Standardized Waste Profile Sheet

☒ **NTS Only** ☐ **Hanford Only** ☐ **Both NTS and Hanford**

A. Generator Information

1. Company name: CH2M Hill B&W West Valley, LLC
2. Address: 10282 Rock Springs Road, West Valley, NY 14171
3. Generator facility: West Valley Demonstration Project

4. Primary Technical Contact: Linda Michalczak email: Linda.Michalczak@wves.org Phone: 716-942-4907 Fax: 716-942-2444

5. DOE Contact: Daniel Sullivan email: Daniel.Sullivan@wv.doe.gov Phone: 716-942-4016 Fax: 716-942-4703

6. Waste Certification Official: Linda Lund email: Linda.Lund@wves.org Phone: 716-942-2266 Fax: 716-942-2398

7. Generator's EPA Identification Number (If profile involves hazardous waste):

8. If the waste is being processed/treated/shipped from a location other than the Generator Facility provide the following: (NTS ONLY)

   Company name:

   Address:

   Primary Technical Contact: email: Phone: Fax:

   Processing/Treatment Facility's EPA Identification Number (If profile involves hazardous waste):

B. General Waste Stream Information

1. Waste stream name: Vitrification Process Components

   ☒ New Profile
   ☐ Revised Profile

2.a. (NTS Only) NTS Waste stream identification number: WVDP000000007

Profile Revision Number: 00 Profile Revision Date: 8/29/11

2.b. (Hanford Only) Hanford Profile Sheet Tracking Number:____________________

Profile Revision Number: Profile Revision Date:

2.c. Profile revisions: (NTS ONLY) *Describe and list **all** changes made to the profile.*

3. Waste generating process description:

   This low-level waste (LLW) was generated from the Decontamination & Decommissioning (D&D) of the Vitrification facility. The waste materials have been incidentally contaminated with slurry from Vitrification operations. The Vitrification facility was shut down in September 2002 after being used to vitrify high-level waste (HLW) and process system residuals for six years. Processing of the HLW occurred from June 1996 through November 2001, followed by a program to flush the remaining HLW through to the melter. This waste stream consists of large process components (i.e. vessels). The internals of each of the vessels and the package are filled with grout for stability.

3.a. For revisions only, has any part of the generating, packaging, characterization, and certification process changed? Yes ☐ No ☐
If yes, list all process changes in detail and provide applicable information that supports the changes to any processes.

4. Waste management services requested:
☒ Disposal
☐ Storage (Available only at Hanford)
☐ Treatment (Available only at Hanford); describe:
☐ Other; describe:

5. Waste Category (Check all that apply)
☒ Low Level
☐ "Classified Waste"
☐ Mixed Low-Level
☐ Transuranic Waste
☐ Hanford Category 1 LLW
☐ Hanford Category 3 LLW
☐ Exceeds Hanford Category 3 LLW
☐ Regulated Asbestiform Low-Level Waste
☐ "Classified Waste" requiring protection from visual observation
☐ 11(e)2 By-product Material
☐ PCB Waste requiring disposal in a permitted hazardous waste landfill
☐ Hydrocarbon-burdened LLW (NNSA/NSO generated waste only)
☐ Contains accountable nuclear material

6. Estimated volume: 175 (m^3/yr) Total remaining volume (for revised profiles only): 175 (m^3)

7. Estimated frequency of shipments per fiscal year: 2

8. Total Number of Waste Containers (for NTS Mixed Waste Profiles only),

C. Physical/Chemical Characterization

1. Physical/Chemical process knowledge. Describe the process knowledge information used for physical/chemical characterization of this waste stream:

☐ Material Safety Data Sheets. Attach MSDSs used to designate this waste stream (Hanford Site users can list Hanford MSDS numbers below in lieu of providing MSDSs).

☐ Mass balance from process inputs. Describe how process inputs are controlled and recorded:

☐ Historical process and analytical data. Describe:

☐ Inert debris characterized by inventory control. Check this box when the waste stream consists largely of inert debris items that are characterized by inventory control procedures and recorded on inventory sheets. Briefly list or describe inventory procedures:

☒ Other. Describe: See attached RCRA Technical Basis Document

☐ Physical/chemical characterization varies. Check this box when the characterization strategy varies from container to container. Describe below the strategy used to meet the acceptable knowledge requirements of the waste acceptance criteria.

2. Physical/chemical analysis. Describe the sampling and analysis performed to characterize this waste stream:

☒ No analysis performed.
☐ Field screening performed. Describe the frequency and type of field screening performed:
☐ Laboratory analysis performed. Describe the sample source and sampling frequency and methods: For Hanford, list the analytical methods used, including upper confidence limits and explanations of anomalies for all analytes analyzed. Attach representative analytical sample result summary.
For NTS, attach completed Table B-1 and data validation summary.

3. Regulatory status. Check all boxes below that describe the regulatory status of the waste stream:

- ☐ Federally regulated (RCRA) hazardous waste (40 CFR 261). List all RCRA U, P, F, K or D waste codes that apply to the waste stream; place waste codes that do not apply to all containers in parentheses:
- ☐ TSCA regulated PCB (40 CFR 761). Describe category of PCB (PCB waste, PCB bulk product waste, PCB remediation waste, PCB analytical waste, etc). Describe PCB source and concentration:
- ☐ Waste generated from cleanup activities conducted under CERCLA. If checked, list applicable regulatory documents and agreements (Records of Decisions, Remedial Actions/Feasibility Studies, Removal Action Plans, etc.).
- ☐ Waste is hazardous per state-of-generation regulations? If yes, identify hazardous components and state regulations.
- ☐ For Hanford only, Washington State dangerous waste (WaAdminCode173-303), excluding W001. List all Washington waste codes that apply; place waste codes that do not apply to all containers in parentheses:
- ☐ For Hanford only, Washington State dangerous PCB waste (Waste code W001 of WaAdminCode173-303): Describe PCB source and concentration:
- ☐ For NTS only, is any part of the generating site under investigation or findings pending by any regulating authority, (i.e., Federal, State, or Local) which affects waste characterization data. If checked, explain in detail.
- ☒ Waste is not regulated under any of the above regulations.

4. Federal land disposal restrictions. Check all boxes that apply:

- ☒ Waste stream is not subject to federal land disposal restrictions
- ☐ Waste stream requires treatment to meet land disposal restrictions of 40 CFR Part 268. If checked, provide the following information:
  ☐ Wastewater ☐ Non-wastewater ☐ Hazardous debris
  ☐ Waste contains Underlying Hazardous Constituents (applicable UHCs must be included in Item C.9)
  Was the waste treated after August 24, 1998? Yes ☐ No ☐
- ☐ Waste stream meets some of the applicable land disposal restrictions of 40 CFR 268. Check this box if the waste has been treated to meet some federal land disposal restrictions or if it meets some federal land disposal restrictions as generated. If checked, describe the treatment performed and analytical data to support LDR determination:
- ☐ Waste stream meets all applicable land disposal restrictions of 40 CFR 268. Check this box if the waste has been treated to meet all federal land disposal restrictions or if it meets the land disposal restrictions as generated. If checked, describe the treatment performed and analytical data to support LDR determination:

5. Waste characteristics. Check any of the boxes for regulated characteristics that apply to the waste stream:

☐ Flash point < 38°C ☐ Flash point 38°C – < 60°C ☐ Flash point 60°C – 93.3°C
☐ Ignitable solid ☐ Oxidizer
☐ pH 2 or less ☐ pH 12.5 or greater
☐ Liquid that corrodes steel at a rate greater than or equal to 0.25 inches/year
☐ Reactive cyanide ☐ Reactive sulfide ☐ Water Reactive
☐ Explosive, unstable or pyrophoric ☐ Generates toxic gases, vapors or fumes

6. Physical state:

☐ Liquid ☐ Sludge ☒ Debris ☒ Solid
☐ Powder/Dust ☐ Sealed Source ☐ Encapsulated ☐ Solidified
☐ Other; describe:

7. Liquid form. If the waste stream contains liquid, check all that apply:
☐ Containerized liquid ☐ Absorbed Liquid ☐ Stabilized liquid

7a. For NTS only, If this waste stream contains a high moisture content waste or if it contains absorbed or stabilized liquid, has this portion of the waste stream been evaluated to determine its potential to release liquid during handling, storage, and transportation? Describe the evaluation performed to support this determination.

8. Other contents: Check any of the following that are components of the waste stream, and provide a description of how the waste acceptance criteria for each are met:

☐ Animal carcasses ☐ Infectious waste ☐ Vegetation ☐ Free liquids

☐ Chelating agents ☐ Organic liquids ☐ Asbestiform (Friable) ☐ Particulates

☐ Gases ☐ PCBs ☐ Explosives ☐ Pyrophorics

☐ Beryllium Dust ☐ Gloveboxes ☐ HEPA or Pre-Filters ☐ Other

9. Waste composition. Describe the gross composition/component of the waste stream and all hazardous constituents that contribute to any waste codes or LDR treatment standards.
☐ Check this box if the chemical composition varies greatly from container to container, and provide bounding values or ranges here. Further evaluation will occur on the specific package paperwork as it is provided for highly variable streams

CAS Number	Chemical constituent	Waste Component	Estimated weight percent ☒ Estimated volume percent ☐
		Non- Hazardous metal debris	10
		Grout	90

D. Radiological Characterization

1. Radiological process knowledge. Describe the source(s) of the radioactive material in this waste stream (i.e., the radiological processes that introduced the radioactive material into the waste stream).

The source of the radioactive material is from residues of slurry from the Vitrification process.

2. Radiological characterization methods. Describe the analysis and characterization methods used to determine the radionuclide inventory of the waste stream. Check all that apply.

☐ Radionuclide material accountability. Describe the accounting methods used to help establish the radionuclide inventory:
☒ Radiochemical analysis. Describe type and frequency of sampling and analysis: *For NTS, attach data validation summary* - Multiple slurry samples were obtained for full isotopic information.
☐ Nondestructive assay. Describe type and frequency of assay performed:
☒ Field measurement instruments. Describe the type of instruments and how they are used to help establish the radionuclide inventory: Ion chamber; provide dose rate for Dose-to Curie calculation.
☒ Scaling factors. Explain how the scaling factors were derived and how they are used: Derived from analytical samples; used in RADMAN software.
☒ Computer models. Describe the computer model used and how it is used to establish the radionuclide inventory: QAD geometry model; used to develop Dose to Curie Factor. RADMAN program; used to perform container dose-to-curie calculation.
☐ Other. Describe method:

If two or more methods are checked above, describe how the methods are used together to establish the radiological inventory of the waste stream. For complex or highly variable waste streams, explain the strategy used to meet the acceptable knowledge requirements of the waste acceptance criteria.

The analytical data was used to develop the scaling factors that would be used in conjunction with Dose-To-Curie factors developed from QAD-GCCP-A geometry model of each vessel. To quantify the total activity of the vessels, the calculated QAD geometry model Dose to Curie Factor (DCF) for each vessel was used in conjunction with the associated radiological distribution and average shielded probe dose rate for each vessel. For the final radiological characterization, the DCF and the average dose rate are entered into the RADMAN computer program for each vessel.

3. Estimated Radiation Dose of disposal package (mSv/hr):

Surface: 0.001 to 1.95 30 cm: 0.001 to 0.95 1 Meter: 0.001 to 0.8

4. For NTS Only

☒Yes ☐No Does the waste contain enriched uranium (^{235}U wt% $\geq$ 0.90), ^{233}U, ^{239}Pu, ^{241}Pu, ^{242m}Am, ^{243}Cm, ^{245}Cm, ^{247}Cm, ^{249}Cf, ^{251}Cf? If yes, answer the following and check the most restrictive limit listed in D.4.2 through D.4.7 that applies to this waste stream for compliance with the criticality safety criteria of the NTSWAC. If no, skip to Section D.5.

4.1 ☒ Attach completed NTSWAC, Appendix E, Table E.3, ^{235}U FGE and ^{235}U Effective Enrichment, for each enrichment level or range.

4.2 ☒ Waste package contains 15 g of ^{235}U FGE or less.
Specify controlling document: WM-230, Determining Radioactivity in a Waste Package

4.3 ☐ Fissile material does not exceed 350 g of ^{235}U FGE per package nor does it exceed 2 g of ^{235}U FGE per kilogram of waste (mass of the package is not included in the mass of the waste) (graphite and beryllium must not exceed 1% of the mass of the waste).
Specify controlling document:

4.4 ☐ Waste complies with the limits and conditions as specified in NTSWAC, Appendix E, Table E.4.
Specify controlling document:

4.5 ☐ Graphite and beryllium exceeds 1% of the mass of the waste.

4.6 ☐ Waste complies with the limits and conditions as specified in NTSWAC, Appendix E, Tables E.5 and E.6. Specify controlling document:

4.7 ☐ A waste specific nuclear criticality safety evaluation (NCSE) was performed to show compliance with the NTSWAC, Section 3.2.1. Attach NCSE for review and specify controlling document:

5. Reportable radionuclides. List the radionuclides that could be reportable in the waste stream:
☐ If the nuclides vary greatly from container to container, check this box and provide bounding values or ranges here. Further evaluation will occur on the specific package paperwork as it is provided for highly variable streams. *Note: For the NTS, concentrations must be entered in Becquerel/cubic meter.*

Isotope	Concentration Bq/m3 (Ci/m3); Range and Activity Representative of Final Waste Form	Isotope	Concentration Bq/m3 (Ci/m3); Range and Activity Representative of Final Waste Form
See attached			

6. Does the waste contain any alpha-emitting transuranic radionuclides with a half-life greater than 20 years? If yes, list below.

Transuranic Nuclide	Concentration (nCi/g); Range and Activity Representative of Final Waste Form	Transuranic Nuclide	Concentration (nCi/g); Range and Activity Representative of Final Waste Form
See attached			

7. For NTS only, Are there any packages in this waste stream that exceed the Plutonium Equivalent Gram (PE-g) limits specified in NTSWAC, Section 3.2.2? Yes ☐ No ☒
   Provide supporting PE-g calculations. **See Table A-1**

8. For Hanford only, Total FGE as defined in Hanford Site Solid Waste Acceptance Criteria, HNF-EP-0063.

E. Packaging

1. Packaging used. Check the applicable boxes.
   ☐ Drum; describe size(s), type, and weight range:

   ☒ Metal box; describe size range, type, and weight range:

CFMT Box	230"L x 156"W x 168"H	Strong tight, IP's, Type A	334,000 lbs.
MFHT Box	191"L x 156"W x 168"H	Strong tight, IP's, Type A	285,000 lbs.

   ☐ Wood box; describe size range, type, and weight range:

   Do the Metal or Wood boxes meet the 3,375 lb/ft^2 strength test? Yes ☐ No ☒

   ☐ High integrity container; describe size range, type, and weight range:
   ☐ Cargo transport container; describe size range, type, and weight range:
   ☐ Roll-off container; describe size range, type, and weight range:
   Have returnable roll-off boxes been packaged in accordance with NTSWAC Appendix F? Yes ☐ No ☐

   ☐ Other container; describe size(s), type, and weight range:
   ☐ Bulk waste – bulk package and shipment dimensions and weight ranges – describe (supersack, burrito wraps, equipment, etc.):
   ☐ Vented; describe type of venting:
   ☒ Shielded; describe type of shielding: Steel
   ☐ Sorbents (required information for NTS Mixed Waste Profiles); describe type and amount used:
   ☐ Radiologically stabilized in concrete or other stabilization agent; describe type and amount of material used and provide data to demonstrate waste meets stabilization criteria:

2. Maximum container size: 5.8m x 4.0m x 4.3m

3. Maximum container gross weight: 151,500 Kg

4. Describe any liners/protective coatings used to ensure that the container is compatible with the waste: N/A

5. Does each container meet each of the package criteria as defined in the Nevada Test Site Waste Acceptance Criteria or Hanford Site Solid Waste Acceptance Criteria, HNF-EP-0063?
   ☒ Yes ☐ No
   If no, explain why criteria are not met:

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6. Are any of the containers checked above required to be returned to the generator facility? Yes ☐ No ☒
   If yes, specify.

7. Do any packages listed above require special handling (remote handled, Type B Package, odd package configurations, etc.) Reference any special handling procedures and ALARA documentation, if applicable.

   Containers are large and weigh 334,000 lbs and 285,000 lbs. Certified rigging to be provided for lift.

F. Additional Information

1. Comments:

2. Exception or Deviation Request to waste acceptance criteria: Complete if needed
   a) Identify specific requirement for which an exception or deviation is desired:
   b) Provide reason an exception or deviation is needed:
   c) Describe any proposed alternative methods to meet the general intent of the requirement:

3. Attachments. List any attachments provided with this profile: 1) RCRA Technical Basis Document
   2) Radiological Technical Basis Document
   3) Table D. 5. Reportable Nuclides
   4) Table D. 6. Transuranic Nuclides
   5) Table A-1: PE-g Calculation
   6) Table E.3: U235 FGE Calculation
   7) Container drawings
   8) Heavy-haul trailer specifications

G. Generator Signatures

To the best of my knowledge, the information provided on this form and the attached documentation is a full, true and accurate description of the waste stream. Willful and deliberate omissions have not been made. All known and suspected hazardous materials have been disclosed.

Technical Contact Name: Linda Michalczak

Signature: [signature] Date: 9/7/11

Waste Certification Official Name: Linda Lund

Signature: Linda M. Lund Date: 9/8/11

Technical Justification for RCRA Characterization of the Concentrator Feed Make-up Tank (CFMT) and Melter Feed Hold Tank (MFHT) Revision 1

1.0 Purpose

This document is intended to demonstrate, through process knowledge, that the Concentrator Feed Make-up Tank (CFMT) and the Melter Feed Hold Tank (MFHT) do not contain Resource Conservation and Recovery Act (RCRA) constituents in sufficient quantity to render the units as hazardous (mixed) waste.

2.0 Background

The vitrification process at the West Valley Demonstration Project (WVDP) was constructed to treat high level waste (HLW) liquid (slurry) into solid glass logs that were contained within stainless steel canisters. A total of 275 canisters were produced. The CFMT received sludge from tank 8D-2, where it was concentrated, by evaporation, to remove excess water. Glass former chemicals were mixed into the sludge in accordance with the recipe to facilitate glass formation. Once the mixture in the CFMT was sampled and determined to conform to the recipe, it was transferred to the MFHT where it was held until transfer to the melter for final glass processing.

The CFMT is a large cylindrical vessel, approximately three meters in diameter by four meters in height. It is constructed of Hastelloy C-22 to resist corrosion. The volume of the CFMT is approximately 23,000 liters. The MFHT is also a large cylindrical vessel made of 304L stainless steel. The MFHT is approximately 3 meters in diameter by 3 meters in height. The volume is approximately 19,000 liters.

WVDP-107, West Valley Demonstration Project Waste Analysis Plan (Reference I), characterized the waste in 8D-2 as mixed high level waste due to the presence of RCRA metals. The Plan identified the Purex Sludge as containing barium (D005), cadmium (D006), chrome (D007), mercury (D009), and selenium (D010) at or above regulatory levels. The Thorex waste stream was stated to contain barium, cadmium, chromium, selenium, and silver (D011), as well as exhibit the characteristic of corrosivity (D002). The thorex liquid waste stream was neutralized and the corrosivity characteristic was removed prior to processing.

3.0 Equipment Flushing and Rinsing

The vitrification of the HLW slurry was completed in the fourth quarter of fiscal year 2002. The CFMT and MFHT, along with other process equipment were flushed and jetted during the last two slurry transfers to remove as much residual contamination as possible.

The CFMT was flushed three times to remove residual solids from the internal surface of the tank. The tank was flushed with high pressure demineralized water at approximately 1000 psig. The flush water was then jetted to the waste tank 8D-2. The inside of the tank was inspected, before and after each water flush with a Rees video camera. The video clearly indicated that the interior walls of the tank were effectively cleaned of residual solids. The jet draw line is one or more inches from the bottom of the tank. Therefore, approximately 150 gallons of residual solids and flush water remained after the flushing. Radiation probe readings before and after flushing were taken to determine the change in radiation levels. The CFMT realized only a 15% reduction. However, background radiation from the other vitrification equipment is likely to have had a significant effect on the readings.

The MFHT was flushed three times with demineralized water at 1000 psig. The flush water was jetted back to the CFMT which was then jetted back to 8D-2. The inside of the MFHT was also inspected with

the video camera prior to and after the flushing operation. The video demonstrated that the flushing operation was effective in removing residual solids from the internal surface of the tank and the support structure. The jet draw line on the MFHT is also approximately two to three inches from the bottom resulting in a heel of approximately 150 gallons. The radiation probe readings on the MFHT registered a 94% reduction after the flushings. The flushing operation, including photographs of the before and after flush, is documented in WD:2002:0452 (Reference II). Samples of the CFMT were taken on 7/30/02 and submitted to Analytical and Process Chemistry (A&PC) laboratory for metals analysis. The analysis reported cadmium at 13.1 ug/g and chrome at 228 ug/g. Arsenic, silver, mercury, lead, and selenium were reported as a "less than", but the values are above the toxicity characteristic levels. The analytical report is included in WD:2003:0223 (Reference III).

In June of 2003, liquid waste from the A&PC lab was discharged through intermediate tanks, vessels, and piping to the CFMT. The waste was generated from dissolving stainless steel coupons for analysis. A sample of the contents of the CFMT was obtained in July 2003 and analyzed for metals. Chromium was detected at 304 ug/ml but the other TC metals (except barium) were reported as "less than" values that were above the regulatory limits. The analytical data is reported in VAST Sample ID Number 03-1155. In preparation to returning the liquid in the CFMT to 8D-4, a stainless steel tank, the pH of the liquid was adjusted with 55 gallons of 50% sodium hydroxide to retard corrosion. The volume of sodium hydroxide added was calculated to ensure that the liquid would have a pH of less than 12.5. The alkaline liquid, along with an additional 200 gallons of water flush was jetted to 8D-4 for storage.

As stated above, flushing of the CFMT and MFHT left a heel of water and sludge in each of the tanks. Each was estimated to have approximately 150 gallons remaining. The liquid and residual heel in both the CFMT and MFHT were pumped with a diaphragm pump to remove as much of the heel as possible. Video cameras were used to determine the progress of the pumping. CF:2004:0031 (Reference IV) reported that the heels were removed to the extent practical by pumping. The report further stated that a conservative estimate of the amount of residual waste is less than five gallons in each of the CFMT and MFHT.

Prior to removal from the vitrification cell, additional equipment was placed inside the CFMT and MFHT. Items include: feed pump, sample pump, bubbler jet, steam jet, and agitator shafts. The items are not hazardous waste and therefore will not affect the RCRA determination of this waste stream.

Prior to packaging the CFMT and MFHT for disposal, both units will be filled with grout to provide package stability. The addition of the grout will ensure that there is no free liquid in the waste packages.

4.0 RCRA Determination

For a waste to be hazardous under RCRA or New York State regulations, it must be specifically listed as a hazardous waste or exhibit a hazardous characteristic. The characteristics are ignitability, corrosivity, reactivity, and toxicity. The regulations authorize a generator to determine if a waste is hazardous by either testing the waste according to methods set forth in CFR 261 Subpart C and 6NYCRR 371.3; or applying knowledge of the hazard characteristic of the waste in light of the materials or processes used; or applying a combination of analytical data and waste knowledge. The characterization of the CFMT and MFHT was based upon process knowledge of the waste that was processed through the equipment and the flushing that the equipment received after the processing was completed.

4.1 Listed Waste

Waste is potentially subject to RCRA regulations as a hazardous waste if it is a waste listed in 40 CFR 261.31-261.33 (6 NYCRR 371.4). Listed wastes fall into one of five categories: hazardous waste from non-specific sources (F-codes); hazardous waste from specific sources (K-codes); acute hazardous wastes (P-codes); toxic wastes (U-codes); and in New

York State, PCB wastes (B-codes). New York State regulates all solid wastes containing 50 ppm or greater PCBs as listed hazardous waste.

The CFMT and the MFHT are vessels that contained characteristic waste. Neither the Purex nor the Thorex waste streams were listed waste. Therefore, the CFMT and the MFHT are not listed waste since they were not mixed with or derived from a listed waste.

Based on knowledge of the waste and the generation process it has been determined that the CFMT and MFHT do not meet the definition of any of the five categories of listed waste.

4.2 Characteristic Waste

Ignitability

To be a RCRA waste in this category a material must possess any of the following properties:

- It is a liquid other than an aqueous solution containing less than 24% alcohol and a flashpoint less than 140°F (60°C).
- It is not a liquid and is capable of causing fire through friction, absorption of moisture, or spontaneous chemical changes;
- It is an ignitable compressed gas; or
- It is an oxidizer as defined by the US Department of Transportation regulations

Based on visual examination and knowledge of the waste stream, it has been determined that the CFMT and MFHT do not meet any of the above definitions of an ignitable waste under RCRA.

Reactivity

To be a RCRA waste in this category a material must possess any of the following properties:

- It is unstable and can undergo violent change;
- It reacts violently with water;
- It forms potentially explosive mixtures with water;
- It reacts with water to generate toxic gases, vapors, or fumes that are harmful;
- It contains cyanides or sulfide that can generate toxic gases, vapors or fumes;
- It can detonate or explode at standard temperature and pressure; or
- It is a DOT forbidden Class A or B explosive.

Based on visual examination, knowledge of the waste, and the generation process it has been determined that the CFMT and MFHT do not meet any of the above definitions of a reactive waste under RCRA.

Corrosivity

To be a RCRA waste in this category a material must possess any of the following properties:

- It is aqueous with a pH less than or equal to 2 or greater than or equal to 12.5; or
- It is a liquid and corrodes steel at a rate greater than 6.35 mm per year.

The flush water and sodium hydroxide that was introduced into the CFMT was calculated to ensure that the pH would remain less than 12.5. The alkaline liquid was jetted from the CFMT to 8D-4 and flushed with 200 gallons of water. The sodium hydroxide was not added to the MFHT. The pH of the sludge and slurry was typically neutral.

Based on visual examination, knowledge of the waste, and the generation process it has been determined that the CFMT and MFHT as packaged for disposal are neither aqueous nor liquid and therefore do not meet the definition of a corrosive waste under RCRA.

Toxicity

To exhibit the toxicity characteristic, a waste must exceed regulatory levels for specific metal or organic compounds when subjected to the Toxicity Characteristic Leaching Procedure (TCLP) test.

The CFMT and the MFHT are empty process tanks that once contained HLW with the toxicity characteristics for D005, D006, D007, D009, D010, and D011. However, the interior of the tanks were flushed and cleaned to the maximum extent possible. The photos in Reference III, confirm that the internal walls of the tanks are essentially free of visual contamination and it was noted that the fabrication weld beads and metal polishing marks were clearly visible. As stated in Section 3, the residues and flush heels from inside the tanks have been removed to the extent possible. It is estimated that the tanks contain less than five gallons of flush water and residual solids in each unit. Attachment A includes calculations of the mass of key hazardous constituents in the residual heel and the concentration of those constituents in the respective tanks. Consequently, it is concluded that the residual heel in the CFMT and MFHT is not sufficient to render the tanks hazardous for those characteristics. The plans for packaging the CFMT and MFHT call for the interior of both tanks to be filled with over 100,000 lbs. of grout for package stability purposes.

A visual inspection of the exterior of the tank does indicate very slight contamination on the exterior surface of the tanks. It is believed that small volumes of tank contents spilled onto the exterior during an agitator change out and from normal operations. Calculations to estimate the approximate amount of HLW residue required to be affixed to the CFMT and MFHT to render it RCRA hazardous are included in Attachment B. The CFMT and MFHT were visually inspected in relation to the mass of residue that would meet or exceed the calculated values. The inspection revealed that neither the CFMT nor MFHT contain the required mass of residue to equal the calculated values. Therefore, the CFMT and MFHT are not RCRA hazardous for the toxicity characteristic (TC) for metals due to dried residue on the exterior of the tanks.

Attachment C combines the potential mass of key hazardous constituents from the residual heels and the dried residue on the exterior of the tanks. The calculation indicates that the CFMT and MFHT are not hazardous for the toxicity characteristic of metals.

It should be noted, that many of the assumptions that were used in the calculations are conservative. Sludge data was used to calculate the potential contamination from the dried residue on the exterior of the CFMT. In reality, any dried residue is most likely due to slurry contamination which is approximately 40% of the sludge concentrations. The calculation for total mass of chromium was based on 100 lbs. of residue on the exterior of the tank. Based on visual observation it is estimated that the amount of dried residue is much less than 100 lbs. Consequently, the actual amount of hazardous constituents present in and on the CFMT and MFHT is believed to be less than those used in the calculations.

The HLW slurry did not contain TC organics at or above regulatory limits. Therefore, the CFMT and MFHT are not hazardous for those characteristics.

5.0 Conclusion

Through process knowledge it has been determined that the CFMT and MFHT do not meet the definition of a listed waste. As demonstrated above through process knowledge it has been determined that this waste stream does not exhibit any of the four hazardous characteristics. Therefore, the CFMT and MFHT waste stream is not a hazardous waste.

Prepared by: [signature] Date: 6/20/11

Reviewed by: [signature] Date: 6/20/11

Reference I WVDP-107, WVDP Waste Analysis Plan

Reference II WD:2002:0452, Report on Deployment of Miscellaneous Tank and Piping Cleaning Equipment and Methodology, August 30, 2002

Reference III WD:2003:0223, Transmittal of CFMT Sample Results, from W.M.Wierzbicki to A.C. Williams, dated May 6, 2003

Reference IV CF:2004:0031, Addendum to Attachment A-1 of Nevada Test Site (NTS) Profile WVDP000000007, T.J Jones to Characterization file, dated August 18, 2004

Attachment A
Calculation of Mass of Hazardous Constituents Remaining in the CFMT and MFHT

Assumption/data

Weight of CFMT = 18,206 lbs. (8,258 Kg)
Weight of MFHT 23,486 lbs. (10,653 Kg)
Volume of tank heels = 5 gallons
The sample matrix was water, therefore it is assumed that total and TCLP are the same.
Potential concentration of TC metals per VAST Sample ID# 03-1155:

Analyte	Average A&PC Result (mg/L)	Regulatory Limit (mg/L)	Ratio of Avg Result to Regulatory
Arsenic	<111	5	22
Barium	<88.9	100	0.89
Cadmium	<22.2	1	22
Chromium	289	5	58
Lead	<222.3	5	45
Mercury	<5.8	0.2	29
Selenium	<89.8	1	90
Silver	<88.9	5	18

Note: Selenium and chromium are the two most predominate metals and will therefore be used in the calculations.

Calculations

Action	**Chromium at 289 mg/L**	**Selenium at <89.9 mg/L**
Convert gallons to liters	5 gallons x 3.785 L/gal =18.93 liters	5 gallons x 3.785 L/gal= 18.93 liters
Convert concentration of constituent to %	289 mg/kg /1,000,000 = 0.00029	89.9 mg/kg /1,000,000 = 0.00009
CFMT Calculations		
Calculate mass of chrome in residue	289 mg/L x 18.93 liters = 5471 mg Cr (0.0055 kg)	89.9 mg/L x 18.93 liters = 1701.8 mg Se
Calculate concentration of chrome in entire CFMT	5471 mg Cr/8258 kg CFMT = 0.66 mg/kg	1701.8 mg Se/8258 kg CFMT 0.21 mg/kg
MFHT Calculations		
Calculate mass of constituent in MFHT	289 mg/L x 18.93 liters = 5471 mg Cr (0.0055 kg)	89.9 mg/L x 18.93 liters = 1701.8 mg Se
Calculate concentration of constituent in entire MFHT	5471 mg Cr/10,653 kg MFHT = 0.51 mg/kg	1701.8 mg Se/10,653 kg MFHT 0.16 mg/kg

Attachment B
Calculation of Mass of Dried Residue Required on the CFMT and MFHT to Render Them Hazardous for TC Metals
(Page 1 of 2)

Data for the calculations were obtained from EP:1999:0009. These values were selected because it is assumed that any residue would likely be dried sludge or slurry and that the liquid portion evaporated leaving only a dried residue. To be conservative the sludge values are used for CFMT and slurry is used for MFHT.

Potential TC Metal	Sludge Concentration (CFMT) Calculated TCLP	Slurry Concentration (MFHT) Calculated TCLP
Chrome	135 ppm	54 ppm
Mercury	5.4 ppm	2.2 ppm
Silver	16 ppm	6.4 ppm

Estimated total solids in sludge 50%
Weight of CFMT = 18,206 lbs. (8258 kg)
Weight of MFHT = 23,486 lbs. (10,653 kg)

Action	**Chrome**	**Mercury**	**Silver**
CFMT Calculations			
Convert concentration from TCLP to Total	135 mg/L x 20 L/kg = 2700 mg/kg	5.4 mg/L x 20 L/kg = 108 mg/kg	16 mg/L x 20 L/kg = 320 mg/kg
Convert concentration in sludge to residue	2700 mg/kg x 1 kg/0.5 kg solids = 5400 mg/kg residue	108 mg/kg x 1 kg/0.5 kg solids = 216 mg/kg residue	320 mg/kg x 1 kg/0.5 kg solids = 640 mg/kg residue
Convert to mass of metal	5400 mg/kg x 1 kg / 1,000,000 mg = 0.0054	216 mg/kg x 1 kg / 1,000,000 mg = 0.00022	640 mg/kg x 1 kg / 1,000,000 mg = 0.00064
Calculate mass of constituent metal required to yield 1 kg CFMT Hazardous for that metal (note: the mg/kg values are 20 times the TCLP limit)	100 mg Cr/kg residue / 0.0054 = 18,519 mg residue /kg of CFMT = 0.0185 kg residue / kg CFMT	4.0 mg Hg/kg residue / 0.00022 = 18,182 mg residue /kg of CFMT = 0.0182 kg residue / kg CFMT	100 mg Ag/kg residue / 0.00064 = 156,250 mg residue /kg of CFMT = 0.0156 kg residue / kg CFMT
Calculate total mass of residue required to render CFMT as hazardous	8258 kg x 0.0185 kg residue = 152.8 kg residue on CFMT (336.9 lbs.)	8258 kg x 0.0182 kg residue = 150.3 kg residue CFMT (331.4 lbs.)	8258 kg x 0.0156 kg residue = 1,288.2 kg residue on CFMT (2840 lbs.)
Calculate mass of total constituent metal in 100 lbs. of dried residue	100 lbs. residue x 0.0054 = 0.54 lbs. (0.245 kg) of Cr on the CFMT due to dried residue	100 lbs. residue x 0.00022 = 0.022 lbs. (0.0099 kg) of Hg on the CFMT due to dried residue	100 lbs. residue x 0.00064 = 0.064 lbs. (0.029 kg) of Ag on the CFMT due to dried residue

Note: The 100 lbs. of residue is a conservative value for calculation purposes. It is estimated that the actual amount of residue is considerably less than 100 lbs.

Attachment B
Calculation of Mass of Dried Residue Required on the CFMT and MFHT to Render Them Hazardous for TC Metals
(Page 2 of 2)

Action	**Chrome**	**Mercury**	**Silver**
MFHT Calculations			
Convert concentration from TCLP to Total	54 mg/L x 20 L/kg = 1080 mg/kg	2.2 mg/L x 20 L/kg = 44 mg/kg	6.4 mg/L x 20 L/kg = 128 mg/kg
Convert concentration in sludge to residue	1080 mg/kg x 1 kg/0.5 kg solids = 2160 mg/kg residue	44 mg/kg x 1 kg/0.5 kg solids = 88 mg/kg residue	128 mg/kg x 1 kg/0.5 kg solids = 256 mg/kg residue
Convert to mass of metal	2160 mg/kg x 1 kg / 1,000,000 mg = 0.0022	88 mg/kg x 1 kg / 1,000,000 mg = 0.000088	256 mg/kg x 1 kg / 1,000,000 mg = 0.00026
Calculate mass of constituent metal required to yield 1 kg MFHT Hazardous for that metal (note: the mg/kg values are 20 times the TCLP limit)	100 mg Cr/kg residue / 0.0022 = 45,455 mg residue /kg of MFHT = 0.045 kg residue / kg MFHT	4.0 mg Hg/kg residue / 0.000088 = 45,455 mg residue /kg of MFHT = 0.045 kg residue / kg MFHT	100 mg Ag/kg residue / 0.00026 = 384,615 mg residue /kg of MFHT = 0.39 kg residue / kg MFHT
Calculate total mass of residue required to render MFHT as hazardous	10,653 kg x 0.045 kg residue = 479.38 kg residue on MFHT (1057 lbs.)	10,653 kg x 0.045 kg residue = 479.38 kg residue on MFHT (1057 lbs.)	10,653 kg x 0.39 kg residue = 4155 kg residue on MFHT (9162 lbs.)
Calculate mass of total constituent metal in 100 lbs. of dried residue	100 lbs. residue x 0.0022 = 0.22 lbs. (0.099 kg) of Cr on the MFHT due to dried residue	100 lbs. residue x 0.000088 = 0.0088 lbs. (0.004 kg) of Hg on the MFHT due to dried residue	100 lbs. residue x 0.00026 = 0.026 lbs. (0.012 kg) of Ag on the MFHT due to dried residue

Note: The 100 lbs. of residue is a conservative value for calculation purposes. It is estimated that the actual amount of residue is considerably less than 100 lbs.

Attachment C
Calculated Concentration of Hazardous Constituents from Internal Residual Heel and Dried Residue on the Exterior of the Tanks

Since chromium is the only hazardous constituent identified in both Attachment A and Attachment B, chromium will be used to calculate the potential concentration in the CFMT and MFHT.

	CFMT	MFHT
Calculated mass of Cr from residual heel (from Attachment A)	0.0055 kg Cr	0.0055 kg Cr
Calculated mass of Cr from 100 lbs. (45.36 kg)of dried residue on exterior of tanks (Attachment B)	45.36 kg residue x 0.0054 = 0.245 kg Cr	45.36 kg residue x 0.0022 = 0.099 kg Cr
Total potential mass of Cr	0.251 kg	0.105 kg
Total Cr concentration	0.251 kg / 8258 kg = 30.39 mg/kg (as total Cr)	0.105 kg / 10,653 kg = 9.86 mg/kg (as total Cr)
Calculated TCLP	30.39 mg/kg x 1 kg / 20L = 1.52 mg/L	9.86 mg/kg x 1 kg / 20L = 0.493 mg/L

TECHNICAL BASIS FOR RADIOLOGICAL PROPERTIES ASSOCIATED WITH THE VITRIFICATION PROCESS COMPONENTS (VPC.001)

1.0 Purpose and Background

This Technical Basis Document (TBD) is intended to provide justification for radionuclide properties associated with low-level waste (LLW) generated from the Decontamination & Decommissioning (D&D) of the Vitrification facility. This TBD addresses waste materials that have been contaminated with slurry associated with the vitrification process. Slurry consists of PUREX/THOREX sludge and glass former chemicals blended together for the vitrification recipe. After six years of processing the Vitrification facility was shut down in September, 2002. The waste addressed in this TBD consists of large components removed from the Vitrification facility. At the time of the development of this TBD, only two components will be addressed. The components are the concentrator Feed Makeup Tank (CFMT) and the Melter Feed Hold Tank (MFHT).

The CFMT is a large, cylindrical vessel, approximately four meters in height and made of Hastelloy C-22 to resist corrosion. The design volume of the tank is nominally 23,000 liters. The CFMT received pre-treated high-level waste (HLW) where it was combined with the heel from the previous feed slurry batch and vitrification process recycle streams. CFMT contents were sampled and analyzed. The CFMT mixture composition was adjusted by addition of chemicals until the composition complied with waste form compositional requirements. Excess water was removed from the waste by evaporation while the waste sample was being analyzed and initial chemical additions were prepared. Following verification of the desired composition, the feed slurry batch was transferred to the MFHT.

The MFHT is a large, cylindrical vessel approximately three meters in height and made of 304L stainless steel. The design volume of the tank is nominally 19,000 liters. The MFHT provided necessary surge volume for smooth vitrification operations and was the interface transition between feed preparation and melter operations. The melter was fed continuously from the MFHT. The contents of the MFHT were constantly agitated (except when making level measurements) while feeding the melter to ensure consistent feed composition.

During the last year (2002) of the HLW processing campaign, flushing activities were conducted. The flushing was conducted to reduce the source term from pipe lines, tanks, and equipment that were thought to have significant accumulation of radioactive residues. The flushed materials were included in the final vitrification batches. Flushing activities focused on the main process vessels, including the CFMT and MFHT. Flushing reagents included dilute nitric acid and water.

The effectiveness of the flushing was evaluated with visual examination. The video inspections conducted of the CFMT and MFHT internal surfaces showed a dramatic improvement in the degree of cleanliness. The internal surfaces of these tanks were essentially free of any visible deposits and it was noted that even the fabrication weld beads and polishing marks could be identified.

Two DOT Type A steel shielded packages were designed for the CFMT and MFHT. After the vessels were placed into the packages, the vessel and annulus were filled with 70 lbs. /ft^3 grout.

Radiological characterization of the CFMT is based on analytical data obtained from the last three slurry transfers from the waste tank farm to the vitrification facility and laboratory waste liquid that was stored in the vessel after vitrification was completed (Attachment A). Radiological characterization of the MFHT is based on analytical data obtained from the last three slurry transfers from the waste tank farm to the vitrification facility and glass shard samples from the last canisters of vitrified waste (Attachment B). The analytical data was used to develop the scaling factors that would be used in conjunction with Dose-To-Curie factors developed from QAD-GCCP-A geometry model of each tank. To quantify the total activity of the vessels, the calculated QAD geometry model Dose to Curie Factor (DCF) for each vessel

was used in conjunction with the associated radiological distribution and average shielded probe dose rate for each vessel. The DCF and the average dose rate are entered into the RADMAN computer program for each vessel for the final radiological characterization.

It should be noted that the data supplied by the RADMAN computer program and actual sampling data for the vitrification process components is needed to support this technical basis and should be included in the data file.

This TBD supports the radionuclide properties associated with the waste stream profile for VPC.001, including:

- Isotopes of concern
- Radioisotopic activity ranges
- Representative final waste form activity
- Transuranic (TRU) nuclide data
- Enriched uranium data
- Fissile Gram Equivalent data
- Plutonium Equivalent Gram (PE-g) Evaluation

2.0 Isotopes of Concern

Radionuclides associated with the vitrification process components have been determined through radiochemical sampling. Based on this sampling effort, 29 radionuclides were initially identified as isotopes of concern with this waste stream. After considering the high activity range for this waste stream, only 8 radionuclides were reported. This was warranted since the maximum concentration of the omitted radionuclides would be present below one percent of the Action Levels specified in DOE/NV-325 and below one percent of the total waste form activity. See Table 4-1C and Table 5-1C for a listing of these radionuclides.

3.0 Radioisotopic Activity Ranges

The high and low activity ranges for the vitrification process components are based on bounding conditions. Radionuclide package concentrations are based on the DCF and average shielded probe dose readings along with scaling factors developed using an established isotopic distribution for each vessel. The low activity range for this waste stream is based on a 20% reduction of the activity from the final form radiological characterization of each vessel.

The high activity range for this waste stream is based on a 20% increase of the activity from the final form radiological characterization of each vessel.

4.0 Representative Final Waste Form Activity

The CFMT and MFHT radiological characterizations were completed by WMG, Inc. WMG, Inc. created the QAD geometry model to create the DCF for each of the vessels. The DCF and the average dose rate along with the isotopic distribution for each vessel are entered into the RADMAN software for package characterization.

The output from RADMAN (Attachment C) was used in development of the final waste form activity for the CFMT. The DCF calculated with the QAD geometry model is 60.56 Ci/(R/hr) and is used with the average dose rate of 1.62 R/hr. This average dose rate was obtained from multiple shielded probe readings at one foot from the actual waste material. The weight of the CFMT and any metal objects that will be left in the tank is 18,810 pounds. These results are tabulated in Table 4-1A.

The output from RADMAN (Attachment D) was used in development of the final waste form activity for the MFHT. The DCF calculated with the QAD geometry model is 63.819 Ci/(R/hr) and is used with the average dose rate of 1.64 R/hr. This average dose rate was obtained from multiple shielded probe readings at one foot from the actual waste material. The weight of the MFHT and any metal objects that will be left in the tank is 23,710 pounds. These results are tabulated in Table 4-1B.

In order to simplify the reporting of nuclides associated with this waste stream, nuclide data from Tables 4-1A and 4-1B were combined. Using the lowest values (for the low activity range) and the highest values (for the high activity range and final waste form activity), Table 4-1C was created.

Table 4-1A
Low and High Activity Ranges and Representative Final Waste Form Activity Associated with the CFMT

ISOTOPE	LOW ACTIVITY RANGE (Bq/m^3)	HIGH ACTIVITY RANGE (Bq/m^3)	FINAL WASTE FORM ACTIVITY (Bq/m^3)
Am-241[A,B]	2.41E+07	3.62E+07	3.02E+07
Am-243[A,B]	2.48E+05	3.72E+05	3.10E+05
Cm-242[A]	9.52E+04	1.43E+05	NR
Cm-243[A,B]	1.51E+05	2.26E+05	1.89E+05
Cm-244[A]	3.91E+06	5.87E+06	NR
Co-60[A]	1.80E+06	2.70E+06	NR
Cs-137	9.28E+10	1.39E+11	1.16E+11
Eu-154[A]	5.03E+07	7.55E+07	NR
Np-237[A]	6.48E+04	9.73E+04	NR
Pu-238[A,B]	5.05E+06	7.58E+06	6.32E+06
Pu-239[A,B]	1.36E+06	2.04E+06	1.70E+06
Pu-240[A,B]	1.04E+06	1.56E+06	1.30E+06
Pu-241[A]	1.50E+07	2.25E+07	NR
Sr-90	1.09E+09	1.64E+09	1.36E+09
Tc-99[A]	4.06E+06	6.09E+06	NR
Th-232[A]	2.46E+03	3.70E+03	NR
U-232[A]	1.37E+05	2.06E+05	NR
U-233[A]	5.69E+04	8.53E+04	NR
U-234[A]	2.72E+04	4.07E+04	NR
U-238[A]	6.22E+03	9.33E+03	NR

A. These radionuclides **are not** required to be reported since they would exist either below one percent of the NNSS Action Level (Table E-1 of the DOE/NV-325) and below one percent of the total activity concentration or not listed in Table E-1.
B. Radionuclides that are alpha-emitting and transuranic, with a half-life greater than twenty years and are greater than 10 pCi/g, **are** required to be reported on waste profile.

- NR = Not Reported on the waste stream profile

Table 4-1B
Low and High Activity Ranges and Representative Final Waste Form Activity Associated with the MFHT

ISOTOPE	LOW ACTIVITY RANGE (Bq/m^3)	HIGH ACTIVITY RANGE (Bq/m^3)	FINAL WASTE FORM ACTIVITY (Bq/m^3)
Am-241[A,B]	6.05E+07	9.07E+07	7.56E+07
Am-243[A,B]	5.49E+05	8.23E+05	6.86E+05
C-14[A]	5.56E+05	8.34E+05	NR
Cm-242[A]	4.78E+05	7.16E+05	NR
Cm-243[A,B]	3.97E+05	5.95E+05	4.96E+05
Cm-244[A]	1.03E+07	1.54E+07	NR
Co-60[A]	2.21E+06	3.31E+06	NR
Cs-137	1.36E+11	2.03E+11	1.69E+11
Eu-154[A]	4.44E+07	6.66E+07	NR
K-40[A]	2.15E+06	3.23E+06	NR
Mn-54[A]	2.33E+06	3.50E+06	NR
Ni-63[A]	2.64E+07	3.96E+07	NR
Np-237[A]	1.01E+05	1.52E+05	NR
Pu-238[A,B]	1.28E+07	1.92E+07	1.60E+07
Pu-239[A,B]	3.18E+06	4.78E+06	3.98E+06
Pu-240[A,B]	2.43E+06	3.64E+06	3.04E+06
Pu-241[A]	8.21E+07	1.23E+08	NR
Sr-90	7.46E+09	1.12E+10	9.32E+09
Tc-99[A]	1.16E+06	1.75E+06	NR
Th-228[A]	1.09E+06	1.63E+06	NR
Th-230[A]	9.55E+03	1.43E+04	NR
Th-232[A]	1.05E+04	1.58E+04	NR
U-232[A]	1.31E+06	1.97E+06	NR
U-233[A]	5.39E+05	8.08E+05	NR
U-234[A]	2.57E+05	3.85E+05	NR
U-235[A]	9.87E+03	1.48E+04	NR
U-236[A]	2.96E+04	4.44E+04	NR
U-238[A]	5.91E+04	8.86E+04	NR
Zr-95[A]	5.19E+07	7.79E+07	NR

A. These radionuclides **are not** required to be reported since they would exist either below one percent of the NNSS Action Level (Table E-1 of the DOE/NV-325) and below one percent of the total activity concentration.
B. Radionuclides that are alpha-emitting and transuranic, with a half-life greater than twenty years and are greater than 10 pCi/g, **are** required to be reported on waste profile.

- NR = Not Reported on the waste stream profile

Table 4-1C
Low and High Activity Ranges and Representative Final Waste Form Activity Associated with the Vitrification Process Components

ISOTOPE	LOW ACTIVITY RANGE (Bq/m^3)	HIGH ACTIVITY RANGE (Bq/m^3)	FINAL WASTE FORM ACTIVITY (Bq/m^3)
Am-241[A,B]	2.41E+07	9.07E+07	7.56E+07
Am-243[A,B]	2.48E+05	8.23E+05	6.86E+05
C-14[A]	5.56E+05	8.34E+05	NR
Cm-242[A]	9.52E+04	7.16E+05	NR
Cm-243[A,B]	1.51E+05	5.95E+05	4.96E+05
Cm-244[A]	3.91E+06	1.54E+07	NR
Co-60[A]	1.80E+06	3.31E+06	NR
Cs-137	9.28E+10	2.03E+11	1.69E+11
Eu-154[A]	4.44E+07	7.55E+07	NR
K-40[A]	2.15E+06	3.23E+06	NR
Mn-54[A]	2.33E+06	3.50E+06	NR
Ni-63[A]	2.64E+07	3.96E+07	NR
Np-237[A]	6.48E+04	1.52E+05	NR
Pu-238[A,B]	5.05E+06	1.92E+07	1.60E+07
Pu-239[A,B]	1.36E+06	4.78E+06	3.98E+06
Pu-240[A,B]	1.04E+06	3.64E+06	3.04E+06
Pu-241[A]	1.50E+07	1.23E+08	NR
Sr-90	1.09E+09	1.12E+10	9.32E+09
Tc-99[A]	1.16E+06	6.09E+06	NR
Th-228[A]	1.09E+06	1.63E+06	NR
Th-230[A]	9.55E+03	1.43E+04	NR
Th-232[A]	2.46E+03	1.58E+04	NR
U-232[A]	1.37E+05	1.97E+06	NR
U-233[A]	5.69E+04	8.08E+05	NR
U-234[A]	2.72E+04	3.85E+05	NR
U-235[A]	9.87E+03	1.48E+04	NR
U-236[A]	2.96E+04	4.44E+04	NR
U-238[A]	6.22E+03	8.86E+04	NR
Zr-95[A]	5.19E+07	7.79E+07	NR

A. These radionuclides **are not** required to be reported since they would exist either below one percent of the NNSS Action Level (Table E-1 of the DOE/NV-325) and below one percent of the total activity concentration.
B. Radionuclides that are alpha-emitting and transuranic, with a half-life greater than twenty years and are greater than 10 pCi/g, **are** required to be reported on waste profile.

- NR = Not Reported on the waste stream profile

5.0 Transuranic Nuclide Data

There are multiple transuranic radionuclides associated with the vitrification process components that warrant further attention. In particular, this waste stream has a total of 6 transuranic isotopes that are considered in this section. In determining the transuranic activity ranges and final transuranic waste form activities, methodology similar to that in Section 3.0 are followed.

5.1 Low & High TRU Activity Range and TRU Activity Representative of the Final Waste Form

Using the data provided in Table 4-1A and Table 4-1B for the low, high and final form activity range along with the waste mass for the CFMT and MFHT (i.e. 8.53E+6 and 1.08E+7g/box, respectively), the TRU activity range can be calculated.

For the CFMT, first the values in Table 4-1A are divided by 37 Bq/nCi and multiplied by 30.4 m^3/shielded box to arrive at nCi/box. The resultant values are then divided by 8.53E+6 g/box to arrive at nCi/g. For the MFHT, first the values in Table 4-1B are divided by 37 Bq/nCi and multiplied by 21.2 m^3/shielded box to arrive at nCi/box. The resultant values are then divided by 1.08E+7 g/box to arrive at nCi/g.

See Table 5-1A and 5-1B for a listing of TRU activities.

In order to simplify the reporting of transuranic nuclides associated with this waste stream, nuclide data from Tables 5-1A and 5-1B were combined. Using the lowest values (for the low activity range) and the highest values (for the high activity range and final waste form activity), Table 5-1C was created.

Table 5-1A
Low and High Activity Ranges and Final Waste Form Activities Associated with TRU Isotopes for CFMT

ISOTOPE	LOW TRU ACTIVITY RANGE (nCi/g)	HIGH TRU ACTIVITY RANGE (nCi/g)	FINAL WASTE FORM ACTIVITY (nCi/g)
Am-241	2.33E+00	3.49E+00	2.91E+00
Am-243	2.39E-02	3.59E-02	2.99E-02
Cm-243	1.45E-02	2.18E-02	1.82E-02
Np-237	6.24E-03	9.37E-03	7.81E-03
Pu-238	4.87E-01	7.30E-01	6.08E-01
Pu-239	1.31E-01	1.97E-01	1.64E-01
Pu-240	1.00E-01	1.50E-01	1.25E-01
Total	**3.09E+00**	**4.63E+00**	**3.86E+00**

Table 5-1B
Low and High Activity Ranges and Final Waste Form Activities Associated with TRU Isotopes for MFHT

ISOTOPE	LOW TRU ACTIVITY RANGE (nCi/g)	HIGH TRU ACTIVITY RANGE (nCi/g)	FINAL WASTE FORM ACTIVITY (nCi/g)
Am-241	3.22E+00	4.83E+00	4.03E+00
Am-243	2.92E-02	4.38E-02	3.65E-02
Cm-243	2.11E-02	3.17E-02	2.64E-02
Np-237	5.40E-03	8.10E-03	6.75E-03
Pu-238	6.84E-01	1.03E+00	8.54E-01
Pu-239	1.70E-01	2.54E-01	2.12E-01
Pu-240	1.29E-01	1.94E-01	1.62E-01
Total	**4.26E+00**	**6.39E+00**	**5.32E+00**

Table 5-1C
Low and High Activity Ranges and Final Waste Form Activities Associated with TRU Isotopes for Vitrification Process Components

ISOTOPE	LOW TRU ACTIVITY RANGE (nCi/g)	HIGH TRU ACTIVITY RANGE (nCi/g)	FINAL WASTE FORM ACTIVITY (nCi/g)
Am-241	2.33E+00	4.83E+00	4.03E+00
Am-243	2.39E-02	4.38E-02	3.65E-02
Cm-243	1.45E-02	3.17E-02	2.64E-02
Np-237	5.40E-03	9.37E-03	7.81E-03
Pu-238	4.87E-01	1.03E+00	8.54E-01
Pu-239	1.31E-01	2.54E-01	2.12E-01
Pu-240	1.00E-01	1.94E-01	1.62E-01
Total	**3.09E+00**	**6.39E+00**	**5.33E+00**

6.0 Enriched Uranium Data

Although the uranium isotopes associated with this waste stream would be present in quantities below the reporting level, it appears that vitrification process components may contain enriched uranium. Using the data provided in Table 4-1C, the data input for activity is based on dividing the high activity range by 3.7 E+10 Bq/Ci to reflect appropriate curie concentrations on a cubic meter basis. Table 6-1 was created as input for the enrichment calculation:

Table 6-1
Data Input for Uranium Enrichment Calculation

ISOTOPES	High Activity Range (Ci/m^3)	Specific Activity (Ci/g)[1]
U-232	5.32E-05	2.2E+01
U-233	2.18E-05	9.7E-03
U-234	1.04E-05	6.2E-03
U-235	4.00E-07	2.2E-06
U-236	1.20E-06	6.5E-05
U-238	2.39E-06	3.4E-07

1. Specific activities are from 49CFR173.435, Table of A1 and A2 values for radionuclides.

Using the data in Table 6-1, uranium mass can be calculated for each isotope by dividing the high activity range value by the specific activity. This results in uranium gram values per cubic meter of waste:

U-232 = 2.4E-06 grams per m^3 of waste
U-233 = 2.2E-03 grams per m^3 of waste
U-234 = 1.7E-03 grams per m^3 of waste
U-235 = 1.8E-01 grams per m^3 of waste
U-236 = 1.8E-02 grams per m^3 of waste
U-238 = 7.0E+00 grams per m^3 of waste

Based on the above gram values, the uranium-235 enrichment for vitrification process components can be calculated as:

$$\text{U-235}_{Enr} = \left[\frac{U-235_{Mass}\ (g)}{Total\ U_{Mass}\ \ (g)}\right] \times 100$$

In this case, an enrichment of about 2.5 percent U-235 by mass has been determined.

Based on the uranium mass information, above, a maximum U-235 gram value can be estimated based on the type of package used. The largest volume of waste anticipated to be used is the CFMT at 30.4m^3. Since the maximum mass concentration of uranium-235 is estimated to be about 1.8E-01grams/m^3, the worst case scenario for U-235 gram loading could equate to about 5.5 grams.

7.0 Fissile Gram Equivalent Data

Considering that several other fissile nuclides are present in this waste stream, additional evaluation is warranted in determination of total fissile gram equivalents (FGE). Using the high activity ranges provided in Table 4-1C, maximum U-235 FGE can be calculated. See Table 7-1 for the U-235 FGE Calculation.

Table 7-1
U-235 FGE Calculation for Vitrification Process Components

Nuclide	Activity per package[a] (Bq) (A)	Specific Activity (Bq/g) (B)	Mass of Isotope (g) (A/B=C)	U-235 FGE factor[b] (D)	U-235 FGE (CxD=E)	If FGE is >1% of U-235 mass, then include
U-233	**2.46E+07**	3.6E+08	6.8E-02	1.4E+00	9.5E-02	9.5E-02
U-235	**4.50E+05**	8.1E+04	5.6E+00	1.0E+00	5.6E+00	5.6E+00
Pu-239	**1.45E+08**	2.3E+09	6.3E-02	1.6E+00	1.0E-01	1.0E-01
Pu-241	**3.74E+09**	3.8E+12	9.8E-04	3.5E+00	3.4E-03	
Cm-243	**1.81E+07**	1.9E+12	9.5E-06	7.8E+00	7.4E-05	
Effective U-235 Enrichment = $\left[\frac{Total\ U-235\ FGE}{Total\ U^{c}}\right] \times 100$					**Total U-235 FGE**	**5.8E+00**
Effective U-235 Enrichment=		**2.6E+00**				

a. Activity per package determined using the high activity range provided in Table 4-1C. The input values (in terms of Bq/m^3) were multiplied by 30.4 m^3 to reflect the largest anticipated waste volume.
b. Numbers extracted from Table E-3 of DOE/NV-325
c. Total U extracted from Section 6.0 and multiplied by 30.4 rn^3 to reflect the largest anticipated waste volume.

8.0 Plutonium Equivalent Gram (PE-g) Evaluation

As required by the NNSS WAC, each waste stream is to be evaluated as to its contribution to Plutonium Equivalent Gram (PE-g). PE-g is a methodology to normalized Pu-239 in terms of health effects to all other nuclides. Attachment E, Table A-1 of this TBD provides an excel spreadsheet that calculates the PE-g value for the vitrification process components high activity case. In summary for this waste stream, a maximum PE-g value of 1.68E+01 has been determined and a total of 5.53E-01 PE-g/m^3, which is well below the limit imposed by NNSS.

Prepared by: ______________________ Date: 9/7/11

Reviewed by: ______________________ Date: 9/7/11

ATTACHMENT A

CFMT Radiological Data

CFM1

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Value Comparison
(Last Column is Average Value for All Data Sets)

Session Date : 5/24/2004

Waste :	Batch 72 slurry #1	Batch 72 slurry #2	Batch 74 slurry	Batch 75 slurry	CFMT Liquid	CFMT Liquid	CFMT Liquid				
Date :	08/04/2000	10/03/2000	06/18/2001	11/24/2001	07/07/2003	07/07/2003	07/07/2003				**Average Value ALL Data Sets**
Sample Id :	00-1534	00-2076	01-1281	01-2498	03-1155#1	03-1155#2	03-1155#3				
Units :	uCi/gm	uCi/gm	uCi/gm	uCi/gm	uCi/cc	uCi/cc	uCi/cc				
Nuclide	------	------	------	------	------	------	------	------	------	------	------
Co-60	8.47E-03	**	**	2.96E-01	**	**	**				5.01E-02
Sr-90	3.46E+01	2.62E+02	1.02E+02	8.70E+02	2.60E+00	2.59E+00	2.70E+00				2.83E+01
Tc-99	1.14E-02	4.59E-02	6.57E-02	1.59E-01	2.89E-01	2.80E-01	2.94E-01				1.04E-01
Cs-137	4.85E+02	6.57E+03	2.56E+03	1.16E+04	1.69E+03	1.66E+03	1.77E+03				2.41E+03
Np-237	5.13E-04	2.48E-03	8.31E-04	7.14E-03	**	**	**				1.66E-03
Pu-238	5.61E-02	2.60E-01	1.40E-01	1.27E+00	6.03E-02	5.84E-02	6.82E-02				1.30E-01
Pu-239	1.49E-02	6.85E-02	3.54E-02	3.04E-01	1.67E-02	1.67E-02	2.04E-02				3.49E-02
Pu-240	1.13E-02	5.23E-02	2.70E-02	2.32E-01	1.27E-02	1.28E-02	1.56E-02				2.66E-02
Am-241	3.86E-01	1.89E+00	5.28E-01	3.82E+00	2.83E-01	2.75E-01	3.02E-01				6.18E-01
Am-243	7.12E-03	3.45E-02	1.14E-03	4.60E-02	3.16E-03	3.07E-03	3.37E-03				6.36E-03
Cm-242	4.42E-03	2.22E-02	6.44E-03	4.37E-02	2.57E-03	2.82E-03	2.75E-03				6.61E-03
Cm-243	2.92E-03	1.42E-02	3.70E-03	2.57E-02	1.60E-03	1.39E-03	1.65E-03				3.93E-03
Cm-244	7.61E-02	3.71E-01	9.64E-02	6.72E-01	4.18E-02	3.64E-02	4.31E-02				1.03E-01
Eu-154	**	**	6.21E-01	2.95E+00	**	**	**				1.35E+00
Th-232	**	**	**	**	4.51E-05	**	8.77E-05				6.29E-05
U-232	**	**	**	**	3.13E-03	2.07E-03	6.79E-03				3.53E-03
U-233	**	**	**	**	1.29E-03	8.53E-04	2.80E-03				1.46E-03
U-234	**	**	**	**	6.17E-04	4.07E-04	1.34E-03				6.96E-04
U-238	**	**	**	**	1.41E-04	9.33E-05	3.06E-04				1.59E-04
Pu-241	**	**	**	**	4.17E-01	3.17E-01	4.65E-01				3.95E-01
Totals :	5.20E+02	6.83E+03	2.66E+03	1.25E+04	1.69E+03	1.66E+03	1.77E+03				2.44E+03

Co-60/
Cs-137 Ratios:

** - Indicates NO Value for Nuclide

ATTACHMENT B

MFHT Radiological Data

MFHT

Analysis of Multiple Sample Data Sets (SCAL)

Sample Data Set Value Comparison
(Last Column is Average Value for All Data Sets)

Session Date : 5/24/2004

Waste :	Batch 72 slurry #2	Batch 72 slurry #1	Batch 74 slurry	Batch 75 slurry	Vit glass shard composite	Vit glass shard composite					
Date :	10/03/2000	08/04/2000	06/18/2001	11/24/2001	03/10/2004	03/10/2004					Average Value ALL Data Sets
Sample Id :	00-2076	00-1534	01-1281	01-2498	04-0073 Comp	04-0074 Comp					
Units :	uCi/gm	uCi/gm	uCi/gm	uCi/gm	uCi/gm	uCi/gm					
Nuclide	------	------	------	------	------	------	------	------	------	------	------
Sr-90	2.62E+02	3.46E+01	1.02E+02	8.70E+02	1.27E+02	1.46E+02					1.57E+02
Tc-99	4.59E-02	1.14E-02	6.57E-02	1.59E-01	9.65E-03	3.73E-03					2.41E-02
Cs-137	6.57E+03	4.85E+02	2.56E+03	1.16E+04	2.30E+03	2.46E+03					2.85E+03
Np-237	2.48E-03	5.13E-04	8.31E-04	7.14E-03	3.21E-03	3.52E-03					2.10E-03
Pu-238	2.60E-01	5.61E-02	1.40E-01	1.27E+00	3.47E-01	4.02E-01					2.67E-01
Pu-239	6.85E-02	1.49E-02	3.54E-02	3.04E-01	7.95E-02	9.29E-02					6.58E-02
Pu-240	5.23E-02	1.13E-02	2.70E-02	2.32E-01	6.08E-02	7.11E-02					5.02E-02
Am-241	1.89E+00	3.86E-01	5.28E-01	3.82E+00	1.49E+00	1.77E+00					1.25E+00
Am-243	3.45E-02	7.12E-03	1.14E-03	4.60E-02	1.47E-02	1.13E-02					1.14E-02
Cm-242	2.22E-02	4.42E-03	6.44E-03	4.37E-02	1.03E-01	1.31E-01					2.68E-02
Cm-243	1.42E-02	2.92E-03	3.70E-03	2.57E-02	8.35E-03	1.03E-02					8.35E-03
Cm-244	3.71E-01	7.61E-02	9.64E-02	6.72E-01	2.18E-01	2.69E-01					2.18E-01
Co-60	**	8.47E-03	**	2.96E-01	4.04E-02	6.06E-02					4.98E-02
Eu-154	**	**	6.21E-01	2.95E+00	5.99E-01	7.99E-01					9.67E-01
Ni-63	**	**	**	**	5.15E-01	5.87E-01					5.50E-01
Th-228	**	**	**	**	2.92E-02	2.77E-02					2.85E-02
Th-230	**	**	**	**	2.09E-04	1.87E-04					1.98E-04
Th-232	**	**	**	**	1.95E-04	2.43E-04					2.18E-04
U-232	**	**	**	**	2.70E-02	2.77E-02					2.74E-02
U-233	**	**	**	**	1.10E-02	1.13E-02					1.11E-02
U-234	**	**	**	**	5.24E-03	5.40E-03					5.32E-03
U-235	**	**	**	**	1.98E-04	2.11E-04					2.04E-04
U-236	**	**	**	**	5.93E-04	6.32E-04					6.12E-04
U-238	**	**	**	**	1.07E-03	1.40E-03					1.22E-03
Pu-241	**	**	**	**	1.62E+00	1.90E+00					1.75E+00

** - Indicates NO Value for Nuclide

ATTACHMENT C

CFMT Radiological Characterization

Package Characterization Report

Printed on:	8/31/2004 during Characterization	Signature:	*(signature)*
Method Used:	Gross Gamma	Date:	8/31/2004

Date:	10/01/2004	Liner Serial No.	n/a
Package ID:	CFMT Rev. 2	DOT Package Class:	~~>A LSA II~~
NRC Waste Class:	C	Physical Form:	~~Solid~~
Waste Description:	CFMT Package	Container Type:	CFMT Package
Chemical Form:	Metal Oxides	Weight % Chelating Agent:	N/A
Chelating Agent:	N/A	Package Volume (Ft3):	~~2665.0~~
Waste Volume (Ft	37.62	Package Weight (lbs):	321632 00
Waste Weight (lbs):	18810.00	Characterization Dist (in):	12
Dose / Curie Factor:	60.66	3 Meter Dose (mR/hr):	Not Calculated

Contact Rad Level (mR/hr): ~~10~~ TBD SAS 1 Meter Rad Level (mR/hr): ~~1~~ TBD SAS Survey Date: 02/09/2004

Nuclide:	mCi:	Nuclide:	mCi:	Nuclide:	mCi:
Co-60	1.85E+00	Sr-90	1.12E+03	Tc-99	4.17E+00
Cs-137	9.53E+04	Eu-154	5.17E+01	Th-232	2.53E-03
U-232	1.41E-01	U-233	5.64E-02	U-234	2.79E-02
U-238	6.39E-03	Np-237	6.66E-02	Pu-238	5.19E+00
Pu-239	1.40E+00	Pu-240	1.07E+00	Pu-241	1.54E+01
Am-241	2.48E+01	Am-243	2.55E-01	Cm-242	9.78E-02
Cm-243	1.55E-01	Cm-244	4.02E+00		

PROPRIETARY INFORMATION

(20)

Total: 9.65E+04

Entered Dose Rates in mR/hr Average = 1617.78

2250	2200	2000	1800	1300	1170
1210	1280	1350			

Part 61 Information

Sample ID	: CFMT Sample
Sample Date	: 05/21/2004
Activity Units	: uCi/gm
Analysis Vendor	: WMG Inc

This package contains Reportable Quantities of Radionuclides

Prepared By: *(initials)*

Reviewed By: *(initials)*

ATTACHMENT D

MFHT Radiological Characterization

Package Characterization Report

...ted on:	8/31/2004	during Characterization		Signature:	
...thod Used:	Gross Gamma			Date:	8/31/2004

Date:	10/01/2004	Liner Serial No.	n/a
Package ID:	MFHT Rev.2	DOT Package Class:	>A LSA II
NRC Waste Class:	C	Physical Form:	Solid
Waste Description:	MFHT Package	Container Type:	MFHT Package
Chemical Form:	Metal Oxides	Weight % Chelating Agent:	N/A
Chelating Agent:	N/A	Package Volume (Ft3):	2398.0
Waste Volume (Ft	47.42	Package Weight (lbs):	271906.00
Waste Weight (lbs):	23710.00	Characterization Dist (in):	39.37
Dose / Curie Factor:	83.819	3 Meter Dose (mR/hr):	Not Calculated

Contact Rad Level (mR/hr): ~~10~~ TBD JMS 1 Meter Rad Level (mR/hr): ~~1~~ TBD JMS Survey Date: 02/09/2004

Nuclide:	mCi:	Nuclide:	mCi:	Nuclide:	mCi:
C-14	3.98E-01	K-40	1.64E+00	Mn-54	1.67E+00
Co-60	1.58E+00	Ni-63	1.89E+01	Sr-90	5.34E+03
Zr-95	3.72E+01	Tc-99	8.34E-01	Cs-137	9.71E+04
Eu-154	3.18E+01	Th-228	7.79E-01	Th-230	6.84E-03
Th-232	7.63E-03	U-232	9.40E-01	U-233	3.86E-01
U-234	1.84E-01	U-235	7.07E-03	U-236	2.12E-02
U-238	4.23E-02	Np-237	7.26E-02	Pu-238	9.19E+00
Pu-239	2.28E+00	Pu-240	1.74E+00	Pu-241	5.86E+01
Am-241	4.33E+01	Am-243	3.93E-01	Cm-242	3.42E-01
Cm-243	2.84E-01	Cm-244	7.36E+00		
				Total:	1.03E+05

PROPRIETARY INFORMATION

Entered Dose Rates in mR/hr — Average = 1840.00

1750	1750	1880	2100	1560	1360
1400	1400	1550			

Part 61 Information

Sample ID : MFHT Sample
Sample Date : 06/07/2004
Activity Units : uCi/gm
Analysis Vendor :

This package contains Reportable Quantities of Radionuclides

Prepared By: NZ Reviewed By: JMS

ATTACHMENT E

PE-g Calculation

Table A-1: Plutonium Equivalent Gram Calculation Vitrification Process Components

Isotope	High Activity (Bq/m^3)	PE-g CF	High Range ($PE\text{-}g/m^3$)	Max. Container Waste Volume (m^3)	PE-g for container
Am-241	9.07E+07	2.65E-09	2.40E-01		
Am-243	8.23E+05	2.63E-09	2.16E-03		
C-14	8.34E+05	1.58E-13	1.32E-07		
Cm-242	7.16E+05	1.63E-10	1.17E-04	CFMT= 30.4	1.68E+01
Cm-243	5.95E+05	1.91E-09	1.14E-03		
Cm-244	1.54E+07	1.57E-09	2.42E-02		
Co-60	3.31E+06	8.47E-13	2.80E-06		
Cs-137	2.03E+11	1.08E-12	2.19E-01		
Eu-154	7.55E+07	3.04E-12	2.30E-04		
K-40	3.23E+06	2.33E-12	7.53E-06		
Mn-54	3.50E+06	8.99E-14	3.15E-07		
Ni-63	3.96E+07	3.46E-14	1.37E-06		
Np-237	1.52E+05	1.37E-09	2.08E-04		
Pu-238	1.92E+07	4.42E-10	8.49E-03		
Pu-239	4.78E+06	4.41E-10	2.11E-03		
Pu-240	3.64E+06	4.41E-10	1.61E-03		
Pu-241	1.23E+08	4.80E-12	5.90E-04		
Sr-90	1.12E+10	4.32E-12	4.84E-02		
Tc-99	6.09E+06	3.67E-13	2.24E-06		
Th-228	1.63E+06	1.09E-09	1.78E-03		
Th-230	1.43E+04	2.79E-09	3.99E-05		
Th-232	1.58E+04	3.02E-09	4.77E-05		
U-232	1.97E+06	1.02E-09	2.01E-03		
U-233	8.08E+05	2.64E-10	2.13E-04		
U-234	3.85E+05	2.59E-10	9.97E-05		
U-235	1.48E+04	2.33E-10	3.45E-06		
U-236	4.44E+04	2.40E-10	1.07E-05		
U-238	8.86E+04	2.21E-10	1.96E-05		
Zr-95	7.79E+07	1.61E-13	1.25E-05		
		Total $PE\text{-}g/m^3$ =	**5.53E-01**		

Prepared by: [signature] Date: 9/7/11

Reviewed by: [signature] Date: 9/7/11

D. 5. Radiological Properties

Low and High Activity Ranges and Representative Final Waste Form Activity Associated with Vitrification Process Components[1]

ISOTOPE[2]	Low Activity Range (Bq/m^3)	High Activity Range (Bq/m^3)	Final Waste Form Activity (Bq/m^3)
Am-241	2.41E+07	9.07E+07	7.56E+07
Am-243	2.48E+05	8.23E+05	6.86E+05
Cm-243	1.51E+05	5.95E+05	4.96E+05
Cs-137	9.28E+10	2.03E+11	1.69E+11
Pu-238	5.05E+06	1.92E+07	1.60E+07
Pu-239	1.36E+06	4.78E+06	3.98E+06
Pu-240	1.04E+06	3.64E+06	3.04E+06
Sr-90	1.09E+09	1.12E+10	9.32E+09

1. Values in this table are based on either the lowest (low activity range) or highest (high activity range and final waste form activity) values extracted for the distribution as listed in Table 4-1C of the Radiological Technical Basis Document.

2. Nuclides listed are those that are reportable per the NNSS WAC. From examination of Table 4-1C, these nuclides are either TRU >10pCi/g, contribute greater than 1% of the NTS WAC Action Levels, and/or contribute greater than 1% of the total activity.

D.6. Transuranic Nuclides

Low and High Activity Ranges and Final Waste Form Activities Associated with TRU Isotopes for Vitrification Process Components

ISOTOPE	Low TRU Activity Range (nCi/g)	High TRU Activity Range (nCi/g)	Final Waste Form Activity (nCi/g)
Am-241	2.33E+00	4.83E+00	4.03E+00
Am-243	2.39E-02	4.38E-02	3.65E-02
Cm-243	1.45E-02	3.17E-02	2.64E-02
Np-237	5.40E-03	9.37E-03	7.81E-03
Pu-238	4.87E-01	1.03E+00	8.54E-01
Pu-239	1.31E-01	2.54E-01	2.12E-01
Pu-240	1.00E-01	1.94E-01	1.62E-01
Total TRU[1]	**3.09E+00**	**6.39E+00**	**5.33E+00**

1. Includes contribution from all TRU nuclides (alpha emitters with half-lives greater than 20 years): Pu-238, 239, 240, Am-241, 243, Cm-243, and Np-237.

Table A-1: Plutonium Equivalent Gram Calculation Vitrification Process Components

Isotope	High Activity (Bq/m^3)	PE-g CF	High Range ($PE\text{-}g/m^3$)	Max. Container Waste Volume (m^3)	PE-g for container
Am-241	9.07E+07	2.65E-09	2.40E-01		
Am-243	8.23E+05	2.63E-09	2.16E-03		
C-14	8.34E+05	1.58E-13	1.32E-07		
Cm-242	7.16E+05	1.63E-10	1.17E-04	CFMT= 30.4	1.68E+01
Cm-243	5.95E+05	1.91E-09	1.14E-03		
Cm-244	1.54E+07	1.57E-09	2.42E-02		
Co-60	3.31E+06	8.47E-13	2.80E-06		
Cs-137	2.03E+11	1.08E-12	2.19E-01		
Eu-154	7.55E+07	3.04E-12	2.30E-04		
K-40	3.23E+06	2.33E-12	7.53E-06		
Mn-54	3.50E+06	8.99E-14	3.15E-07		
Ni-63	3.96E+07	3.46E-14	1.37E-06		
Np-237	1.52E+05	1.37E-09	2.08E-04		
Pu-238	1.92E+07	4.42E-10	8.49E-03		
Pu-239	4.78E+06	4.41E-10	2.11E-03		
Pu-240	3.64E+06	4.41E-10	1.61E-03		
Pu-241	1.23E+08	4.80E-12	5.90E-04		
Sr-90	1.12E+10	4.32E-12	4.84E-02		
Tc-99	6.09E+06	3.67E-13	2.24E-06		
Th-228	1.63E+06	1.09E-09	1.78E-03		
Th-230	1.43E+04	2.79E-09	3.99E-05		
Th-232	1.58E+04	3.02E-09	4.77E-05		
U-232	1.97E+06	1.02E-09	2.01E-03		
U-233	8.08E+05	2.64E-10	2.13E-04		
U-234	3.85E+05	2.59E-10	9.97E-05		
U-235	1.48E+04	2.33E-10	3.45E-06		
U-236	4.44E+04	2.40E-10	1.07E-05		
U-238	8.86E+04	2.21E-10	1.96E-05		
Zr-95	7.79E+07	1.61E-13	1.25E-05		
		Total $PE\text{-}g/m^3$ =	**5.53E-01**		

Prepared by: ________________________________ Date:_______________

Reviewed by: ________________________________ Date:_______________

Attachment 6

U-235 FGE Calculation for Vitrification Process Components

Nuclide	Activity per package[a] (Bq) (A)	Specific Activity (Bq/g) (B)	Mass of Isotope (g) (A/B=C)	U-235 FGE factor[b] (D)	U-235 FGE (CxD=E)	If FGE is >1% of U-235 mass, then include
U-233	**2.46E+07**	3.6E+08	6.8E-02	1.4E+00	9.5E-02	9.5E-02
U-235	**4.50E+05**	8.1E+04	5.6E+00	1.0E+00	5.6E+00	5.6E+00
Pu-239	**1.45E+08**	2.3E+09	6.3E-02	1.6E+00	1.0E-01	1.0E-01
Pu-241	**3.74E+09**	3.8E+12	9.8E-04	3.5E+00	3.4E-03	
Cm-243	**1.81E+07**	1.9E+12	9.5E-06	7.8E+00	7.4E-05	
Effective U-235 Enrichment = $\left[\frac{Total\ U-235\ FGE}{Total\ U^{c}}\right]$ x 100					**Total U-235 FGE**	**5.8E+00**
Effective U-235 Enrichment=		**2.6E+00**				

a. Activity per package determined using the high activity range provided in Table 4-1C of Rad Technical Basis Document (TBD). The input values (in terms of Bq/m^3) were multiplied by 30.4 m^3 to reflect the largest anticipated waste volume.

b. Numbers extracted from Table E-3 of DOE/NV-325

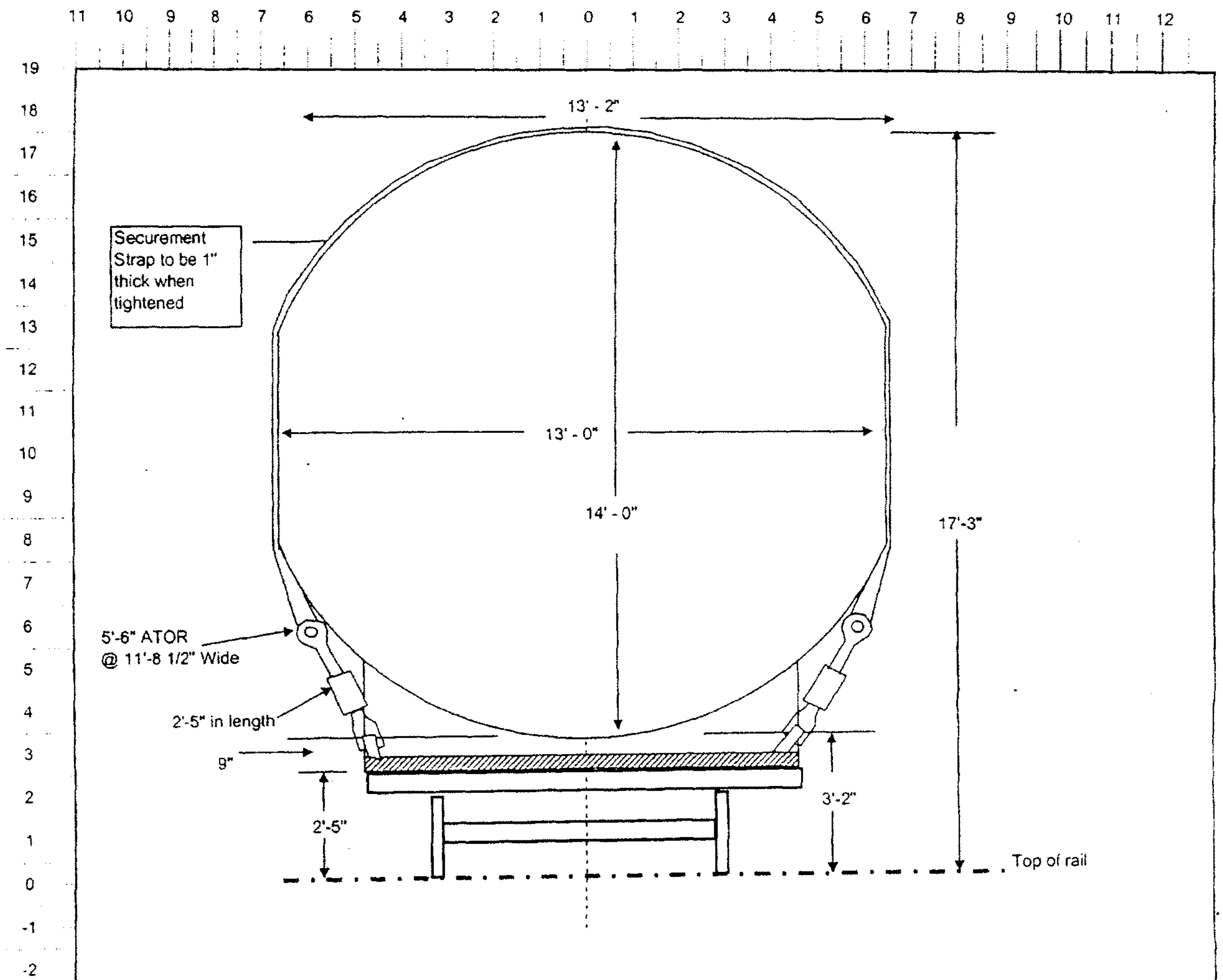
c. Total U extracted from Section 6.0 of the Rad TBD and multiplied by 30.4 rn^3 to reflect the largest anticipated waste volume.

Attachment A-7

Concentrator Feed Make-up Tank (CFMT) and Melter Feed Hold Tank (MFHT) Container Drawings

Cavanagh Services Group, LLC

MFHT Clearance Cylinder 1	Revision 2	Revision	Revision:
Drawing No:	Date: 6-14-04	Date:	Date:



CLEARANCE DIMENSIONS ABOVE TOP OR RAIL:

Height ATOR	Width
17'-3"	2'
16'-0"	9'
13''-0"	13'
8'-0"	13'
5'-6"	11'9"
5'-0"	9'-4"
3'-6"	9'-4
2'-5"	9'-4"

Gross Weights:

Package:	271,682 lbs.
Cradles:	10,252 lbs
Securement:	20,000 lbs.
Railcar:	156,100 lbs.
TOTAL GROSS WEIGHT:	458,034 lbs.

PACKAGE DIMENSIONS:

Length: 15'-1" – 181

Width: 13'-0" 156

Height: 14'-0" 168

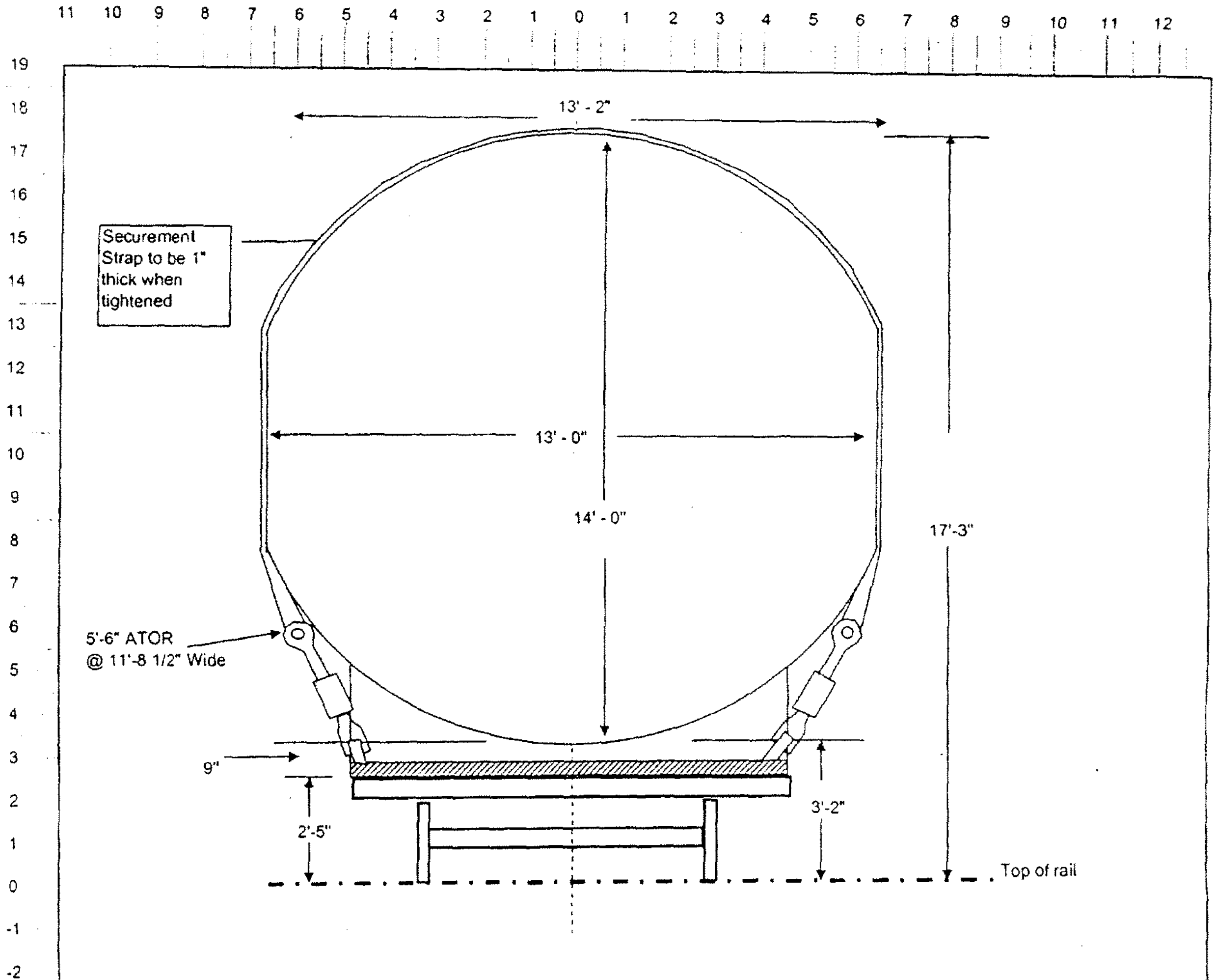
RAILCAR TYPE:

Depressed Deck heavy Duty 8 Axle Flat

Car Series: KRL 90002 -90004 and KRL 900212, 90014 & 90016

DRAFT

Cavanagh Services Group, LLC	CFMT Clearance Cylinder 1	Revision 2	Revision	Revision:
	Drawing No:	Date: 6-14-04	Date:	Date:



CLEARANCE DIMENSIONS ABOVE TOP OR RAIL:

Height ATOR	Width
17'-3"	2'
16'-0"	9'
13"-0"	13'
8'-0"	13'
5'-6"	11'9"
5'-0"	9'-4"
3'-6"	9'-4
2'-5"	9'-4"

Gross Weights:

Package:	321,028 lbs.
Cradles:	10,252 lbs
Securement:	20,000 lbs.
Railcar:	156,100 lbs.
TOTAL GROSS WEIGHT:	507,380 lbs.

PACKAGE DIMENSIONS:

Length: 19'-2" 230

Width: 13'-0"

Height: 14'-0"

RAILCAR TYPE:

Depressed Deck heavy Duty 8 Axle Flat

Car Series: KRL 90002 -90004 and KRL 900212, 90014 & 90016

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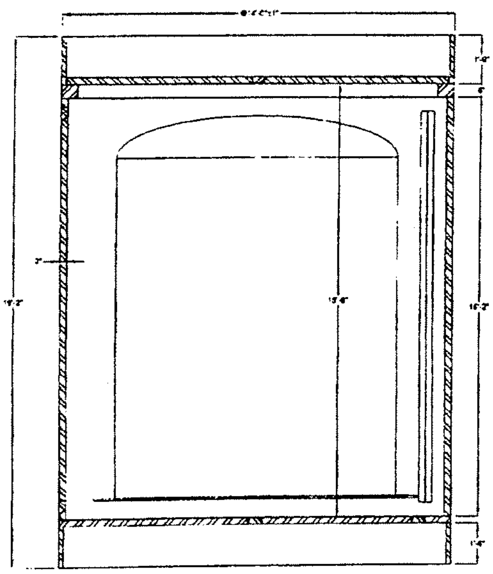
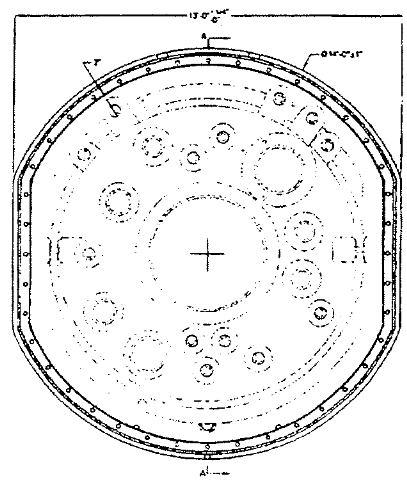
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
0	Issued for Fabrication	[illegible]	[illegible]



Section A-A
CFMT Tank Profile
Shown for Clarity



Top View: CFMT Inside Package
(Lid Not Shown for Clarity)

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. Package cross section with tank shown for clarity.
3. All surfaces to be primed and painted.

All dimensions apply to reference temp. of 66° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.
West Valley CFMT
Complete Package Assembly

Dwn By	Date	Size	FSCM No.	DWG No.	Rev
[illegible]	6/18/08	B		4005-DW-002	0

Proprietary Information | Scale: NTS | Sheet: 1 of 5

DRAFT

Bill of Materials

Item	Description	Quantity	Material
1	Semicircular Plate 14'-0" OD x 13'-6" ID x 15'-2" Long (cut to fit)	2	Steel
1A	Plate 15'-2" x 5'-2½" x 3" (cut to fit)	2	Steel
2	Semicircular Plate 14'-0" OD x 13'-6" ID x 1'-9" Long (cut to fit)	2	Steel
2A	Plate 1'-9" x 5'-2½" x 2" (cut to fit)	2	Steel
3	Round Plate 14'-0" OD x 3" Thick (cut to fit)	1	Steel
4	Round Plate 13'-7" OD x 3" Thick (cut to fit)	1	Steel
5	Semicircular Plate 14'-0" OD x 12'-10" ID x 6" Long (cut to fit)	2	A516 Gr 70
5A	Plate 6" x 5'-2½" x 7" (cut to fit)	2	A516 Gr 70
6	23° Cylinder Segment 13'-6" OD x 13'-0" ID x 15'-2" Long	4	Steel
6A	Plate 15'-2" x 5'-2½" x 3" (cut to fit)	2	Steel
7	1-3/4" Ø UNC x 6½" Long Bolt with Hardened Washer	40	A193-B7
8	Semicircular Plate 14'-0" OD x 13'-6" ID x 1'-6" Long (cut to fit)	2	Steel
8A	Plate 1'-6" x 5'-2½" x 2" (cut to fit)	2	Steel
9	Plate 12'-11" OD x 12'-10" ID x 1/4" Thick (cut to fit)	1	Steel
9A	Plate 5'-0" x 1/2" x 1/4" Thick	2	Steel
10	Plate 13'-8" OD x 13'-6" ID x 1/4" Thick (cut to fit)	1	Steel
10A	Plate 5'-2" x 1" x 1/4" Thick	2	Steel
11	Gasket 13'-4½" OD x 12'-11½" ID x 3/8" Thick. Dur. 45 - 55 Shore A	1	Neoprene
12	4" x 3" x 2" Block	2	Steel
13	1/4" Thick Full Flat Gasket. Dur. 45 - 55, Shore A	4	Neoprene
14	6" OD x 3" Thick Plug (cut to fit)	5	Steel
15	5/16" SHCS	15	Steel
16	2" Nominal Pipe (2.375" OD) - Sch 80 x 14'-2" Long	2	A-53
17	3½" x 4" x 14'-2" Bar	2	Steel

Revisions

Rev	Description	Date	Approved
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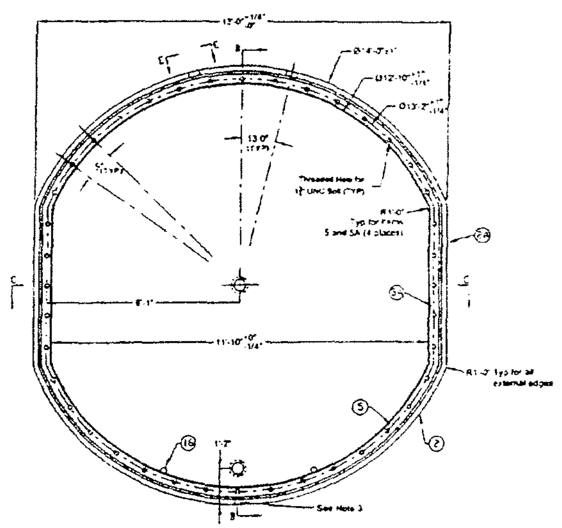

Top View
(Hidden Lines Not shown for Clarity)

Reference Drawings

1	4005-DW-004
2	
3	
4	

General Notes

1. Material: All steel is A-36 minimum (see Bill of Material).
2. All surfaces to be primed and painted.
3. Two 2½" Ø holes must be added to items 8 and 2 at 180° to match the cradle (see 4005-DW-004). The holes are 3½" and 9½" down from the top of item 8 and 3½" and 9½" up from the bottom of item 2.

All dimensions apply to reference temp. of 66° F
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.
West Valley CFMT
Package Bottom Assembly

Dwn. By: [signature] Date: 1/12/04 | Size: B | FSCM No | Dwg No: 4005-DW-002 | Rev: 0
Proprietary Information | Scale: NTS | Sheet: 2 of 5

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
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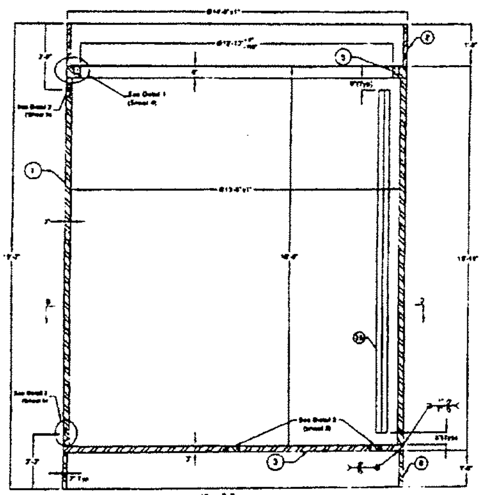

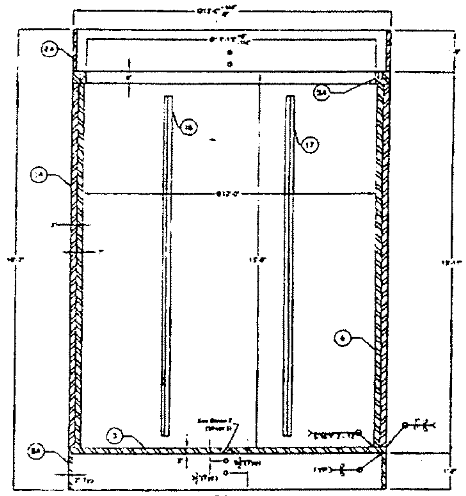

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. All surfaces to be primed and painted.

All dimensions apply to reference temp. of 68° F
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

Dwn. By / Date

Proprietary information

WMG inc.

West Valley CFMT

Package Bottom Assembly

SIZE	FSCM NO.	DWG NO.	REV
B		4005-DW-002	0
SCALE NTS		SHEET 3 of 5	

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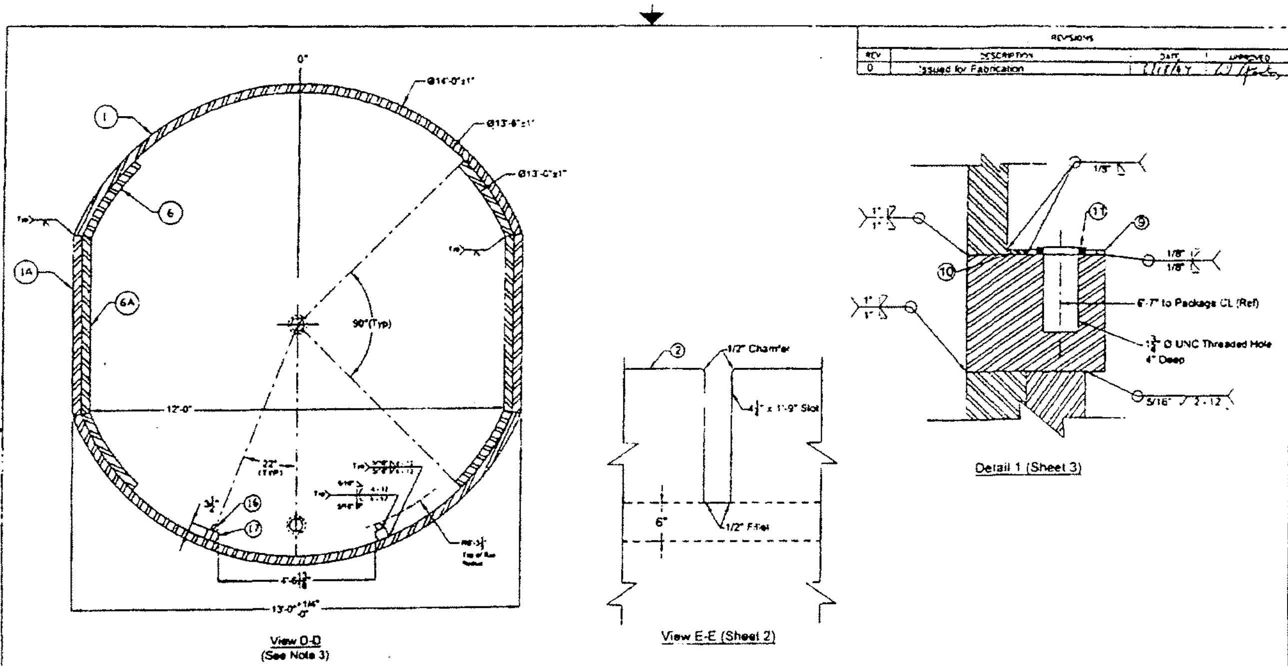


Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. All surfaces to be primed and painted.
3. Zero Degrees corresponds to vertical up.
4. All shell welds shall be full penetration.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

Dwn By: Date: 6/18/04

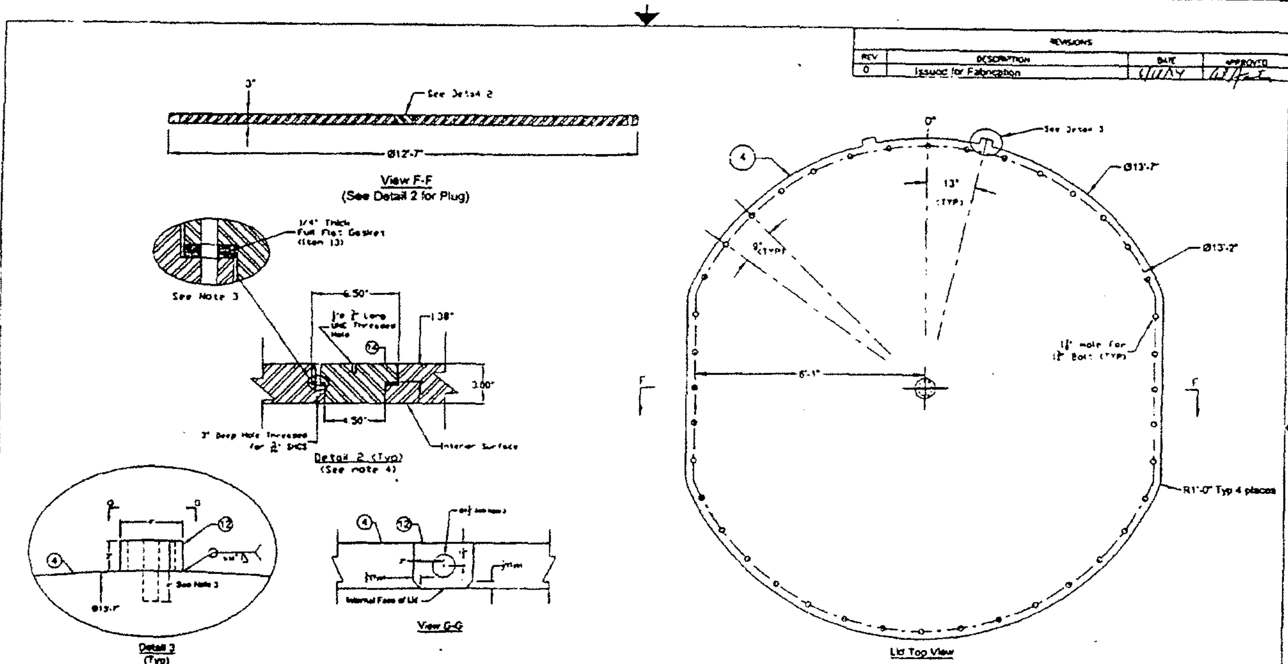
Proprietary Information

WMG inc.

West Valley CFMT Package
Bottom Assembly Details

SIZE	FSCM NO	DWG NO	REV
B		4005-DW-002	0
SCALE NTS		SHEET 4 of 5	

DRAFT



Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: As Noted on Sheet 2.
2. All surfaces to be primed and painted.
3. 1½" Ø UNC threaded 4" deep. Centered in block.
4. 6.5" Ø plug fastened into top plate using three (3) 5/16" socket head cap screws (SHCS) 120° apart. 5 plugs and 15 SHCS required.
5. SHCS not shown for clarity

All dimensions apply to reference temp. of 66° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

Dwn. By Date 6/18/04

Proprietary Information

WMG inc.
West Valley CFMT
Package Lid

SIZE	FSCM NO	DWG NO	REV
B		4005-DW-002	0

SCALE NTS SHEET 5 of 5

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
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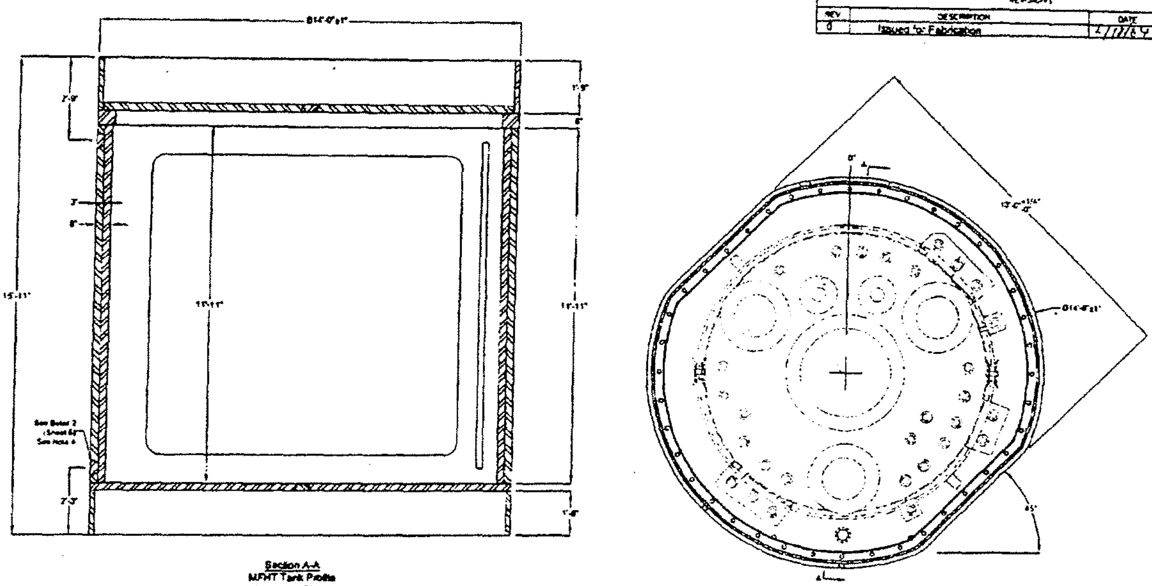

Section A-A
MFHT Tank Profile
Shown for Clarity

Top View: MFHT Inside Package
(Lid not Shown for Clarity)

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. Package cross section with tank shown for clarity.
3. All surfaces to be primed and painted.
4. Grout plugs located in 3" cylinder wall are to be offset +5° from 0° position to avoid interference with 3" inner shield.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.
West Valley MFHT
Complete Package Assembly

Dwn By: Date 6/18/04 | SIZE B | FSCM NO | DWG NO. 4005-DW-003 | REV 0

Proprietary Information | SCALE NTS | SHEET 1 of 5

DRAFT

Bill of Materials

Item	Description	Quantity	Material
1	Semicircular Plate 14'-9" OD x 13'-8" ID x 11'-11" Long (cut to fit)	2	Steel
1A	Plate 15'-2" x 5'-2½" x 3" (cut to fit)	2	Steel
2	Semicircular Plate 14'-0" OD x 13'-8" ID x 1'-8" Long (cut to fit)	2	Steel
2A	Plate 1'-8" x 5'-2½" x 2" (cut to fit)	2	Steel
3	Round Plate 14'-0" OD x 3" Thick (cut to fit)	1	Steel
4	Round Plate 13'-7" OD x 3" Thick (cut to fit)	1	Steel
5	Semicircular Plate 14'-4" OD x 12'-10" ID x 6" Long (cut to fit)	2	A516 Gr 70
5A	Plate 6" x 5'-2½" x 7" (cut to fit)	2	A516 Gr 70
6	23° Cylinder Segment 13'-6" OD x 13'-0" ID x 15'-2" Long	4	Steel
6A	Plate 15'-2" x 5'-2½" x 3" (cut to fit)	2	Steel
7	1-3/4" Ø UNC x 6½" Long Bolt with Hardened Washer	40	A193-B7
8	Semicircular Plate 14'-9" OD x 13'-8" ID x 1'-8" Long (cut to fit)	2	Steel
8A	Plate 1'-8" x 5'-2½" x 2" (cut to fit)	2	Steel
9	Plate 12'-11" OD x 12'-10" ID x 1/4" Thick (cut to fit)	1	Steel
9A	Plate 5'-9" x 1/2" x 1/4" Thick	2	Steel
10	Plate 13'-8" OD x 13'-6" ID x 1/4" Thick (cut to fit)	1	Steel
10A	Plate 5'-2" x 1" x 1/4" Thick	2	Steel
11	Gasket 13'-4½" OD x 12'-11½" ID x 3/4" Thick. Dur. 45 - 55, Shore A.	1	Neoprene
12	4" x 3" x 2" Block	2	Steel
13	1/4" Thick Full Flat Gasket. Dur. 45 - 55, Shore A.	4	Neoprene
14	6" OD x 3" Thick Plug (cut to fit)	5	Steel
15	5/16" SHCS	15	Steel
16	2" Nominal Pipe (2.375" OD) - Sch 80 x 14'-2" Long	2	A-53
17	3½" x 4" x 14'-2" Bar	1	Steel
18	1/2" x 4" x 14'-2" Bar (cut to fit)	1	Steel

Revisions

Rev	Description	Date	Approved
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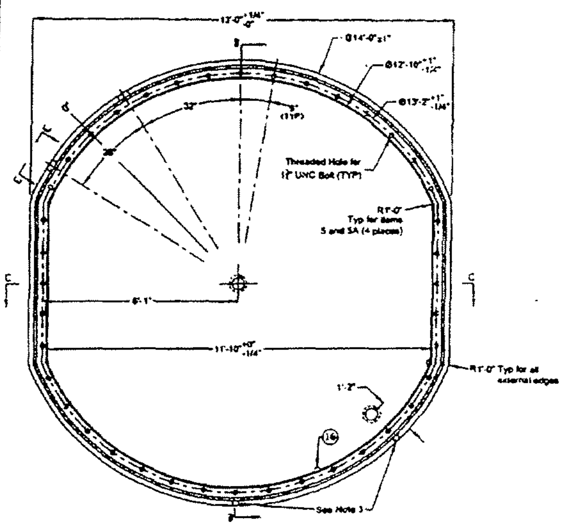


Top View
(Hidden Lines Not Shown for Clarity)

Reference Drawings

1	4005-DW-004
2	
3	
4	

General Notes

1. Material: A-36 Minimum
2. All surfaces to be primed and painted.
3. Two sets of 2¼" Ø holes must be added to items 8 and 2 at 180° to match the cradle (see 4005-DW-004). The holes are 3½" and 9½" down from the top of item 8 and 3½" and 9½" up from the bottom of item 2.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

Dwn. By [signature] Date 6/8/04

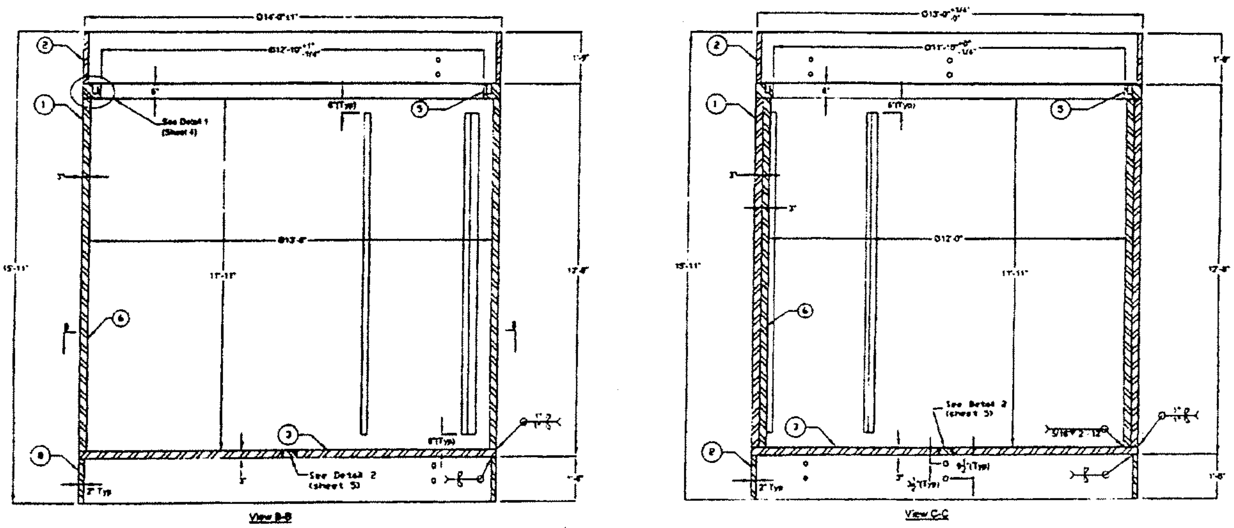
Proprietary Information

WMG inc.
West Valley MFHT
Package Bottom Assembly

Size: B | FSCM No.: | DWG No.: 4005-DW-003 | Rev: 0

Scale: NTS | Sheet: 2 of 5

DRAFT



REV	DESCRIPTION	DATE	APPROVED
0	Issued for Fabrication		

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. All surfaces to be primed and painted.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.
West Valley MFHT
Package Bottom Assembly

Dwn. By | Date | SIZE B | FSCM NO. | DWG NO. 4005-DW-003 | REV 0

Proprietary Information | SCALE NTS | SHEET 3 of 5

DRAFT

REV	DESCRIPTION	DATE	APPROVED
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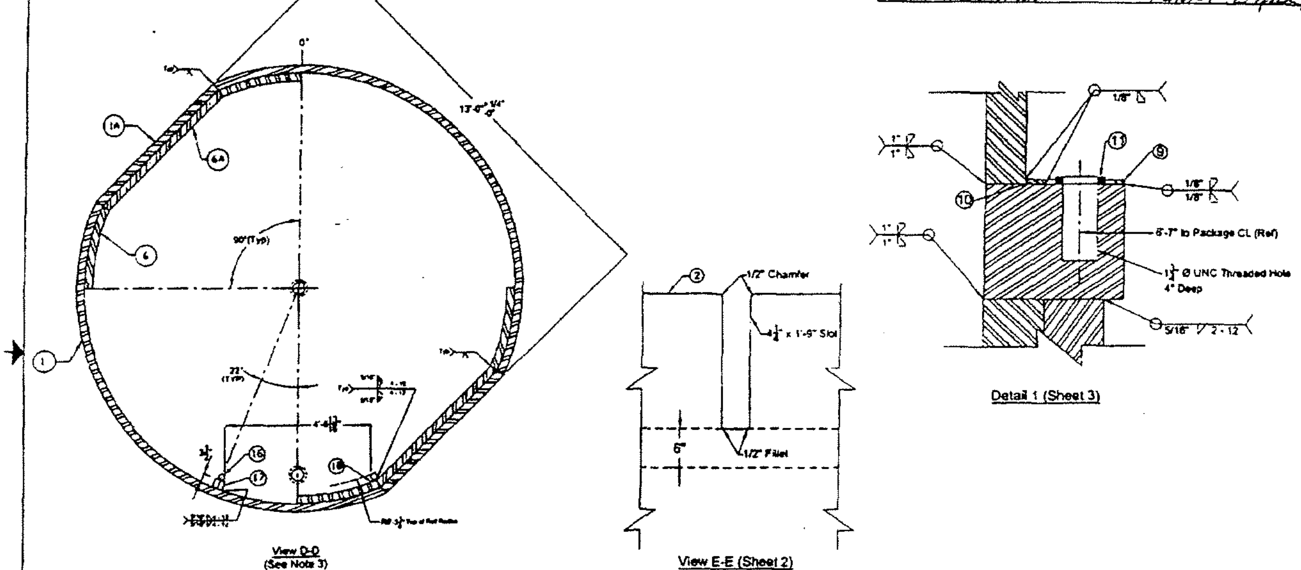

View D-D (See Note 3)

View E-E (Sheet 2)

Detail 1 (Sheet 3)

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: as noted on sheet 2.
2. All surfaces to be primed and painted.
3. Zero Degrees corresponds to vertical up.

All dimensions apply to reference temp. of 66° F
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.

West Valley MFHT Package
Bottom Assembly Details

Dwn. By [signature] Date 6/18/04 | SIZE B | FSCM NO. | DWG NO. 4005-DW-003 | REV 0

Proprietary Information | SCALE NTS | SHEET 4 of 5

DRAFT

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
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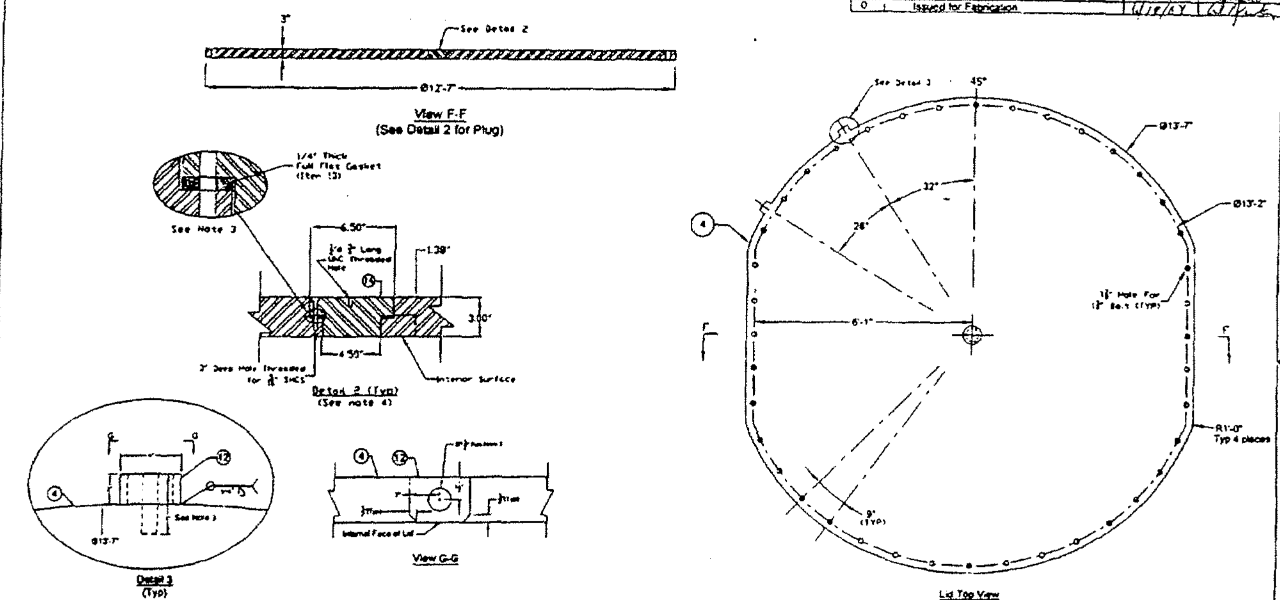

Reference Drawings	
1	4005-DW-004
2	
3	
4	

General Notes

1. Material: As Noted on Sheet 2.
2. All surfaces to be primed and painted.
3. 1½" Ø UNC threaded 4" deep. Centered in block.
4. 6.5" Ø plug fastened into top plate using three (3) 5/16" socket head cap screws (SHCS) 120° apart. 5 plugs and 15 SHCS required.
5. SHCS not shown for clarity

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.

West Valley MFHT
Package Lid

Drn. By	Date	SIZE	FSCM NO.	DWG NO	REV
[signature]	6/18/04	B		4005-DW-003	0
Proprietary Information		SCALE NTS		SHEET 5 of 5	

DRAFT

Bill of Materials

Item	Description	Quantity	Material
1	Plate 9'-4" x 4' x 3" (cut to shape)	1	Steel
2	14" ID Bent Plate (cut to fit)	2	Steel
3	Plate 10[illegible]" x 7[illegible]" x 1"	4	Steel
4	Plate 3'-1[illegible]" x 1'-7[illegible]" x 1" (cut to fit)	8	Steel
5	Plate 2" x 4" x 1"	2	Steel
6	Plate 2" x 3" x 2" (cut to fit)	2	Steel
7	Lifting Lug 8[illegible]" x 8" x 1" (cut to fit)	4	Steel
8	TPXC EE 5000 Slingmax - 30'-3[illegible]" Long	2	K-Spec Fiber
9	2[illegible]" x 6" Turnbuckle (jaw and jaw)	4	Steel
10	Deleted		
11	Plate 24" x 14" x 1"	4	Steel
12	Plate 24" x 8" x 3"	2	Steel
13	Plate 24" x 3" x 1"	2	Steel
14	Plate 12" x 9" x 1"	12	Steel
15	Plate 8[illegible]" x 5" x 1"	8	Steel
16	Triangular Gusset Plate 12" x 12" x 1"	4	Steel
17	Plate 27" x 24" x 1" (cut to fit)	1	Steel
18	Bent Plate 24" x 1" x 7' OR	1	Steel
19	Plate 24[illegible]" x 3[illegible]" x 1" (cut to fit)	4	Steel

Revisions

Rev	Description	Date	Approved
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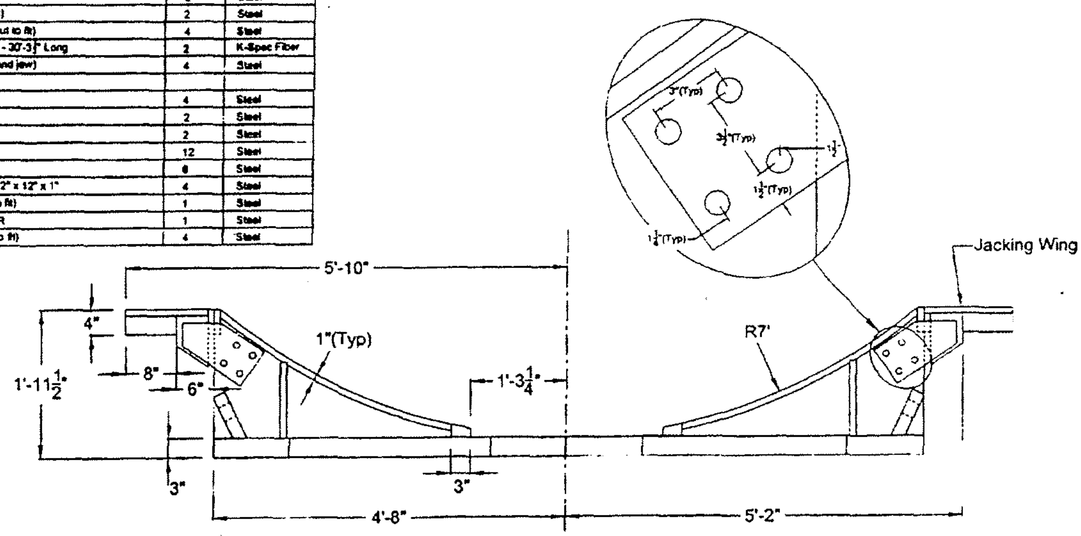


Reference Drawings

1	4005-DW-002
2	4005-DW-003
3	
4	

General Notes

1. Material: A36 minimum.
2. All surfaces to be primed and painted.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

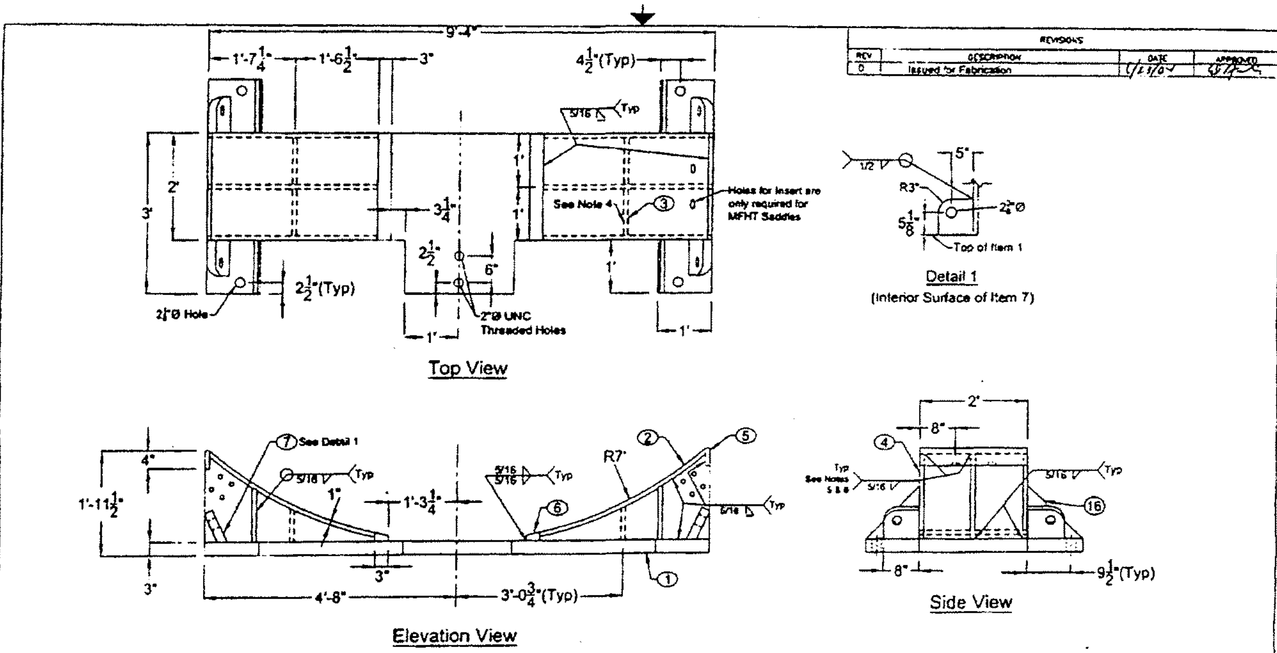
WMG inc.

West Valley MFHT
& CFMT Cradle

Dwn. By	Date	Size	FSCM No.	Dwg No.	Rev
[signature]	6/23/04	B		4005-DW-004	0

Proprietary Information | Scale: NTS | Sheet: 1 of 5

DRAFT



	Reference Drawings
1	4005-DW-002
2	4005-DW-003
3	
4	

General Notes

1. Material: as noted on sheet 1.
2. All surfaces to be primed and painted.
3. All welds 5/16" fillet or groove welds unless otherwise specified.
4. Item 3 welded on accessible side only.
5. Item 2 to be welded after Item 4s have been welded to Item 1.
6. Provide fillet weld between Item 2 and Item 4s as accessible.

All dimensions apply to reference temp. of 68° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG inc.

West Valley MFHT & CFMT Cradle Details

Dwn. By	Date	Size	FSCM No	Dwg No	Rev
[signature]	6/23/04	B		4005-DW-004	0

Proprietary Information | Scale NTS | Sheet 2 of 5

DRAFT

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
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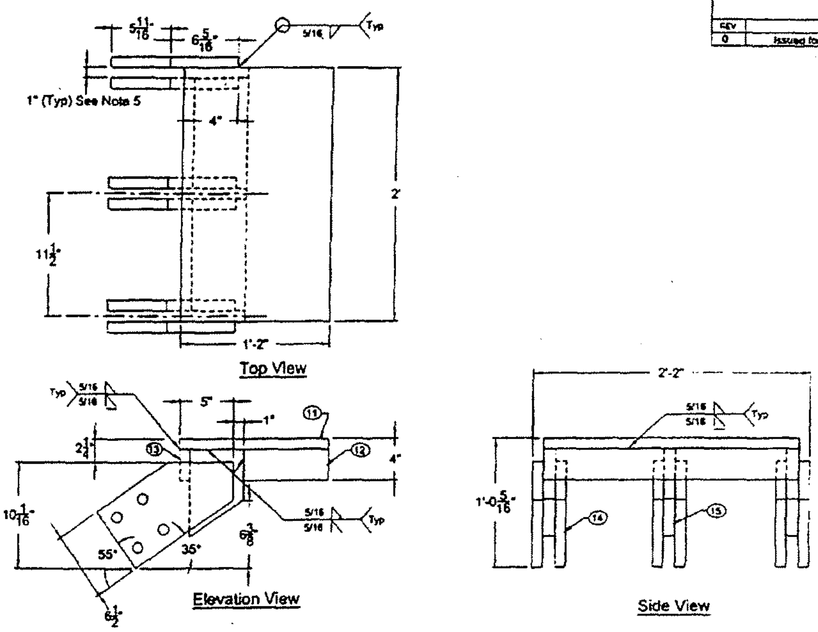


Reference Drawings	
1	4005-DW-002
2	4005-DW-003
3	
4	

General Notes

1. Material: As noted on sheet 1.
2. All surfaces to be primed and painted.
3. All plates are 1-inch thick unless otherwise noted.
4. All welds are 5/16 fillet or partial penetration.
5. Contact surface of plates ground to fit.

All dimensions apply to reference temp. of 66° F.
Tolerances on:
Fractions ±1/16"
Angles ± 1°
unless noted

WMG Inc.

West Valley MFHT & CFMT
Cradle Jacking Wing Details

Dwn. By	Date	SIZE	FSCM NO	DWG NO	REV
[signature]	6/23/04	B		4005-DW-004	0
Proprietary Information		SCALE NTS		SHEET 3 of 5	

Attachment A-8

Trailer Specifications

Approval Request Review Form

Part I (Completed by AR Coordinator)							
Project Name (optional)	Transportation of CFMT and MFHT						
AR Number	001	Revision		PO Number	19-099757-C-RC	Issue Date	7/21/04
AR Subject	QA/QC Program						
AR Coordinator	L. E. Rowell		Mail Stop	B1A	Ext.	4985	
Reviewer: Sheila Westcott WEPO			Type of Request: Approval				

The attached AR is forwarded for your review and comment in accordance with EP-5-003, Approval Requests. Your response is required by 7/26/04 (Date) ([ ] no response required) to ensure that the dispositioned AR is returned to the subcontractor in the time allocated by the Procurement Documents. Return this completed form to L. E. Rowell (AR Coordinator). Comments not received by the required date are subject to incorporation at the discretion of the Cognizant Engineer.

Part II (Completed by AR Reviewer)

Disposition: [✓] Approved [ ] Conditionally Approved [ ] Disapproved [ ] Disapproved, No Resubmittal Required [ ] Receipt Acknowledged

Comments:

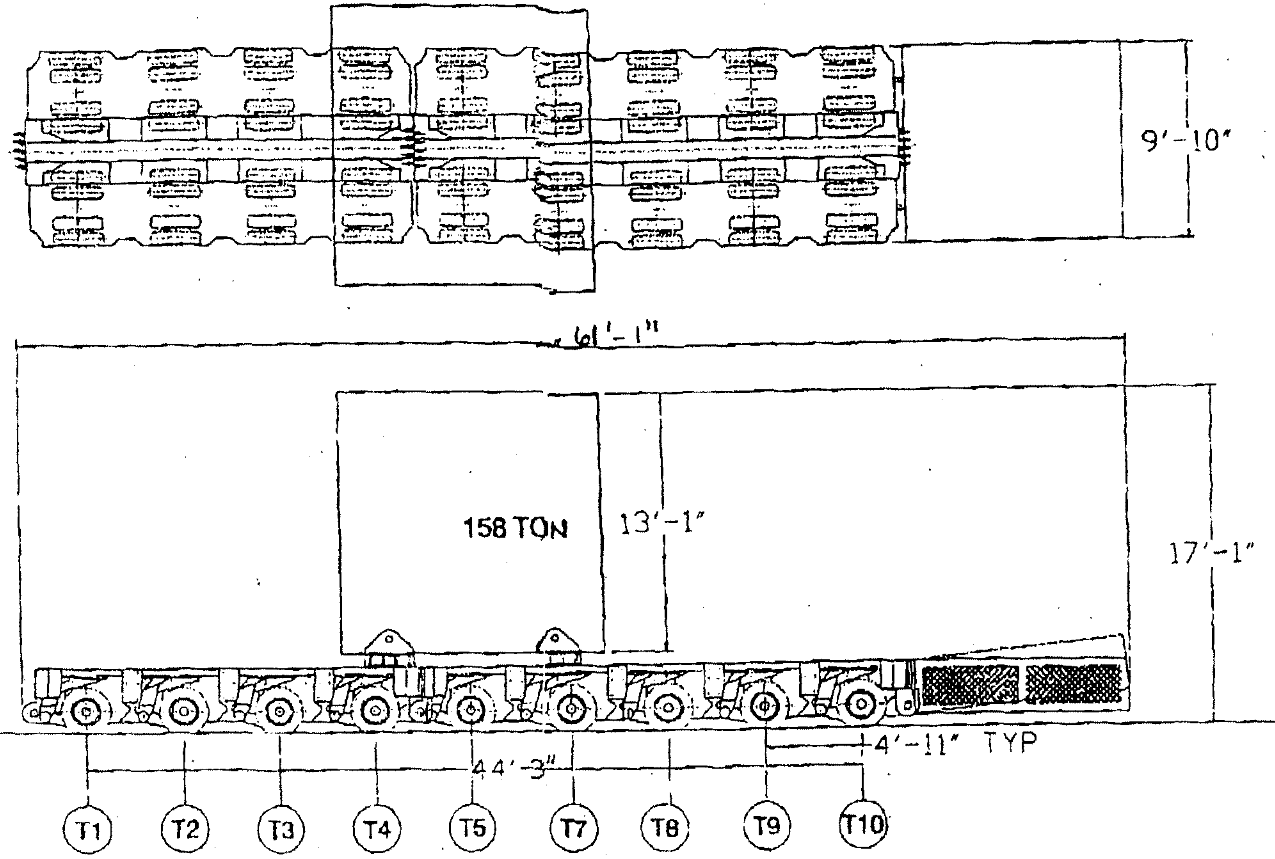
Recommended Action (if any):

Reviewer Signature	SM Westcott	Date	7/27/04

Part III
(Completed by Cognizant Engineer when AR Coordinator does not agree with AR Reviewer comment(s))

Comment Resolution with Reviewer:

Reviewer Concurrence		Date	
Cognizant Engineer		Date	
Comments Rejected	Cognizant Manager		Date



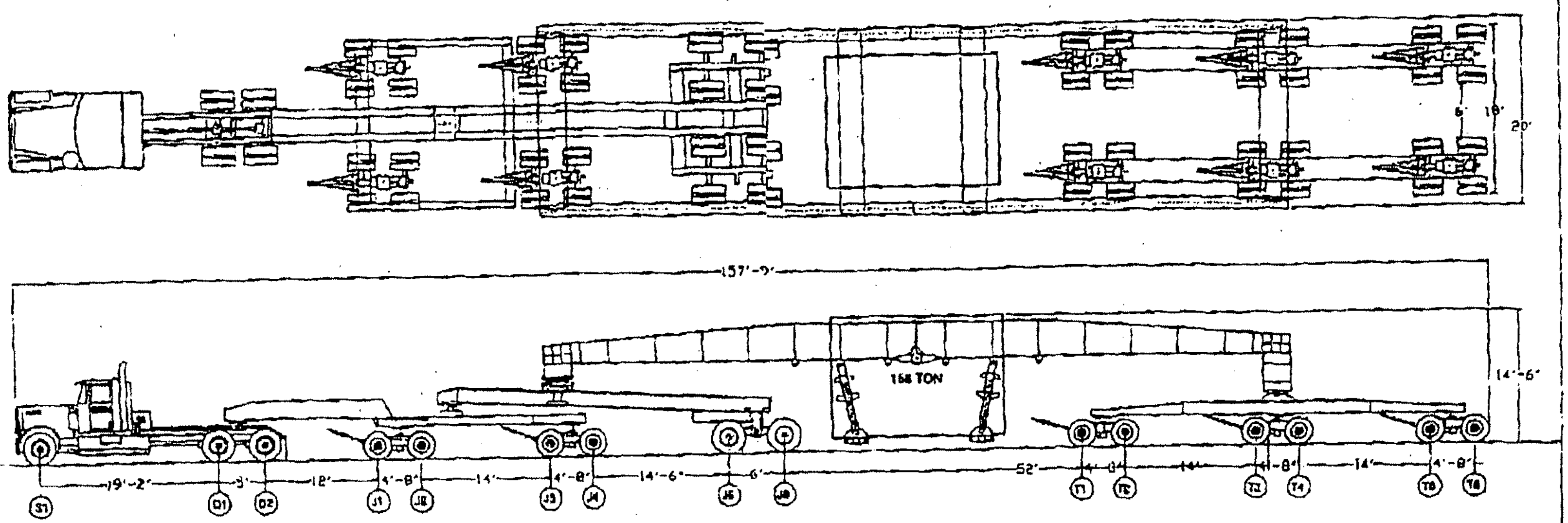
10 Axle Self-Propelled Goldhofer

Axle	Gross lbs	Wheels per line	Load-lbs per Wheel	Tire Width	Lat Inch Loading
T1	41267	8	5158	8.46	609 lbs/in
T2	41267	8	5158	8.46	609 lbs/in
T3	41267	8	5158	8.46	609 lbs/in
T4	41267	8	5158	8.46	609 lbs/in
T5	41267	8	5158	8.46	609 lbs/in
T6	41267	8	5158	8.46	609 lbs/in
T7	41267	8	5158	8.46	609 lbs/in
T8	41267	8	5158	8.46	609 lbs/in
T9	41267	8	5158	8.46	609 lbs/in
T10	41267	8	5158	8.46	609 lbs/in
Total	412,670	80			

CAST TRANSPORTATION, INC.

Ralph Coates
Operations Manager

9850 Havana Street • Henderson, CO 80640-8443
1-800-369-6374 • (303) 534-6376 • FAX (303) 853-3377
Cell: (303) 589-5835
E-mail: casttrans@aol.com



Axle	Gross lbs	Wheels per line	Load- lbs per Wheel	Tire Width	Lat Inch Loading
Tractor					
S1	14000	2	7000	14.0	500 lbs/in
D1	20000	4	5000	11.0	455 lbs/in
D2	20000	4	5000	11.0	455 lbs/in
Dual Lane 4 Dolly Jeep					
J1	40000	8	5000	11.0	455 lbs/in
J2	40000	8	5000	11.0	455 lbs/in
J3	40000	8	5000	11.0	455 lbs/in
J4	40000	8	5000	11.0	455 lbs/in
Dual Lane Jeep					
J5	40000	8	5000	11.0	455 lbs/in
J6	40000	8	5000	11.0	455 lbs/in
6 Dolly Walking Beams					
T1	40000	8	5000	11.0	455 lbs/in
T2	40000	8	5000	11.0	455 lbs/in
T3	40000	8	5000	11.0	455 lbs/in
T4	40000	8	5000	11.0	455 lbs/in
T5	40000	8	5000	11.0	455 lbs/in
T6	40000	8	5000	11.0	455 lbs/in
Total	534,000	106			

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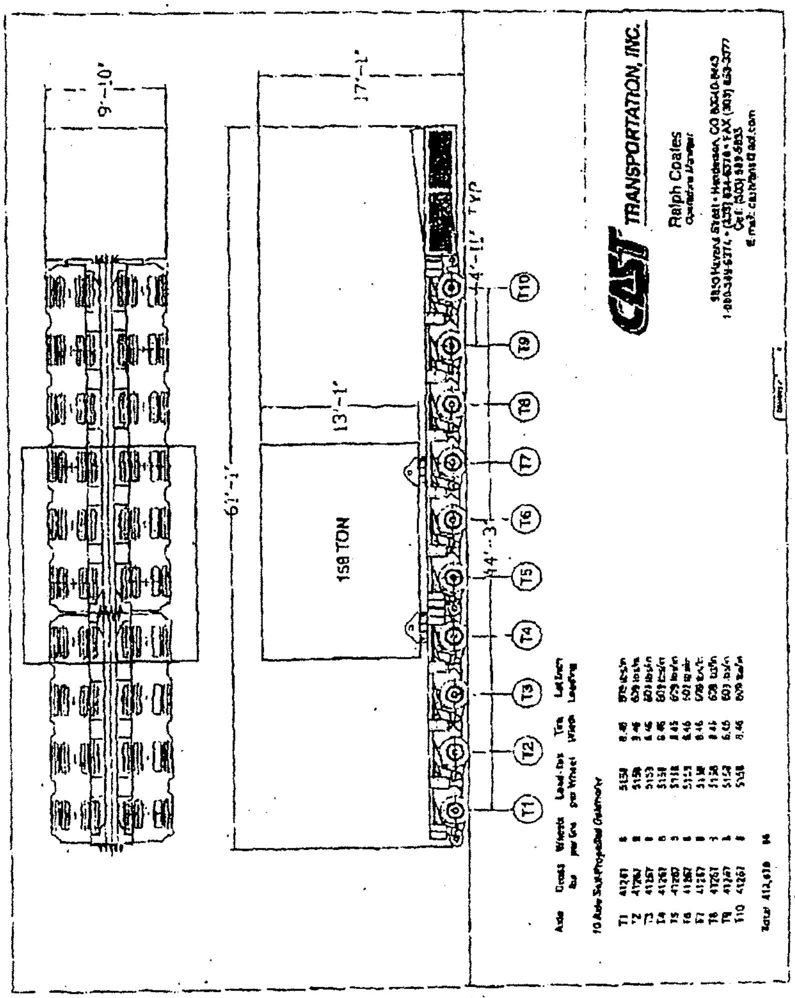
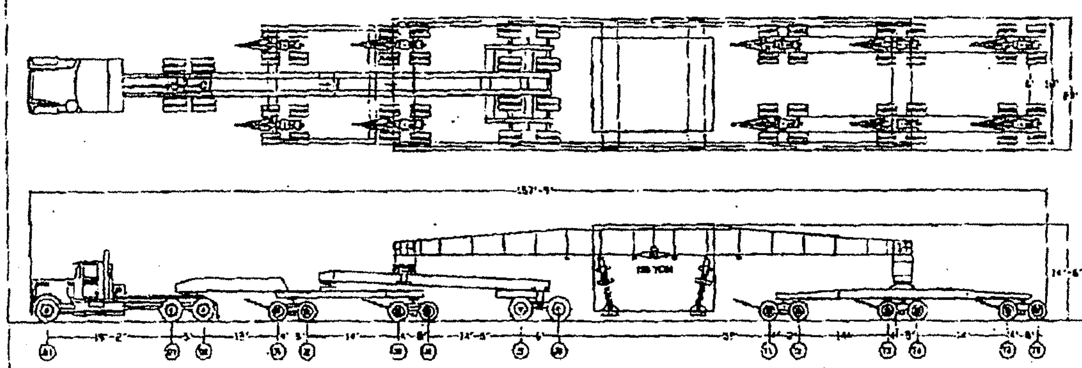


10 Axle Self-Propelled Goldhofer

Axle	Gross lbs	Wheels per line	Load lbs per Wheel	Tire Width	Lat. Each Loading
T1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
T10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]			



Axle	Gross lbs	Wheels per line	Load-lbs per Wheel	Tire Width	Lin Inch Loading
Tractor					
S1	14000	2	7000	14.0	500 lbs/in
D1	20000	4	5000	11.0	455 lbs/in
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Dual Lane 4 Dolly Jeep					
J1	40000	8	5000	11.0	455 lbs/in
J2	40000	8	5000	11.0	455 lbs/in
J3	40000	8	5000	11.0	455 lbs/in
J4	40000	8	5000	11.0	455 lbs/in
Dual Lane Jeep					
J5	40000	8	5000	11.0	455 lbs/in
J6	40000	8	5000	11.0	455 lbs/in
8 Dolly Walking Beams					
T1	40000	8	5000	11.0	455 lbs/in
T2	40000	8	5000	11.0	455 lbs/in
T3	40000	8	5000	11.0	455 lbs/in
T4	40000	8	5000	11.0	455 lbs/in
T5	40000	8	5000	11.0	455 lbs/in
T6	40000	8	5000	11.0	455 lbs/in
Total	534,000	108			

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