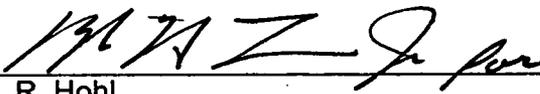


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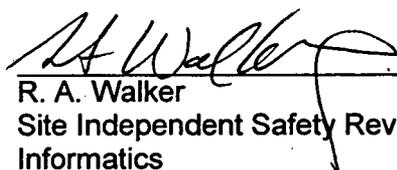
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1.0 Introduction

The information provided herein documents the preliminary hazard categorization for the Aqueous Waste Treatment System (AWTS) Project based on the estimated nuclear Material at Risk (MAR). This preliminary hazard classification is derived in accordance with DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* (Reference 1).

The AWTS Project, collectively, is preliminarily classified as **radiological** based on the amount of plutonium in the liquid low level/low level mixed (LL/LLM) waste to be collected, transported onsite, staged, treated onsite (if required), and/or conveyed offsite for treatment and disposal. The AWTS Project as described below is distributed across the Site, and as such, is segmented as allowed by *General Ground Rules*, (Attachment 1 to Reference 1 above). Based on estimated influent waste streams including nuclear Material at Risk (MAR), the amount of plutonium (Pu) in any given AWTS Project element or segment will be less than the Hazard Category 3 threshold value of 8.4 E+00 Pu grams listed in DOE-STD-1027-92. Additionally, based on chemical constituents in the waste and processing chemicals that may be used to treat AWTS Project waste streams onsite, non-nuclear documentation will be provided with the future AWTS Project Facility Safety Analysis (FSA) as part of the Site Safety Analysis Report (SSAR), Volume II. The AWTS FSA will be developed in accordance with DOE-EM-STD-5502-94 (Reference 2).

The AWTS Project Statements of Work (SOWs) document safe onsite radiological waste collection, transportation, and staging operations; offsite shipment and treatment (Reference 3[a]) and compliant onsite treatment facility design and operations (Reference 3[b], if required). AWTS designs and operations will be in accordance with *Facility Safety*, DOE Order 420.1 (Reference 4) and *Radioactive Waste Management*, DOE Order 435.1 (Reference 5) requirements. Administrative controls such as Waste Acceptance Criteria (WAC), inventory controls, influent/in-process/effluent sampling and analysis, and monthly actinide mass balance surveillance will ensure continued operation of the AWTS Project elements, collectively, as a **radiological** facility.

2.0 Background

The Rocky Flats Closure Project will safely cleanup and close the Rocky Flats Environmental Technology Site (RFETS or Site). To support timely Site Closure, an aqueous water treatment system is needed to replace the existing, deteriorating Building 374 Liquid Waste Treatment Facility (LWTF). Currently, the Building 374 LWTF treats LL/LLM waste collected from the Site's nuclear processing buildings. Water to be treated is transferred from process buildings through the Process Waste Transfer System (PWTS), an underground piping and vault system, to Building 374. Water is also collected at a number of other buildings which is then transported by truck to Building 374. K-H strategic planning includes replacement of the Building 374 LWTF with the Aqueous Waste Treatment System (AWTS) as described in Sections 3 and 4.

3.0 AWTS Project Strategy

The current Site Wastewater Treatment Strategy involves excluding Building 374 LWTF from receiving Site LL/LLM wastewater as early as October 1, 2001. Thereafter, that liquid LL/LLM waste is planned to be transported via the Process Waste Transfer System (PWTS) to the 231 Tanks for interim storage until the AWTS Project becomes fully operational.

Building 374 treatment processes will continue to operate and treat the Building 374 inventory until it is eliminated. It is anticipated that the B374 process equipment will be operational for several months after the influent (liquid LL/LLM waste) is shut off. Once the B374 inventory is eliminated the process equipment will be taken out of service and D&D activities will commence.

LL/LLM waste, including secondary waste and sanitary wastes generated by the AWTS Project, will be managed in accordance with Site requirements and State and Federal regulations. The AWTS Project strategy for the management of Site liquid LL/LLM wastewater focuses on two paths for procurement as described below.

3.1 Primary AWTS Project Strategy

The primary strategy consists of solicitation of vendor proposals for the collection, onsite transportation, staging for shipment, and offsite shipment via conveyances such as tanker trucks or railcar tankers to a K-H approved offsite facility for treatment and disposal (Reference 3 [a]). The scope and discrete elements involved with the AWTS Project's primary offsite treatment and disposal strategy is described in Section 4.1 below.

3.2 Secondary AWTS Project Strategy

Should the primary strategy prove to be impractical or not cost-effective, the secondary approach to AWTS management of the liquid LL/LLM wastewater involves the onsite treatment of the wastewater via subcontractor-owned and operated treatment units (Reference 3 [b]). The scope and discrete elements involved with the AWTS Project's secondary strategy for the onsite treatment of the Site's LL/LLM wastewater is described in Section 4.2 below.

4.0 AWTS Project Scope

A synopsis of the AWTS Project's offsite and onsite waste management strategies, work scope, equipment/facilities, and operational descriptions are provided below.

4.1 Offsite Transport For Treatment and Disposal

All liquid LL/LLM waste will be collected, transferred to a transportation conveyance staging location onsite, and transported offsite to a K-H-approved treatment facility for treatment and disposal.

Major elements/operations comprising the offsite treatment option include:

- Standardized Transfer Stations and associated piping, vents, etc. are planned to be installed at Buildings 559, 707 (731), 774, 776 (valve vault 9), 777, 891, and the 231 A and B Tanks (see Figure 1). This equipment will be used to pump and collect liquid wastewater from the buildings via tanker trucks for staging onsite. Note: Building 891 has a transfer station with a design that will not interface with AWTS tanker trucks from nuclear facilities and, therefore, co-mingling with south-side wastes cannot occur. A mechanism to transfer the Building 891 ion exchange brine (secondary waste) to the AWTS treatment facility will also be installed.
- Transfer the liquid wastewater to an onsite staging location for a vendor-selected conveyance such as larger capacity tanker trucks of 4,000 to 5,000 gallons or a railcar tanker of approximately 25,000 gallon capacity. Shipping the staged wastewater offsite via that conveyance for treatment and disposal.

The AWTS Project Readiness Demonstration for the offsite option is planned for December 2001 and project startup is planned for January 2002. AWTS Project cessation of operations is planned for the end of Fiscal Year (FY) 2005.

4.2 Onsite Treatment

Site liquid LL/LLM waste will be initially transferred to the 231 A and B Tanks for interim storage until the AWTS treatment facility is operational. Thereafter, wastewater will be collected and transferred to the new AWTS treatment facility for treatment.

Major elements/operations comprising the onsite treatment option (Reference 3(b)) include:

- Standardized Transfer Stations and associated piping, vents, etc. as discussed in Section 4.1 above.
- Onsite transportation of Site wastewater from building points of generation to the AWTS treatment facility as discussed in Section 4.1 above.
- The 231 A and B Tanks will be used for interim LL/LLM wastewater storage capacity until an onsite AWTS treatment facility becomes operational.
- An AWTS onsite treatment facility would be a subcontractor operated, skid-mounted, modular treatment system(s). The AWTS treatment facility/components would be installed in the vicinity of Building 891. This treatment system and equipment will be designed for ease of decontamination and decommissioning (D&D) and removal after Site Closure.

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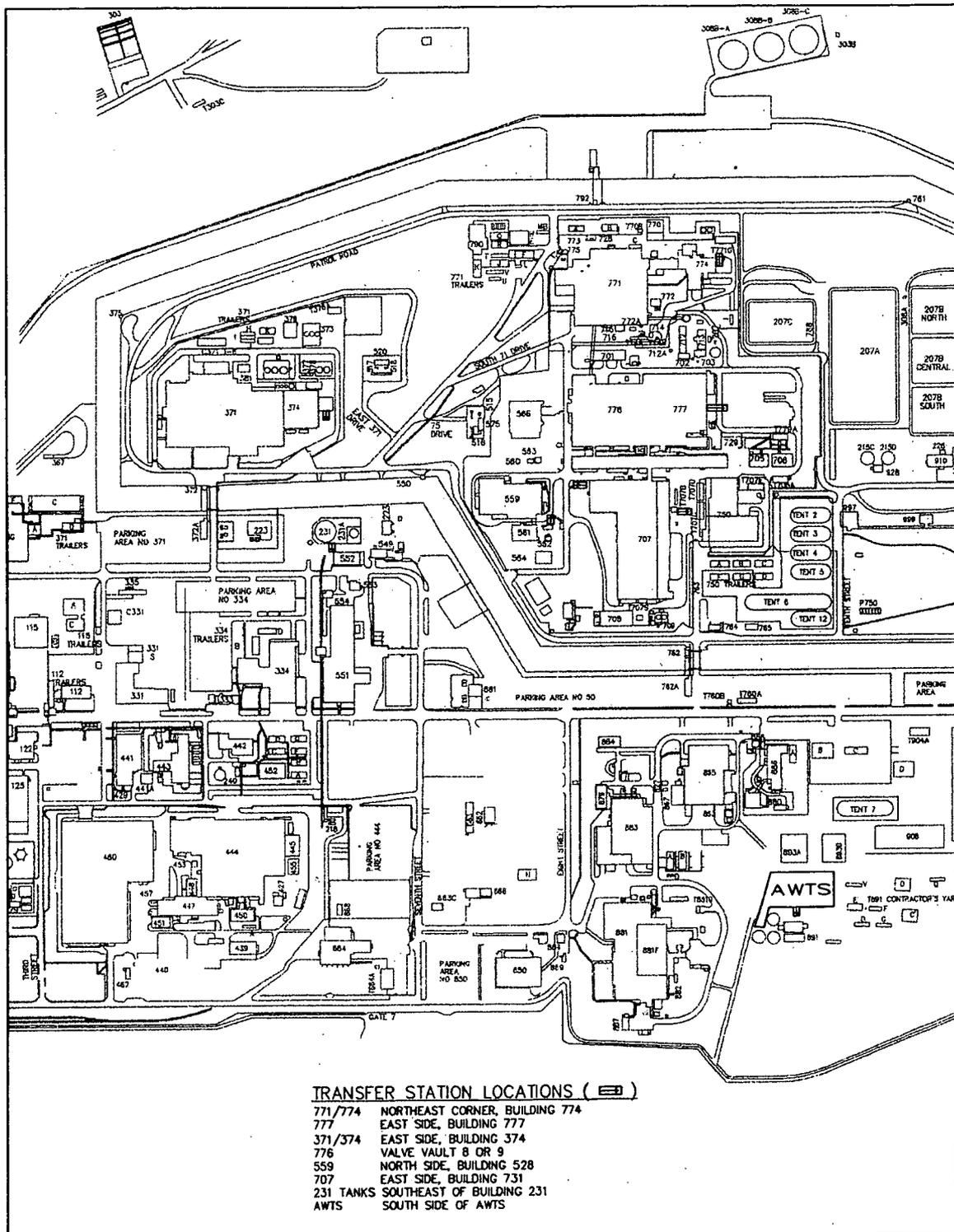


Figure 1 Planned AWTS Project Locations at RFETS

Preliminary Hazard Categorization for the Aqueous Waste Treatment System

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AWTS onsite treatment technologies may include:

- Chemical conditioning, chemical precipitation followed by filtration, evaporation or reverse osmosis and/or ion exchange to remove metals and radionuclides;
- Carbon adsorption and/or air stripping will be used to remove organic constituents;
- Sludges and solids generated will be collected and dewatered using vacuum filters, filter press, or other standard dewatering equipment.
- Secondary waste will be packaged and transferred to Material Stewardship for waste management and final disposition.

Note: Treatment system equipment and components as well as flow rates used will be dependent upon subcontractor selection. The treated LL/LLM sludge and any secondary wastes will be staged and transported to a Site-approved offsite disposal facility.

After treatment of Site LL/LLM wastewater in the AWTS treatment facilities to Rocky Flats Cleanup Agreement (RFCA) Surface Water Action Levels, the treated effluent will be discharged to the environment via the existing Building 891 outfall at the South Interceptor Ditch.

5.0 Preliminary Hazard Categorization of the AWTS Project

The AWTS Project (Reference 3 [b]) includes an average onsite operational treatment throughput of 500,000 gallons per year (assumes a one-shift operation) with a potential treatment expansion capability of approximately 1,500,000 gallons per year, if necessary. For conservative MAR planning, the MAR for the AWTS Project, on a year-to-year treatment basis, is assumed using the Table 1 MAR estimate for FY 2003 of 2,100,700 gallons of influent.

Per Table 1 AWTS Project MAR estimates for onsite treatment, the maximum plutonium (Pu) MAR possible in any AWTS Project element or segment year (for either the offsite or onsite strategy), is 4.7 grams Pu, which is far less than the DOE-STD-1027-92, Attachment 1, Category 3 Pu threshold of 8.4 grams.

Currently, the AWTS project is planning to solicit the Reference 3(a) SOW (after required approvals are obtained) and award a firm fixed price contract for treatment of 200,000 gallons per year with a fixed unit rate per gallon above that throughput rate, if needed, for fiscal years 2002 and 2003. A decision will be made by the project in the coming years whether to implement Reference 3(b) or extend Reference 3(a) for fiscal years beyond 2003. The decision will be based on the cost benefit of constructing a treatment facility compared with continued shipment of the aqueous waste, as influenced by the D&D aqueous waste generation projections. These D&D projections will continue to be refined as characterization data improves.

The AWTS Project is preliminarily classified as **radiological** based on the amount of plutonium to be collected, transferred, staged, or treated. The AWTS Project, as described in Sections 3 and 4, is distributed across the Site, and as such, is segmented as allowed by Reference 1, Attachment 1, General Ground Rules. The lack of physical interaction between the independent AWTS Project segments precludes bringing materials together or causing harmful interaction from common severe phenomenon. The amount Pu of in any given AWTS Project element or segment (see Table 1 below) is less than the Hazard Category 3 threshold value of 8.4 E+00 Pu gram listed in DOE-STD-1027-92. AWTS Project Pu MAR estimates are delineated by Building Utility and High D&D waste streams in Table 1, below.

The AWTS Project elements or segments including Site liquid waste collection and transfer, 231 A and B Tank use for interim storage, transport conveyance staging, and an onsite treatment facility are, therefore, categorized as **radiological** facilities. The overall facility categorization of the AWTS Project is, therefore, **radiological**. *Non-nuclear low hazard* facility documentation will be included with the Project's hazard baseline documentation in accordance with DOE-EM-STD-5502-94, *Hazard Baseline Documentation* (Reference 2). The radiological inventory bounds the AWTS Project's waste stream chemical constituent and process chemical inventory.

Table 1 MAR Estimates By Fiscal Year

Waste Stream	FY 02 (gr/Pu)	FY 03 (gr Pu)	FY 04 (gr Pu)	FY 05 (gr Pu)	Volume Basis
Utility & B891 Brine	1.3	0.9	0.7	0.2	Building Estimates (1)
D&D	1.0	3.9	1.6	-	Sq Ft Estimates (2)
Total Grams Pu/Yr	2.2	4.7	2.2	0.2	Numbers rounded.
Total Gallons To Be Treated (3)	645,600	2,100,700	886,232	25,500	Highest Reasonable Volume Estimates
Note (1)	See Building 374 Logbooks (4-year weighted average)				
Note (2)	Estimate based on Building 779 D & D average Pu concentration X 10				
Note (3)	Volumes and MAR are for the onsite treatment option. Existing interim storage/treatment capacity is currently insufficient, however, additional shifts can be added if required to allow entire waste volume treatment.				

5.1 MAR Assumptions

Major AWTS Project Assumptions used to estimate the above MAR include:

- Metals Data is based on current samples from the T231 B Tank.
- D&D High aqueous waste volumes are based on reasonably conservative square footage estimates:
 - > 50% of floor square footage requires Hydrolasing for Nuclear Facilities

MAR Assumptions, continued

- 10% of walls requires Hydrolasing excluding Buildings 776/777.
- 100% of walls require Hydrolasing for Buildings 776/777.
- Ceiling square footage is 2X floor square footage.
- 2 gallons/square foot for floor and walls; 1 gallons/square foot for ceiling.
- Process waste stream influent for the AWTS onsite treatment facility assumes 5% solids and 10 ppm of organics. Note: These solids and organic constituents have not historically been seen at Building 374. However, due to the uncertainty of future D&D aqueous waste content, the AWTS Project team has included them into the AWTS treatment facility design requirements. The radiological inventory bounds the waste stream chemical constituent and process chemical inventory.
 - Influent does not include Modular Storage Tank waste water or sludges.
 - Influent does not currently include waste waters associated with the storage of Solar Pond Sludge on the 750 Pad.

5.2 Project Controls To Protect the Radiological Categorization

AWTS Project operations will apply inventory sampling and actinide mass balance controls such that the project's safety basis to operate as a **radiological** facility is protected. Additionally, sampling of the onsite treatment process will include in-process sampling to determine efficiencies and sampling of the treated water to validate the process and insure discharges are within acceptable stream standards. Field measurements/scans of the AWTS treatment facility will be conducted annually to assess material holdup and verify continued **radiological** facility operation. If at any time it is discovered that the **radiological** MAR threshold is exceeded (e.g., Category 3) by any element of the AWTS Project, the Project will have 30 days to assess and correct system problems and reduce the system MAR to acceptable **radiological** limits.

Criticality Safety Engineering will review AWTS Project transport conveyance, treatment facility, and tank/equipment design criteria and vendor preliminary and final designs as applicable. Criticality Safety Engineering will prepare Criticality Safety Evaluations (CSEs) for the AWTS Project elements or segments based on the project design phase, transport conveyance (tanker truck, railcar tanker), as necessary.

The AWTS Project FSA will describe Project participation in Site SMPs (Reference 6) and expand SMP descriptions pertinent to the FSA's hazard analysis and safety basis. If at any time it is determined that the 15 gram Criticality Safety limit for any AWTS Project segment has been exceeded, K-H will invoke a Criticality Safety Program.

The AWTS Project FSA that will encompass all Site AWTS Project equipment, facilities, transfers for staging, transportation, and operations, is planned to be completed in December 2001.

6.0 References

1. Department of Energy (DOE) Standard, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, DOE-STD-1027-92, DOE Standard, U.S. Department of Energy, Washington, D.C., December 1992.
2. *Hazard Baseline Documentation*, DOE-EM-STD-5502-94, DOE Limited Standard, U.S. Department of Energy, Washington, D.C., August 1994.
3. (a) *Statement of Work for Offsite Aqueous Waste Treatment System*, Revision 0, Kaiser-Hill Company, L.L.C., Golden, Colorado, August 2001, and
(b) *Statement of Work for Onsite Aqueous Waste Treatment System*, Revised Draft, Kaiser-Hill Company, L.L.C., Golden, Colorado, August 2001.
4. *Facility Safety*, DOE Order 420.1, Change 3, U.S. Department of Energy, Washington, D.C., November 22, 2000.
5. *Radioactive Waste Management*, DOE Order 435.1, U.S. Department of Energy, Washington, D.C., July 9, 1999.
6. *Site Safety Analysis Report*, Volume I, Revision 2, and Volume II, Revision 2, Kaiser-Hill Company, L.L.C., Golden, Colorado, November 2000 and June 1999, respectively.

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