutonium in contact with beryllium could result in production of neutrons.
3) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.
4) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration

of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Raw material changes: raw material purification; and substitution.
3) Product change: product substitution and conservation; and change in product composition.

General Comments:

Process Knowledge is used when available. Sampling and Analysis is used to compliment process knowledge or for off-site shipments.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
D004	Conc.	Vitrification
D005	Conc.	Chemical Precipitation; or Stabilization
D006A	Tech.	Thermal Recovery of Metals
D006B	Conc.	Stabilization
D007	Conc.	Chemical Reduction followed by Stabilization
D008A	Tech.	Secondary Lead Smelting
D008B	Conc.	Stabilization
D008C	Tech.	Macroencapsulation
D009A	Tech.	Incineration; or Mercury Roast/Retort
D009B	Tech.	Mercury Roast/Retort
D009C	Conc.	Thermal Recovery of Metals; Acid Leaching; Stabilization; or Incineration
D009D	Tech.	Amalgamation
D009E	Tech.	Incineration
D010	Conc.	Stabilization
D011	Conc.	Stabilization

State: Tennessee ID #: 0000002112

Site: OAK RIDGE Y-12 PLANT

Waste Stream Name: CONTAMINATED SOIL, SEDIMENTS, AND SPOIL

Matrix: Soils Waste Type: MLLW

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F004	Conc.	Incineration
F005A	Conc.	Incineration
F007	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F039	Conc.	Incineration; or Fuel Substitution (Organics) followed by Stabilization (Metals)

State: Tennessee ID #: 0000002109

Site: OAK RIDGE Y-12 PLANT

Waste Stream Name: SOLVENT CONTAMINATED SOLIDS AND SLUDGES

Matrix: Multiple Waste Type: MLLW

Waste Stream Description and Source:

Assembly, Development, Lithium Operations, Fusion Energy Research, Fabrication, Maintenance, Waste Management, Quality Assurance, Uranium Recovery, and Plant Laboratory Analytical Processes. This waste stream includes organic sludges/particulates, inorganic sludges/particulates, and soils.

Current Inventory as of December 31, 1991						Projected Generation 1992 through 1996	
Not Subject To LDR Prohibition		Subject To LDR Prohibition		TOTAL			
m^3	kg	m^3	kg	m^3	kg	m^3	kg
0.000	0.000	4,860.0	7,290,581.0	4,860.0	7,290,581.0	3,247.0	4,870,375.0

Treatability Group:

MLLW CH, Multiple, Toxic Organics and Metals w/ Mercury

Treatment Status:

Plan to treat on-site at the planned Oak Ridge Reservation Mixed Waste Treatment Facility. Soils contaminated with nonvolatile constituents will be stabilized at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility. Organic contaminants will be removed using low temperature thermal desorption. Stabilization at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility was identified as the treatment for inorganic solids. Pretreatment is required to process organic solids at the K-25 Site TSCA Incinerator following completion of the proposed modifications to the incinerator feed system. The resulting ash will be stabilized at the proposed Oak Ridge Reservation Mixed Waste Treatment Facility.

Technology Status:

Technology exists. Needs modifications or verification for application to DOE waste streams.

Radiation Characteristics:

1) Contact-handled
2) Beta/gamma emitter
3) Alpha emitter, < 10 nCi/g

Waste-Specific Radiation Effects on Treatment:

1) High alpha activity in contact with organics or water can result in radiolysis, with production of hydrogen gas, methane and other degradation products. The buildup of hydrogen gas and radiation interaction with the waste form can affect storage, design and operation of treatment facilities, and stability of the final waste form.
2) Treatments using chemical separation could result in concentration of certain isotopes of uranium and plutonium to form a critical mass; concentration of polonium or plutonium in contact with beryllium could result in production of neutrons.

State: Tennessee	ID #: 0000002109
Site: OAK RIDGE Y-12 PLANT	
Waste Stream Name: SOLVENT CONTAMINATED SOLIDS AND SLUDGES	
Matrix: Multiple	Waste Type: MLLW

3) Certain isotopes of U, Pu, Am, Cm, Cf, Np and Th are non-accountable if present below specific levels, and require different levels of safeguards, depending on the amount present. Treatments resulting in concentration of the material can result in the "roll up" of large volumes of non-accountable wastes into a smaller volume of accountable waste or change a mixed low-level waste to a TRU waste.
4) Treatment could result in plating, precipitation, or some other form of concentration, which could cause workers to receive a significant radiation exposure. The potential for concentration of beta and gamma emitters will affect the design and operation of a treatment facility.

Waste Minimization Activities:

1) Improved operating practices: changes in material handling and inventory procedures; waste segregation; and changes in production scheduling.
2) Technology changes: process changes; equipment, piping, or layout changes; automation; changes in operational settings; and energy, water conservation.
3) Product change: product substitution and conservation; and change in product composition.
4) Waste avoidance due to recycling/reuse: solvent, oil, and metals recycling; chemical exchange and reuse; and packaging material reuse.
5) Change in operations status; process interruptions; work stoppages; mission changes; and new processes.

General Comments:

Process Knowledge is used when available. Sampling and Analysis is used to compliment process knowledge or for off-site shipments.

EPA CODES

Waste Characterization Basis: Process Knowledge

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F001	Conc.	Incineration
F002	Conc.	Incineration
F003	Conc.	Incineration
F005A	Conc.	Incineration
F006	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization; or Incineration; or High Temperature Metals Recovery
F007	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F008	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization

State: Tennessee

ID #: 0000002109

Site: OAK RIDGE Y-12 PLANT

Waste Stream Name: SOLVENT CONTAMINATED SOLIDS AND SLUDGES

Matrix: Multiple

Waste Type: MLLW

Waste Codes	LDR Basis	Best Demonstrated Available Technologies
F009	Conc.	Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F010	Conc.	Incineration
F011	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F012	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation; and Stabilization
F027	Conc.	Incineration
F039	Conc.	Incineration; or Fuel Substitution (Organics) followed by Stabilization (Metals)
P029	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation
P030	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation
P033	Tech.	Chemical Oxidation; Wet Air Oxidation; OR Incineration
P098	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation
P104	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation followed by Stabilization
P106	Conc.	Chemical Oxidation followed by Alkaline Chlorination followed by Chemical Precipitation
U002	Conc.	Incineration
U080	Conc.	Incineration
U151	Tech.	Amalgamation

APPENDIX B

NEPA Report

1. INTRODUCTION

This report section covers the information required to determine the environmental impact of the demonstration of the VAC*TRAX system on material from a DOE facility. This document supplies the necessary information for the DOE to prepare the NEPA documentation for the project. Since this testing will be performed at a WMX Company site (hereafter referred to as Company), the major DOE activity involving NEPA will be the delivery of the test material to the Company facility. However, Rust has provided additional information to describe the controls being exercised to ensure a safe and efficient demonstration. This information includes a nonconfidential description of the VAC*TRAX equipment and of the demonstration, a discussion regarding the current environmental characteristics and concerns of the site and/or process, a listing of the federal, state, and local permits and licenses required for the full-scale demonstration test, and a list of contact people used for assessment of ES&H aspects of the demonstration test.

2. STATEMENT OF PURPOSE

The VAC*TRAX process is designed to remove volatile components from solid matrices by thermal desorption, volatilizing the components, removing them from the dryer by means of vacuum and nitrogen carrier gas, and condensing the volatile components in a gas handling system for separate disposal. The system is designed to be mobile, with low mobilization, demobilization, decontamination, and operating costs. The system is furthermore designed with superior emissions controls, making the system ideal for the treatment of radioactive materials.

The primary markets for the VAC*TRAX system are (1) mixed waste solids containing volatile components as the hazardous (RCRA or TSCA) constituent and (2) hazardous wastes that, due to a small waste volume (< 5000 cu. yards), are best handled by a small system with low start-up and shut-down costs. These markets encompass a large volume of waste, from a significant portion of the mixed waste inventory, to environmental restoration of areas with radioactive and volatile RCRA and/or TSCA regulated materials, to countless areas containing small volumes of hazardous material that cannot presently be handled economically. Known wastes from the mixed waste inventory easily indicate 30,000 yd^3 of applicable material. Environmental restoration projects are estimated to be much larger, perhaps an order of magnitued higher than those applicable streams on the mixed waste inventory. In any event, VAC*TRAX provides a economical solution to a problem that presently has no answer.

3. DESCRIPTION OF THE VAC*TRAX SYSTEM

The VAC*TRAX™ system is a two-trailer mobile treatment system designed for ease of mobilization, operation, decontamination, and demobilization. The only site requirements for this system are a power supply, a propane source, a nitrogen source,

and any housekeeping pads and/or facilities required by the site for containment and ES&H concerns. The two main components of the VAC*TRAX system are (1) the VAC*TRAX dryer system and (2) the gas handling system. An artists rendering of the full-scale VAC*TRAX system is shown in Figure 1.

3.1 Vacuum Dryer System

The VAC*TRAX vacuum dryer is designed to be the largest batch dryer that is readily transportable over commercial highways. Being a jacketed vacuum dryer, it was deemed unpractical to break the dryer into two trailers, which would require extensive construction upon arrival on-site.

The dryer trailer, which includes the dryer and hot oil unit, is 13½ feet high, 10 feet wide, and 60 feet long. The dryer capacity is approximately 10 yd^3, with a heat transfer area of approximately 2,000 ft^2. Heat is provided to the dryer by passing a synthetic heat transfer oil through jackets in the dryer and agitator, allowing a maximum solids temperature of approximately 600°F. The internal surfaces of the dryer, as well as the agitator, are made of stainless steel for ease of decontamination.

3.1.1 Loading Operations

Material to be treated is first loaded into a custom-made loading hopper, as shown in Figure A. This hopper is loaded using a front-end loader or forklift with rotating forks, and then the lid is placed securely on top, for contamination and spill control. Next, the hopper is hoisted and moved to the loading port of the VAC*TRAX dryer, using a monorail crane assembly, shown in Figure B. A proximity switch indicates when the hopper is successfully in place over the loading port. The volume of this hopper is slightly greater than 90ft3, which is a standard size for waste containers (CPC's B-25 steel box).

When the hopper is in place, the vacuum valve over the loading port is electronically opened. This valve cannot be opened unless a feed hopper is sensed at the loading position. Then, the valve at the bottom of the hopper is opened, allowing the material to dump into the dryer. The hopper capacity is approximately 5 tons of soil, allowing the dryer to be loaded in three charges. Throughout this loading step, the gas system is operated at low vacuum (0.5" Hg.) to provide controlled ventilation and eliminate fugitive emissions and worker exposure.

After the dryer has been charged, the valve at the loading port is resealed, allowing the system to pull 26+" Hg vacuum on the dryer.

A maximum particle size of 6" has been selected for nonfriable particles placed in the VAC*TRAX dryer. This size has been selected to prevent jamming of the agitator within the dryer, as well as to prevent the plugging of the discharge port. Other than this restriction, solids of all types may be placed within the dryer.

While loading the material, the VAC*TRAX agitator will be operated to help distribute the solids throughout the dryer. The agitator will additionally provide approximately 1/2 of the dryer's soil/steel contact heat exchange area for later heating operations. After the dryer is loaded, full vacuum is pulled on the system, and the dryer is purged with nitrogen to inert the system.

3.1.2 Heating Operations

Material is treated in the VAC*TRAX dryer at a temperature appropriate to the matrix; soil can be treated at the maximum temperature, but PPE, plastic, and similar debris will be treated at lower temperatures to prevent the material from melting and adhering to the internal surfaces of the dryer. Full vacuum will be run in all cases at the end of the heating cycle; there is no technological or economic benefit to running at less than full vacuum. Additionally, as with the pilot system, an intermediate temperature may be initially used when treating material with a significant moisture content; this will prevent overloading of the condensers. Volatilized water and contaminants are swept up with the nitrogen carrier gas, passing through a particle filtration system that is integral with the dryer prior to travelling to the condensing train. This filtration system, has a particle size rating of 5 microns, absolute. Based on data for filters of this type, the filter should rate as a high efficiency particulate air (HEPA) filter (ie > 99.7% removal at 0.3 micron).

After the material in the dryer has been sufficiently treated, the material is sprayed with water by means of spray nozzles located in the dryer, while the flow of the hot oil is blocked from the dryer. Spraying water on the material serves two purposes. First, the material is cooled rapidly, transferring the thermal energy from the heated soil to the heating and boiling of the water, which is then removed and handled by the gas treatment system. Second, after the material has been cooled to 200°F, slight water addition will be used to dedust the treated matrix, adding moisture to aid in contamination control. Depending on the material treated, water addition could vary from a few gallons to several hundred gallons. The gas treatment system is designed to handle the heaviest of loads expected during this operation.

3.1.3 Unloading Operations

After dedusting, the material is dumped out of the dryer by means of a motorized vacuum valve located at the bottom of the dryer. Like the loading valve, this valve is designed to allow the dryer to operate under a 26" Hg. vacuum with only minimal in-leakage.

The solids are dropped into an 5 appropriately sized container which is fastened and sealed to the bottom of the dryer. A proximity switch is located on the dryer to sense the presence of the product container. The valve will not open unless the switch indicates the presence of the unloading container. Additionally, a level switch is provided to indicate when the container is full and, consequently, causing the discharge valve to close. As a backup, a lighted camera is mounted in the collection vessel, allowing an operator to observe the loading of the container. The operator can then manually close the product valve when the product container is filled.

After a product container is loaded, it is removed from under the dryer and then moved by forklift to an appropriate location. An empty product container is then placed under the product port, and unloading is continued. The dryer agitator is kept running during unloading operations, sweeping the material into the container positioned beneath the dryer. If B-25 boxes are used, three boxes are required for

complete unloading of the dryer. After a given container is filled the dumping door will be resealed, the container moved out and replaced by an empty one, and the system reloaded for the next batch. Typically, feed preparation and material handling will be performed during the heating and treatment cycle, minimizing the time required to load and unload the system. This will allow a quick turn around between batches, significantly increasing the effective treatment rate (tons or m^3/day) of the system. When switching to a different waste stream, the system may be accessed for complete decontamination, by opening several small doors on the dryer side wall to allow personnel to access and clean the inside of the dryer. Upon completion of cleaning, the VAC*TRAX dryer will be less than 0.3% full, qualifying as a RCRA empty container.

3.2 The Gas Treatment System

After the gas stream passes the filtration system in the dryer, it is essentially particulate free, and contains nitrogen, water vapor, and volatile contaminants removed from the treated material. It is the function of the gas treatment system to condense and recover the water vapor and bulk of the contaminants, as well as to prevent uncontrolled emissions to the atmosphere. The gas system also provides the vacuum for the dryer, facilitating treatment as well as controlling fugitive emissions.

3.2.1 Condensing Train

The first stage of the VAC*TRAX gas treatment system is a shell and tube heat exchanger, cooled by a fin-fan cooler. This condenser is designed to reject the bulk of the heat in the gas stream, condensing the majority of the water (>80%) as well as cooling the gas stream to approximately 100-150°F. Tap water is the cooling side fluid. Based on the nature of the system, the ability of the primary condenser to reject heat will vary with local weather conditions, notably surrounding air temperature.

The second stage of the VAC*TRAX gas treatment system is a refrigerated shell and tube heat exchanger. For this heat exchanger, a 50/50 propylene glycol/water solution is used as the cooling side fluid, with the fluid cooled by means of a refrigeration unit. The gas stream is cooled to 50-100°F in this stage, with a fraction of the water vapor and volatile contaminants being condensed.

The third stage of the VAC*TRAX gas treatment system is also a refrigerated shell and tube heat exchanger. Like the second condenser, the cooling fluid is chilled to 32°F by means of a refrigeration unit. It should be noted that this stage of condensation is located after the vacuum pump; the gas stream passing through this heat exchanger is therefore at atmospheric pressure. The gas exiting this condenser has been cooled to less than 45°F and is primarily nitrogen, with a trace of organic compounds.

The condensers all contain small tanks at the bottom portion. This area of each

condenser contains multiple level switches, indicating when a particular condenser needs to be drained. For condensers 1 and 2, the condensate transfer tank is first evacuated, and then the valves to drain the tanks for condensers 1 and 2 are opened automatically, allowing the fluid to drain into the 100 gallon condensate transfer tank. Then, the valves to the condenser's tanks are closed and the tanks are allowed to return to atmospheric pressure. For condenser 3, the condenser valve is simply opened, draining the liquid into the condensate transfer tank, since both units are at atmospheric pressure. Electronic programming in the PLC prevents opening more than one of the condenser valves at the same time, since that would establish undesirable flow patterns for the gas stream. Also, through this valve sequence, working losses from the condensate transfer tank are eliminated.

After exiting the third condenser, the majority of the gas stream is reheated, by passing it through a hot oil heat exchanger, and then recirculated to the dryer. A small fraction of the carrier gas is vented, to allow make-up nitrogen to be introduced into the system to prevent oxygen buildup. The vented gas stream passes through a series of filtration and monitoring steps before being released to the atmosphere. These steps include pre- and post-filtration, carbon adsorption, and monitoring.

3.2.2 Filtration/Adsorption

Prefiltration consists of passing the vented gas stream through a coalescing filter, designed to remove submicron oil, water, and dirt. This prefiltration is designed to take the load off the HEPA filters, thus extending HEPA filter life.

Final-filtration consists of passing the process vent stream through a DOP tested HEPA filter with a bag-out housing, allowing for ease of filter replacement for the system. When used in combination with the prefilter and the dryer filter elements, the VAC*TRAX system provides absolute containment of radioparticulates. Radioactivity emissions should be negligible.

After the particle filtration systems, the gas stream next passes through an activated carbon bed. The activated carbon is designed to remove any trace organic constituents that were not removed by the condensation train. Based on previous testing using the pilot VAC*TRAX system, as well as pilot and full-scale X*TRAX testing, organic removals using this setup are excellent, achieving BACT standards prior to atmospheric emission. By placing the granular activated carbon (GAC) after the HEPA filtration systems, the GAC is unlikely to become radioactive in normal service.

3.2.3 Monitoring

The process vent is monitored using a continuous emission monitoring system (CEMS) prior to atmospheric discharge. The CEMS consists of:

- Total flow rate (lb/hr)
- Total Hydrocarbon Content (lb/hr)

- Oxygen Content (%)
- Total radioactivity, alpha and beta, gamma (curies/hr)

While the process controls will ensure that these will all be within predicted and acceptable levels, monitoring will verify this. Audio and visual alarms annunciate off specific operation. If not corrected, the system initiates an automatic shutdown.

3.2.4 Condensate Management

Throughout the treatment cycle, the condensate transfer tank, T-1, will have to be drained to either the centrifuge or to the condensate storage tank, T-2.

In the centrifuge, organic and aqueous phases will be separated, with the organic phase sent for disposal and the aqueous phase sent to the condensate storage tank, T-2. It is anticipated that the centrifuge will allow for more efficient separation of organics from the aqueous phase.

If a centrifuge is being used, the condensate storage tank will be used to store aqueous condensate briefly before pumping it out for disposal or for use in dedusting operations. If the centrifuge is bypassed, however, the condensate storage tank will be used to separate the organic and aqueous phases. Here, time will be used to achieve a separation between the aqueous and organic phases. Then, the aqueous phase will be disposed of or used for dedusting (or both), while the organic phase will be sent to an appropriately permitted incinerator or fuel recycler for disposal.

3.2.5 Control Room

The VAC*TRAX control room is the focal point for observing and controlling the operations of the VAC*TRAX process. From the control room, temperatures and pressures of each unit operation can be monitored, valves can be opened or closed, and the heat supplied to the VAC*TRAX dryer can be controlled. A PLC, located at the control room, provides the programming for the routine operations of the system. The control room is removable, being connected to the rest of the system by 100 feet of plug-in power and control cables. This allows for the trailer to be placed outside of an RCA or CSCA, providing operation from the support zone.

4. PROJECT DESCRIPTION

Through this demonstration, the effectiveness of the full-scale VAC*TRAX system on DOE waste will be proven. Testing will consist of running three or more batches (30 or more cubic yards) of DOE mixed wastes through the VAC*TRAX system. Analyses for the constituents of concern will be performed on the feed material, as well as the treated product. Through comparison of these values, the removal efficiency of the system can be determined for the given waste stream. The required performance goal is to (1) treat 60% of the hazardous organic constituents in the feed to below the land disposal restrictions (LDR) and (2) to achieve a 90% removal efficiency on 80% of the

remaining organic constituents. Analysis will also be performed on the condensed waster and oil phases to (1) assess the recovery of the constituents of concern and (2) determine radioactivity levels in the liquids.

In addition to treatment goals, the ability of the system to meet operational performance goals will be evaluated. Batch time will be determined for the waste, based on the time required for loading, treating, and dumping the waste material. Health and safety issues will be evaluated, demonstrating that the full-scale system meets or exceeds the safety standard set by the pilot system. Material handling, mobilization and demobilization times, and decontamination will also be evaluated as part of this demonstration.

5. ENVIRONMENTAL CONCERNS

Environmental characteristics of the site waste, as well as environmental impacts from the demonstration have been considered in both the equipment design and the waste selection processes. As such, the environmental impact from the demonstration will be minimal. The areas of concern that are covered in this report include:

i. Air Quality
ii. Water Resources
iii. Land Use
iv. Waste Management
v. Ecological Impacts
vi. Socioeconomic Impacts
vii. Archeological, Cultural, and Historical Resources
viii. Noise
ix. Occupational Safety and Health
x. Cumulative Impacts
xi. Summary of Environmental Impacts

Each of these aspects will be covered in turn. It should be noted that, since the testing will be performed at a Company facility, the NEPA reporting requirements will not be as extensive as if the testing were performed at a DOE facility. Environmental impact concerns for testing, however, are still provided for general information. The primary activity provided by the selected DOE site as far as NEPA is concerned is the shipment of the feed material to the Company facility, as well as the final disposition of the treated solids and the associated residuals.

i. Air Quality

There are three point source emissions points from the VAC*TRAX LTTD system. These points are listed in Table 1.

Table 1.Point Sources from the VAC*TRAX Process

	DESCRIPTION	CONTENTS
1	Hot Oil Heater Furnace Stack	Propane Combustion Products
2	Process Vent	Nitrogen with trace VOCs
3	Tank Head Space	Nitrogen with trace VOCs

1. Hot Oil Heater Furnace Stack

The hot oil heater is powered by the combustion of propane, a clean burning fuel whose combustion products are essentially free from air pollutants. The hot oil heater provides a maximum heat input of 6 million Btu/hr to the heat transfer fluid, whcih then is pumped through the jackets in the VAC*TRAX dryer to indirectly heat the waste material. Based on calculations presented in Appendix A, the hot oil heater would have a maximum fuel firing rate of 280 lb. propane/hr and a maximum theoretical air requirement of 920 cfm-air. Other emissions data for the hot oil heater are also presented in Appendix A.

2. Process Vent

The process gases exiting the VAC*TRAX condensing train are passed through HEPA filtration and activated carbon beds prior to release to the atmosphere. As such, there should be no radioactivity emissions from the process vent and hydrocarbon emissions are expected to be low. Based on calculations presented in Appendix B, total hydrocarbon emissions to the atmosphere will always be less than the 3 lb/hr limit specified by RCRA, and will be much lower than this, perhaps 1/5 to 1/10 this level, for the majority of a test run; since this is a batch system, the bulk of volatile hydrocarbons will be driven off at the same time, towards the beginning of the heating cycle. Sulfur oxides, nitrogen oxides, and carbon monoxide are typically associated with combustion. Since the nitrogen purge to the system, as well as the strong vacuum prevents combustion, these contaminants should not be present in this stream. Ozone will likewise not be produced by this system. Lead, if present in the feed, would be removed by filters in the system, preventing release to the atmosphere.

3. Tank Head Space

Based on the small capacity of tanks considered for this system (a 1400 gallon and 100 gallon tank), a separate air permit for these items should not be required. Massachusetts regulations, for example, do not require a separate permit for a tank capacity of less than 40,000 gallons. Regardless, emissions from these tanks should be negligible; the tanks will be closed during operations and vented regularly, with the vent gas passing through the VAC*TRAX gas handling system to control emissions. Additionally, monitoring will be performed as required to ensure that hydrocarbon

emissions, if any, are at acceptable levels.

In addition to emissions from the LTTD system, emissions must be considered for the loading and unloading of the VAC*TRAX dryer. Air monitoring will be performed during the loading and unloading operations, so that exposure cooncerns may be noted and addressed. Based on the contamination levels of the feed, additional precautions may be required.

ii. Water Resources

The VAC*TRAX system is a closed, stand-alone system, except for the need for power, natural gas, and nitrogen from the site or from other systems. The system typically sets on a housekeeping pad or, in any event, not immediately adjacent to surface waters. Additionally, the condensing train skid has secondary containment as part of the trailer. This means that, should a leak in the system occur, the leak would be contained, not reaching either surface or groundwaters.

The condensate collected from the condensing train skid will be separated into its organic and aqueous fractions. The organic, or oil fraction will be sent to an approved incinerator for disposal. The aqueous fraction, after minimal treatment (such as carbon filtration) will be sprayed back onto the treated material for dedusting purposes. In the case of feed materials with high moisture content, not all of the water will be readded to the feed; the remaining portion will be handled at an appropriately permitted disposal facility.

Other possible leak points include the controlled cooling water and chilled water systems. These systems utilize a propylene glycol and water solution as the heat transfer fluid. Water used in the controlled cooling water and chilled water systems is recirculated in closed loop systems; after initial charge of the systems, no further water addition is required.

Thus, there will be no environmental impact to surface or ground water from these operations. Since there will be no water discharge to surface or ground water from this process, National Pollutant Discharge Elimination System permits (NPDES permits are not required.

iii. Land Use

Based on preliminary assessments, an area approximately 100 foot by 100 foot would prove sufficient for the set-up and operation of the VAC*TRAX system, including material handling, operation, and residuals management. The area, entirely on Company property, will be enclosed in a temporary building or sprung structure, both adding to the aesthetics of the operation and providing minimal protection from the elements. The structure will be approximately twenty-five feet tall, to accomodate

the loading and unloading of the dryer. The demonstration area will also be accessible by truck, allowing the VAC*TRAX system to be driven onto the test location.

iv. Waste Management

The feed material for this testing is mixed waste, a solid matrix with both a radioactive constituent and a volatile hazardous (RCRA or TSCA) component. A number of waste streams will be generated from activities involving the treatment of this material. These streams are presented in Table 2.

Table 2.Waste Generated from VAC*TRAX Testing on Mixed Waste Solids

WASTE STREAM	DESCRIPTION	VOLUME/MASS	DISPOSITION
Treated Product	Solids containing radioactive constituents but with little or no organic contamination	10 m^3/batch	Envirocare or appropriate radioactive materials landfill
Condensed Water	Liquid containing organic constituents, but with little or no radioactivity	0-10,000 L/batch (depends on matrix and initial moisture content in material)	Sprayed back on solids for dedusting after filtration through carbon; extra is either sent to a RCRA incinerator if non-rad, DSSI if rad.
Condensed Oil	Oil containing high levels of organic contamination, with little or no radioactivity	0-1,000 L/batch (depends on matrix and initial concentration levels in material)	Sent to an approved incinerator if non-rad; sent to DSSI if rad.
PPE/Debris from Operations	PPE worn during treatment operations, spent oil filters, rags to wipe down the system, etc.	Approximately 1 drum (55 gallons) per batch	Sent to an approved incinerator if non-rad; disposition if rad will depend on regulatory status (RCRA/TSCA) of PPE/debris. If non-hazardous, it will be sent to Barnwell or appropriate rad. landfill. If hazardous, it will first be treated by VAC*TRAX
Spent Carbon	Spent carbon from the granular ativated carbon (GAC) drums	Approximately ½ drum per batch	Sent to an approved incinerator if non-rad; treated by VAC*TRAX if rad.
Decontamination Solution	Water/kerosene solution used to decontaminate equipment after operations	10-20 gallons/decontamination	Sent to DSSI, expected to be rad.
Decontamination Debris	Rags, brushes, etc. used to decontaminate equipment after testing	10 gallons of debris/decontamination	Sent to approved incinerator if non-rad; treated by VAC*TRAX if rad.

v. Ecological Impacts

The project will be performed at a Company facility, contained within a sprung structure or similar construction. Existing facilities will be used if possible to minimize cost and to meet an aggressive schedule. As an alternative, the temporary structure will be erected on-site in a presently cleared area. Additionally, air and water quality would not be impacted, as described in the appropriate sections of the report. Thus, this demonstration would not represent an impact to vegatation, terrestrial wildlife, aquatic wildlife, threatened and/or endangered species, critical habitats, floodplains,

or wetlands.

vi. Socioeconomic Impacts

The set-up, operation, and testing of the VAC*TRAX process for the PRDA demonstration will require several people: two system operators, a driver for a front-end loader, and a ES&H manager per shift. Additional people will be required for site set-up, moving the feed material to the VAC*TRAX system, sampling and analysis of the feed and products, disposition of the treated material and residuals, and disassembly and decontamination of the system. Site support will additionally be required for coordination efforts between the DOE facility providing the waste stream and Rust.

vii. Archaeological, Cultural, and Historical Resources

The demonstration will be performed at a Company owned facility. Additionally, the demonstration will either be performed in an existing building, or in a temporary structure erected in free space. As such, no buildings or areas of archaeological, cultural, or historical significance will be affected by the performance of this demonstration.

viii. Noise

Noise levels can be a major factor in many operations, requiring special hearing protection and possibly restricting the operation of the system to daylight hours. The full-scale VAC*TRAX system is not expected to have these problems.

Based on the pilot VAC*TRAX system, the process does not create a noise hazard, requiring no hearing protection even next to the unit. Outside the tent, the noise levels for the full-scale system should be less than 65 decibels, well within acceptable levels. Additionally, residential establishments are several hundred feet from the demonstration; no noise would even be detectible from our nearest neighbors. For these reasons, there would be no noise impact as a result of this demonstration.

ix. Occupational Safety and Health

Worker health and safety is paramount to a successful project. Engineering controls, where possible, are used to minimize employee risk. Where engineering and administrative controls are not feasible, PPE will be utilized in an appropriate and effective manner to prevent exposures. ALARA will be practiced throughout the project. Additionally, all applicable OSHA requirements will be followed for this demonstration.

x. Cumulative Impacts

Due to the strong and effective use of engineering and administrative controls, PPE, and training, no single item was found to have a significant impact on the environment, or on health and safety. Taken together, or cumulatively, the impact is still minimal. Where a concern has been expressed, through several hundred hours of pilot-scale testing, as well as through the full-scale design process, actions have been taken to reduce risk, eliminate or minimize exposure, and maximize employee well-being.

xi. Summary of Environmental Impacts

As seen from the report, the environmental impacts from the demonstration will be minimal, including cumulative impacts.

6. Permit and License Requirements

A number of licenses and permits are required at the local, state, and federal levels for this demonstration. These are presented in Table 3.

Table 3.License and Permit Requirements for the VAC*TRAX PRDA Demonstration

Item	Requirement	Level
Treatment of RCRA waste	RCRA Part B permit	National
Treatment of radioactive material	Radioactive Materials License	State
Air Emissions from combustion of natural gas	Air Permit	State/Local
Treatment of PCB contaminated materials	TSCA Permit	National

7. Agencies/Contact Persons for ES&H Aspects

Information used to assess the environmental impact of this demonstration was gathered from (1) over three hundred hours of pilot VAC*TRAX testing at the Clemson Technical Center, (2) testing of the pilot VAC*TRAX system at DOE- Rocky Flats, and (3) the performance of the full-scale X*TRAX system, both as part of an EPA SITE demonstration and during regular operation. A copy of the site demonstration is included in Appendix B for reference. Additionally, the ES&H

program at CTC is also included in the appendices. This program worked well for the operation of the pilot system, with no OSHA reportable incidents during its two years of operation there. Contact people for these sources is presented below.

Daniel Hogan
ES&H Manager
Clemson Technical Center
100 Technology Drive
Anderson, SC 29625
(803)646-2413

Ed Blush
Radiological Engineer
EG&G Rocky Flats
Golden, CO 80402-0464

Dick Lingk
Industrial Hygiene Officer
EG&G Rocky Flats
Golden, CO 80402-0464

EG&G personnel for the VAC*TRAX project should be contacted through the principle investigator for the project, Peter Montez at (303) 966-7681.

Paul DePercin
EPA Project Manager
U.S. EPA Risk Reduction Engineering Laboratory
26 West Martin Luther King Drive
Cincinnati, OH 45268
(513)569-7797