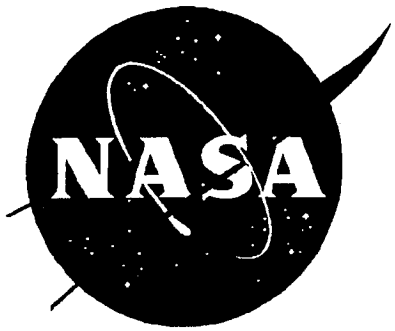
ATTACHMENT 12
WASTE ANALYSIS PLAN

(PERMIT APPLICATION SECTION 6)



NASA WSTF
Waste Analysis Plan

NASA Johnson Space Center
White Sands Test Facility

November 2005

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6.0 § 270.14(b)(3) – Waste Analysis Plan

This Waste Analysis Plan (WAP) has been prepared to support the Resource Conservation and Recovery Act (RCRA) Part B Permit Renewal Application for the NASA White Sands Test Facility (WSTF). WSTF is a treatment, storage, and disposal facility. Hazardous waste is managed in two permitted hazardous waste tank systems (the ETU and FTU) and at the CSU for 90 days or less under the provisions of 40 CFR 262.34. These waste management activities are performed under the Environmental Protection Agency (EPA) Identification Number NM8800019434 and a RCRA Operating Permit issued in February of 1993.

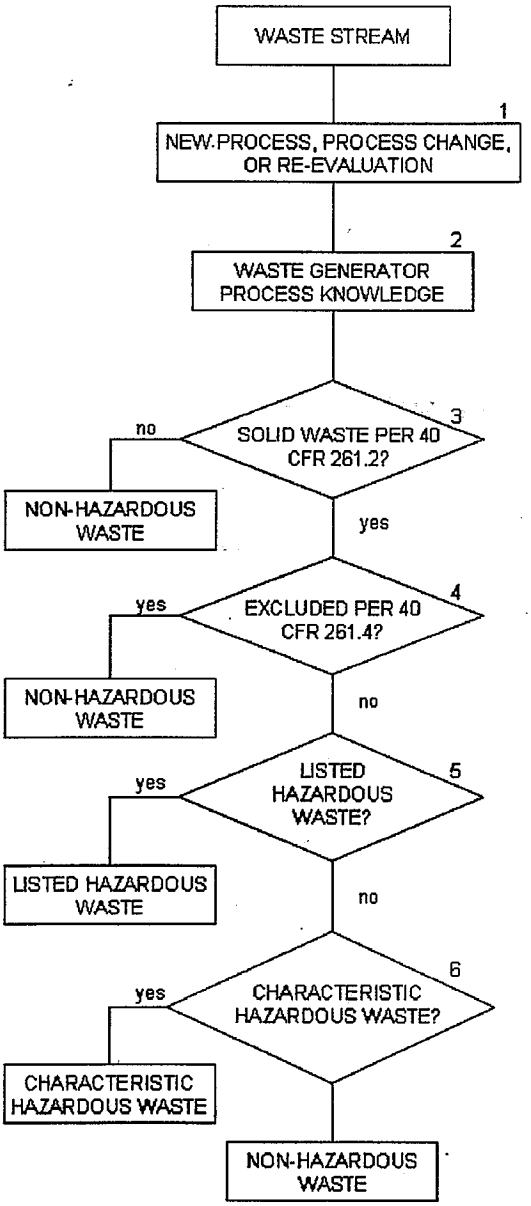
New Mexico Hazardous Waste Management Regulations 20.4.1.500 NMAC, incorporating 40 CFR 264.13 (a)(1) require waste characterization through chemical analysis and/or acceptable knowledge to provide the information required to manage, store and dispose of the waste in accordance with 40 CFR 264.13 and 40 CFR Part 268. This WAP was developed to meet these requirements. The content of this WAP follows guidance provided by "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual" (EPA, 1994) and addresses the following regulatory requirements:

- 40 CFR 264.13(a)(1) requires waste characterization through acceptable knowledge, analysis, or historical data to provide all the information needed to store, and ultimately dispose of the in accordance with 40 CFR 264.13 and 40 CFR 268 and are addressed per Section 6.3 of the WAP.
- 40 CFR 262.10 establishes standards for hazardous waste generators and 40 CFR 262.11 defines the requirements for hazardous waste determination. 40 CFR 262.10(c) incorporating 262.11 is addressed per a hazardous waste identification flow chart presented in Figure 6.1 of the WAP.
- 40 CFR 262.11, 40 CFR 268.7 including 268.7(a)(2), 40 CFR 268.9 including 268.9(a) require identification of the hazardous constituents in a waste stream to identify all applicable hazardous waste codes and all underlying hazardous constituents and a determination of whether the waste must be treated before it can be land disposed. The requirements of 40 CFR 262.11 and the determination of applicable treatment standards per 40 CFR 268.7 and 40 CFR 268.9, including 40 CFR 268.9(a), are addressed per Sections 6.3.1.2, 6.2.7 and 6.6.2 of the WAP.
- 40 CFR 264.13 and 268.7(a)(3)(iii) require a determination as to whether a routine waste generating process has changed sufficiently to create a new waste stream and alternative regulatory requirements. This requirement is addressed per Section 6.3.1.4.
- 40 CFR 262.10 (h) requires an owner or operator who initiates shipment of a hazardous waste from a treatment, storage, or disposal facility to comply with the generator standards per 40 CFR part 262. Included are the pre-transportation requirements per 40 CFR 262.30, 262.31, 262.32 and 262.33. These regulations incorporate the Department of Transportation regulation on hazardous materials, packaging, labeling, marking and placard under 49 CFR Parts 172, 173, 178 and 179.
- 40 CFR 270.23(d), 40 CFR 264.601(c)(1), and 40 CFR 268.7(a)(5) require a demonstration of the adequacy of the treatment activities (both permitted and non-permitted) with respect to meeting treatment goals and standards. For the ETU, this is addressed in Sections 6.2.2.4 through 6.2.2.7 and for Section 6.2.3.3 for the FTU.
- 40 CFR 270.25(a), 40 CFR 264.179, 40 CFR 264.200, 40 CFR 264.13(b)(6), 40 CFR 264.601(c)(1), 40 CFR 264.1050, and 40 CFR 264.1082 deal with compliance with the Subpart AA, BB and CC air emission regulations and are addressed in Sections 6.2.2.3, 6.2.3.3, and 6.2.4.1 of the WAP.
- The LDR dilution prohibition per 40 CFR 268.3(a) prohibits dilution as a substitute for adequate treatment and is addressed in Section 6.2.2.7 and 6.2.3.2.
- 40 CFR 270.15 (b)(1) and 264.13 (b)(6)) apply to storage areas that store containers holding waste that do not contain free liquids. The regulations require test procedures and results or other documentation or information to show that the wastes do not contain free liquids and are addressed per Sections 6.2.7 and 6.3.1.1 of the WAP.
- 40 CFR 270.15, 40 CFR 270.16, 40 CFR 264.172, 40 CFR 264.177, and 40 CFR 264.199 – The regulations apply to incompatible wastes and waste container or tank system compatibility and are addressed in Sections 6.2.1, 6.2.2.1, 6.2.2.2, 6.2.3.1, 6.2.3.2, 6.2.4, 6.2.4.1, and 6.2.7 of the WAP.
- 40 CFR 270.16 (j), 40 CFR 264.17 (a), and 40 CFR 264.198 (a) apply to ignitable and reactive waste in containers and tank systems and are addressed in Sections 6.2.1, 6.2.2.1, 6.2.2.2, 6.2.3.1, 6.2.3.2, 6.2.4, 6.2.4.1, and 6.2.7 of the WAP.

- 40 CFR 264.13 (c) provides the WAP requirements for facilities that receive waste from off-site facilities. WSTF does not receive waste from off-site facilities; therefore, 40 CFR 264.13 does not apply.

40 CFR 268.50 (f) deals with the storage requirements for liquid hazardous wastes containing poly chlorinated biphenyls (PCBs) at concentrations greater than or equal to 50 ppm. WSTF does not generate PCB waste at concentrations greater than or equal to 50 ppm, therefore, the 40 CFR 268.50 (f) does not apply.

Figure 6.1 Hazardous Waste Identification Flow Chart



1 For new projects, Environmental Department support during the planning and design phase (design reviews, system safety analysis, test readiness reviews, etc.)

2 Waste generating process information such as test plans, test reports, test procedures, test specifications, engineering calculations, material balances, raw materials, intermediate materials, by-products, final products, manufacturer's product information, process reactions, MSDS's, and analytical data.

3 WSTF Environmental Department review of process knowledge with respect to 40 CFR 261.2, "Definition of Solid Waste".

4 WSTF Environmental Department review of process knowledge with respect to 40 CFR 261.4, "Exclusions".

5 WSTF Environmental Department review of process knowledge with respect to:

- Listed wastes per 40 CFR subpart D listing descriptions per 40 CFR 261.31-261.33
- Mixed wastes per 40 CFR 261.3(a) and (b)
- Rebuttable presumption for used oil per 40 CFR 261.3(a)(2)
- Derived from wastes per 40 CFR 261.3(c), (d) and (g)

6 WSTF Environmental Department review of process knowledge with respect to 40 CFR subpart C if required sampling and analysis.

6.1 Facility Description

6.1.1 General Facility Description

WSTF is a preeminent resource for testing and evaluating materials, space flight components, and rocket propulsion systems. These services are provided to NASA, the Department of Defense, other Federal agencies, universities, and commercial industry. The primary mission of WSTF is to support NASA's Space Shuttle and Space Station Programs. As the official Johnson Space Center (JSC) Propulsion Systems Development Facility, the WSTF rocket propulsion program possesses unique test expertise in hypergolic propellant handling and training and is the Shuttle Fleet Leader for testing orbital maneuvering and reaction control subsystems.

WSTF has been a part of NASA JSC since its construction in 1963. The site's primary mission is to provide the expertise and infrastructure to test and evaluate spacecraft materials, components, and rocket propulsion systems to enable the safe human exploration and utilization of space. Beginning with Project Apollo in the early 1960s, WSTF has supported every United States human exploration space flight program and WSTF continues to play a key role in the nation's space effort by evaluating materials and components for use in propulsion, power generation, and life-support systems, crew cabin equipment, payloads, and experiments carried aboard the Shuttle Orbiter and the International Space Station.

Numerous full-scale propulsion systems for the Apollo Service Propulsion and Lunar Modules, Space Shuttle Orbiter, and the International Space Station, as well as commercial and military upper stages and planetary exploration spacecraft, have been developed and qualified through exhaustive simulated mission duty cycle testing. WSTF is also evaluating upgraded or redesigned Shuttle Orbiter components to extend service life, enhance performance, and improve mission safety. WSTF is formally certified to perform precision cleaning and depot-level refurbishment of Shuttle orbital maneuvering engines, reaction control system thrusters, and several other flight-critical propulsion system components.

The scientific investigation of explosion phenomena at WSTF is aimed at improving safety at launch facilities and other areas where hazardous materials are used. Using ultra high-speed instrumentation to measure the effects of exploding liquid and solid propellants, WSTF can more precisely define safety and structural requirements for new and existing launch facilities.

6.1.2 Description of Facility Processes and Activities

The five NASA Offices that generate waste at WSTF are:

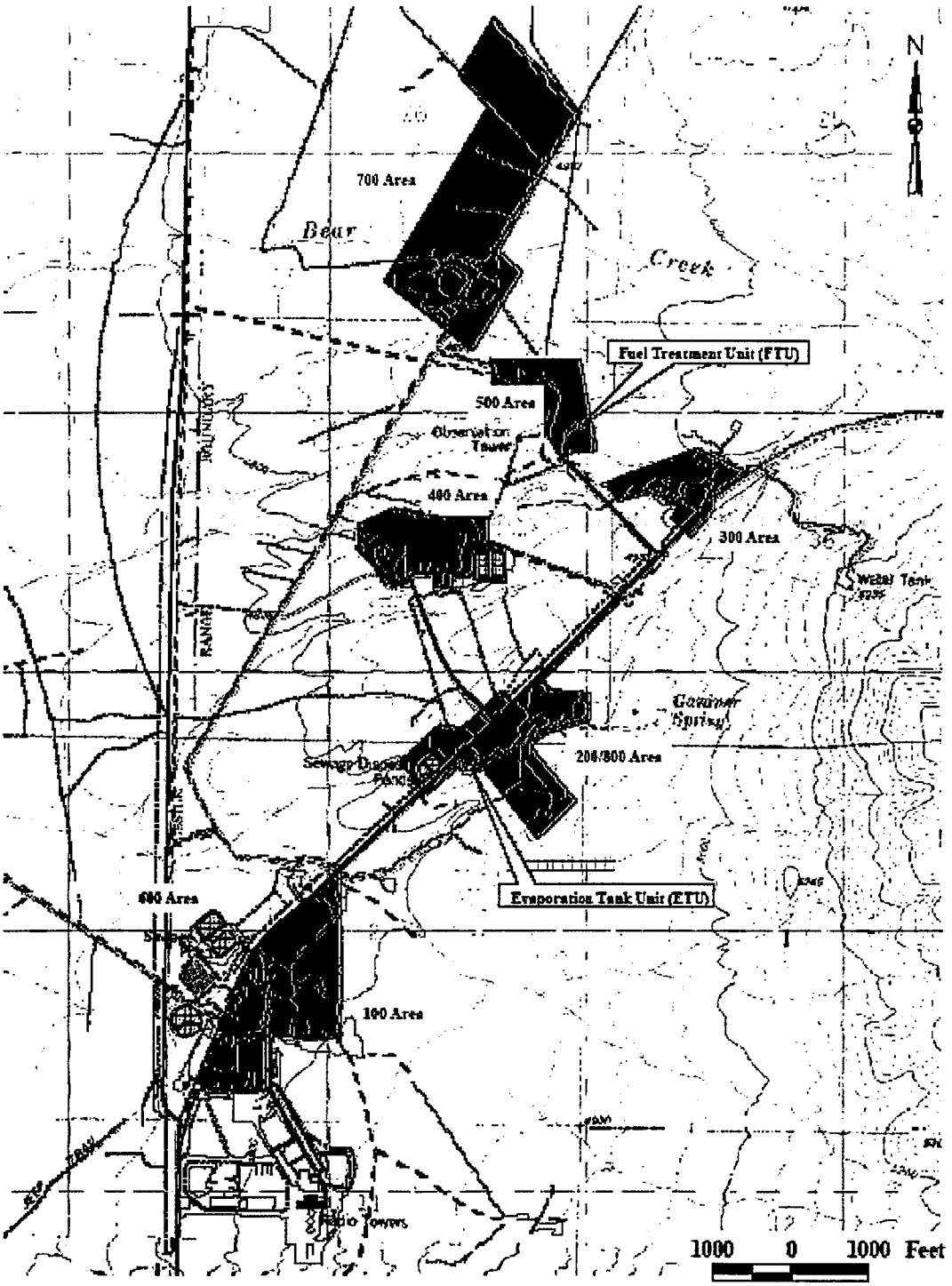
- Propulsion Test;
- Laboratories
- Engineering;
- Environmental; and
- Quality Assurance, Reliability and Safety

Figure 6.2 provides a site map to identify the Test Areas located within WSTF industrial boundaries. Research, development and test activities are performed by the Propulsion Test Office and the Laboratories. The other technical areas are generally associated with site support. The following sections provide general descriptions of the five technical areas.

6.1.2.1 Propulsion Test

Propulsion Test conducts tests on spacecraft rocket propulsion and associated systems to simulate and evaluate the effects of phenomena and variables encountered in spaceflight and related ground operations, define system operating characteristics, and identify hardware and procedural deficiencies. These tests typically culminate in qualification of the rocket propulsion system and related hardware for spaceflight and quantification of acceptable operating parameters.

Figure 6.2 Test Areas located within WSTF industrial boundaries



Propulsion Test also provides the infrastructure and expertise to perform Depot-level repairs and failure analyses on Shuttle Reaction Control System (RCS) and Orbital Maneuvering System (OMS) engines and related components. They coordinate test requirements and define the necessary facilities, systems, equipment, modifications, and utilization of those assets; manage test conduct, data reduction/analysis, and test reporting necessary to meet those requirements; and manage the associated cost and schedule. In addition to project management, they manage maintenance and operation of test facilities and systems necessary to support propulsion systems testing for the Space Shuttle, and other current and future NASA spacecraft, as well as maintenance and repair of Shuttle propulsion system flight hardware.

Propulsion tests are performed in the 300 and 400 Areas. Depot-level repairs are performed at the Component Test Facility (CTF) located in the 200 Area North Highbay.

Propulsion test activities generate hazardous waste in the 300, 400, and CTF Areas. Waste generated is associated with Test Stands/Cells: 301; 302; 303; 328; 401; 402; 403; 405; 406; and CTF. Hazardous waste generated in the Propulsion Test Areas is managed with the assistance of the NASA WSTF Individual Waste Profile Sheet program, and is managed in containers in satellite accumulation areas and in 90 day areas pursuant to 40 CFR 262.34. No hazardous waste is treated or stored in tanks in these Areas. Universal waste is also generated and managed in these Areas.

6.1.2.2 Laboratories

The Laboratories support site testing and conduct research and development activities. They provide the facilities and expertise to: test and evaluate materials; perform component verification and qualification tests; determine materials/fluids compatibility; evaluate hazards and determine use parameters for reactive, explosive, and toxic materials/fluids; and evaluate hazards due to meteoroid and debris impact. Activities include: NASA uniform materials tests; a wide range of component engineering, development, acceptance, and qualification tests; failure analyses; oxygen hazards assessment; ignition and combustion testing; propellant hazards assessment; propellant characterization; free field blast studies; hypervelocity impact testing; space environment simulation testing; explosion hazards assessments; and materials compatibility testing. The Laboratories also manage small-scale, detailed scientific analyses, as well as large, long-term multi-disciplined projects. The Laboratories activities are primarily performed in the 200, 250, 270, 272, and 800 Areas.

6.1.2.3 Engineering

Engineering provides technical services and maintains and operates institutional facilities required at WSTF. Technical services include: mechanical and electrical calibration; photography; precision cleaning; and fluid component refurbishment. Institutional facilities support includes: maintenance and operation of buildings, structures, and utility systems; maintenance of roads and grounds; machining; and welding.

Technical services are performed primarily in the 200 Area. Machining operations are performed primarily in the 100 Area. The other institutional support activities are performed within all industrial areas of the WSTF site.

6.1.2.4 Environmental

Environmental oversees WSTF's environmental compliance, waste management, contamination assessment, and remediation activities. WSTF's permitted hazardous waste management units, the Evaporation Tank Unit (ETU) and the Fuel Treatment Unit (FTU), are located in the 200 and 500 areas (see Figure 6.2). Contamination assessment activities are performed in all regions of WSTF. Groundwater remediation activities are currently focused on the construction of a groundwater remediation system located west of WSTF's Industrial Area. Operations of this system will be in accordance with an Interim Measures Work Plan approved by the NMED.

6.1.2.5 Quality Assurance, Reliability, and Safety Office

Quality Assurance, Reliability, and Safety waste generating activities are associated with WSTF Emergency and Medical Services and the use of a firing range for firearms qualification of security personnel. Emergency and Medical Services are located in the 100 area. The WSTF security firing range is located in the 150 area.

6.2 Description of Hazardous Waste Management Activities

6.2.1 Identification of Hazardous Waste Managed at WSTF

An illustration of waste generators with respect to the NASA Offices at WSTF is presented in Figure 6.3. Waste generated at WSTF is segregated into waste categories related to chemical and physical properties of the waste. A waste category is defined as waste material that is generated from a single process or from activities that produce waste with similar chemical and physical properties, hazardous constituents, and constituent concentrations. These categories are structured to support appropriate waste management, either managed in a Container Storage Unit (CSU) for 90 days or less under the provisions of 40 CFR 262.34, transferred to the FTU, or discharged to the ETU through the hazardous waste drain lines or at the ETU pumping station.

Table 6.1, Table 6.2 and Table 6.3 provide a general description of the waste categories that are currently managed in a CSU for 90 days or less, at the ETU, and at the FTU. Typical waste generation scenarios that identify the waste generating processes with respect to the waste categories are presented in Appendix 6-A. The scenarios provide a general representation of the wastes and the waste generating processes at WSTF.

Due to the unique nature of research, development and test activities at WSTF, the scenarios may not be all inclusive, but provide a general framework for development of the Waste Analysis Plan.

6.2.2 200 Area Evaporation Tank Unit (ETU)

6.2.2.1 Description

The 200 Area Evaporation Tank Unit (ETU) consists of two tanks that are 79 feet in diameter and six feet, three inches in height. Each tank has a capacity of 147,000 gallons at maximum capacity (two feet of freeboard inside the tank). The tanks are constructed of ¼ inch carbon steel plates that are welded together to form the tank structure. The tank structures are lined by two layers of geotextile fabric, which provides primary and secondary containment, with the steel tank providing tertiary containment. Both tanks are equipped with leak detection. A steel work platform runs between the top of both tanks to allow for sample collection, depth measurements, and visual inspection. Containerized waste is brought to the tanks from more remote parts of the site and pumped into the tanks from the areas pumping station. The pumping station provides a concrete pad for waste transfer operations. The pumping station's pad is curbed on all sides and is sloped to a sump to for containment of any waste spills. For security purposes, the tanks and all related structures are completely surrounded by a seven foot high chain link fence. ETU drawings and diagrams are provided in Appendix 6-B. Photos of the ETU are provided in Appendix 6-C.

The Hazardous Waste Drain Line (HWDL) is the piping system that carries wastes from the 200 and 800 Areas. All segments of the primary drain line that are underground are double walled. Above ground segments of the drain line that tie into the primary drain line are made from single walled piping with welded joints. All segments of the drain line are constructed of materials that are compatible with the waste being conveyed. The HWDL Sump is located where the three main branches of the HWDL converge between the 200 and 800 areas and the tanks.

Figure 6.3 WSTF Waste Generators

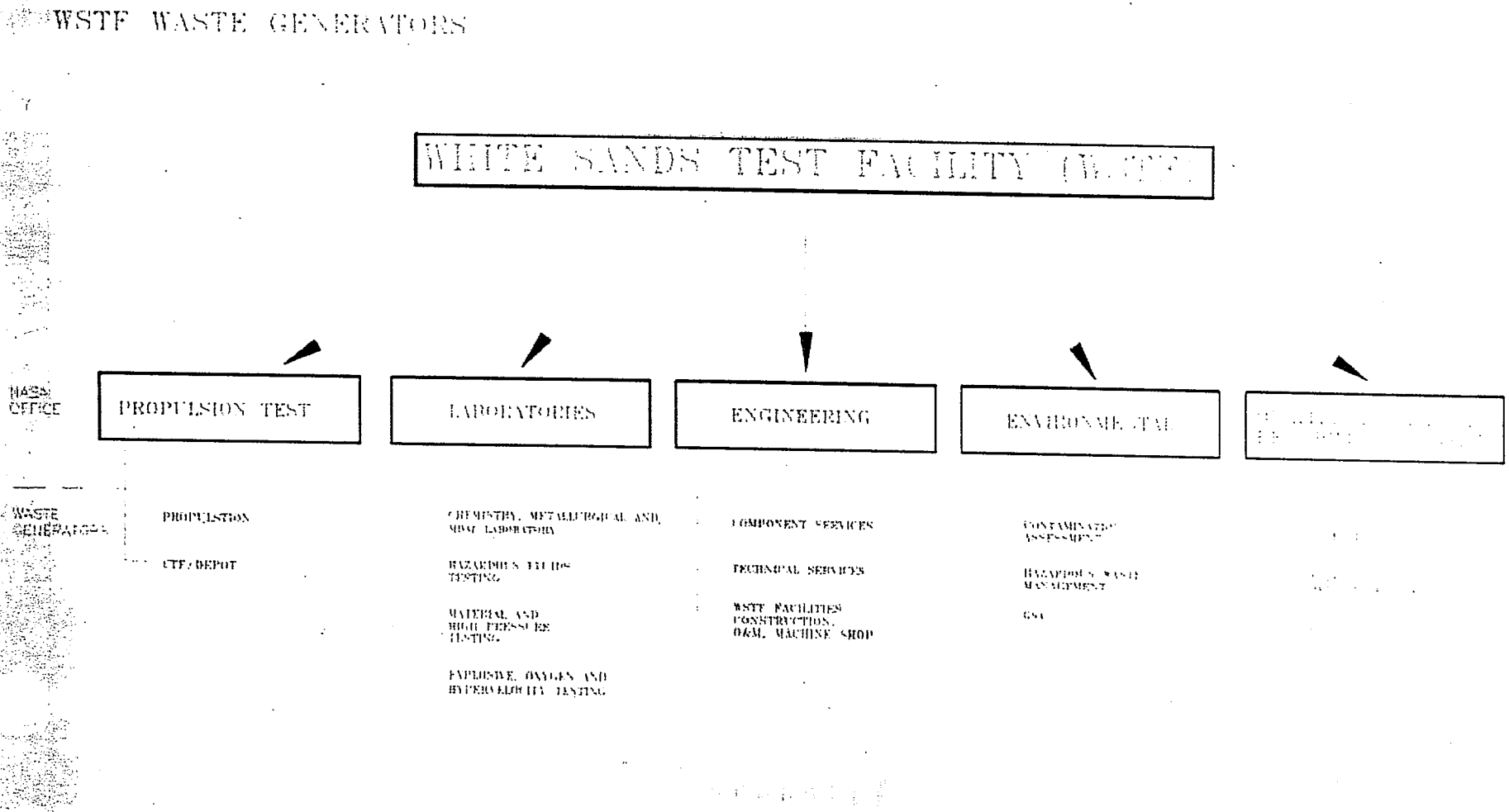


Table 6.1 Typical CSU Waste Descriptions

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	LDR, WW or NWW
Degreasing Solvents	Petroleum naptha based solvent used in routine degreasing/cleaning of equipment or components.	Acceptable Knowledge - Product information and MSDSs.	I	Ignitability-D001 UHCs (40 CFR Part 268.48)	NWW
Isopropyl Alcohol	Spent isopropyl alcohol generated from the component services precision cleaning process.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal) and process knowledge.	I	Ignitability-D001	NWW
Liquid Paints	Unused, off-specification, liquid coating, and sealant-type products, including but not limited to, commercial paints, coatings, and adhesives or sealants generated during material testing operations or routing facility operation and maintenance.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal), product information, and MSDSs.	I E H T	Ignitability-D001 Cadmium-D006 Chromium-D007 Lead-D008 Mercury-D009 Methyl ethyl ketone-D035 UHCs (40 CFR Part 268.48) P and U listed Wastes **Note:** Where applicable and when information is available to determine the sole active ingredient the appropriate P or U listing will be determined.	NWW
Waste Organic Acid Solutions	Waste organic acid solutions from various WSTF operations having volatile organic concentration at the point of waste origination that are above the organic air emission standards as defined by 40 CFR Parts 264/265, Subpart CC.	Acceptable Knowledge - Process knowledge, product information and MSDSs.	C	Corrosive-D002 UHCs (40 CFR Part 268.48)	NWW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	EDR, WW or NWW
Organics	Unused, off-specification products, spent organics compounds, and organic solvents consisting of but not limited to, acetone, Bis-2-ethylhexyl phthalate, chloroform, cyclohexane, ethyl benzene,methyl ethyl ketone, methylene chloride,methyl isobutyl ketone, toluene, 1,1,1trichloroethane, or xylenes. Organic waste generating processes include but are not limited to chemistry laboratory operations and during routine operation and maintenance of the facility or equipment.	Acceptable Knowledge - Evaluation of the waste generating process, historical data from fingerprint analysis (off-site disposal), product information, and MSDSs.	I E H T	Ignitability-D001 Chloroform-D022 Methyl ethyl ketone-D035 Spent solvents listed in F001-F005 UHCs (40 CFR Part 268.48) P and U Isted Wastes **Note:** Where applicable and when information is available to determine the sole active ingredient the appropriate P or U listing will be determined.	NWW
Lead Acid Batteries	Lead acid batteries are generated from numerous facility operations including automotive and heavy equipment maintenance and varied support operations that utilize lead acid batteries as a power source.	Acceptable Knowledge - Product information and MSDSs.	C E	Corrosive-D002 Lead-D008	NWW
Caustic Paint Remover	Sodium hydroxide-based cleaning solutions used for paint stripping operations.	Acceptable Knowledge Product information and MSDSs.	C E	Corrosive-D002 Cadmium-D006 Chromium-D007 Lead-D008 Mercury-D009	NWW
Lithium Batteries	Lithium batteries are generated from numerous facility operations where the batteries are used as a power source.	Acceptable Knowledge - Product information and MSDSs.	R	Reactivity-D003 UHCs (40 CFR Part 268.48)	NWW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	LDR, WW or NWW
Machine Shop Oils	Spent cutting oils generated during machining operations at WSTF.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal) and process knowledge.	E	Lead-D008 UHCs (40 CFR Part 268.48)	NWW
NiCad Batteries	NiCad batteries are generated from numerous facility operations where the batteries are used as a power source.	Acceptable Knowledge - Product information and MSDSs.	E	Cadmium-D006 UHCs (40 CFR Part 268.48)	NWW
Cured Paints	Unused or off-specification, solidified coating/sealant-type products including, but not limited to, commercial paints, coatings, adhesives or sealants generated during material testing operations or routing facility operation and maintenance.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal), product information, and MSDSs.	I E H T	Cadmium-D006 Chromium-D007 Lead-D008 Mercury-D009 Methyl ethyl ketone-D035 UHCs (40 CFR Part 268.48) P and U listed Wastes **Note:** Where applicable and when information is available to determine the sole active ingredient the appropriate P or U listing will be determined.	NWW
Oily Sludge	An oil, water and clay/sand/soil-type mixture that has the potential to be contaminated with RCRA listed or characteristic wastes. The waste is generated from processes including, but not limited to, equipment cleaning and well drilling.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal), product information, and MSDSs.	E	Cadmium-D006 Chromium-D007 Lead-D008 Any additional UHCs (40 CFR Part 268.48)	NWW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	LDR, WW or NWW
Photo Fixer Solution (after Silver Recovery)	Waste photo fixer solution after silver recovery.	Acceptable Kowledge - Product information, and MSDSs.	E	Silver-D011	WW
Hazardous Refuse	Spent materials generated during routine facility testing, operations, or maintenance that have the potential for contamination with solvents, oils, grease, RCRA regulated listed waste, or characteristic wastes.	Acceptable Kowledge - Historical data from fingerprint analysis (off-site disposal).	T	Chromium-D007 Lead-D008 Silver-D011 Chloroform-D022 Methyl ethyl ketone-D035 Spent Solvents- F001-F005 UHCs (40 CFR Part 268.48)	NWW
Lead Contaminated Refuse	Softgoods type materials contaminated with lead. Waste is generated from processes including, but not limited to, operation of the WSTF security services firing range.	Acceptable Kowledge - Process knowledge, materials are only in contact with lead-type hazardous waste constituents.	E	Lead-D008 UHCs (40 CFR Part 268.48)	NWW
Mercury In Manufactured Articles	Materials containing or contaminated with mercury such as mercury thermometers, mercury lights, mercury switches and mercury contaminated wipes and absorbents. Waste is generated from processes including but not limited to operation of the remediation facility, calibration laboratory and chemistry laboratory.	Acceptable Kowledge - Historical data from fingerprint analysis (off-site disposal) and product information MSDSs.	E	Mercury-D009	NWW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	LDR, WW or NWW
Mercury, Metallic	Metallic liquid mercury from equipment such as manometers. Waste is generated from processes including, but not limited to, operation of the calibration laboratory.	Acceptable Knowledge - Product information MSDSs.	E	Mercury-D009	NWW
Passivating Solution	A solution of nitric acid or nitric acid and sodium dichromate used to passivate hardware during Wstf component services cleaning process.	Acceptable Knowledge - Product information MSDSs.	C E	Corrosive-D002 Chromium-D007 UHCs (40 CFR Part 268.48)	WW
Vacuum Pump Oil	Used oil (halogenated and non-hologenated) from vacuum pumps and other equipment that has the potential to be contaminated with RCRA listed or characteristic wastes.	Acceptable Knowledge - Historical data from fingerprint analysis (off-site disposal), product information and MSDSs.	E	Selenium -D010 UHCs (40 CFR Part 268.48)	NWW
Fuel Contaminated Softgoods	Non-metallic solid materials from process associated with hydrazine-type propellants where the propellant permeates or is absorbed by the material and is not easily decontaminated. These materials include, but are not limited to items such as personnel protective equipment, wipes, component gaskets, seals and O rings, and other absorbent materials.	Acceptable Knowledge - Process knowledge, materials ore only in contact with hydrazine-type hazardous waste constituents.	H T	Methyl hydrazine-P068 1,1-Dimethylhydrazine-U098 Hydrazine-U133	NWW

[1] -Indicates the potential to be present at the point of generation.
[2] -Waste Classifi cation Definitions
(C) - Indicates Corrosive Waste per 40 CFR Part 261.22 and 261.30(b)
(E) - Indicates Toxicity Characteristic Waste per 40 CFR Part 261.24 and 261.30(b)
(H) - Indicates Acute Hazardous Waste per 40 CFR Part 261.30(b) and 261.33
(I) - Indicates Ignitable Waste per 40 CFR Part 261.21 and 261.30(b)
(R) - Indicates Reactive Waste per 40 CFR Part 261.22 and 261.30(b) .
(T) - Indicates Toxic Waste per 40 CFR Part 261.30(b) and 261.31

Table 6.2 ETU Waste Descriptions

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	RCRA WW or NWW
Acidic Cleaning Solution	Phosphoric acid based cleaning solution.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive -D002 Chromium -D007 UHCs (40 CFR Part 268.48)	WW
Ammonia Waste Water	Waste water from ammonia emission control systems or waste from operations where aqueous ammonia is used as a process fluid.	Acceptable knowledge supplemented by sampling and analysis (as required).	C	Corrosive -D002	WW
Caustic Cleaning Solution	Sodium hydroxide based cleaning solution.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive -D002 Chromium -D007 UHCs (40 CFR Part 268.48)	WW
Citric Acid Solution	Citric acid solution used in cleaning, descaling and derusting during operations	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive -D002 Chromium -D007 UHCs (40 CFR Part 268.48)	NWW
Pickling/Etching Solution	Nitric hydrofluoric acid based cleaning solution.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive -D002 Chromium -D007 UHCs (40 CFR Part 268.48)	WW
Oxidizer Contaminated Waste Water	Waste water from oxidizer (N_2O_4-type propellants) decontamination processes and waste water from the servicing of oxidizer emission control systems.	Acceptable knowledge supplemented by sampling and analysis (as required).	C H	Corrosive -D002 Acute Toxic-P078	WW
Nitric Hydrofluoric Solution	A solution of nitric acid or nitric acid and sodium dichromate used passivate hardware during the WSTF component services precision cleaning process.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive -D002 Chromium -D007 UHCs (40 CFR Part 268.48)	WW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	PWW or NWW
Contaminated Groundwater	Groundwater contaminated with WSTF groundwater contaminants generated during operations.	Acceptable knowledge - analytical data from groundwater sampling and analyses	T	F001 - F002 Constituents of Concern: Trichloroethylene, Tetrachloroethylene, Trichlorofluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane	WW
Clean Room Rinse Water	Potable water, deionized water, and ultrapure water used in rinsing operations as part of the WSTF's component services precision cleaning process.	Acceptable knowledge supplemented by sampling and analysis (as required).	Non-Hazardous	NA	NA
Contact-Contaminated Waste Water	Accumulated precipitation and test process water.	Acceptable knowledge supplemented by sampling and analysis (as required).	Non-Hazardous	NA	NA
Detergent-Type Waste Water	Detergent based cleaning solution.	Acceptable knowledge supplemented by sampling and analysis (as required).	Non-Hazardous	NA	NA
Metallurgical Lab Waste Water	Waste water generated during metallurgical laboratory metal/material preparation, metal etching and equipment maintenance.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive - D002 Chromium - D007 UHC's (40 CFR Part 268.48)	NWW
Chemical Lab Waste Water	Waste water generated during chemistry laboratory rinsing/cleaning operations and equipment maintenance.	Acceptable knowledge supplemented by sampling and analysis (as required).	C E	Corrosive - D002 Chromium - D007 UHC's (40 CFR Part 268.48)	NWW
Photo Fixer Solution after Silver Recovery	Waste photo fixer solution after silver recovery.	Acceptable knowledge supplemented by sampling and analysis (as required).	E	Silver - D011	WW

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	RCRA WW or NWW
Evaporation Tank Water	Waste Streams Discharged to Evaporation Tanks	Acceptable knowledge supplemented by sampling and analysis (as required).	C T H	Corrosive D002 Treatment residual-F001 Treatment residual-F002 Treatment residual- P076 **Note:** Only wastes that have been treated to below DR treatment standards are discharged to the ETU with the exception of D002.	WW
Evaporation Tank Sludge	Sludge in Evaporation Tanks after condensing liquid	Acceptable knowledge supplemented by sampling and analysis (as required).	T H	Treatment residual-F001 Treatment residual-F002 Treatment residual- P076	WW

[1] - Indicates the potential to be present at the point of generation.
[2] - Waste Classification Definitions
(C) - Indicates Corrosive Waste per 40 CFR Part 261.22 and 261.30(b)
(E) - Indicates Toxicity Characteristic Waste per 40 CFR Part 261.24 and 261.30(b)
(H) - Indicates Acute Hazardous Waste per 40 CFR Part 261.30(b) and 261.33
(I) - Indicates Ignitable Waste per 40 CFR Part 261.21 and 261.30(b)
(R) - Indicates Reactive Waste per 40 CFR Part 261.22 and 261.30(b)
(T) - Indicates Toxic Waste per 40 CFR Part 261.30(b) and 261.31
NA - Indicates not applicable.

Table 6.3 Fuel Waste Descriptions

Waste Category	Waste Description/Waste Generating Process	Rationale for Waste Designation	Potential Waste Classification[2]	Potential Hazardous Constituents and EPA Waste Codes[1]	RCRA MWW or NMWW
Fuel Contaminated Waste Water	Waste water from fuel (hydrazine-type propellant) decontamination processes and waste water from the servicing of fuel (hydrazine-type propellants) emission control systems, including, but not limited, to emission control systems such as aspirators, vent tanks, cryotraps, and scrubbers.	Acceptable Knowledge - Process knowledge, the only materials used in the process are hydrazine-type fuels and water.	H R T	Methyl hydrazine-P068 1,1-Dimethylhydrazine-U098 Hydrazine-U133	NMWW
Waste Fuel	Unused or off-specification fuel (hydrazine-type propellants) including but not limited to unused fuel product samples from analyses performed in the 200 Area Chemistry Laboratory.	Acceptable Knowledge - Process knowledge, the only materials used in the process are hydrazine-type fuels.	H R T	Methyl hydrazine-P068 1,1-Dimethylhydrazine-U098 Hydrazine-U133	NMWW

[1] - Indicates the potential to be present at the point of generation.
[2] - Waste Classification Definitions
(H) - Indicates Acute Hazardous Waste per 40 CFR Part 261.30(b) and 261.33
(R) - Indicates Reactive Waste per 40 CFR Part 261.22 and 261.30(b)
(T) - Indicates Toxic Waste per 40 CFR Part 261.30(b) and 261.31

6.2.2.2 Waste Management

All wastes are characterized according to Section 6.3 of this plan. If the waste characterization process determines that treatment in the ETU is the proper disposal method, the waste will be transferred to the ETU.

Wastes enter the ETU from either the HWDL or from the pump station. The HWDL collects wastes from various points located in the 200 and 800 Areas. Collection points include decontamination sinks, fume hood sinks, and floor drains (see ETU drawings and diagrams in Appendix 6-B). Log books are maintained at each collection point to log wastes as they are discharged. All wastes flow through the HWDL to the evaporation tanks by gravity with the exception of wastes coming from the Component Services cleaning vats which are drained to a small lift-station tank (see ETU drawings and diagrams in Appendix 6-B). The lift station pumps wastes to a level of approximately 15 ft., where they are then transferred by gravity to the ETU.

Wastes are also received from the ETU pump station. Wastes that are brought to the ETU from more isolated areas of the site are moved in tankers and drums. Wastes are transferred from containers using a tank mounted, air driven, diaphragm pump or portable pumps, located on the pump station's unloading pad. These transfers will take place on the pump station's unloading pad in order to contain any leaks or spills.

The following provides a general summary of wastes received at the ETU from various facility operations (as provided in Appendix 6-A):

Propulsion Test:

- Oxidizer contaminated waste water; and
- Contact contaminated waste water.

Laboratories:

- Contact contaminated waste water;
- Chemistry lab waste water;
- Metallurgical lab waste water;
- Pickling/etching solution;
- Photo fixer solution (after silver recovery);
- Oxidizer contaminated waste water; and
- Ammonia waste water.

Engineering:

- Ammonia waste water (drafting);
- Photo fixer (photo lab);
- Clean room rinse water;
- Caustic cleaning solution;
- Acidic cleaning solution;
- Nitric/Hydroflouric acid solution;
- Detergent-type waste water;
- Citric acid;
- Oxidizer contaminated waste water;
- Pickling solution; and
- Passivating solution.

Environmental:

- Contaminated groundwater;
- Citric acid; and
- Contact contaminated waste water.

Quality Assurance, Reliability, and Safety:

- None.

Waste is treated at the ETU by waste reduction by evaporation, deactivation or neutralization. Waste reduction performed by evaporation is achieved through direct exposure of the waste contained in the tanks to the sun and wind. Waste reduction in the tanks is limited to weather conditions, e.g. temperature, at the tanks. Deactivation and/or neutralization of corrosive waste (resulting in a pH above 2 but less than 12.5) is achieved by dilution with water or waste water and the mixing of caustic and acidic waste reagents prior to or immediately after discharge to the tanks. All accumulated sludge in the tanks that are removed during liner repair or replacement, are shipped to a permitted off-site disposal facility for treatment.

The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA Subpart CC regulations) and under the provisions of 40 CFR 268.50(e) (LDR regulations). All waste discharged to the ETU is limited to waste with an average volatile organic (VO) concentration of less than 500 ppmw, as determined at the point of waste origination. The LDR treatment standard, with respect to corrosivity, is met prior to or immediately after discharge to the ETU. Fuel contaminated waste water (P068, U098, and U133 listed hazardous wastes) is restricted from discharge to the ETU. The waste discharged to the ETU is limited to investigative derived waste (IDW) that meets LDR treatment standards, oxidizer contaminated waste water treated by ADGAS, and corrosive wastes that meet LDR treatment standards.

6.2.2.3 Subpart AA, BB, and CC Compliance

The ETU does not use any of the processes identified in 40 CFR 264.1030(b); and is therefore exempt from the air emission regulations for process vents per 40 CFR Subpart AA. The ETU does not manage RCRA-regulated wastes with organic concentration greater than 10% by weight and is also exempt from the RCRA subpart BB regulations. The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1). NASA has developed a Subpart CC Compliance Plan to limit wastes managed in the ETU to those with an average volatile organic (VO) concentration of less than 500 ppmw, as determined at the point of waste origination. The NASA WSTF ETU RCRA Subpart CC Compliance Plan is provided in Appendix 6-D.

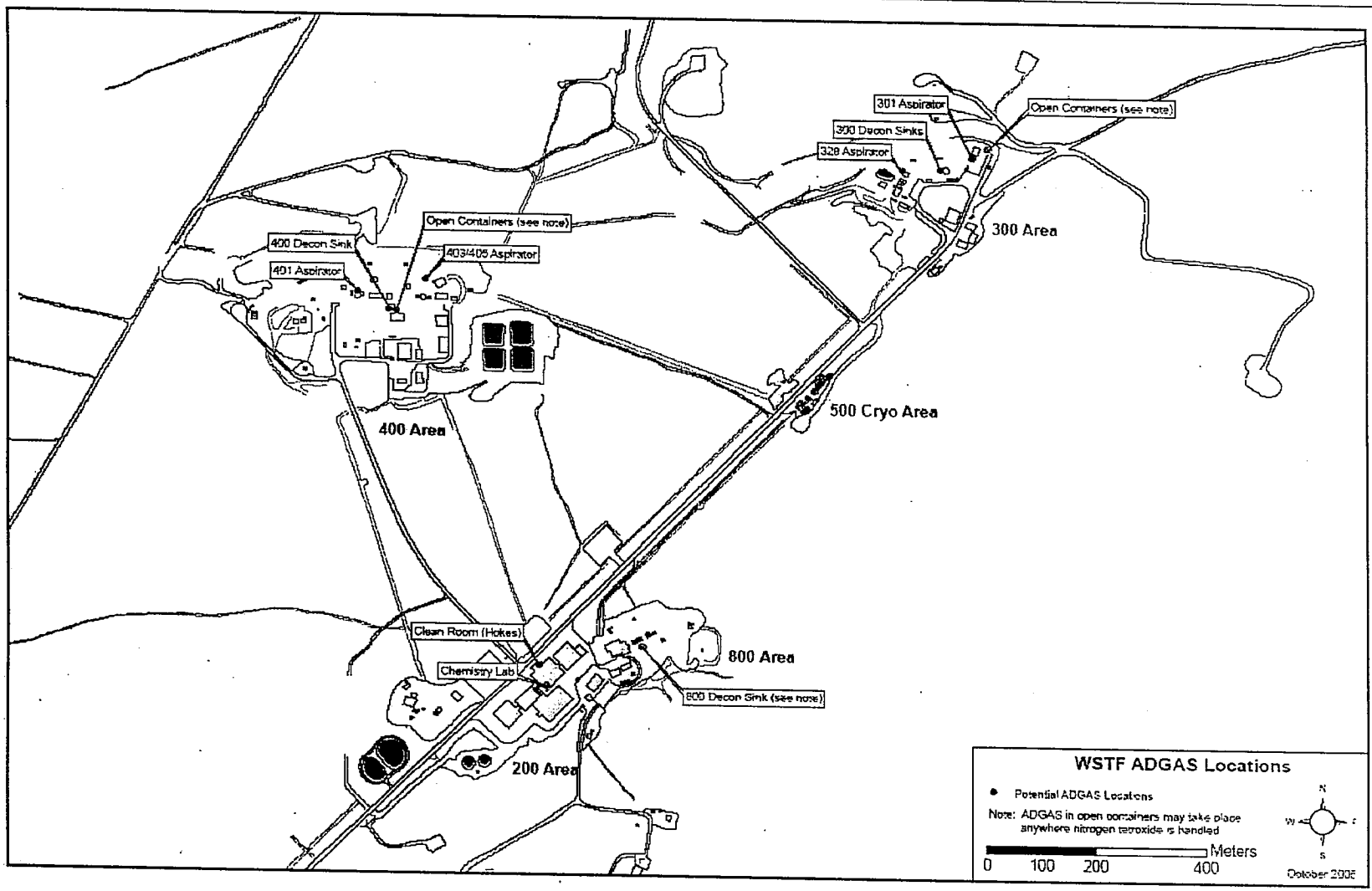
6.2.2.4 Fuel Waste Water Management Plan

Fuel contaminated waste water (P068, U098, and U133 listed hazardous wastes) will be restricted from discharge to the ETU. NASA has developed a Fuel Waste Water Management Plan to segregate and define the P068, U098, and U133 listed hazardous waste and non-hazardous waste water. The NASA WSTF Fuel Waste Water Management Plan is provided in Appendix 6-E.

6.2.2.5 Oxidizer Waste Water Management

NASA treats P078 listed hazardous wastes in containers regulated under 40 CFR 262.34 at the point of generation. Figure 6.4 provides locations where ADGAS operations may occur. D002 waste streams maybe derived from the treatment of P078 wastes by ADGAS (40CFR Part 268.40) treatment. These potential D002 waste streams are subsequently discharged to the ETU where DEACT (40CFR Part 268.40) treatment occurs via the media contained in the ETU. ADGAS treatment occurs prior to discharge to the ETU and DEACT, for potential corrosivity, occurs immediately after discharge to the ETU. Compliance with 40 CFR 268.7(a) (5) and LDR treatment standards for both the P078 and the potentially derived from D002 waste streams are provided by the pH measurements included in Section 6.2.2.8.

Figure 6.4 Locations of ADGAS Operations



6.2.2.6 Investigative Derived Waste (IDW)

IDW (F001, F002 waste) is generated in support of WSTF groundwater sampling, well development and remediation activities. All IDW will be below LDR treatment standards, or treated to below LDR treatment standards (in containers regulated under 40 CFR 262.34) prior to discharge to the ETU.

Whenever possible, "acceptable knowledge" will be used to document compliance. Analytical data from groundwater sampling and analysis will be reviewed with respect to the F001 and F002 constituents identified per 40 CFR 268.48. IDW with a reasonable potential to contain F001 and F002 constituents above LDR treatment standards will be either sampled and analyzed to document compliance, shipped off-site for disposal or treated to below LDR treatment standards (in containers regulated under 40 CFR 262.34).

A conceptual design of the treatment process is presented in Figure 6.5.

The treatment process will utilize carbon adsorption to remove F001 and F002 constituents. IDW above LDR treatment standards will be aggregated (in container(s) managed in accordance with 40 CFR 262.34) for centralized treatment. The containers (polyethylene, stainless steel, carbon steel or carbon steel with a chemical resistant lining) will be sized to allow the entire process from the start of accumulation to discharge to the ETU to be completed within the 90 day regulatory time frame.

The system design assures a constant, controllable flow rate that allows optimum contact with the carbon media. Typically the process consists of two stages (identical fixed carbon bed units) in series. The design capacity of the system is based on the adsorptive capacity of a single stage. Adsorption or contaminant removal process occurs in the first stage. The second stage is installed as an added safeguard to prevent the breakthrough of contaminants in the final effluent.

The effluent from the first stage will be sampled to determine when breakthrough occurs. Breakthrough occurs when the concentration of target contaminants in the effluent from the first stage reaches a predetermined limit (such as LDR treatment standards). At this time the carbon bed or columns in the first stage are removed for off-site disposal, the carbon bed or columns in the second stage are shifted to the first stage position and virgin carbon media or columns are installed in the second stage position.

Target contaminants will be sampled and analyzed prior to discharge to the ETU. During the treatment process, the treated effluent will be transferred into a second container. The treated effluent will be held until receipt of analytical data demonstrates that the potential F001 and F002 constituents have been treated to below LDR treatment standards. At that time the waste will either retreated (if required) or discharged to the ETU. The entire process from the start of accumulation to discharge to the ETU will be completed within the 90 day regulatory time frame.

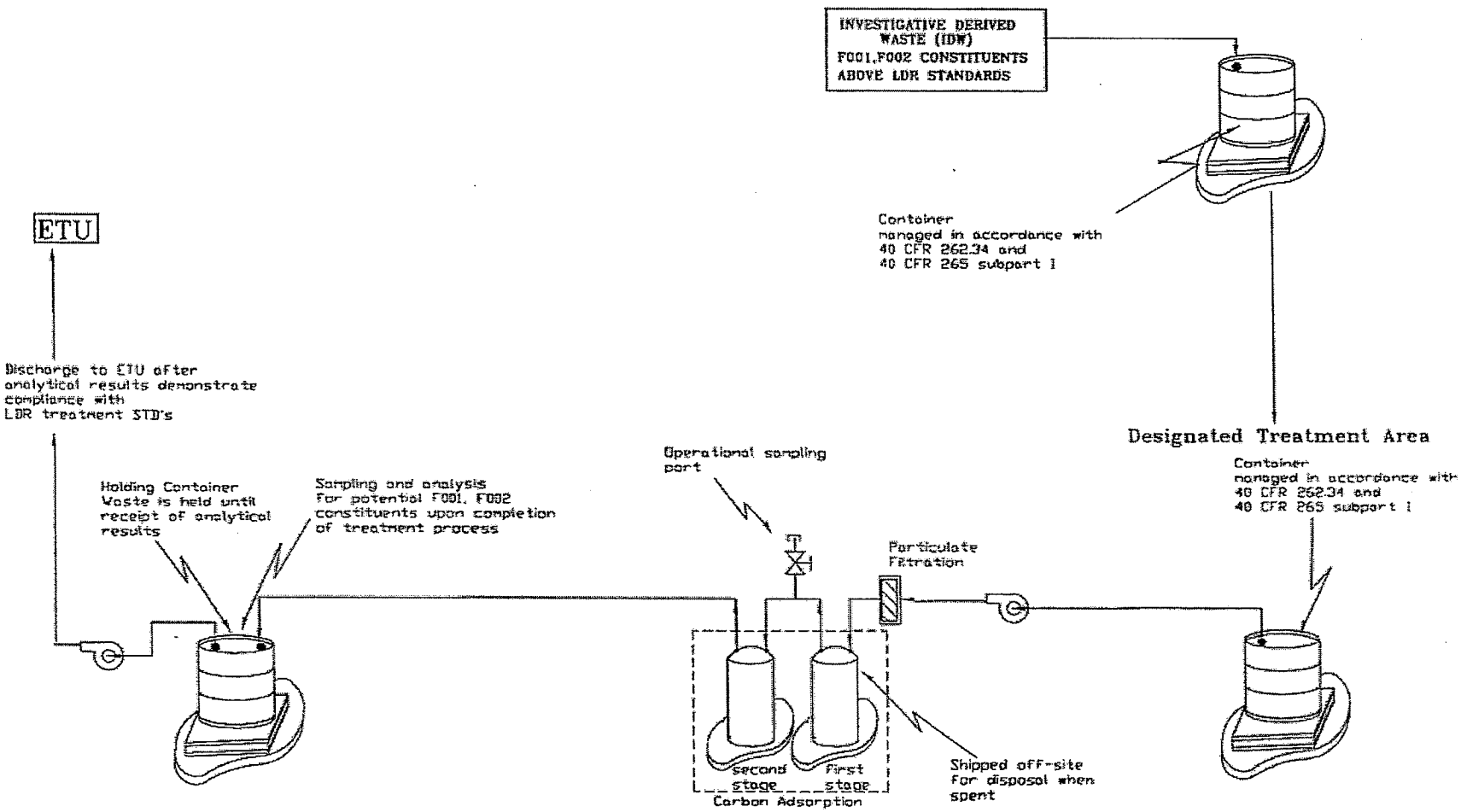
6.2.2.7 Corrosive Waste Management Plan

The ETU is operated as an exempt unit under the provisions of 40 CFR 268.50 (e) (LDR regulations). To assure compliance the LDR regulations, the management of corrosive waste includes the option of pretreatment for potential inorganic UHCs (in containers regulated under 40 CFR 262.34) prior to discharge to the ETU. Pursuant to 40 CFR 268.7(a)(4) a WAP is required. NASA has developed the ETU Corrosive Waste Water Management Plan to provide details with respect to the management of corrosive waste water and a WAP for pretreatment option for corrosive waste with potential inorganic UHCs. The ETU Corrosive Waste Water Management Plan is provided in Appendix 6-F.

6.2.2.8 ETU Sampling and Analysis

The waste discharged to the ETU is limited to investigative derived waste (IDW), oxidizer contaminated waste water and corrosive wastes that meets LDR treatment standards or has been treated to meet LDR treatment standards and consists of waste with an average volatile organic (VO) concentration of less than 500 ppmw as determined at the point of waste origination and waste that meets LDR treatment standards Fuel contaminated waste water (P068, U098 and U133 listed hazardous wastes) are restricted from discharge to the ETU.

FIGURE 6.5 – IDW TREATMENT PROCESS CONCEPTUAL DESIGN



NASA has developed a Fuel Waste Water Management Plan that includes sampling and analysis at the point of generation to segregate and define the P068, U098 and U133 listed hazardous waste and non-hazardous waste water. The NASA WSTF Fuel Waste Water Management Plan is provided in Appendix 6-E. The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA subpart CC regulations) and under the provisions of 40 CFR 268.50 (e) (LDR regulations). Waste determinations (per 40 CFR 264.1083 of the RCRA subpart CC regulations) to determine the averaged volatile organic concentration at the point of waste origination are provided in the Appendix 6-D, the NASA WSTF ETU RCRA Subpart CC Compliance Plan. For corrosive waste water, compliance with the LDR treatment standards including sampling and analysis for inorganic UHCs is provided in Appendix 6-F, the ETU Corrosive Waste Water Management Plan.

In addition to the above, the ETU tanks will be sampled and analyzed as specified in Tables 6.4 and 6.5.

Table 6.4 Evaporation Tanks, Analysis of Light Phase

Parameters	Frequency	Method
pH	Monthly	SW-846, 9040
Physical Appearance	Monthly	N/A
Evolvable Cyanides	Annually	SW-846, 7.3.3.2
Evolvable Sulfides	Annually	SW-846, 7.3.4.2
TCLP Metals	Annually	SW-846, 1311

Table 6.5 Evaporation Tanks, Analysis of Dense Phase

Parameters	Frequency	Method
pH	Monthly	SW-846, 9040
Physical Appearance	Monthly	N/A
Evolvable Cyanides	Annually	SW-846, 7.3.3.2
Evolvable Sulfides	Annually	SW-846, 7.3.4.2
TCLP Metals	Annually	SW-846, 1311

6.2.3 500 Area Fuel Treatment Unit (FTU)

6.2.3.1 Description

The FTU is a 40 CFR Part 270 permitted Subpart J tank Unit, and is located on WSTF as shown in Figure 6.1. It is operated as required for waste treatment and storage of waste hydrazine(s) prior to off-site disposal activities. WSTF waste hydrazine(s) are treated by dilution and/or are accumulated at the FTU until shipment to a permitted off-site disposal facility for the treatment of the listed wastes. Treatment at the Unit consists of removing the characteristics of ignitability and reactivity from neat fuels prior to or immediately after their entering the tankage, and lowering the vapor phase concentration of the tank(s) to comply with air emissions control device requirements. The control devices are carbon adsorption units, receiving all tank ullage venting, including diurnal tank breathing. Additionally, waste at the Unit is occasionally treated by dilution to ensure that operations are safer for personnel, to ensure compliance with the requirements for empty containers that contained P and U listed wastes, and to ensure that transportation and disposal requirements are met. Waste hydrazine(s) may be added to or off-loaded from the tank system from several types of containers, including large transport vehicles.

Components of the unit consist of two 4,000 gallon glass-lined treatment/storage tanks, tank secondary containment systems, and numerous connecting pipelines with in-line valves, meters, gauges, and pumps. Each tank in the Unit stands on a pedestal within the secondary containment and has a sight glass for operations. Wastes entering the system may be introduced into either tank, and may be transferred between tanks. Off-loading of the system to the disposal transport may be accomplished by either the Unit or transport equipment. All components are suspended above the containment pads on legs or mounts for complete visual inspection access. Components containing waste receive year-round thermal protection to avoid freezing during cold conditions. Appendix 6-G provides the civil construction, electrical/instrumentation, process piping diagrams, and the process flow diagram for the FTU. Photos of the Unit and components are provided in Appendix 6-H.

The Unit includes four different fluid systems: site water for treatment and decontamination; fuel waste; gaseous nitrogen for muscle pressure; and breathing air. These systems are maintained pursuant to NASA policy (encompassing applicable codes for material compatibility, pressure safety devices, flexible elements, cleanliness, etc.).

During all waste movement and treatment activities performed in this area, access will be restricted to authorized personnel. Waste movement and treatment activities will be performed by personnel wearing totally encapsulating protective equipment in accordance with NASA safety policy. The Unit is enclosed with a security fence and two gates that are locked when the Unit is not operational. Warning signs in English and Spanish are on all sides of the fencing stating that no unauthorized personnel are allowed. The Unit has an audio announcement system, two emergency pull-down stations, and a warning light. The Unit is also equipped with two emergency shower and eyewash stations.

The Unit has a small operations building that contains the current operations and inspection logs, control panels that operate the electric pumps, the emergency warning light, and a telephone. The electric pumps also have individual emergency shut-off panels located at the pumps.

6.2.3.2 Waste Management

The FTU treats and amasses neat and aqueous fuel wastes generated from throughout WSTF. Each waste stream is defined per a WSTF Individual Waste Profile Sheet (WIWPS).

Neat (100%) Fuel Waste

The FTU accepts neat fuel waste for introduction into the storage tank from two sources. One source is from the sampling containers (HOKE bottles) that routinely come from the Fuel Analytical Lab. The other source is from off-spec product that is deemed waste. The HOKE bottles are aspirated into the tank at less than 10% by weight fuel concentration. Any off-spec neat fuel is added directly to the tank, then, pursuant to 40 CFR 264.198 (a) (1), if required, water is added to the tank to keep the tank fluid less than 10% by weight for compliance with 40 CFR 264.17.

Dilute Aqueous Fuel Waste at Concentrations of Greater than 10% Fuel by Weight

The FTU rarely accepts dilute aqueous fuel waste at concentrations of greater than 10% by weight. Aqueous fuel waste greater than 10% by weight is generated either from spill scenarios or from process perturbations. For increased safety, NASA WSTF tries to handle this type of waste as little as possible, and requires NASA/contractor concurrence in handling fuel waste greater than 10%. Therefore, instead of diluting the waste in other containers and sampling each of the containers to verify they are each below 10% and then transferring these containers, the waste is handling once, after sample analysis, and that is when it is introduced into FTU storage. Again, pursuant to 40 CFR 264.198 (a) (1), if required, water is added to the tank to keep the tank fluid less that 10% for compliance with 40 CFR 264.17.

Dilute Aqueous Fuel Waste at Concentrations of Less than 10% Fuel by Weight

NASA WSTF policy is to handle fuel waste concentrations of less than 10% by weight at the point of collection so that the handling of the accumulation containers occurs after the waste is rendered non-ignitable and non-reactive. Ninety-five percent or greater of all WSTF waste fuel streams fall into this category. When a satellite accumulation area container or process equipment fluid is deemed ready for transfer, the aqueous fuel waste stream is sampled and analyzed prior to acceptance into the FTU tank. Upon receipt of the event analytical, that verifies the waste is less then 10% by weight hydrazine(s), the waste is scheduled for routine introduction into the tank.

As the tank is filled from different waste stream events, it is sampled and analyzed semi-annually to verify hydrazine(s) concentration, to conform to 40 CFR 264 Subparts AA, BB, and CC compliance, and to conform to 40 CFR 268 DEACT process completion, pursuant to 40 CFR Part 264.17 and 40 CFR Part 264.198. When the tank has accumulated enough waste for disposal or has accumulated waste for one year, the tank is sampled and analyzed to verify the fuel concentration. It is then transferred to a transport vehicle and disposed of off-site at a permitted disposal facility.

Operation of the FTU generates two waste streams. These waste streams, characterized by WIWPS, are hydrazine(s) contaminated soft goods, and secondary containment rainwater. The soft goods are managed by aggregation at a satellite

accumulation area for subsequent disposal at an off-site permitted disposal facility. The rainwater has been characterized as free of hydrazine(s) (non-detect by HPLC methodology), and is transferred to the ETU.

The following provides a general summary of wastes received at the FTU from various facility operations (as provided in Appendix 6-A):

Propulsion Test:

- Fuel contaminated waste water.

Laboratories:

- Waste fuel; and
- Fuel contaminated waste water.

Engineering:

- Fuel contaminated waste water.

Environmental:

- None.

Quality Assurance, Reliability, and Safety:

- None.

6.2.3.3 Subpart AA, BB, and CC Compliance

6.2.3.3.1 Subpart AA

The FTU is a Unit that is subject to the permitting requirements of 40 CFR Part 270 and is compliant with 40 CFR Part 264 Subpart AA. Although the FTU does not have process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations, it is regulated by Subpart AA to the extent required by Subpart CC §264.1087(b)(2), §264.1087(b)(4), §264.1087(c)(3)(i), §276.1087(c)(3)(ii), and §264.1087(c)(7). These regulations for closed-vent systems with control devices obligate the FTU's compliance with the design, operation, inspection, monitoring, control device maintenance, and waste management requirements of Subpart AA §264.1033(f)(2), §264.1033(h), §264.1033(k), §264.1033(l), and §264.1033(n). The FTU is also compliant with Subpart AA §264.1035(b)(4)(iii)(G) in having all the calculations and record keeping required on file in the Unit's operating record.

6.2.3.3.2 Subpart BB

Subpart BB is applicable to the FTU since the Unit handles waste with organic concentrations greater than 10% by weight pursuant to §264.1050(b)(1). The FTU equipment; the flex hose from the product HOKE bottle to the aspirator, the diaphragm pump, and the pump suction flex hose are exposed to organic concentrations of 10% or greater by weight. Since this equipment does not contain or contact waste that has 10% or greater by weight of organics for 300 hours or more per calendar year, it is excluded from regulations pursuant to the Subpart's applicability §264.1050(f). The FTU is compliant with the record keeping requirements of §264.1064(g)(6) in that information for the excluded equipment is recorded in the operating record.

6.2.3.3.3 Subpart CC

Subpart CC is applicable to the FTU since the Unit's tank system contacts or contains waste that has, at point of generation, a concentration of 500 ppmw or greater of volatile organics. The FTU is compliant with the requirements of Subpart CC in that the tank(s) have carbon adsorption control devices, in accordance with §264.1087, and that the operating record contains the required record keeping documentation pursuant to §264.1089.

6.2.4 90 Day Accumulation and Storage Area (Container Storage Unit)(CSU)

Section 6.2.4 has been removed from this document at the request of the NMED.

6.2.5 Satellite Accumulation Areas

Section 6.2.5 has been removed from this document at the request of the NMED.

6.2.6 Waste Transfer and Handling Procedures

Hazardous waste at WSTF is transferred and handled according to established WSTF environmental and safety policies and guidance. The policies are applicable to all WSTF organizations managing waste accumulation areas and transferring waste. All waste transfers are completed by personnel trained and qualified as Hazardous Waste Handlers and maintained in the WSTF Training Database.

Waste handling is the responsibility of the supervisor in the area where the waste accumulation area is established. The area supervisor is responsible for providing trained and qualified Hazardous Waste Handlers to transfer waste from waste accumulation areas to 90-day areas and hazardous waste management units. The contractor environmental organization will provide work authorizing documents for all such transfers.

The following systems are utilized for tracking and documentation of waste transfer:

1. The Access Waste Database is the WSTF system that follows each numbered container from issuance to disposition. The containers are labeled at establishment with labels that carry the drum number, waste name, WIWPS number, location, and dates of establishment and transfer. Log books, initiated for every container, document the accumulation of each addition event to the container.

2. A WSTF Job Instruction (WJI) with a Job Hazard Analysis contains instructions for the movement and transfer of waste. In addition, the WJI has a continuation sheet that has container numbers and identification information recorded.

3. The individual tasks are directed by work authorizing documents (Task Memos) which record the move/transfer activity.

4. The Hazardous Waste sinks/drains have logbooks for recording WIWPS numbers and quantities for each use. The logbooks are utilized each time wastes are released to the drains.

6.2.7 Off-Site Disposal

Characterization of wastes from WSTF that are shipped off-site to RCRA permitted TSD facilities ensures that disposal is compliant with the technology or concentration standards of 40 CFR 268. This characterization also ensures that wastes are transported in accordance with the requirements of 49 CFR Transportation. Characterization of waste by WSTF will be performed in accordance with Section 6.3 of this plan.

WSTF waste is subjected to pre-qualification acceptance characterization by off-site TSD facilities prior to any shipment or disposal of waste. This will vary from facility to facility depending on facility unique permit conditions and may include, but not be limited to, the following:

- Number of phases;
- Percent liquid;
- Color;
- Viscosity;
- Density;
- Flash point;

- Percent ash;
- pH;
- BTU's pound or range;
- Volatile organics;
- Semi volatile organics;
- RCRA metals; and
- Underlying hazardous constituents.

Confirmation that waste conforms to the acceptance characterization is completed in the form of fingerprint analysis for each shipment of waste from WSTF. This fingerprint analysis may include, but is not limited to:

- Percent chlorine;
- Percent sulfur;
- Percent ash;
- Percent scrub;
- Metals;
- BTU's;
- Bulk density;
- Flash point;
- pH;
- Radiation background;
- Radiation value;
- Specific gravity;
- Visual resolution;
- Physical state;
- Paint filter test;
- Blend compatibility;
- Lower explosive limit; and
- Percent water

Waste to be treated by combustion in an incinerator will be characterized for ignitability, total organic carbons, and BTU's at a minimum to ensure that no impermissible dilution of metals occurs as per 40 CFR 268.3 9(c).

Waste characterized as being both a listed and a characteristic waste will be treated to the standards for the listed waste and also for the standard of the characteristic waste if the standard for the listed waste does not act in lieu of the standard for the characteristic waste as per 40 CFR 268.9(b).

6.2.7.1 Manifests

Hazardous Waste Shipped off of WSTF is manifested in accordance with; Subpart B of 40 CFR 262 and the Generator Paperwork Requirements Table of 40 CFR 268.7(a)(4); 49 CFR 172.205; and all applicable WSTF environmental and safety policy. Wastes shipped to locations that have their own state manifest (Arkansas or Texas for example) are shipped to the destination facility using that state's manifest. Wastes shipped to states that do not have their own manifest are shipped using the universal hazardous waste manifest.

Universal waste transported off of WSTF will be consigned to the transporter on a bill of lading. Wastes transported off of WSTF are: packaged in accordance with 40 CFR 262.30 and the Hazardous Materials Table of 49 CFR 172.101; labeled in accordance with 40 CFR 262.31 and Subpart E of 49 CFR 172; marked in accordance with 40 CFR 262.32 and Subpart D of 49 CFR 172; and placarded in accordance with 40 CFR 262.33 and Subpart F of 49 CFR 172.

The following provides the information that will be included on manifests for wastes shipped off-site from WSTF:

- Block One - WSTF US EPA identification number (NM88000119434) and the unique five-digit manifest number (obtained from the manifest files)
- Block Two - Page number (1 of 1)
- Block Three - Facility Address - NASA White Sands Test Facility, P.O. Box 20, Las Cruces, NM 88004.
- Block Four - Telephone Number of the NASA Environmental Program Manager.
- Block Five - The Name of the first transporter.
- Block Six - The US EPA identification number of the first transporter.
- Block Seven - The Name of the second transporter (if required).
- Block Eight - The US EPA identification number of the second transporter (if required).
- Block Nine - The name of the facility designated to receive the waste.
- Block Ten - The US EPA identification number of the facility designated to receive the waste.
- Blocks 11a - 11d - The proper shipping descriptions of the wastes will be entered. The descriptions will include the proper shipping name, hazard class, UN or NA identification number, and packing group number.
- Blocks 12a - 12d - The container type will be entered. The container specifications will comply with those set forth in the Hazardous Materials Table at 49 CFR 172.101 for the waste to be packaged.
- Blocks 13a - 13d - The total quantity of waste shipped.
- Blocks 14a - 14d - The weight/volume unit of wastes shipped (kilograms or liters only).
- Block 15 - Special instructions and the 24 hour emergency response contact information.
- Block 16 - Generators certification (to be signed by NASA personnel who are trained and certified as per 49 CFR 172 Subpart H).
- Block 17 - First transporter signature
- Block 18 - Second transporter signature (if required)
- Block 19 - Information on any discrepancy in the waste that may be noted. This may be a discrepancy in weight, composition, container type, labeling, or various other requirements.
- Block 20 - Disposal facility owner or operator signature. This signature on the manifest will be verified prior to filing when the original copy of the manifest is returned to WSTF.
- Blocks A-K - Optional (completed as required by facility receiving waste or applicable regulations of the state where the receiving facility is located).

Manifests; LDR determinations; LDR notices; LDR certifications; bills of lading; and waste analyses, will be filed, and maintained, for at least three years from the date the waste was last sent to on-site or off-site treatment, storage or disposal, in the facility operating record as required by regulations. This three year period will be automatically extended during the course of any unresolved enforcement action.

6.2.8 Training Requirements

WSTF personnel that participate in waste characterization and perform sampling, waste transfers, or movements will be trained to as Hazardous Waste Handlers and Hazardous Waste Samplers in accordance with RCRA Permit Renewal Section 14.0 "Training Plan". The Hazardous Waste Handlers and Samplers will be trained using Training Plan Module #s 1, 2, 3, 4, 7, and 9, prior to being qualified in the WSTF Training Database. These training requirements meet the standards set forth for permitted hazardous waste facilities per 20.4.1.500.NMAC, incorporating 40 CFR 264.16.

6.3 Waste Characterization

WSTF generates listed hazardous wastes, mixtures of listed hazardous waste and solid waste and characteristic hazardous wastes. The F-listed wastes are process wastes associated with non-specific sources (such as spent solvents). The K-listed wastes are associated with specific waste generating processes. The P and U-listed wastes are products that are hazardous wastes when discarded or spilled. A mixture of a listed waste and other solid waste or a residue from treating a listed waste is

still a listed waste regardless of the concentrations of the hazardous constituents in the mixture. Classification of these wastes requires a knowledge-based evaluation of the waste source and waste generating process with respect to the listing descriptions provided per 40 CFR 261.31, 261.32, and 261.33.

Knowledge of the waste and its constituents is also used to determine whether a waste exhibits a waste characteristic of ignitability, corrosivity, reactivity, or toxicity as defined by 40 CFR Subpart C. All D003 determinations for reactivity are knowledge-based. The regulations do not specify specific methods for determining reactivity. The reactivity of wastes is classified by comparing generator knowledge with the description of reactivity per 40 CRF 261.23.

Classification of characteristic wastes with respect to ignitability, corrosivity, and toxicity can be performed through knowledge of the raw materials, intermediate materials, by-products, process reactions, and products. This knowledge of the waste, and waste constituents, can be used to determine whether or not the waste would exhibit any of the characteristics of a hazardous waste as defined by 40 CFR 261.21, 261.22, and 261.24. In most cases, this can be accomplished by using information provided by the manufacturer or scientific literature and comparing the physical and chemical properties of the raw materials and constituents in the waste with characteristics that would make the waste hazardous.

Some wastes generated at WSTF can not be characterized by acceptable knowledge alone. Classification of these wastes will be accomplished by a combination of acceptable knowledge and analytical testing. For example, if the generator has process knowledge that certain toxic constituents could not be present in a waste, a TCLP analysis can be performed for the constituents that may potentially exist. A representative sample of the waste can be collected and analyzed, in accordance with Section 6.4 and Section 6.5 of this plan, to support appropriate waste management. Subsequent waste from similar processes can then be characterized by acceptable knowledge based on the initial analysis. Additional samples will be collected when:

- WSTF questions the identity of constituents of a waste;
- There is a process change such that the characteristics of the waste may change and insufficient Acceptable Knowledge is available to adequately characterize the waste; or
- Confirmation is required to ensure historical analysis remain current and accurate.

Individual waste streams are tracked and documented by WSTF Individual Waste Profile Sheets (WIWPS) as described in Section 6.3.1. Through revision and review, the actual WIWPS form may change as required to document regulatory compliance or provide more accurate process-specific information.

6.3.1 WSTF Individual Waste Profile Sheets (WIWPS)

WIWPS provide a tool to document and track specific waste streams at WSTF. The WIWPS form has been divided into two parts. The first part is to document generator process knowledge and communicate this information to the contractor Environmental Department for proper waste characterization. The second part of the form is to document the characterization of the waste as well as proper handling, storage, and disposal procedures. All WIWPS forms are filled out and submitted electronically and maintained in a tracking database as part of the facility operating record. Completed WIWPS forms, along with all other documents supporting acceptable knowledge of the waste stream, are filed in the facility operating record. The generator responsible for waste stream producing processes and Environmental Department reviewer are to be designated by their respective management/supervision.

6.3.1.1 WIWPS Form - Part One

Prior to waste stream generation, the generator is responsible for completing the first part of the WIWPS form. This part of the form will provide process knowledge to allow contractor Environmental Department personnel to properly characterize the waste. Obtaining waste generator process knowledge is the first step in the process of waste characterization shown in Figure 6.1.

Generator process knowledge to be provided with this portion of the form includes:

- Facility Area;
- Work area;

- Responsible section;
- Name of waste stream;
- Description of process generating the waste stream;
- List of known hazardous constituents and their concentrations (or possible ranges of concentrations);
- Waste description including physical state, pH, specific gravity, flashpoint, solubility, and reactivity (if applicable or available);
- Other comments, to include other process knowledge and/or analytical documentation (as available)
- Expected annual quantity generated and units of measure;
- Material Safety Data Sheet (MSDS) number (WSTF MSDS System);
- Authorized representative certification of the waste descriptions; and
- Date of completion of generator portion of the form.

Once this portion of the WIWPS is complete, the generator submits it to the WSTF contractor Environmental Department.

6.3.1.2 WIWPS Form - Part Two

Designated contractor Environmental Department personnel review the information provided in part one to determine if the information provided is complete and adequate to characterize the waste and determine proper management and disposal procedures. If insufficient information has been provided, the waste generator will be required to provide additional information. If adequate process knowledge does not exist, appropriate sampling will be required and performed according to Section 6.4 of this plan.

In order to determine proper management procedures, process knowledge and sample analysis data, if required, will be reviewed in order to determine if the waste is hazardous and if it is a listed or characteristic waste. The process shown in Figure 6.1 is used to make these determinations. Once these determinations are made, the second portion of the WIWPS is completed. Information to be provided, as applicable, on the second part of the form includes:

- Waste category;
- Status of waste stream (active for new waste streams);
- Environmental Department representative (as assigned by supervisor);
- How to accumulate the waste and in what accumulation area;
- EPA Waste ID Number(s);
- Specific/Non-Specific source listed waste name;
- UHC Determination;
- List of supporting documents and their locations:
- Required waste collection method (at the point of generation);
- Waste/Satellite accumulation area;
- On-Site storage area;
- Subpart CC information;
- Disposal method;
- Vendor profile number; and
- Other comments (as required).

Once the waste stream has been characterized and proper management and disposal procedures have been determined, these requirements are communicated to the waste generator and procedures are implemented before waste is generated.

6.3.1.3 Waste Stream Occurrences

Part one of the WIWPS form will indicate if the waste stream is recurring or a one-time occurrence. One-time profile sheets will become obsolete after the waste has been collected and disposed of according to the profile. Profiles of recurring waste streams will remain active as long as the process remains and waste is generated using that process. Recurring WIWPS forms will be reviewed, and revised as required, at least annually. All WIWPS will be numbered with two digits, a dash, two more digits, another dash, and two last digits. One-time profiles will contain a 99 after the first dash.

6.3.1.4 WIWPS Review

The WIWPS will be reviewed by the generator annually or when there is a significant change, or proposed change, to the waste generating process, which ever occurs first. Results of reviews require the concurrence of the contractor environmental organization. Upon reviewing the WIWPS, the waste generator verifies the information on Part one of the WIWPS form and makes changes as required. The form is then re-submitted to the WSTF contractor Environmental Department. Designated Environmental Department personnel review the information provided and determine if the waste characterization has changed. Part two of the WIWPS form is then reviewed, and revised as required. If WIWPS review and revision require changes to management or disposal procedures for the waste stream, these requirements are communicated to the waste generator and procedures are modified immediately. The date of the review and the name of the reviewer are entered on the form before it is filed in the operating record.

6.3.2 Acceptable Knowledge

Acceptable knowledge is information considered adequate to provide knowledge-based assessments of waste streams. Acceptable knowledge includes both process knowledge and waste analyses obtained from similar waste streams.

Process knowledge is detailed information on processes that generate waste subject to characterization or detailed information from processes similar to the generating process. Process knowledge includes:

- Historical data obtained for the waste generating process (including data obtained from off-site disposal facilities);
- Material safety data sheets;
- Knowledge of wastes when the processes and procedures and well documented and defined;
- Container labeling information and/or vendor-supplied information for commercial products and materials;
- Detailed information on the waste stream obtained from published manuals, technical documents, or documented waste analyses;
- Material balances for processes that have well-documented procedures and products; and
- Engineering production data.

When WSTF utilizes acceptable knowledge to characterize a waste stream, all supporting information or locations of reference documents utilized will be filed in the WIWPS operating record. Examples of information or references to information in the WIWPS operating record may include:

- MSDSs;
- Standard operating procedures which delineate products and procedures used;
- Waste stream logbooks;
- Test plans and/or project reports;
- Published manuals, technical documents, or data concerning a waste generating process or a similar process;
- Laboratory notebooks that detail research processes and materials used;
- Previous analytical data relevant to the waste stream (including results from historical waste stream analyses, previous analyses performed for the waste stream by off-site disposal facilities, and results for waste stream that have similar constituents and/or processes);
- Chemical inventories;
- Documented interviews or written correspondence with knowledgeable technical personnel; and

- Vendor-supplied data and information.

Acceptable knowledge may also be utilized in cases where the chemical/physical nature of a waste stream may make the use of sampling and analysis undesirable. This is especially the case for situations where the health and safety of sampling personnel are of concern. In cases where the waste stream is an explosive material, neat hydrazine-based fuels, or other acutely hazardous material, acceptable knowledge may be used to meet all or part of the waste characterization requirements.

WSTF will also utilize data, where appropriate from data collected from similar site waste streams that utilize similar processes or the same type of waste streams. The nature of work performed at WSTF involves the site-wide use of many common reagents, materials, and processes.

When there is insufficient information to make a waste determination based on solely acceptable knowledge, the contractor Environmental Department will perform the necessary sampling and analysis in accordance with Section 6.4 of this document.

6.4 Sampling and Analysis of Wastes

When there is insufficient information to adequately characterize a waste stream based on acceptable knowledge, the contractor Environmental Department will perform the appropriate sampling and analysis. Sampling and analytical procedures utilized for characterizing waste types will be based on the physical, chemical, and hazardous properties of the waste.

Samplers will collect a representative sample of the waste by a means that preserves its original physical form and composition. Analytical methods for the characterization of wastes will be performed using EPA-recommended methods, when those methods are available.

The following general sampling strategies will be used for waste sampling, unless alternative sampling strategy are more appropriate based on specific historical, process, safety, or waste information:

- Waste generation will be minimized during sampling activities;
- If the sampling or analysis of the waste would pose a serious threat to human health, the samplers will back out and forego sampling and analysis until either the hazard is mitigated or more appropriate PPE is made available;
- For solid waste whose surface is suspected to be contaminated with RCRA-regulated waste, such as contaminated equipment, surface wipe samples or decontamination effluent samples may be taken;
- Samples may be collected from each phase of wastes that exist in multiple solid, liquid, and/or gas phases;
- For liquid waste items in multiple containers, one sample may be taken for each 55 gallons of waste; and
- All handling of samples and analysis activities will be conducted in a manner that is consistent with EPA methods and protocols.

NASA will utilize laboratories for qualitative and quantitative chemical analyses in the specified methods (EPA-recommended or an equivalent) that have:

- A documented quality assurance/quality control program;
- Technical analytical expertise;
- A document control/records management plan; and
- The capability to perform data reduction, validation, and reporting.

The selection and development of analytical testing methods for waste streams will be based on the following considerations:

- The physical form of the waste;
- Constituents of interest;
- Required detection limits (e.g., regulatory thresholds); and

- Verification of compliance with LDR treatment standards, waste classification, waste codes, and underling hazardous constituents.

These factors contributed to the selection of the analytical methods specified in Section 6.3 of this Plan

6.4.1 Waste Analyses - 264.13(b)(1) and 264.13(b)(2)

As discussed previously, the use of acceptable knowledge for many WSTF waste streams provides sufficient information to characterize many of them. When there is insufficient acceptable knowledge of a new or recurring waste stream, WSTF will perform the necessary sampling and analysis at the point of generation to supplement the available acceptable knowledge. Table 6.6 provides a summary of commonly used waste characterization analytical methods at WSTF. Table 6.7, Table 6.8, and Table 6.9 provide a summary of process wastes that enter the ETU, the FTU, and, except for waste explosives, wastes that are commonly processed through the 90-Day CSU. Table 6.7, Table 6.8, and Table 6.9 provide a summary of the general process wastes entering each of these areas, provide the basis for waste designations, identify potential waste codes and classifications, and analytical methods that could be used to supplement acceptable knowledge (when acceptable knowledge is insufficient).

Table 6.7, Table 6.8, and Table 6.9 do not provide an all-inclusive list of waste streams and analyses that are to be performed at WSTF. These tables do provide the basic framework that is used to make decisions concerning waste analyses. The individual WIWPS will contain waste stream-specific information concerning waste analyses that need to be performed.

There may be cases where WSTF will need to utilize analytical methodologies that are not referenced by Table 6.6, Table 6.7, Table 6.8, or Table 6.9. In these cases WSTF will utilize analytical methods recommended by SW-846 or other EPA sources (if EPA-recommended methods are available).

6.4.2 Frequency of Waste Analyses - 264.13(b)(4)

Scheduled sampling of recurring waste streams will not normally be required when the documentation, procedures, chemicals, and materials used for a process do not change. Both generators and the contractor Environmental Department will review each waste stream and the associated WIWPS on at least an annual basis. The review shall include a confirmation of the acceptable knowledge or analyses used for the waste stream. Waste streams for which the contractor Environmental Department determines that scheduled sampling for specified parameters are required will be denoted in the corresponding WIWPS and the waste stream Additional characterization by either acceptable knowledge or sampling and analysis shall be performed whenever the process or operation has changed. Examples of process changes include introduction of new chemicals or materials to a waste generating process or changes to procedures which may alter the chemical constituents or their concentration in a waste stream. The following criteria will be used to indicate that a process or operation has changed and the waste stream needs to be re-characterized:

- A projected change of pH greater than two standard pH units over the range of conditions expected for a waste stream;
- An anticipated change of flashpoint greater than ten degrees Fahrenheit for a waste stream;
- The waste is expected to exhibit a hazardous characteristic not previously identified; or
- The waste is anticipated to contain UHCs not previously present in the waste;
- The volatile organic concentration of the waste will potentially increase to 500 ppmw or greater.

Annual sampling of the ETU will be performed for operational verification purposes. Samples will be collected for the upper aqueous and lower phase of both tanks. Samples will be collected for the analyses methods specified in Table 6.7.

Sampling for the first analysis of wastes discharged to the FTU will be performed every time prior to transfer to the FTU. The frequency of this first waste analysis is determined by the frequency of the waste generation event, i.e. a fuel waste is ready to be transferred to the FTU. When an event occurs, the waste is analyzed pursuant to the method specified in Table 6.8.

The sampling frequency for the second analysis, i.e. characterization of the waste in the FTU tanks for process knowledge verification, will be when an active tank is half full or every six months, whichever comes first. The waste is analyzed pursuant to the method specified in Table 6.8.

The sampling frequency for the third analysis, i.e. characterization of the waste for off-site disposal, will be every time an active tank is full and ready for off-site disposal or annually, whichever comes first. The waste is analyzed pursuant to the method specified in Table 6.8.

Table 6.6 Summary of Commonly Used Waste Characterization Analytical Methods Used at WSTF

Test Parameter	Analytical Method(s)	Rationale for Use
pH (electrometric)	Aqueous Samples - Method 9040 or equivalent Solid Phase Samples - Method 9045 or equivalent pH Paper -Method 9041 or equivalent	To determine if a waste exhibits the corrosivity characteristic based on pH.
Volatile Organics	Method 1311/Method 8260 or equivalent	To quantitate either TCLP or total volatile organics in a waste stream.
Volatile Organics	Method 25D or equivalent	To determine compliance with Subpart CC.
Total Organic Carbon	Method 9060 or equivalent	To determine the amount of total organic carbon in a waste stream.
Semi-Volatile Organics	Method 1311/Method 8270 or equivalent	To quantitate either TCLP or total semi-volatile organics in a waste stream.
Metals		To quantitate either TCLP or total metals in a waste stream.
Arsenic	Methods 1311/6010, 7060, 7061, or equivalent	
Barium	Methods 1311/6010, 7080, 7081, or equivalent	
Cadmium	Methods 1311/6010, 7130, 7131, or equivalent	
Chromium	Methods 1311/6010, 7190, 7191, or equivalent	
Lead	Methods 1311/6010, 7420, 7421, or equivalent	
Mercury	Methods 1311/6010, 7471, 7472, or equivalent	
Selenium	Methods 1311/6010, 7740, 7741, 7742, or equivalent	
Silver	Methods 1311/6010, 7760, 7761, or equivalent	
Hydrazine Fuels	WJI-CHEMLAB-0268 (WSTF methodology)	To quantitate hydrazine fuel concentrations in a waste stream.
Flash Point	Method 1010, 1020, ASTM D-3278-78, or equivalent	To determine if a waste displays the characteristic of ignitability.
Specific Gravity	ASTM D891-86 or equivalent	To determine if changes of density are occurring in a waste stream.
Explosive Residues	Method 8330	To determine if explosive residues are present in a waste stream.

Table 6.7 Evaporation Tanks

Table 6.7 – Evaporation Tanks

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Acidic Cleaning Solution	Acceptable knowledge - Supplemented by sampling and analysis (as required) - MSDS/Product Information phosphoric acid based cleaning sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards	D002 (C) D005 (E) D007[1] (E) Nickel[1] (UHC) Volatiles[2]	WW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Ammonia Waste Water	Acceptable knowledge – Ammonia and water are the only constituents involved in the process, supplemented by sampling and analysis (as required).	Corrosive - D002	WW	pH
Caustic Cleaning Solution	Acceptable knowledge - MSDS/Product Information phosphoric acid based cleaning – sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	D002 (C) D007[1] (E) Nickel[1] (UHC) Volatiles[2]	WW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Citric Acid Solution	Acceptable knowledge - MSDS/Product Information phosphoric acid based cleaning – sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	D002 (C) D007[1](E) Nickel[1] (UHC) Volatiles[2]	NWW	pH and EPA Method 25D (volatiles)
Pickling/Etching Solution	Acceptable knowledge - A solution of hydrochloric acid and ferric chloride used to remove imbedded machining contaminants such as iron. This waste is generated during cleaning operations, such as the WSTF's component services precision cleaning process supplemented by sampling and analysis (as required).	D002 (C) D004[1] (E) D006[1] (E) D007 [1] (E) Lead[1] (E) D008[1] (E) D010[1] (E) D011 [1] (E) Nickel[1] - (UHC)	WW	pH, TCLP Metals
Oxidizer Contaminated Waste Water	Acceptable knowledge - Supplemented by sampling and analysis (as required).	D002 (C)	WW	pH
Nitric Hydrofluoric Acid	Acceptable knowledge - Nitric hydrofluoric acid based cleaning solution including, but not limited to, commercial products such as Bradford Derustit Corp. Derustit SS-3 and Oakite Products Deoxidizer -SS. This waste is generated during cleaning operations including, but not limited to, the WSTF's component services precision cleaning process for newly welded stainless steel supplemented by sampling and analysis (as required)	D002 (C) D007[1](E) Nickel[1] (UHC)	WW	pH, TCLP Metals
Contaminated Groundwater	Acceptable knowledge – Groundwater analytical data	F001 F002	WW	N/A

Table 6.7 – Evaporation Tanks

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Clean Room Rinse Water	Acceptable knowledge – Constituents involved in the process are water ultra-pure water and drag-out from acid, caustic and detergent cleaning supplemented by sampling and analysis (as required).	Non-Hazardous	WW	pH
Contact-Contaminated Waste Water	Acceptable knowledge – Non-hazardous waste water, including but not limited to, accumulated precipitation and test or process waste water with remote the potential to become contaminated with waste constituents restricted from discharge to the ETU supplemented by sampling and analysis (as required).	Non-Hazardous	WW	HZ by HPLC
Detergent-Type Waste Water	Acceptable knowledge - MSDS/Product Information – detergent based cleaning solution sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	Non-Hazardous	NWW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Met Lab Waste Water	Acceptable knowledge - Waste water generated during metallurgical laboratory metal/material preparation, metal etching and equipment maintenance. supplemented by sampling and analysis (as required)	D002[4] (C)		
Chem. Lab Waste Water	Acceptable knowledge - Waste water generated during chemistry laboratory rinsing/cleaning operations and equipment maintenance supplemented by sampling and analysis (as required)	D002[4] (C)		
Evaporation Tank Water	Acceptable knowledge – WIWPS discharged to ETU and ITU analytical data supplemented by sampling and analysis for inorganic UHCs supplemented by sampling and analysis (as required).	F001, F002, P078, P076	WW	TCLP Volatiles, TCLP Semi-volatiles, and TCLP Metals
Evaporation Tank Sludge	Acceptable knowledge – WIWPS discharged to ETU and ETU analytical data supplemented by sampling and analysis for inorganic UHCs. (as required).	F001, F002, P078, P076	NWW	TCLP Volatiles, TCLP Semi-volatiles, and TCLP Metals

[1] Inorganic constituent(s) (identified per 40 CFR 268.48 with a reasonable potential to be present) to be demonstrated by sampling and analysis or "acceptable knowledge" to be below or treated to below LDR treatment standards.

[2] Volatile organic constituents to be demonstrated by sampling and analysis or "acceptable knowledge" to be below the 500 ppmw regulatory limit for volatile organics as specified by the RCRA subpart CC regulations.

[3] Organic constituent(s) (identified per 40 CFR 268.48 with a reasonable potential to be present) demonstrated by groundwater sampling and analysis compliant with LDR regulations.

[4] Aggregated waste water from laboratory operations, the majority of which is non-hazardous, but has the potential to exhibit the characteristic of corrosivity at some points of generation.

[5] Hydrazine constituents (with a remote potential to be present in non-hazardous waste water) demonstrated by sampling and analysis or "acceptable knowledge" to be ND or below 0.5 ppm.

Table 6.8 Fuel Wastes

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW4	Potential Analytical Methods
Fuel Contaminated Water	Acceptable knowledge - Supplemented by sampling and analysis (as required). P068, U098, and U133 are the only constituents involved in the process.	P068 (H) U098 (T) U133 (T)	NWW/WW	WSTF-HPLC Waste
Waste Fuel	Acceptable knowledge – P068, U098, and U133 waste products	P068 (H) U098 (T) U133 (T)	NWW/WW	NA

Table 6.9 Containerized Waste

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Recycled Degreasing Solvents	Acceptable knowledge - Product information, MSDSs, supplemented by sampling and analysis (as required).	D001(I)	NWW	Flash point
Isopropyl Alcohol	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) and process knowledge supplemented by sampling and analysis (as required).	D001(I) High Toc	NWW	Flash point
Liquid Paints	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal), product information and MSDSs, supplemented by sampling and analysis (as required).	D001(I) D006-D009 (E), D035 (E) (UHC)	NWW	Flash point, TCLP Metals, and TCLP Volatiles
Waste Organic Acids Solutions	Acceptable knowledge - Process knowledge and product information and MSDS, supplemented by sampling and analysis (as required).	D002 (C) (UHC)		pH and TCLP Volatiles
Nitric Hydrofluoric Acid	Acceptable knowledge- Nitric Hydrofluoric Acid solution in contact with primarily stainless steels, supplemented by sampling and analysis (as required).	D002 (C) D005 (E) D007 (E) Nickel (UHC)	WW	pH
Passivating Solution	Acceptable knowledge – Nitric Acid/ Sodium Dichromate solution in contact with primarily stainless steels supplemented by sampling and analysis (as required).	D002 (C) D005 (E) D007 (E) Nickel (UHC)	WW	pH
Pickling/Etching Solution	Acceptable knowledge – Strong inorganic acid solutions in contact with primarily stainless steels, supplemented by sampling and analysis (as required).	D002 (C) D004-D011 (E) Nickel (UHC)	WW	pH

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Organics	Acceptable knowledge - Evaluation of the waste generating process, historical data from fingerprint analysis (off-site disposal) and product information and MSDS, supplemented by sampling and analysis (as required).	D001 (I), F001-F005 (T), D035 (E) (UHC)	NWW	Flash point and TCLP Volatiles
Lead Acid Batteries	Acceptable knowledge - Product information, and MSDS.	D002 (C), D008 (E)	NWW	pH and TCLP Metals
Caustic Paint Remover	Acceptable knowledge - Product information, and MSDS supplemented by sampling and analysis (as required).	D002 (C), D006-D009 (E) (UHC)	NWW	pH, TCLP Metals, and TCLP Volatiles
Lithium Batteries	Acceptable knowledge - Product information, and MSDS	D003 (R)	NWW	NA
Machine Shop Oils	Acceptable knowledge – Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D005 (E), D007 (E), D008 (E), DO37 (E) (UHC)	NWW	TCLP Metals and TCLP Volatiles
NiCad Batteries	Acceptable knowledge - Product information, and MSDS.	D006 (E) (UHC)	NWW	TCLP Metals
Cured Paints	Acceptable knowledge – Historical data from fingerprint analysis (off-site disposal) and product information and MSDS supplemented by sampling and analysis (as required).	D006 (E), D007 (E), D008 (E), D009 (E), D035 (E), and (UHC)	NWW	TCLP Metals
Oily Sludge	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D006-D008 (E) (UHC)	NWW	TCLP Metals
Recycled Carburetor Cleaner	Acceptable knowledge - Product information, and MSDS supplemented by sampling and analysis (as required).	NA		NA
Hazardous Refuse	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D007 (E), D008 (E), D011 (E), D035 (E), D022 (E), F001-F005 (T) (UHC)	NWW	TCLP Metals and TCLP Volatiles
Lead Contaminated Refuse	Acceptable knowledge – Process knowledge. Materials are only in contact with lead-type hazardous waste constituents. Product information, and MSDS supplemented by sampling and analysis (as required).	D008 (E)	NWW	TCLP Metals
Mercury In Manufactured Articles	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D009 (E)	NWW	TCLP Metals
Mercury, Metallic	Acceptable knowledge – Product information and MSDS supplemented by sampling and analysis (as required).	D009 (E)	NWW	TCLP Metals
Vacuum Pump Oil	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal), product information and MSDS supplemented by sampling and analysis (as required).	F001-F005 (T) (UHC)	NWW	TCLP Volatiles

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Reused Degreasing Solvents	Acceptable knowledge - Product information and MSDS supplemented by sampling and analysis (as required).	NA	NWW	NA
Fuel Contaminated Soft goods	Acceptable knowledge – Process knowledge, materials are only in contact with hydrazine-type hazardous waste constituents supplemented by sampling and analysis (as required).	P068 (H), U098 (T), U133 (T)	NWW	Hydrazine Fuels
Waste Explosives	Acceptable knowledge supplemented by sampling and analysis (as required).	D003 (R)	NWW	Explosive residue

6.4.3 Special Parameter Requirements

There will be cases where either WSTF will need to quantitate a non-regulated constituent or the detection limits for a EPA recommended method are unacceptably high for a regulated constituent or constituents. In these cases, WSTF will attempt have the laboratory modify an existing EPA method or utilize the best available non-EPA method for the constituent(s).

Quantification of hydrazine fuel waste waters provides an excellent example of the use of a non-EPA method to quantitate constituents at WSTF. No EPA recommended methods can achieve the required sensitivities and turn-around times required to manage hydrazine fuel contaminated wastewaters at WSTF. This method is required to not only to aid in waste determinations for waste streams, but to also ensure safety in the handling of the waste. WSTF-specific procedure, "Determination of Propellant Hydrazine's in Aqueous Solution Using Hewlett Packard HPLC 1100 Series with Amperometric Detection" (WJICHEMLAB-0268), is used to determine if hydrazine fuels are present. This method is provided in Appendix 6-I of this document.

When WSTF determines that special analyses are required for waste determinations, NMED will be apprised of the need for the special analytical methodology and asked for concurrence.

6.5 QA/QC Procedures

Quality assurance for non-sampling activities outlined in this waste analysis plan will be based on compliance with the applicable regulations and permit conditions and documentation of this compliance. Quality assurance required for sampling and analyses is described by the following sections.

6.5.1 Data Quality Objectives

Table 6.10 provides a summary of the seven steps of the data quality objective process. These steps will be utilized in developing sampling and analytical requirements for waste streams when acceptable knowledge is insufficient to characterize the waste steam. The data quality objectives process provided in Table 6.10 was outlined in the RCRA Waste Sampling Draft Technical Guidance, EPA 530-D-02-002 (August 2002). The DQO process will be applied each time sampling of a waste stream is required in a manner commensurate with the complexity of the waste in question.

Table 6.10 Data Quality Objectives Process

DQO Step	Description	Purpose
1	State the Problem	Summarize the contamination problem that will require environmental data and identify the resources available to resolve the problem.
2	Identity the Problem	Identify the decision that requires new environmental data to address the contamination problem.
3	Identify Inputs to the Decision	Identify the information needed to support the decision and specify which inputs require new environmental measurements or waste generation/process knowledge.
4	Define the Study Boundaries	Specify the spatial and temporal aspects of the waste or environmental media that data must represent to support the decision.
5	Develop a Decision Rule	Develop a logical if/then statement that defines the conditions that would cause the decision maker to choose among alternative actions.
6	Specify Limits on Decision Errors	Specify the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainty in data.
7	Optimize the Design for Obtaining Data	Identify the most resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs. To identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

6.5.2 Selecting Sampling Procedures and Equipment - § 264.13(b)(3)

Due to the diversity of WSTF waste streams, the type(s) of sampling procedures employed will be variable. The sampling procedures comprise the sampling strategy or data collection design used to ensure the representativeness of the samples and the sampling techniques and equipment used to support the chosen data collection design. The sampling procedure selection process is addressed in Step 3, as well as, Step 7 of the DQO process. In Step 3, sampling protocols and equipment capable of meeting the data requirements are identified and documented. In Step 7, data collection design or sampling strategy is optimized after the outputs of the first six steps of the DQO process are completed and reviewed. Sampling procedures and equipment will be selected in accordance with 40 CFR 261, Appendix I, Test Methods for Evaluating Solid Wastes, Physical/ Chemical Methods EPA (SW-846), the RCRA Waste Sampling Draft Technical Guidance EPA 530-D-02-002, the Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities (ASTM 6232).

6.5.3 Sample Preservation and Storage

The most appropriate sampling preservation and storage for each waste stream will be selected as a part of Step 3 of the DQO process. The sample preservation and storage protocols recommended by Chapters Two, Three, and Four of SW-846 will be used for most samples collected. If more appropriate, guidance from the Standard Guide for Sampling Waste and Soil for Volatile Organic Compounds (ASTM D 4547-98) or other EPA-recommended guidance may be utilized for the preservation of waste samples.

6.5.4 Selection of Analytical Laboratories

Off-site analytical laboratories used by WSTF must be contracted in accordance with Federal Acquisition Regulations. As a part of the procurement process, WSTF provides candidate laboratories with a Statement of Work for the work to be contracted. Any successful bidder must adequately address the requirements of the Statement of Work, prior to award of the contract. The following provides typical elements contained within analytical statements of work:

- The laboratory is required to provide a copy of the laboratory quality assurance plan;
- The laboratory must indicate what laboratory-specific standard operating procedures will be used and provide them if requested;
- WSTF specifies the analytical method(s) to be used;
- WSTF identifies the approximate number of samples to be submitted for each method;
- WSTF identifies the sample matrix or matrices;
- WSTF estimates the approximate time period of sample submission;
- WSTF provides required quantitation and method detection limits;
- The laboratory must provide current laboratory quantitation and detection limits for specified methods and matrices and if unavailable for specific analytes, the laboratory must estimate the time required to establish these limits;
- The laboratory must provide the procedures and frequencies for establishing method detection and quantitation limits;
- The laboratory must provide an analyte list (if different from list specified in method);
- WSTF identifies any additional analytes required for specific analyses;
- Data package requirements are specified by WSTF;
- WSTF requires that the laboratory report data below the quantitation limit, but above the method detection limit;
- The laboratory is required to specify sample container and preservation requirements (if they are different than EPA guidance, the discrepancy is discussed with the laboratory); and
- WSTF specifies laboratory turn-around time requirements.

6.5.5 Sample Control

Strict chain of custody controls are utilized for all samples collected at WSTF. Each sample is recorded on a designated chain of custody form or work order that includes chain of custody data. Chain of custody forms are used to track possession of

samples from the time of collection through sample analysis and the reporting of analytical results to WSTF by on-site and offsite laboratories. Chain of custody forms provide legal documentation of possession throughout the entire sampling and analysis process. Each form will contain the following information as applicable to on-site and off-site laboratories:

- Sample shipment information;
- Unique sample number of each sample;
- Sample type/matrix;
- Sample collection location;
- Number of containers for each sample;
- Required chemical analyses;
- Date of sample shipment; and
- Signature(s), date(s), and time(s) of all personnel involved in sample custody.

A chain of custody form is completed for each shipment of samples and is included in the ice chest during shipment or delivery to the analytical laboratory. A copy of the form is retained at WSTF with the shipping documentation. The original chain of custody accompanies the samples to the analytical laboratory, and is eventually returned with the analytical report from the laboratory to become a part of the permanent sampling and analytical records maintained at WSTF. The current WSTF chain of custody form is provided in Appendix 6-J.

6.5.6 Data Verification, Validation, and Assessment

Upon receipt of analytical data from the laboratories, data verification and validation will be performed to ensure that the sampling and analysis protocols were followed and that the measurement systems performed in accordance with required DOQ criteria.

NASA will review data to ensure that the laboratory(s) have performed the analyses in accordance with the appropriate sampling/quality assurance projects plan(s) and in accordance with the referenced EPA or equivalent method(s).

Review of data may include, but is not limited to, ensuring that the acceptable recovery ranges for surrogates (where applicable) and ensuring laboratory control samples and spiked samples, as well as the acceptable relative percent difference for duplicate laboratory control samples and matrix spike duplicates, are within acceptable limits. The laboratory shall qualify data for which these measurements are out of control and also provide narratives explaining the qualifier(s). The laboratory must also state what corrective actions, if appropriate, were taken when the limits are exceeded. The laboratory must provide results for all analyte concentrations observed at levels below the quantitation limit, but above the method detection limit and qualify these data appropriately.

Upon completion of the data review, data qualifiers where appropriate are included with the data. Data qualifiers are used to identify various out of control conditions for the data quality. Table 6.11 provides a summary of common WSTF Data Qualifiers.

Table 6.11 WSTF Data Qualifiers

Table 6.11 – WSTF Data Qualifiers	
Qualifier	**Description**
*	User defined qualifier. See quality assurance narrative.
A	The result of an analyte for a laboratory control sample (LCS), an initial calibration verification (ICV) or continuing calibration verification (CCV) was outside standard limits.
AD	Relative percent difference for analyst (laboratory) duplicates was outside standard limits.
EB	The analyte was detected in the equipment blank.
FB	The analyte was detected in the field blank.
G	The result is an estimated value greater than the upper calibration limit.

Table 6.11 – WSTF Data Qualifiers	
Qualifier	**Description**
J	The result is an estimated value less than the quantitation limit, but greater than or equal to the detection limit.
NA	The value/result was either not analyzed for or not applicable.
ND	The analyte was not detected above the detection limit.
Q	The result for a blind control sample was outside standard limits.
QD	The relative percent difference for a field duplicate was outside standard limits.
R	The result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
RB	The analyte was detected in the method blank.
S	The result was determined by the method of standard addition.
SP	The matrix spike recovery and/or the relative percent difference for matrix spike duplicates was outside standard limits.
T	The sample was analyzed outside the specified holding time.
TB	The analyte was detected in the trip blank.
TIC	The analyte was tentatively identified by a GC/MS library search and the amount reported is an estimated value.
i	The quantitation limit and method detection limit have been elevated due to a matrix interference.
D	The reported result is from a dilution.

6.5.7 Corrective Action

Data Quality Indicators (DQIs) are used to determine the usability of data for hazardous waste purposes. When DQIs indicate that an accurate waste determination cannot be performed, corrective actions may include re-sampling, sample clean up prior to analyses, and/or the use of data with reliance upon narrative explanations. When all the pertinent corrective actions have been taken to qualify the analytical data and the data is still not within acceptable limits, NASA may augment the determination with acceptable knowledge for purposes of a hazardous waste determination.

6.5.8 Records Management

All analytical records associated with any permitted treatment or storage units located at WSTF will be kept until in the unit's operating record until closure of the facility.

6.6 Special Procedural Requirements

6.6.1 Procedures for Ignitable, Reactive, and Incompatible Wastes

Analytical procedures for ignitable, reactive, and incompatible waste at the WSTF ensure proper storage and facilitate disposal of wastes as per 40 CFR 264.17 (b) by preventing reactions which:

- Generate extreme heat or pressure, fire or explosions, or violent reactions;
- Produce uncontrolled toxic or flammable fumes or gasses;
- Damage the structural integrity of the containers or the storage unit; and
- Threaten the human health or environment.

The analysis ensure proper waste handling of ignitable, reactive, and incompatible waste as per 40 CFR 264.17 (a) and that potentially incompatible wastes are not stored or treated in the same area.

WSTF shall use the following methods to characterize ignitable, reactive, and incompatible wastes:

- Acceptable knowledge of process;
- Chemical analysis;
- Published information; and
- Chemical fingerprint analyses.

6.6.2 Procedures to Ensure Compliance with Land Disposal Restrictions

At the point of generation, and before shipping hazardous waste off-site, WSTF will make a determination if the waste requires treatment prior to land disposal. As per the Land Disposal Regulations at 40 CFR 268.7, hazardous waste must meet the applicable LDR treatment standards under Subpart D of 40 CFR 268. This determination will be made by acceptable knowledge and/or testing. If it is determined that the wastes do not meet applicable LDR standards based upon acceptable knowledge or analytical results, no further analysis is required. Additional testing will only be required at the disposal facility subsequent to treatment to determine that the waste treatment residuals meet treatment standards.

Standards will be determined for each waste having a treatment standard established in Subpart D of 40 CFR 268. Underlying hazardous constituents will be determined for all characteristic waste as per 40 CFR 268.9. Analytical results used in making these determinations will be retained in the facility operating record.

Waste exceeding treatment standards is shipped off of the facility for treatment at a permitted RCRA facility. The waste treatment residuals are tested prior to landfill. LDR notification will be accomplished as per 40 CFR 268.7(a)(2).

Wastes that have been determined through analysis to meet treatment standards as per Subpart D of 40 CFR 268, will be land disposed in a permitted facility without any further treatment. LDR certification, to include 40 CFR 268.7(a)(3) supporting documentation, will be prepared and forwarded to any receiving facility as required.

Treatment of waste at the FTU occurs solely to render such waste less hazardous; safer to store, transport, or dispose of; and amenable for storage in accordance with the definition of treatment found at 40 CFR 260.10. Waste stored at the FTU is transported off-site annually or sooner, as storage capacity dictates, to a permitted TSD facility for treatment that is compliant with 40 CFR 268 standards. This treatment is typically accomplished by, but not limited to, combustion in an incinerator.

Treatment of waste for the ETU to meet LDR standards of 40 CFR 268 will include but not be limited to DEACT or neutralization (either at the point of generation or immediately after discharge to the ETU and ADGAS treatment (at the point of generation prior to discharge to the ETU). Other potential treatment methods for wastes above LDR treatment standards include, but are not limited to, ion exchange (at the point of generation prior to discharge to the ETU) for metals recovery and carbon adsorption treatment of IDW waste codes F001 and F002 (at the point of generation prior to discharge to the ETU).

Treatment of waste transported off-site to a permitted TSD will be in accordance with the appropriate standard set forth in 40 CFR 268. These treatments will include, but not be limited to, combustion in an incinerator; deactivation by combustion in an incinerator; recovery and retort of mercury; neutralization; stabilization and macroencapsulation, and thermal recovery of metals.

Wastes with a characteristic of ignitability and a USEPA waste code of D001, will be treated by combustion in an incinerator. This treatment will include degreasing solvents; isopropyl alcohol; pumpable paints; organics; and non-pumpable paints.

Wastes that meet the requirements of 40 CFR 268.3(c) in that the waste stream consists primarily of organic materials such as wood, paper, cloth, plastic, etc. , or has a heat of combustion greater than 5,000 BTU's per pound, will also be treated by combustion in an incinerator. This treatment will include vacuum pump oils; fuel contaminated soft goods (combustion is also a designated treatment for the USEPA waste codes P068, U098 and U133 of this waste; hazardous refuse; and lead contaminated soft goods.

Waste organic acid solutions and caustic paint removers will be deactivated by neutralization or combustion in an incinerator. Lithium batteries will be deactivated by combustion in an incinerator. Metallic mercury will be treated by recovery or retort of mercury while mercury in manufactured articles will be treated by incineration of mercury or recovery or retort of mercury.

Appendix 6-A

Waste Generation Scenarios

WSTF
Engineering
Waste Generation Scenarios

COMPONENT SERVICES WASTE GENERATION SCENARIOS

WORK COORDINATION

WASTE GENERATING PROCESSES

WASTE

INTERFACE

INTERFACE

WORK REQUEST REQUIREMENTS/ MATERIAL/COMPONENT DESCRIPTION

RETURN COMPONENT TO CUSTOMER

COMPONENT DRAINED/ FLUSHED

NO

YES

PROPELLANT FUEL OR OXIDIZER SERVICE

YES

NO

COMPONENT FIELD DECONNED

YES FUEL

YES OXIDIZER

RETURN COMPONENT TO CUSTOMER

NO

ELASTOMERS TEFLON, NYLON, UNKNOWN

NO

YES

DEGREASING

YES

NO

COMPONENT DECONTAMINATION AND DISSASSEMBLY

COMPONENT DECONTAMINATION AND DISSASSEMBLY

REPAIR OR REFURBISHMENT

NO

YES

REPAIR OR REFURBISHMENT

PRE-CLEANING

YES

PRE-CLEANING

PICKLING PASSIVATION REQUIRED

NO

YES

PRECISION CLEANING SAMPLING

NO

YES

ASSEMBLY FUNCTIONAL TESTING

NO

YES

DEGREASING WITH WIPES

SOLVENT DEGREASING

DEGREASING WITH WIPES

CAUSTIC CLEANING OAKITE 126 OR EQUIVALENT

HOT WATER RINSE ULTRAPURE WATER RINSE

NITROGEN DRYING

PAINT REMOVAL

NO

YES

YES

SANDBLASTING

CAUSTIC PAINT REMOVAL OAKITE RUSTRIPPER OR EQUIVALENT

WATER RINSE

PICKLING FERIC CHLORIDE HYDROCHLORIC ACID SOLUTION

PASSIVATION NITRIC ACID SOLUTION

PASSIVATION NITRIC ACID-DICHROMATE SOLUTION

WATER RINSE

DI WATER RINSE

WATER RINSE ULTRA PURE WATER RINSE

IPA DIP

AIR DRY OVEN OR PURGE

VAPOR DEGREASER HFE-7100

ULTRAPURE WATER RINSE

HFE-7100 RINSE

CLEANLINESS VERIFICATION

ULTRAPURE WATER SAMPLE MEDIA

HFE-7100 SAMPLE MEDIA

ISOPROPYL ALCOHOL SAMPLE MEDIA

AIR DRY OVEN OR PURGE

FUNCTIONAL TESTING

TO CUSTOMER

ETU CAUSTIC CLEANING SOLUTION

CSU HAZARDOUS REFUSE

CSU HAZARDOUS REFUSE

ETU CLEAN ROOM RINSE WATER

VENT TO ATMOSPHERE

FTU FUEL CONTAMINATED WASTE WATER

CSU FUEL CONTAMINATED SOFTGOODS

ETU OXIDIZER CONTAMINATED WASTE WATER

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

CSU RECYCLED USED OIL

NON-HAZARDOUS REFUSE

CSU RECYCLED DEGREASING SOLVENTS

CSU VACUUM PUMP OIL

CSU HAZARDOUS REFUSE

ETU PICKLING SOLUTION

ETU PASSIVATING SOLUTION

CSU ISOPROPYL ALCOHOL

ETU CLEAN ROOM RINSE WATER

ETU VENT TO ATMOSPHERE

ETU PASSIVATING SOLUTION

ETU CLEAN ROOM RINSE WATER

REUSED DEGREASING SOLVENTS

CSU ISOPROPYL ALCOHOL

ETU NON-HAZARDOUS WASTE WATER

VENT TO ATMOSPHERE

CSU RECYCLED DEGREASING SOLVENTS

CSU HAZARDOUS REFUSE

CSU CAUSTIC PAINT REMOVER

ETU CLEAN ROOM RINSE WATER

REFER TO PRE-CLEANING WASTE GENERATION SCENARIOS

PROCESS

WASTE

NOTES:

1. The proposed waste codes are based on acceptable knowledge. Additional knowledge or analysis may be used to update the waste codes.
2. LDR Nonwastewater (NWW): Wastewater (WW) designation based on acceptable knowledge. Additional knowledge or testing may be used to update the NWW/WW designation.
3. CSU – Waste designated for management in a container storage unit for 90 days or less under the provisions of 40 CFR 262.34.
4. ETU – Waste designated for management in the ETU.
5. FTU – Waste designated for management in the FTU.

COMPONENT SERVICES PRECLEANING WASTE GENERATION SCENARIO

NOTES:
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3. CSU – Waste designated for management in a container storage unit for 90 days or less under the provisions of 40 CFR 262.34
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5. FTU – Waste designated for management in the FTU

PROCESS
WASTE

FROM COMPONENT SERVICES WASTE GENERATION SCENARIO

TITANIUM OR TITANIUM ALLOYS, GLASSWARE? NO / YES

300 SERIES SS HASTELOY, PH SS MONEL, INCOMEL? NO / YES

NEWLY-WELDED 300 SERIES SS PH SS? NO / YES

400 SERIES SS CARBON STEEL? NO / YES

ALUMINUM OR ALUMINUM ALLOYS? NO / YES

COPPER BRASS OR COPPER ALLOYS? NO / YES

NON-METALLICS ELASTOMERICS OR COATED METALICS? YES

INTERFACE

WASTE GENERATING PROCESSES

CAUSTIC CLEANING OAKITE 126 OR EQUIVALENT
HOT WATER RINSE
ACIDIC CLEANING OAKITE 31 OR EQUIVALENT
HOT WATER RINSE
ULTRAPURE WATER RINSE
AIR DRYING OVEN
RETURN TO COMPONENT SERVICES WASTE GENERATION SCENARIO
VENT TO ATMOSPHERE
CLEAN ROOM RINSE WATER
CAUSTIC CLEANING SOLUTION (ETU)
ACIDIC CLEANING SOLUTION (ETU)

CAUSTIC CLEANING OAKITE 126 OR EQUIVALENT
HOT WATER RINSE
HF ABRASIVE CLEANING PASTE BRADFORD DERUSTIT SS-3 OR EQUIVALENT
HOT WATER RINSE
ACIDIC CLEANING OAKITE 31 OR EQUIVALENT
NITRIC-HYDROFLUORIC ACID DIP
HOT WATER RINSE
ACIDIC CLEANING OAKITE 31 OR EQUIVALENT
HOT WATER RINSE
ULTRAPURE WATER RINSE
HOT WATER RINSE
AIR DRYING OVEN
RETURN TO COMPONENT SERVICES WASTE GENERATION SCENARIO
VENT TO ATMOSPHERE
CLEAN ROOM RINSE WATER
CAUSTIC CLEANING SOLUTION (ETU)
ACIDIC CLEANING SOLUTION (ETU)
ACIDIC CLEANING SOLUTION (ETU)
NITRIC-HYDORFLOURIC ACID SOLUTION (ETU)

CAUSTIC CLEANING OAKITE, RUSTRIPPER OR EQUIVALENT
COLD WATER RINSE
ACIDIC CLEANING OAKITE 31 OR EQUIVALENT
COLD WATER RINSE
ULTRAPURE WATER RINSE
AIR DRYING
RETURN TO COMPONENT SERVICES WASTE GENERATION SCENARIO
VENT TO ATMOSPHERE
CLEAN ROOM RINSE WATER
CAUSTIC CLEANING SOLUTION (ETU)
ACIDIC CLEANING SOLUTION (ETU)

PHOSPHATE DETERGENT CLEANER BRULIN 815 GD OR EQUIVALENT
HOT WATER RINSE
ULTRAPURE WATER RINSE
NITROGEN DRYING
RETURN TO COMPONENT SERVICES WASTE GENERATION SCENARIO
CLEAN ROOM RINSE WATER (ETU)
DETERGENT-TYPE CLEANERS (ETU)
VENT TO ATMOSPHERE

CAUSTIC CLEANING OAKITE 126 OR EQUIVALENT
HOT WATER RINSE
ULTRAPURE WATER RINSE
AIR DRY
ACETIC, NITRIC, PHOSPHONIC ACID BRASS BRIGHTENER
CITRIC ACID
HOT WATER RINSE
ULTRAPURE WATER RINSE
NITROGEN DRYING
VENT TO ATMOSPHERE
CLEAN ROOM RINSE WATER (ETU)
WASTE ORGANIC ACID SOLUTIONS (CSU)
VENT TO ATMOSPHERE
CITRIC ACID (ETU)

CAUSTIC CLEANING OAKITE 126 OR EQUIVALENT
HOT WATER RINSE
ACIDIC CLEANING OAKITE 31 OR EQUIVALENT
HOT WATER RINSE
ULTRAPURE WATER RINSE
AIR DRYING OVEN
RETURN TO COMPONENT SERVICES WASTE GENERATION SCENARIO
VENT TO ATMOSPHERE
CLEAN ROOM RINSE WATER
ACIDIC CLEANING SOLUTION (ETU)
CAUSTIC CLEANING SOLUTION (ETU)

DETERGENT-TYPE CLEANERS BRULIN 815 GD, SIMPLE GREEN OR EQUIVALENT
VENT TO ATMOSPHERE
DETERGENT-TYPE CLEANERS (ETU)

INTERFACE

WASTE

WSTF FACILITIES HEAVY EQUIPMENT, PAINT SHOP AND MACHINE SHOP WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
1. The proposed waste codes are based on acceptable knowledge. Additional knowledge or analysis may be used to update the waste codes.
2. LDR Nonwastewater (NWW): Wastewater (WW) designation based on acceptable knowledge. Additional knowledge or testing may be used to update the NWW/WW designation.
3. CSU – Waste designated for management in a container storage unit for 90 days or less under the provisions of 40 CFR 262.34
4. ETU – Waste designated for management in the ETU
5. FTU – Waste designated for management in the FTU

HEAVY EQUIPMENT
YES
PAINT SHOP
YES
MACHINE SHOP
YES

INTERFACE
INTERFACE
INTERFACE

WASTE GENERATING PROCESSES

EQUIPMENT MAINTENANCE
PAINT BOOTH EQUIPMENT PAINTING
PAINT BOOTH FILTER SERVICING
MACHINING

INTERFACE

WASTE

NON-HAZARDOUS REFUSE
RECYCLED DEGREASING SOLVENTS
CSU
RECYCLED CARBURATOR CLEANER
CSU
HAZARDOUS REFUSE
CSU
ORGANICS
CSU
RECYCLED USED OIL
CSU
LEAD ACID BATTERIES
CSU
CSU
OILY SLUDGE
CSU
RECYCLED USED ANTIFREEZE
CSU
HAZARDOUS REFUSE
CSU
CSU
LIQUID PAINTS
CSU
HAZARDOUS REFUSE
CSU
CSU
RECYCLED ALKALINE BATTERIES
CSU
CURED PAINTS
CSU
RECYCLED USED OIL
CSU
RECYCLED METALS
NON-HAZARDOUS REFUSE
CSU
MACHINE SHOP OILS
CSU
HAZARDOUS REFUSE
CSU
RECYCLED DEGREASING SOLVENTS
CSU
LIQUID PAINTS

WSTF FACILITIES ENGINEERING, CONSTRUCTION, OPERATION AND MAINTENANCE
WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
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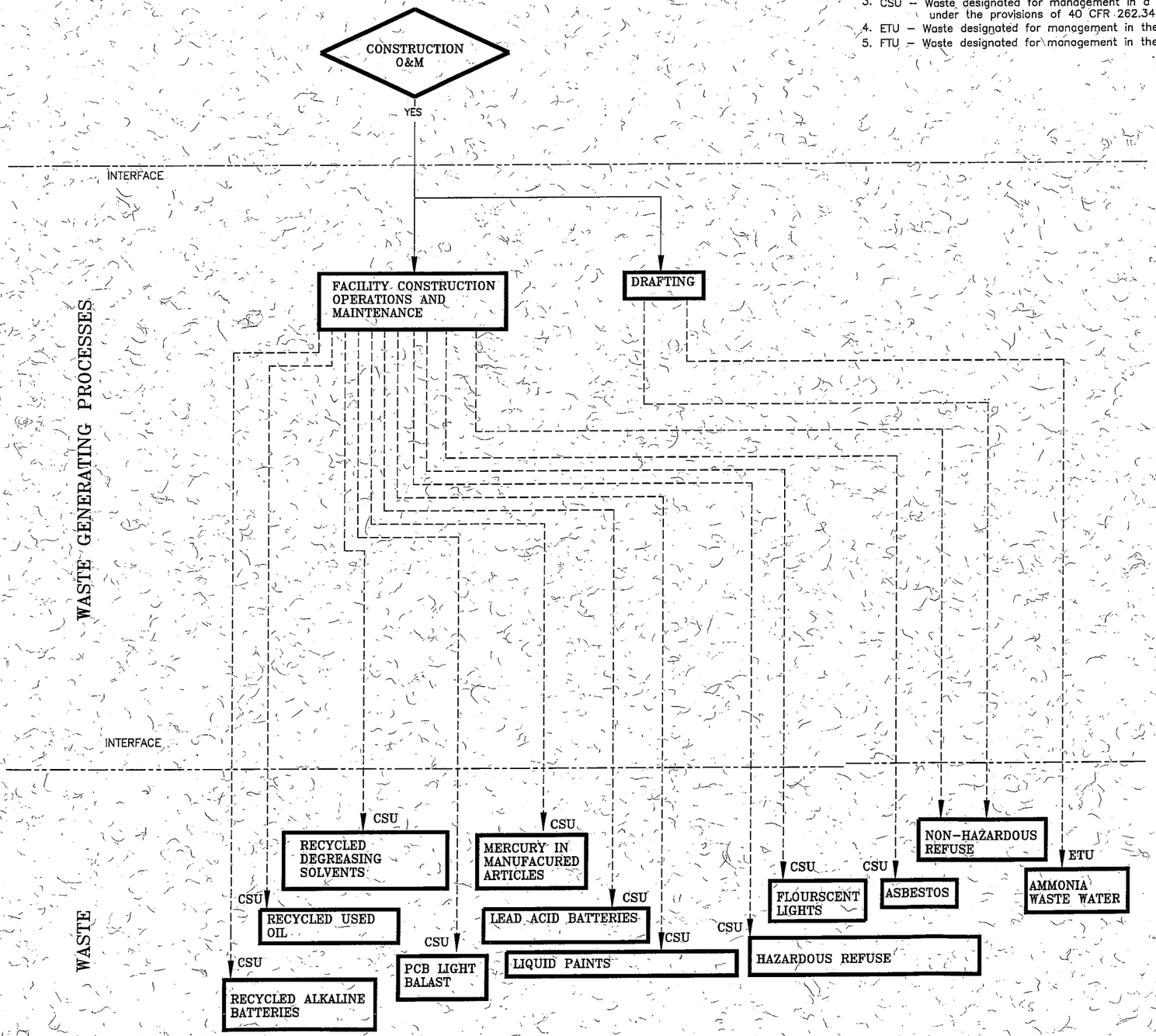

WSTF
Environmental
Waste Generation Scenarios

TECHNICAL SERVICES WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
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4. ETU – Waste designated for management in the ETU
5. FTU – Waste designated for management in the FTU

WASTE GENERATING PROCESSES

PHOTO LAB

ETCH LAB/ SILK SCREEN

CALIBRATION LAB

INTERFACE

INTERFACE

INTERFACE

INTERFACE

PHOTO DEVELOPMENT

CIRCUIT BOARD FABRICATION

SILK SCREEN FABRICATION

INSTRUMENT/ EQUIPMENT CALIBRATION

SILVER RECOVERY UNIT

WASTE

SILVER RECYCLE

ETU
PHOTO FIXER SOLUTION AFTER SILVER RECOVERY

NON-HAZARDOUS WASTE WATER

CSU
CIRCUIT BOARD ETCHANT

CSU
HAZARDOUS REFUSE

CSU
RINSE WATER

CSU
RINSE WATER

CSU
MERCURY IN MANUFACURED ARTICLES

CSU
MERCURY, METALIC

CSU
LITHIUM BATTERIES

CSU
RECYCLED USED OIL

CSU
NICAD BATTERIES

ENVIRONMENTAL – CONTAMINATION ASSESSMENT, WASTE MANAGEMENT AND GSA WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
1. The proposed waste codes are based on acceptable knowledge. Additional knowledge or analysis may be used to update the waste codes.
2. LDR Nonwastewater (NWW): Wastewater (WW) designation based on acceptable knowledge. Additional knowledge or testing may be used to update the NWW/WW designation.
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4. ETU – Waste designated for management in the ETU
5. FTU – Waste designated for management in the FTU

WASTE GENERATING PROCESSES

CONTAMINATION ASSESSMENT

CONTAMINAION ASSESSMENT/ REMEDIATION

WELL INSTALLATION SAMPLING, PUMP TESTS WELL DEVELOPMENT, EQUIPMENT DECONTAMINATION

EQUIPMENT MAINTENANCE

GROUNDWATER REMEDIATION

HAZARDOUS WASTE MANAGEMENT

WASTE MANAGEMENT

ETU OPERATION

FTU OPERATION

<90 DAY AREA OPERATION

GSA

YES

AUTOMOTIVE MAINTENANCE

INTERFACE

WASTE

ETU
CONTAMINATED GROUNDWATER

CSU
OILY SLUDGE

CSU
RECYCLED USED OIL

CSU
ORGANICS

CSU
LEAD ACID BATTERIES

ETU
CITRIC ACID

ETU
CONTAMINATED GROUNDWATER

CSU
MERCURY IN MANUFACURED ARTICLES

CSU
HAZARDOUS REFUSE

ETU ETU
CONTACT-CONTAMINATED WASTE WATER

CSU
HAZARDOUS REFUSE

CSU
FUEL CONTAMINATED SOFTGOODS

CSU
HAZARDOUS REFUSE

NON-HAZARDOUS REFUSE

RECYCLED DEGREASING SOLVENTS
CSU

HAZARDOUS REFUSE
CSU

ORGANICS
CSU

RECYCLED USED OIL
CSU

LEAD ACID BATTERIES
CSU

CSU
OILY SLUDGE

CSU
RECYCLED USED ANTIFREEZE

WSTF
Laboratories
Waste Generation Scenarios

CHEMISTRY LABORATORY WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
1. The proposed waste codes are based on acceptable knowledge. Additional knowledge or analysis may be used to update the waste codes.
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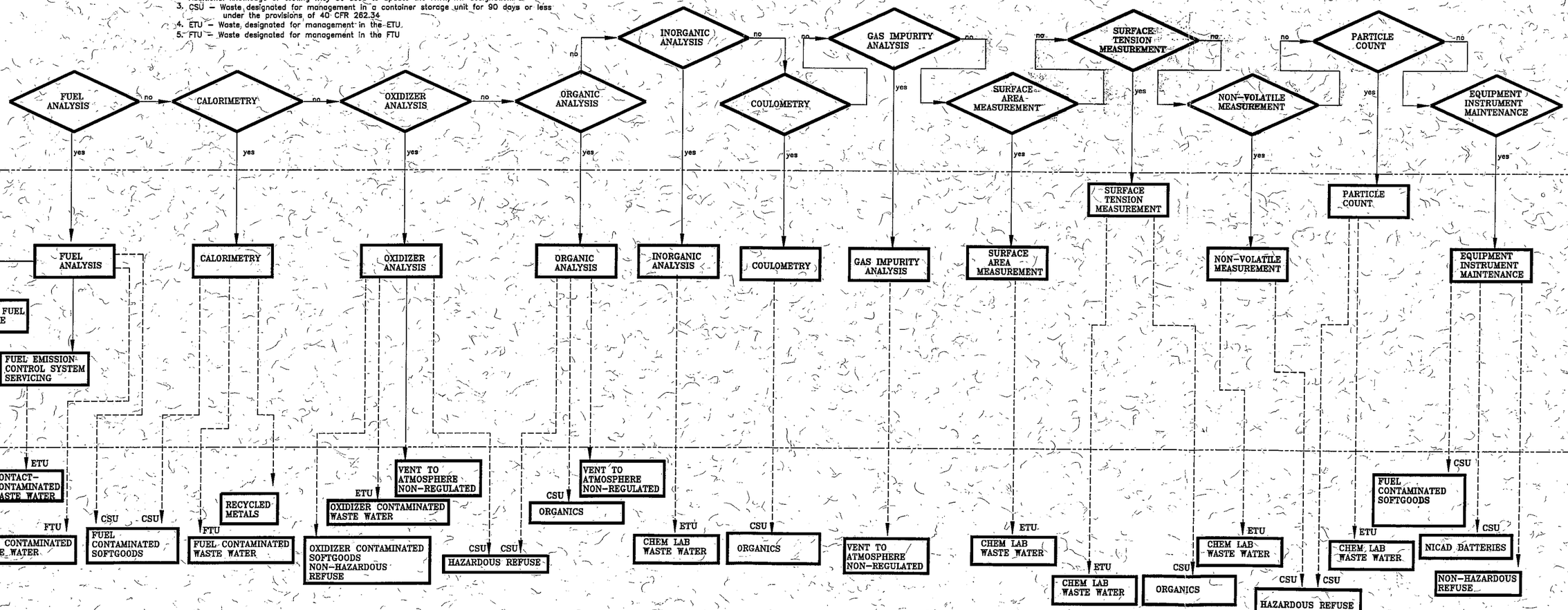
4. ETU – Waste designated for management in the ETU.
5. FTU – Waste designated for management in the FTU



LABORATORIES MATERIAL, HIGH PRESSURE, OXYGEN, EXPLOSIVE, AND HYPERVELOCITY TESTING WASTE GENERATION SCENARIOS

PROCESS
WASTE

NOTES:
1. The proposed waste codes are based on acceptable knowledge. Additional knowledge or analysis may be used to update the waste codes.
2. LDR Nonwastewater (NWW): Wastewater (WW) designation based on acceptable knowledge. Additional knowledge or testing may be used to update the NWW/WW designation.
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4. ETU – Waste designated for management in the ETU
5. FTU – Waste designated for management in the FTU

TEST REQUEST

PROJECT INITIATION PLANNING AND DESIGN

WSTF WASTE MANAGEMENT

INTERFACE

MATERIALS TESTING

no

HIGH PRESSURE TESTING

no

OXYGEN TESTING

no

EXPLOSIVE TESTING

no

HYPERVELOCITY TESTING

yes

yes

yes

yes

yes

WASTE GENERATING PROCESSES

MATERIALS TESTING

HIGH PRESSURE TESTING

OXYGEN TESTING

EXPLOSIVE TESTING

HYPOERVELOCITY TESTING

INTERFACE

WASTE

CSU
HAZARDOUS REFUSE

CSU
LIQUID PAINTS

NON-HAZARDOUS REFUSE

CSU
ORGANICS

CSU
CURED PAINTS

CSU
VACUUM PUMP OIL

CSU
MERCURY IN MANUFACURED ARTICLES D009 NWW

CSU
RECYCLED USED OIL

CSU
NON-HAZARDOUS REFUSE

CSU
RECYCLED USED ANTIFREEZE

RECYCLED METALS

VENT TO ATMOSPHERE PERMIT #'s

WASTE EXPLOSIVES

CSU
HAZARDOUS REFUSE

CSU
LIQUID PAINTS

NON-HAZARDOUS REFUSE

CSU
RECYCLED USED OIL

CSU
CURED PAINTS

LABORATORIES HAZARDOUS FLUIDS PRE-TEST WASTE GENERATION SCENARIO

PROCESS
WASTE

NOTES:
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4. ETU – Waste designated for management in the ETU
5. FTU – Waste designated for management in the FTU

PROJECT INITIATION

TEST REQUEST

PROJECT INITIATION PLANNING AND DESIGN

WSTF WASTE MANAGEMENT

INTERFACE

WASTE GENERATING PROCESSES

FACILITY MODIFICATIONS

NO

YES

WSTF FACILITIES CONSTRUCTION, OPERATION AND MAINTENANCE

TEST SYSTEM MAINTENANCE AND REPAIR

YES

WSTF FACILITIES MACHINE SHOP

YES

NO

COMPONENT REMOVAL
COMPONENT FIELD DECON
PPE DECON

YES FUEL

PROPELLANT CONTAMINATED

NO

YES OXIDIZER

COMPONENT REMOVAL
COMPONENT FIELD DECON
PPE DECON

COMPONENT SERVICES CLEAN ROOM

WSTF FACILITIES MACHINE SHOP

COMPONENT SERVICES CLEAN ROOM

YES

NO

COMPONENT SERVICES CLEAN ROOM

COMPONENT SERVICES VALVE SHOP

NO

YES

TECHNICAL SERVICES

YES

NO

TECHNICAL SERVICES

TEST SYSTEM BUILDUP

EQUIPMENT MAINTENANCE

TEST SUPPORT MAINTENANCE AND REPAIR

YES

TEST SUPPORT MAINTENANCE AND REPAIR

TO LABORATORIES HAZARDOUS FLUID TESTING TEST AND POST-TEST WASTE GENERATION SCENARIOS

OXIDIZER CONTAINMENT SERVICING

AMMONIA EMISSION CONTROL SYSTEM SERVICING

FIREX CHECK NON-CONTACT COOLING WATER

FUEL CONTAIMENT SERVICING

CONTROL SYSTEM SERVICING (AREA VENT TANKS

INTERFACE

WASTE

FTU
FUEL CONTAMINATED WASTE WATER

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

REFER TO WSTF FACILITIES MACHINE SHOP WASTE GENERATION SCENARIOS

CSU
FUEL CONTAMINATED SOFTGOODS

ETU
OXIDIZER CONTAMINATED WASTE WATER

REFER TO COMPONENT SERVICES WASTE GENERATION SCENARIOS

NON-HAZARDOUS REFUSE

REFER TO TECHNICAL SERVICES WASTE GENERATION SCENARIOS

HAZARDOUS REFUSE

CSU

RECYCLED USED OIL

CSU

NON-HAZARDOUS WASTE WATER

CSU
VACUUM PUMP OIL

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

CSU
FUEL CONTAMINATED SOFTGOODS

ETU
AMMONIA WASTE WATER

FTU
FUEL CONTAMINATED WASTE WATER

ETU
OXIDIZER CONTAMINATED WASTE WATER

REFER TO WSTF FACILITIES CONSTRUCTION, OPERATION AND MAINTENANCE WASTE GENERATION SCENARIOS

LABORATORIES HAZARDOUS FLUIDS TEST AND POST-TEST WASTE GENERATION SCENARIOS

PROCESS
WASTE

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PROJECT INITIATION

LABORATORIES HAZARDOUS FLUIDS PRE-TEST WASTE GENERATION SCENARIO

WORK AUTHORIZING DOCUMENTS

WORK/TEST COORDINATION

WSTF WASTE MANAGEMENT

INTERFACE

INTERFACE

TEST OPERATIONS

POST-TEST OPERATIONS

WASTE GENERATING PROCESSES

OXIDIZER SYSTEM SUPPORT

TEST PROCESS

FUEL SYSTEM SUPPORT

TEST ARTICLE REMOVAL

TEST ARTICLE AND COMPONENT DECONTAMINATION

PPE DECONTAMINATION

OXIDIZER SYSTEM PURGE AND VENT

AMMONIA PURGE AND VENT

FUEL SYSTEM PURGE AND VENT

PROPANE

OX BURNER

AMMONIZ EMISSION CONTROL SYSTEM (VENT CONTAINERS)

FUEL EMISSION CONTROL SYSTEM (AREA VENT TANKS)

INTERFACE

VENT TO ATMOSPHERE NON-REGULATED

WASTE

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

CSU

FUEL CONTAMINATED SOFTGOODS

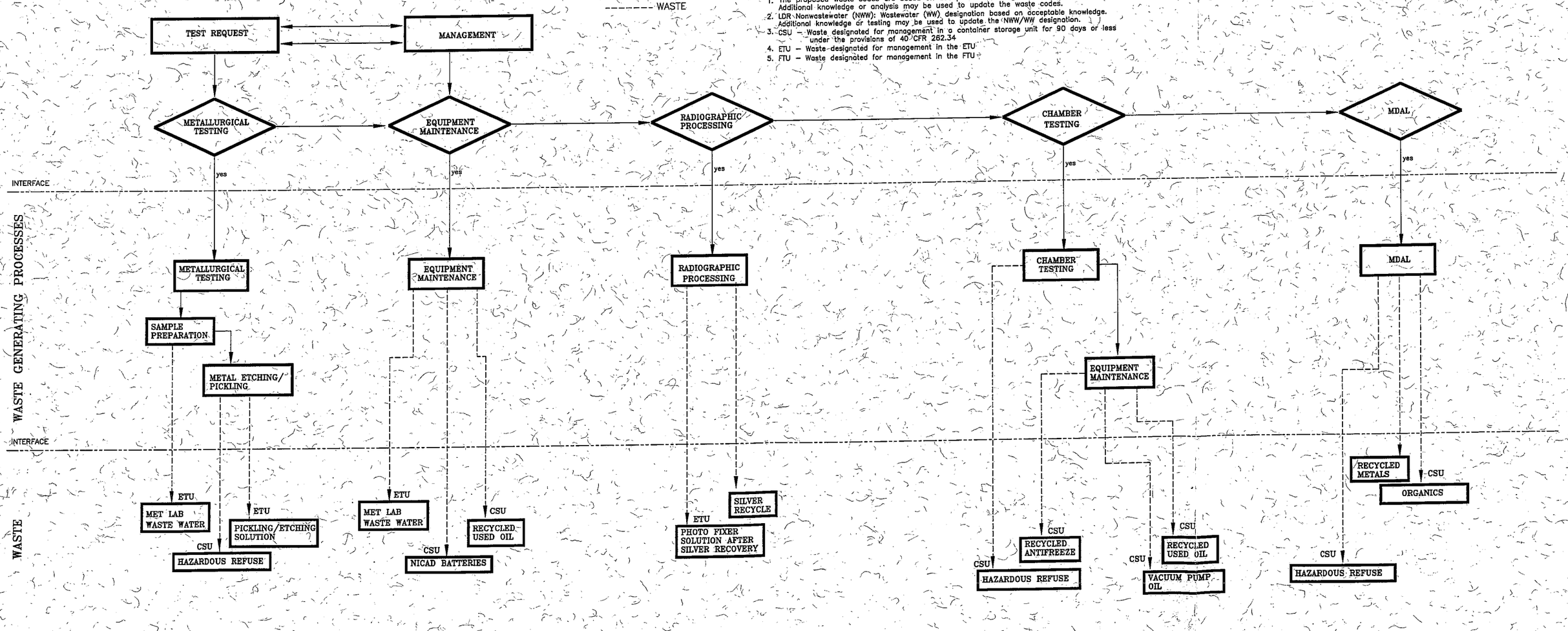
ETU

OXIDIZER CONTAMINATED WASTE WATER

FTU

FUEL CONTAMINATED WASTE WATER

METALLURGICAL LABORATORY AND MDAL LABORATORY WASTE GENERATION SCENARIOS



WSTF
Propulsion Test
Waste Generation Scenarios

PROPULSION – REPAIR AND MAINTENANCE (CTF) WASTE GENERATION SCENARIO

PROCESS
WASTE

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PROJECT INITIATION

COMPONENT REQUIREMENTS REPAIR/MAINTENANCE/TESTING

SERVICES REQUIRED

WSTF WASTE MANAGEMENT

INTERFACE

RECEIVING OPERATIONS/ DECONN

NO

YES

FUEL OR OXIDIZER COMPONENT

YES OXIDIZER

YES FUEL

OXIDIZER FUME HOOD PURGE AND VENT

FUEL FUME HOOD COMPONENT EVACUATION

VACUUM PUMP

WATER

FLOW STAND FLOW CHARACTERISTICS TESTS

VACUUM PUMP CRYOTRAP SERVICING

FUEL FUME HOOD PURGE AND VENT

WATER

FLOW STAND FLOW CHARACTERISTICS TESTS

FUEL EMISSION CONTROL SYSTEM SERVICING

FUEL EMISSION CONTROL SYSTEM SCRUBBER

POST–FLUSH REPAIR AND MAINTENANCE

NO

YES

COMPONENT REPAIR AND MAINTENANCE

POST–REPAIR ACCEPTANCE TESTING

NO

YES

TO PROPULSION – TESTING AND POST–TEST WASTE GENERATION SCENARIOS

TO CUSTOMER

WASTE GENERATING PROCESSES

INTERFACE

WASTE

NON–HAZARDOUS WASTE WATER

VENT TO ATMOSPHERE NON–REGULATED

CSU CSU

FUEL CONTAMINATED SOFTGOODS

FTU FTU

FUEL CONTAMINATED WASTE WATER

ETU

CONTACT–CONTAMINATED WASTE WATER

CSU

ORGANICS

NON–HAZARDOUS REFUSE

CSU

LIQUID PAINTS

CSU

HAZARDOUS REFUSE

REFER TO PROPULSION – TESTING AND POST–TEST WASTE GENERATION SCENARIOS

PROPULSION – PRETEST WASTE GENERATION SCENARIO

PROCESS
WASTE

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PROJECT INITIATION

TEST REQUEST

PROJECT INITIATION PLANNING AND DESIGN

WSTF WASTE MANAGEMENT

INTERFACE

WASTE GENERATING PROCESSES

FACILITY MODIFICATIONS

NO

YES

WSTF FACILITIES CONSTRUCTION, OPERATION AND MAINTENANCE

TEST SYSTEM MAINTENANCE AND REPAIR

YES

WSTF FACILITIES MACHINE SHOP

NO

YES

COMPONENT REMOVAL COMPONENT FIELD DECON PPE DECON

PROPELLANT CONTAMINATED

YES FUEL

NO

YES OXIDIZER

COMPONENT REMOVAL COMPONENT FIELD DECON PPE DECON

COMPONENT SERVICES CLEAN ROOM

WSTF FACILITIES MACHINE SHOP

COMPONENT SERVICES VALVE SHOP

NO

YES

NO

COMPONENT SERVICES CLEAN ROOM

YES

COMPONENT SERVICES CLEAN ROOM

TECHNICAL SERVICES

YES

NO

TECHNICAL SERVICES

TEST SYSTEM BUILDUP

COMPONENT SERVICES VALVE SHOP

TEST SUPPORT MAINTENANCE AND REPAIR

YES

TEST SUPPORT MAINTENANCE AND REPAIR

TO PROPULSION – TESTING AND POST–TEST WASTE GENERATION SCENARIOS

PROPELLANT SAMPLING FUEL AND OXIDIZER

FIREX CHECK, WATER/STEAM SYSTEM MAINTENANCE

FUEL EMISSION CONTROL SYSTEM SERVICING (AREA VENT TANKS)

EQUIPMENT MAINTENANCE

WASTE

INTERFACE

FTU
FUEL CONTAMINATED WASTE WATER

CSU
FUEL CONTAMINATED SOFTGOODS

OXIDIZER CONTAMINATED SOFTGOODS NON–HAZARDOUS REFUSE

ETU
OXIDIZER CONTAMINATED WASTE WATER

REFER TO WSTF FACILITIES MACHINE SHOP WASTE GENERATION SCENARIOS

REFER TO WSTF FACILITIES CONSTRUCTION, OPERATION AND MAINTENANCE WASTE GENERATION SCENARIOS

REFER TO COMPONENT SERVICES WASTE GENERATION SCENARIOS

NON–HAZARDOUS REFUSE

RECYCLED DEGREASING SOLVENTS

CSU

LIQUID PAINTS

CSU

REFER TO TECHNICAL SERVICES WASTE GENERATION SCENARIOS

HAZARDOUS REFUSE

CSU

ORGANICS

CSU

LEAD ACID BATTERIES

CSU

RECYCLED USED OIL

CSU

NON–HAZARDOUS WASTE WATER DP#'s 697 (300 AREA) 1170 (400 AREA)

CSU

ISOPROPYL ALCOHOL

CSU

VACUUM PUMP OIL

CSU

RECYCLED USED ANTIFREEZE

CSU

NICAD BATTERIES

CSU

FUEL CONTAMINATED SOFTGOODS

REFER TO CHEM LAB WASTE GENERATION SCENARIOS

FTU

FUEL CONTAMINATED WASTE WATER

PROPULSION – TESTING AND POST-TEST WASTE GENERTION SCENARIOS

PROCESS
WASTE

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5. FTU – Waste designated for management in the FTU

TEST INITIATION

WORK AUTHORIZING DOCUMENTS

WORK/TEST COORDINATION

WSTF WASTE MANAGEMENT

INTERFACE

TEST OPERATIONS

POST-TEST OPERATIONS

WASTE GENERATING PROCESSES

OXIDIZER SYSTEM SUPPORT

TEST PROCESS – PROPULSION SYSTEM FIRING

FUEL SYSTEM SUPPORT

EXHAUST GAS

NON-CONTACT COOLING WATER

OXIDIZER SYSTEM PURGE AND VENT

OXIDIZER SYSTEM ASPIRATION

PROPANE

OX BURNER

CELL WASH DOWN

FUEL SYSTEM PURGE AND VENT

FUEL SYSTEM ASPIRATION

FUEL EMISSION CONTROL SYSTEM (AREA VENT TANKS)

TEST ARTICLE REMOVAL

TEST ARTICLE AND COMPONENT DECONTAMINATION

PPE DECONTAMINATION

INTERFACE

VENT TO ATMOSPHERE NON-REGULATED

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

NON-HAZARDOUS WASTE WATER DP#'s 697 (300 AREA) 1170 (400 AREA)

FUEL CONTAMINATED SOFTGOODS

CSU

OXIDIZER CONTAMINATED SOFTGOODS NON-HAZARDOUS REFUSE

CSU

FUEL CONTAMINATED SOFTGOODS

ETU

OXIDIZER CONTAMINATED WASTE WATER

ETU

OXIDIZER CONTAMINATED WASTE WATER

FTU

FUEL CONTAMINATED WASTE WATER

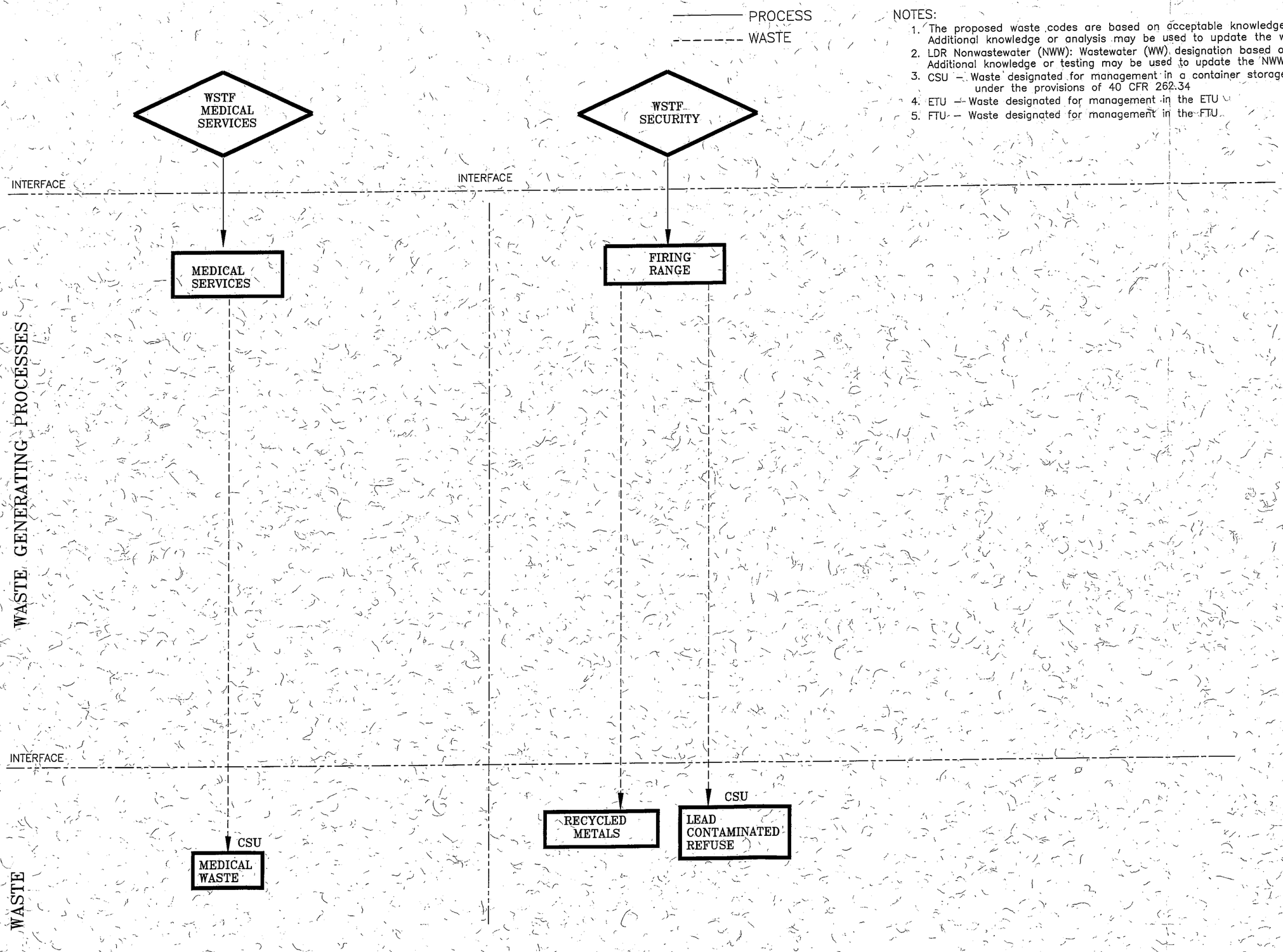
FTU

FUEL CONTAMINATED WASTE WATER

FTU

WSTF
Quality Assurance, Reliability and Safety
Waste Generation Scenarios

QUALITY ASSURANCE, RELIABILITY & SAFETY WASTE GENERATION SCENARION



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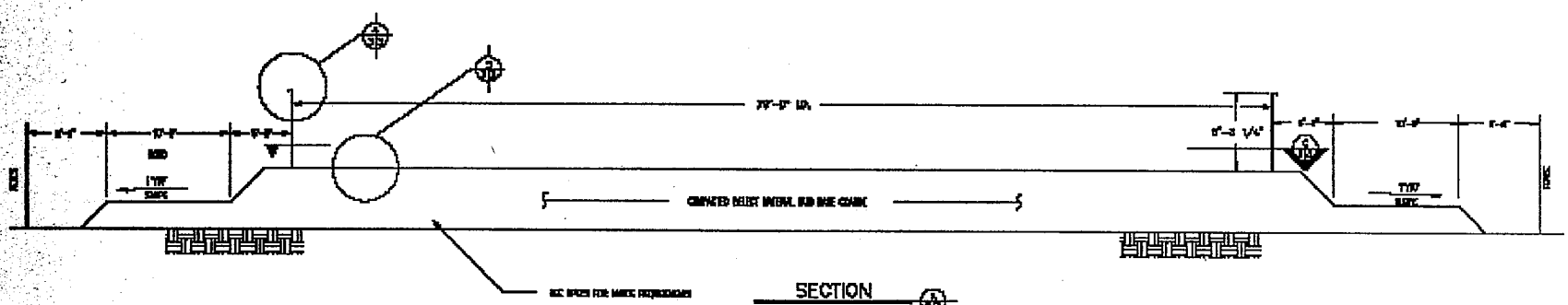
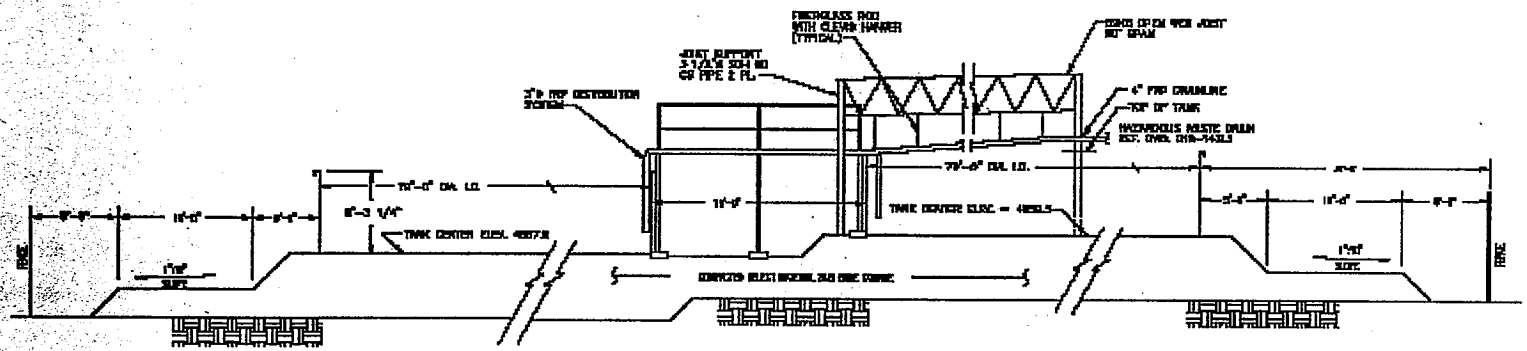
Appendix 6-B

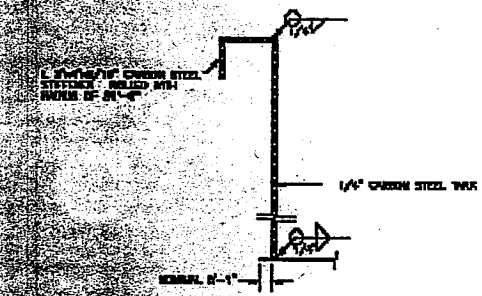
ETU Drawings and Diagrams



SECTION
SCALE: 1/4" = 1'-0"

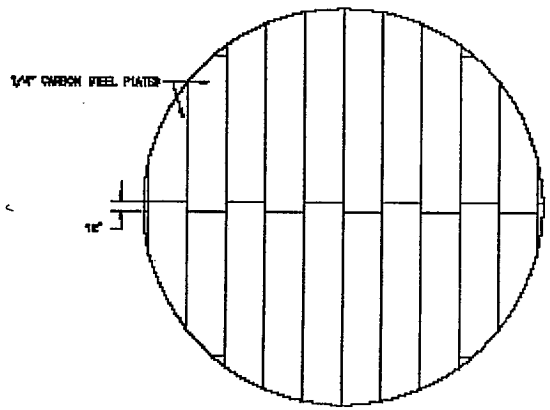


SECTION
SCALE: 1/4" = 1'-0"



DETAIL -- STIFFENING RING
SCALE: 1/4" = 1"

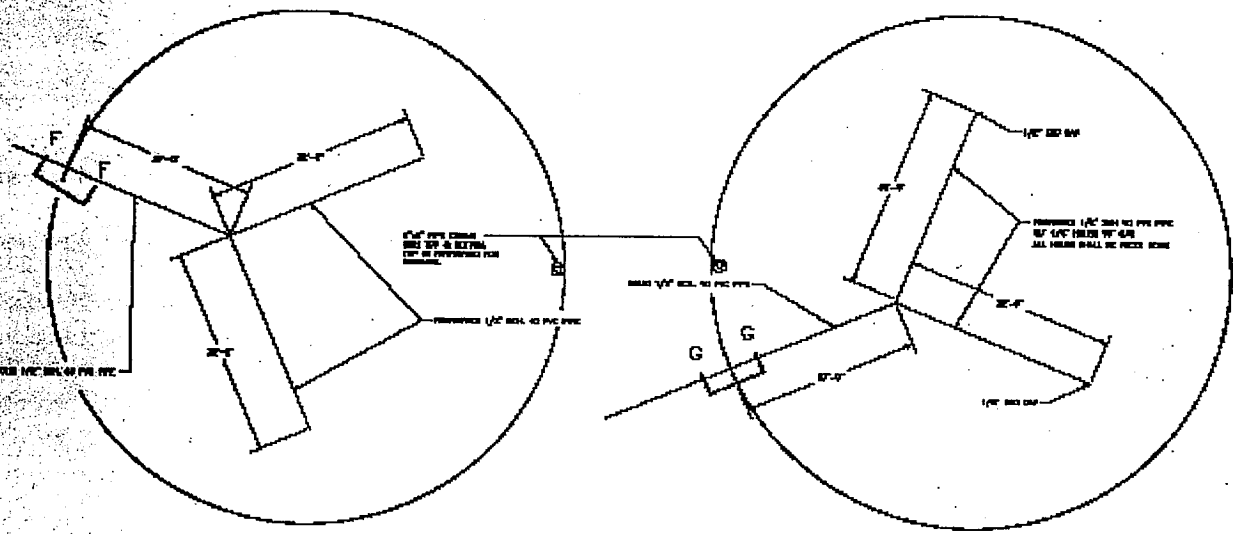
DETAIL -- C.S. PLATE OVERLAP W/ WELD
SCALE: 1/4" = 1"

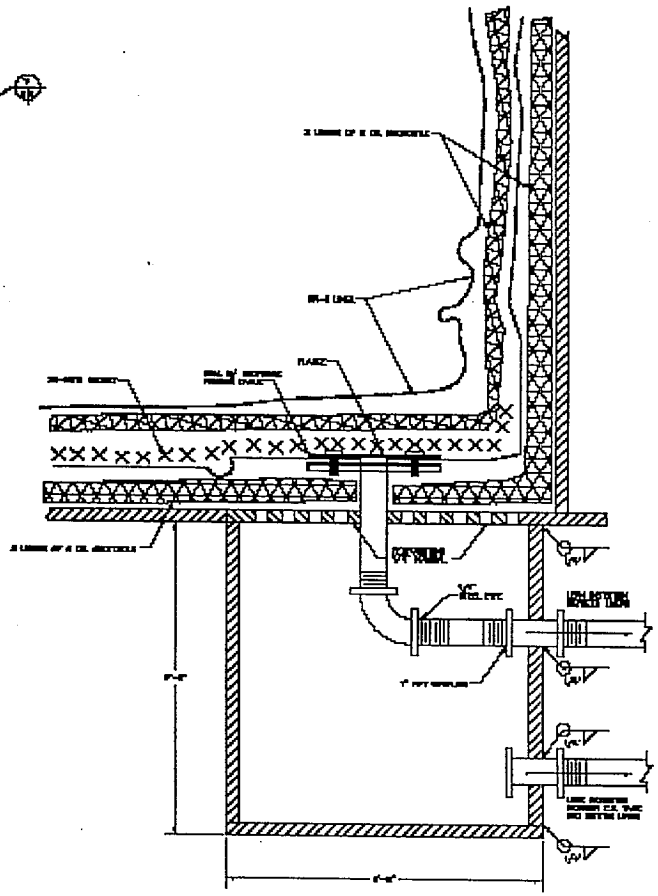


SECTION

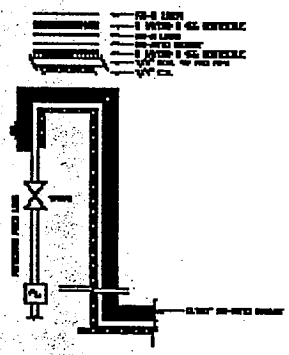
			REVISED	
	F	D19-13972		E

SECTION A–A'

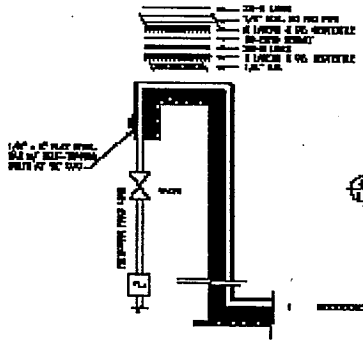




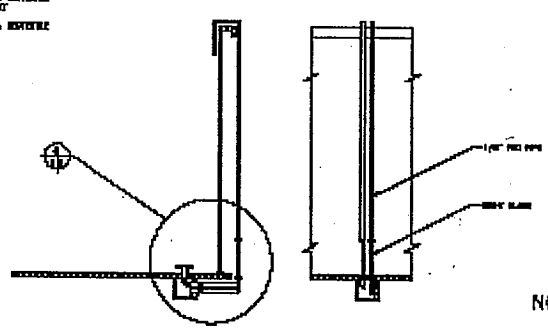
LEAK DETECTION DETAIL



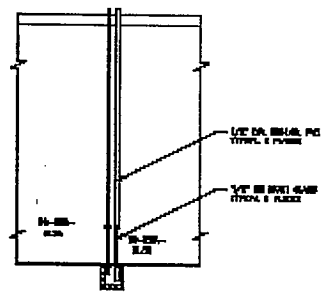
SECTION F



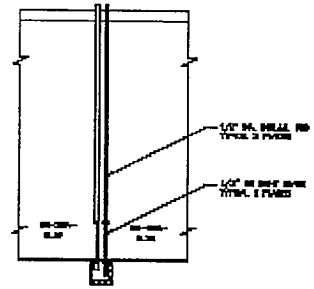
SECTION G



LEAK DETECTION DETAIL

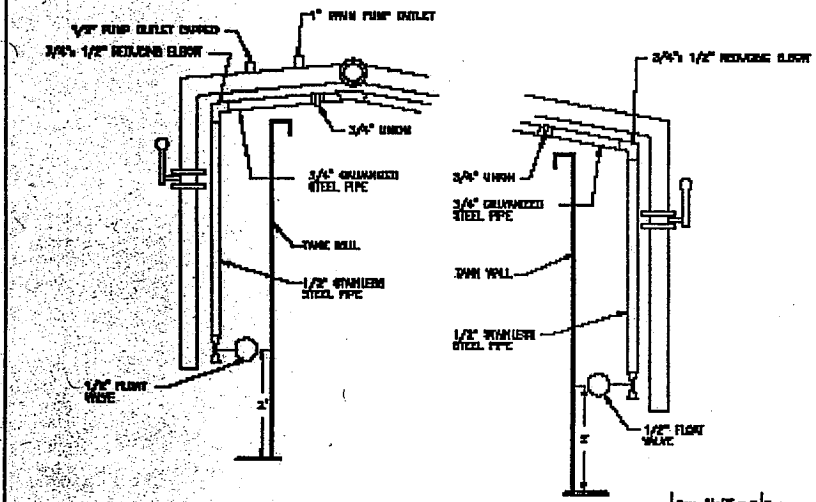


NORTHEAST EVAPORATION TANK
LEAK DETECTION SYSTEM



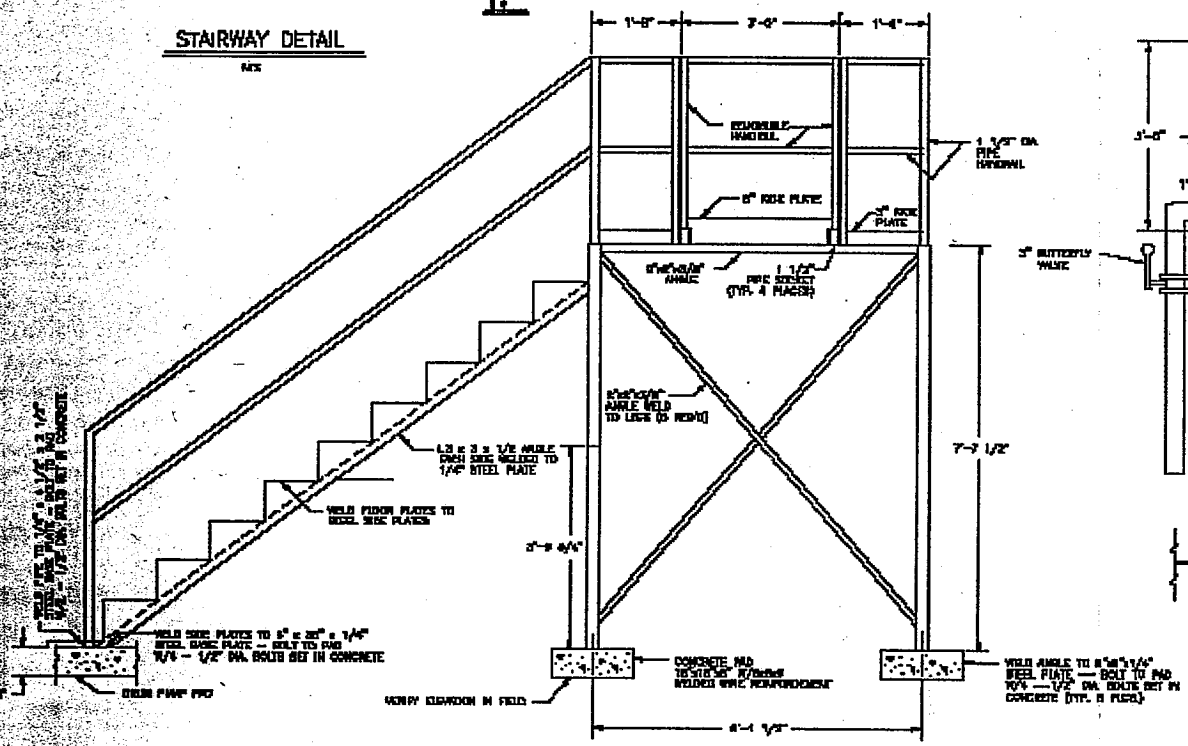
SOUTHWEST EVAPORATION TANK
LEAK DETECTION SYSTEM

	F	018–13872



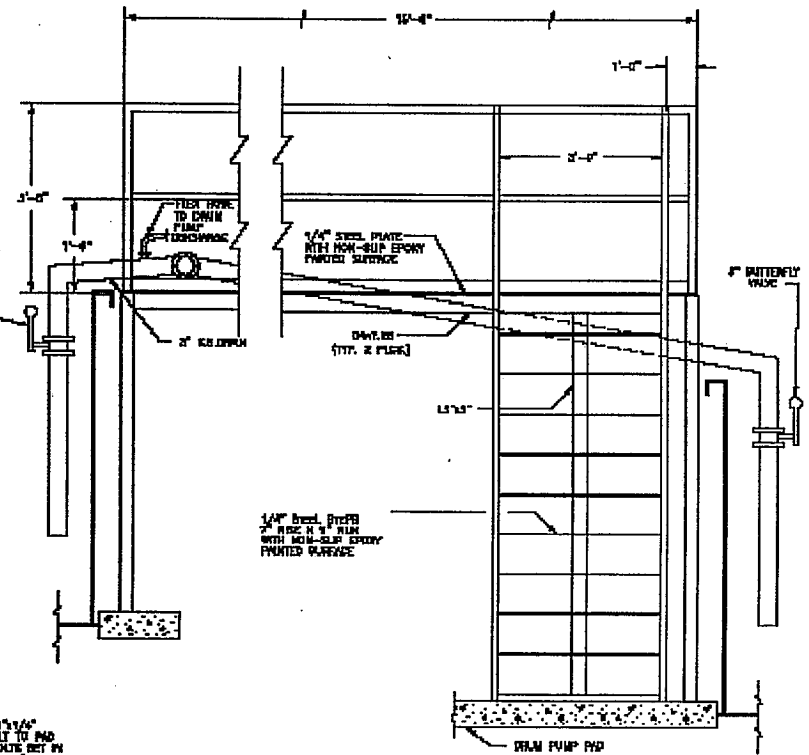
STAIRWAY DETAIL

NTS



DETAIL — LADDER & WORKING PLATFORM

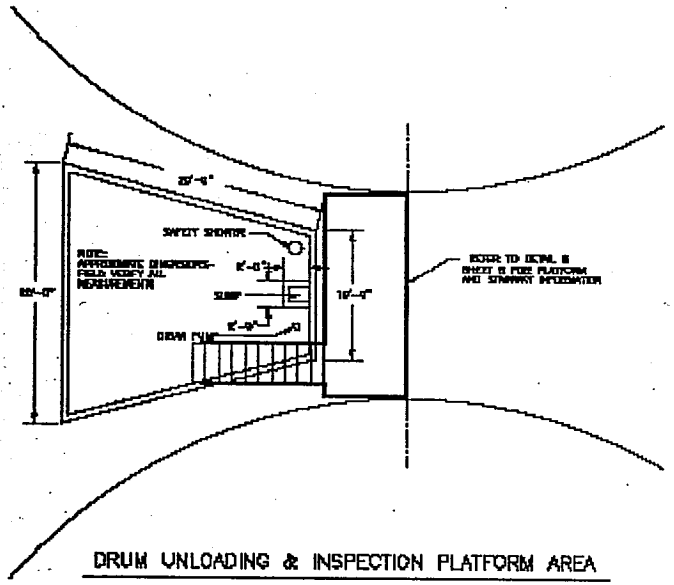
SCALE: 1" = 1'-0"



STAIRWAY DETAIL

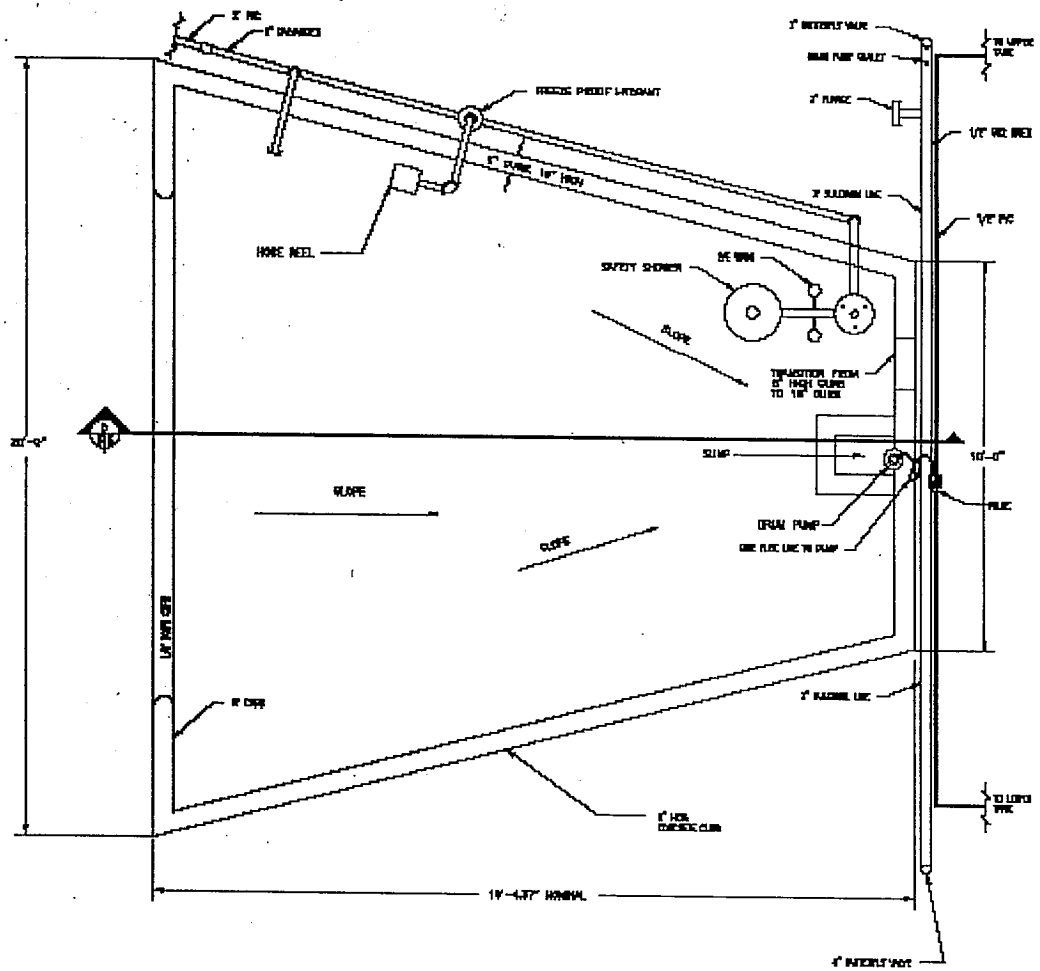
SCALE: 1" = 1'-0"

	A. E. DWG. NO.			SHEET NO.
CORE SHEET	SIZE: F	DWG. NO. 01P-12973		REV. X



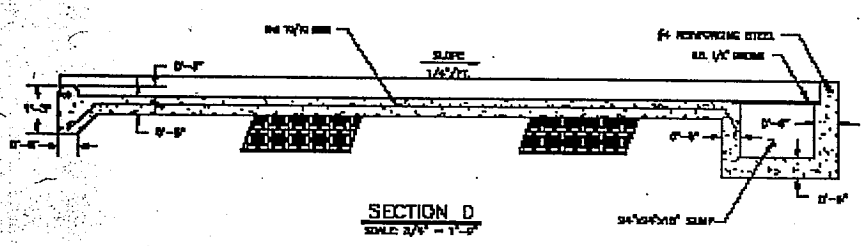
DRUM UNLOADING & INSPECTION PLATFORM AREA

SCALE: 1/4" = 1'-0"



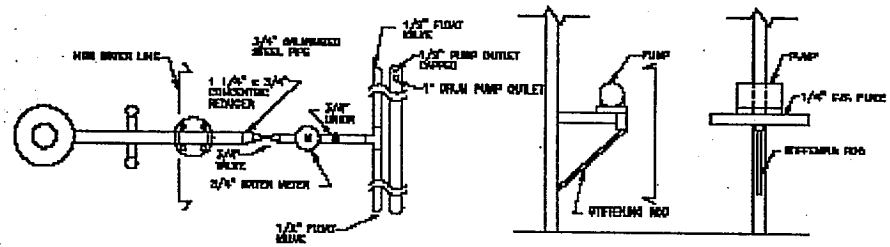
DRUM UNLOADING AREA

SCALE: 3/4" = 1'-0"



SECTION D

SCALE: 3/4" = 1'-0"

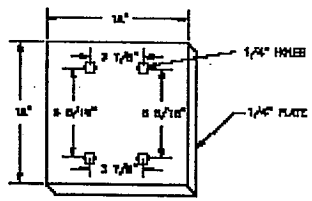


DRUM UNLOADING AREA

NTS

DRUM PUMP MOUNTING PLATE

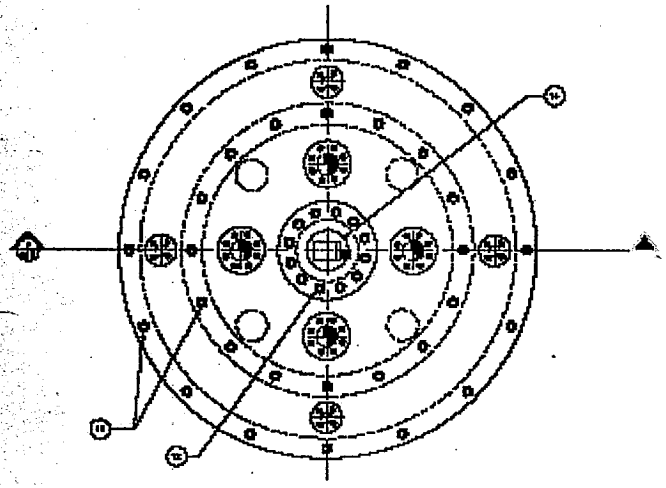
NTS



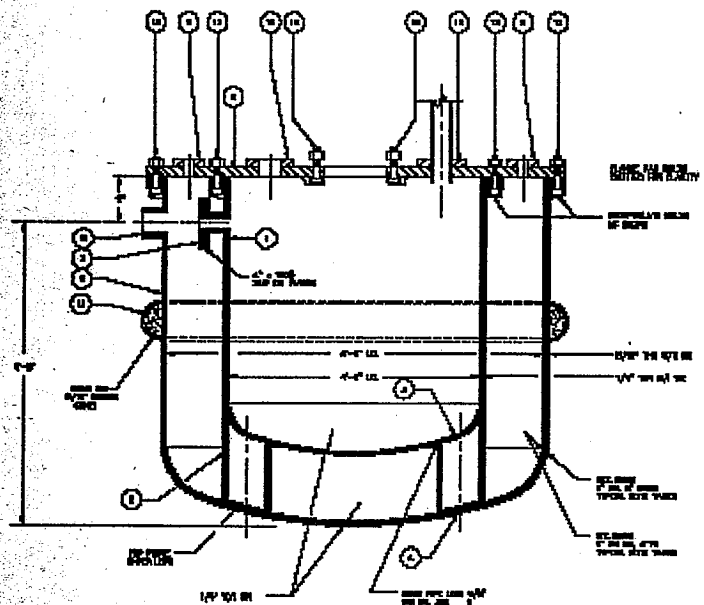
NOTES:

1. ALL EXPOSED WATER LINES OUTSIDE OF TANK WALL TO BE INSULATED WITH ARMAFLEX INSULATION.
2. FLOAT VALVE WILL BE SET TO MAINTAIN 3 FEET OF LIQUID IN TANKS (2" FROM BOTTOM, 4" FROM TOP).
3. INSTALLATION WILL BEGIN WITH REPLACEMENT OF ELBOW AT TOP OF SAFETY SHOWER LINE WITH A TEE.

CHECK MODEL	SIZE F	DWG. NO. 019-13972	REV E



SUMP TANK PLAN VIEW

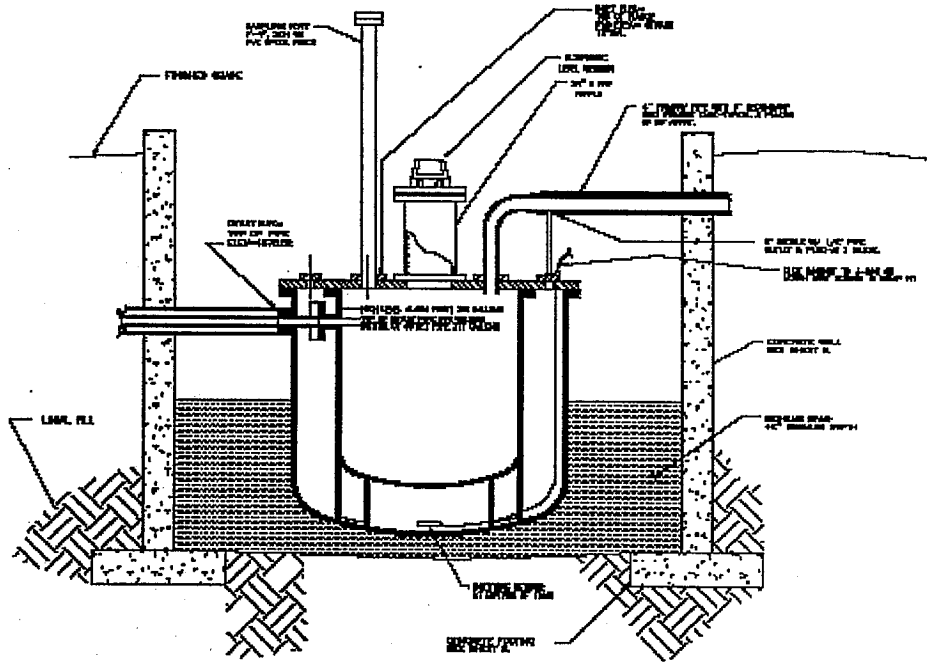


SUMP TANK ELEVATION

GENERAL NOTES:

NOTE:

APPURTENANCE AND MATERIAL SCHEDULE			
ITEM	QTY.	SIZE	DESCRIPTION
1	1		
2	1		
3	1		
4	1		
5	1		
6	4		
7	1	4"	
8	1	8"	
9	8	2"	
10	1	4"	
11	1		
12	12		
13	28		
14	1		

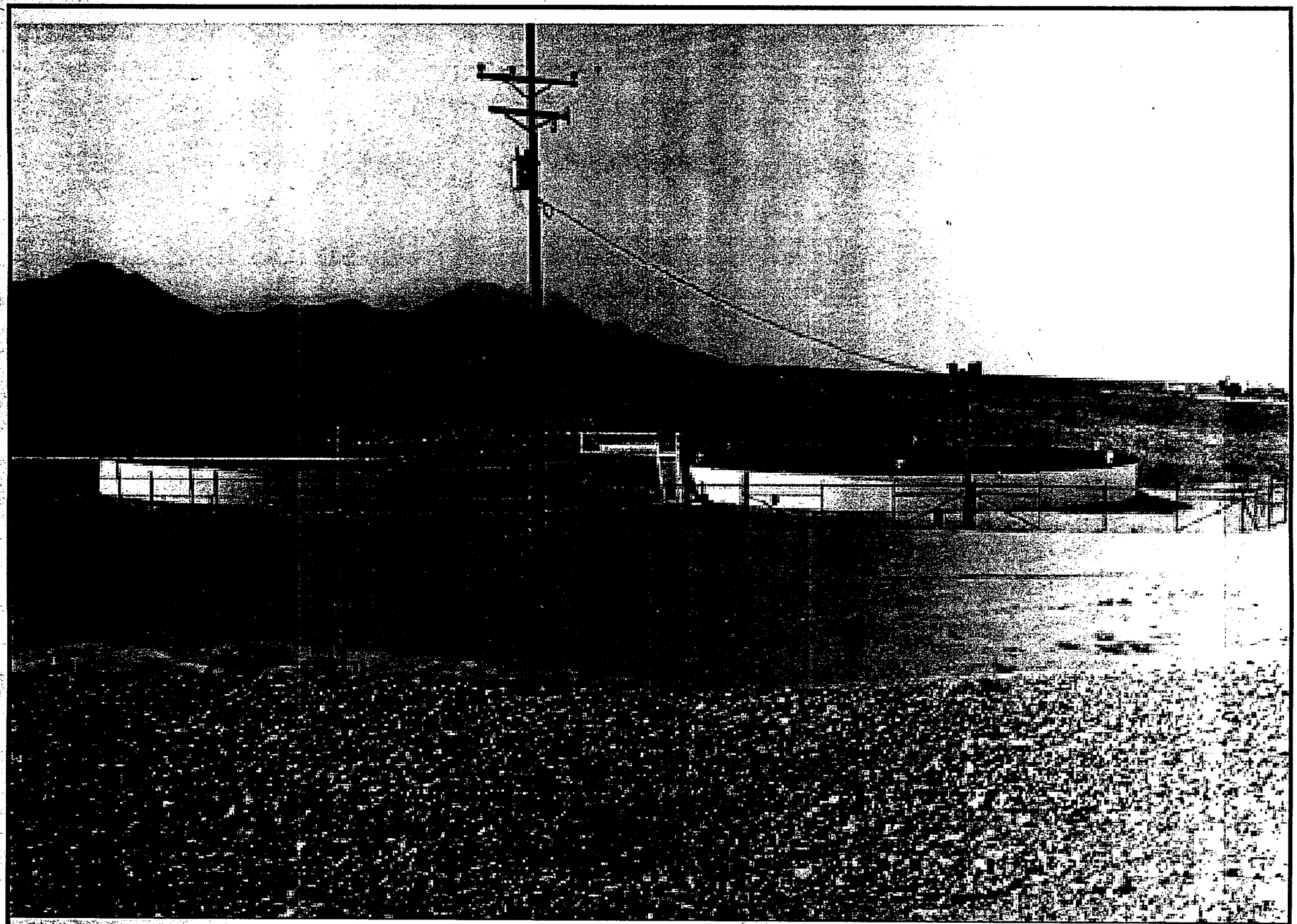


ASSEMBLY VIEW

	F	019-44313	

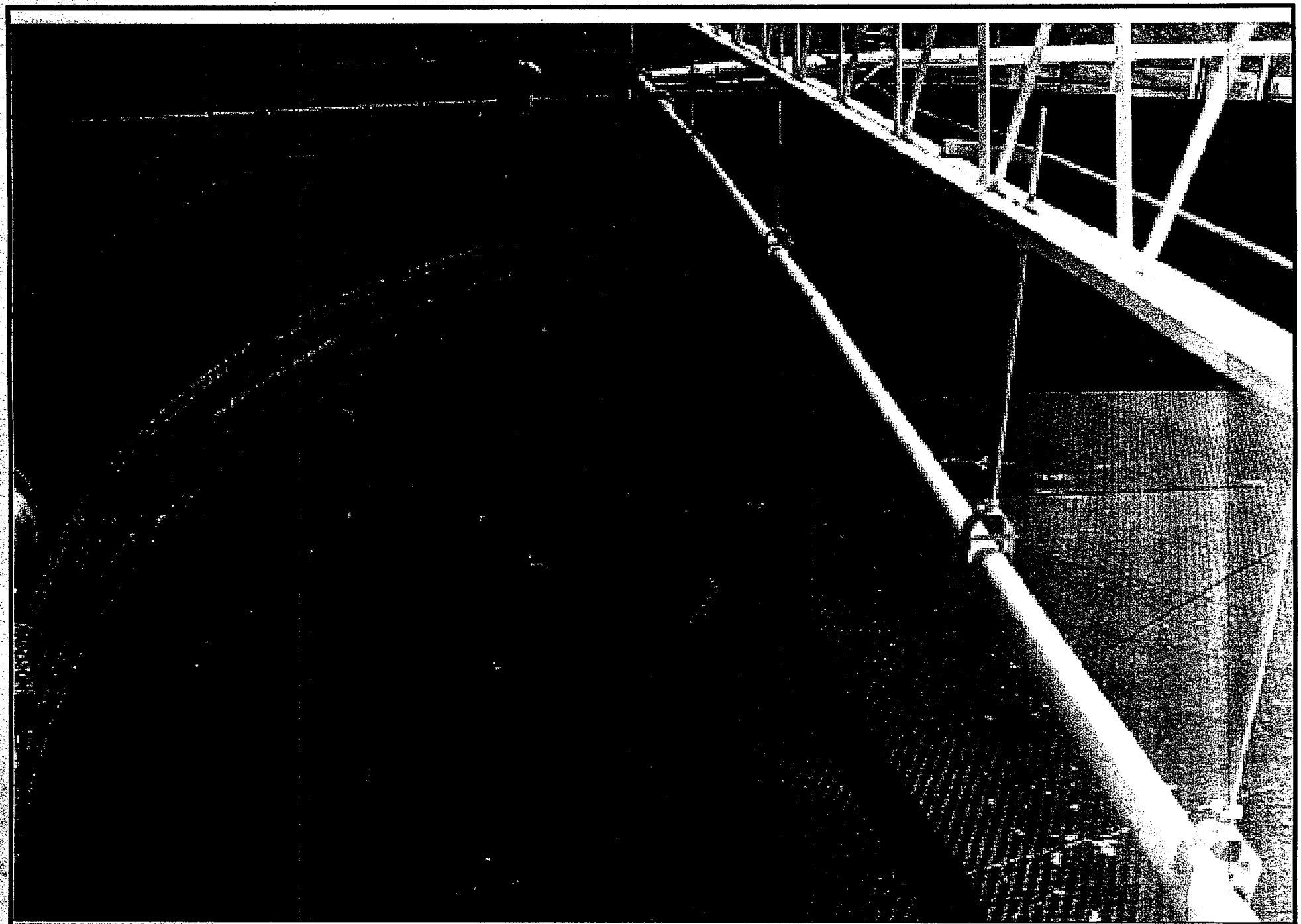
Appendix 6-C

ETU Photos

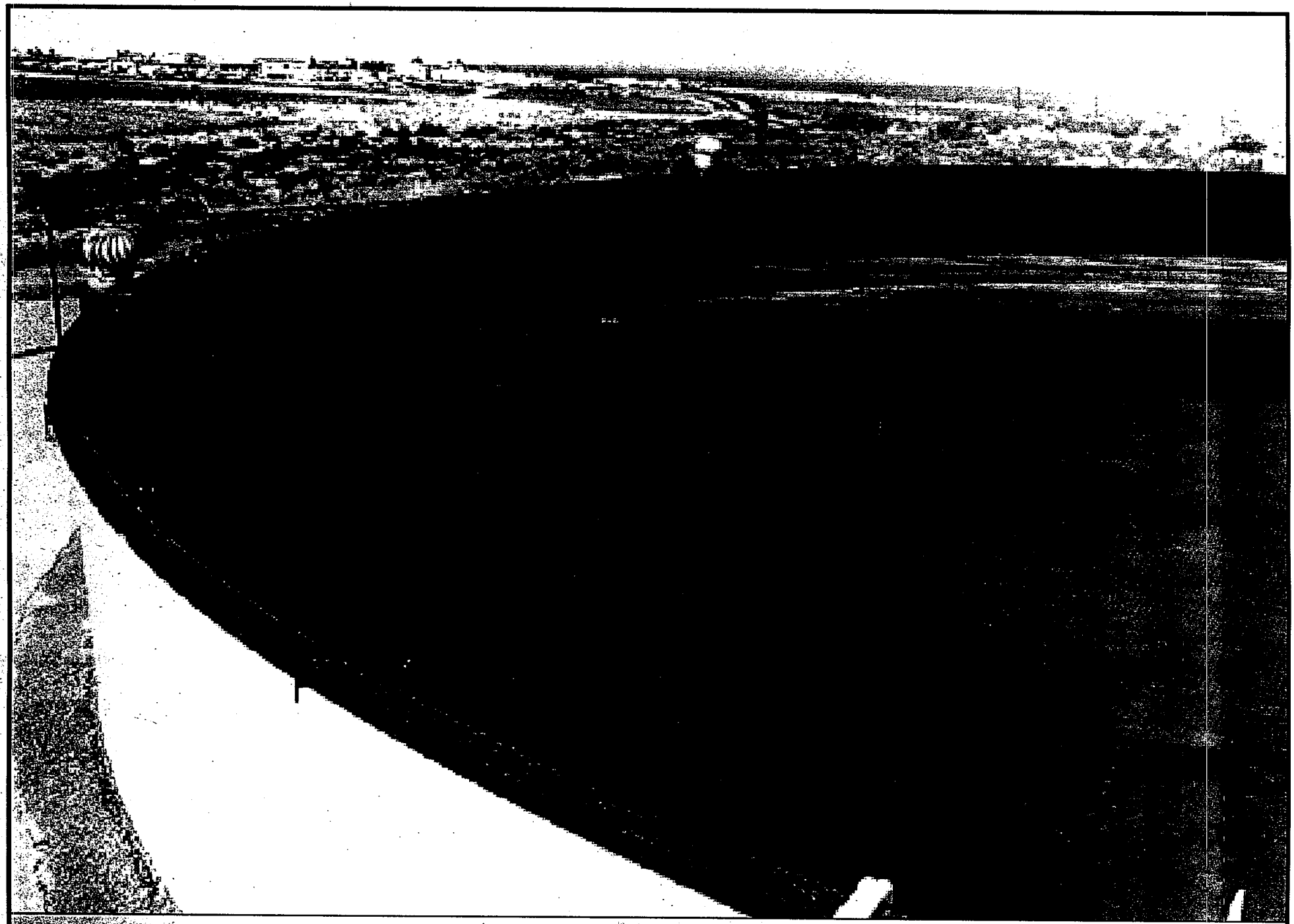


View of the evaporation tank unit (ETU) showing the entrance gates. (June 2002)

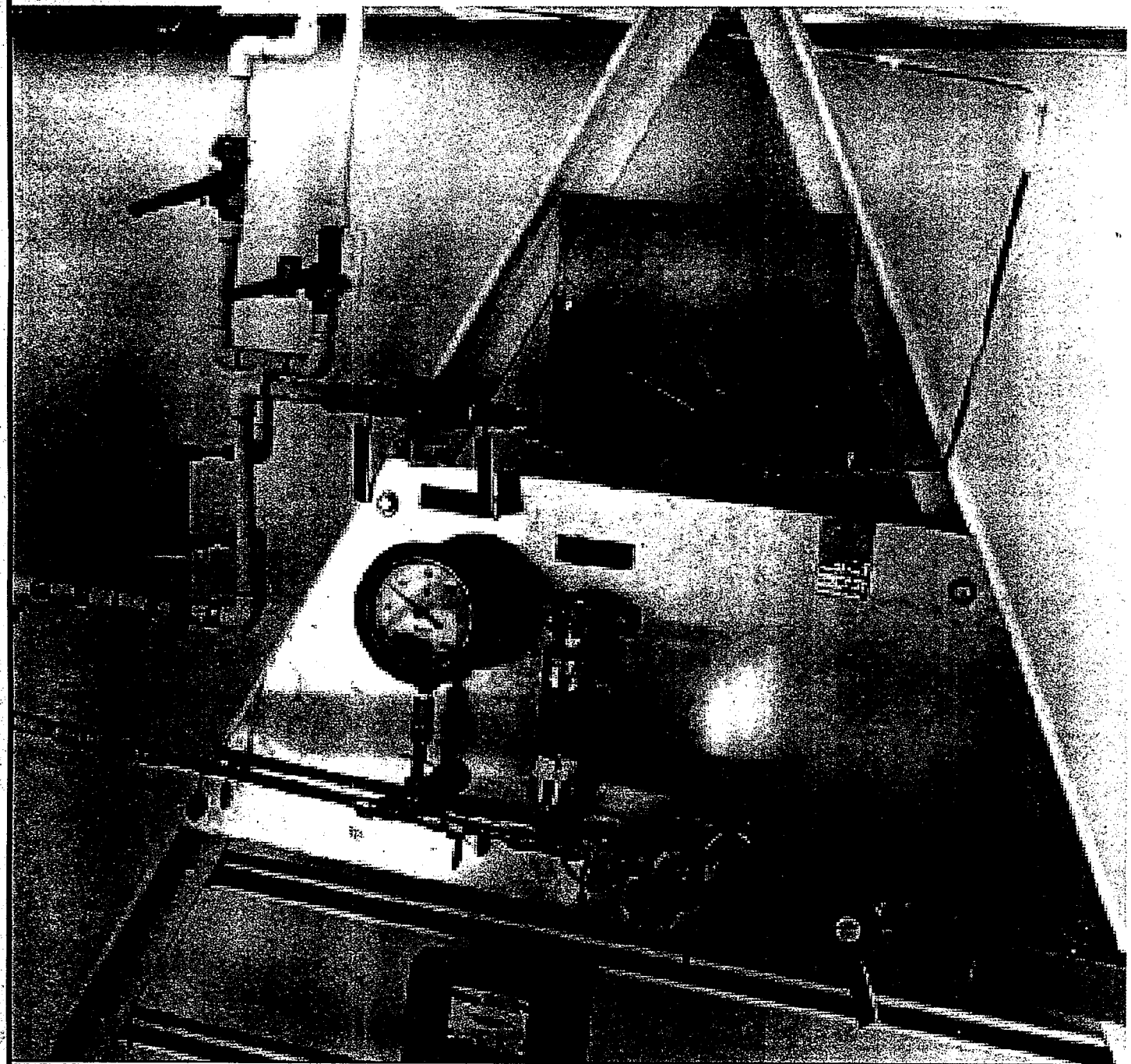
View of the ETU showing the two tanks, incoming drainline, and drainline support truss. (June 2002)



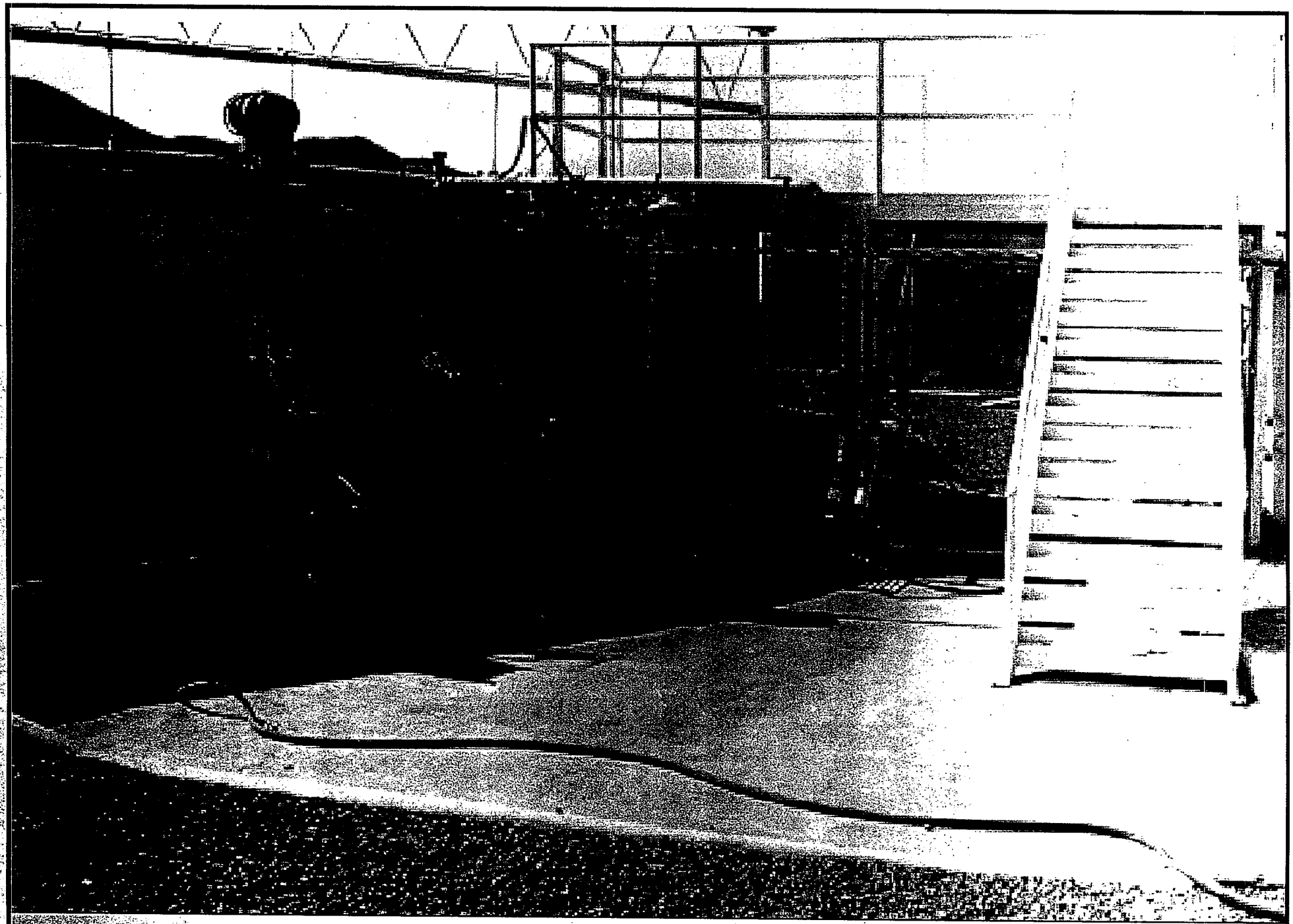
Inside view of the eastern tank. (June 2002)



Inside view of the western tank. (June 2002)



Front view of the nitrogen panel. (June 2002)



View shows the pump station to the left, the off-loading pad in the center, and the stairway and working platform to the right. (June 2002)

Appendix 6-D

NASA/WSTF ETU
RCRA Subpart CC Compliance Plan

Appendix 6-D NASA/WSTF ETU
RCRA Subpart CC Compliance Plan

1.0 Introduction

The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA Subpart CC regulations) and under the provisions of 40 CFR 268.50 (e) (LDR regulations). To assure compliance the RCRA subpart CC regulations, all waste discharged to the ETU will be limited to waste with an average volatile organic (VO) concentration of less than 500 ppmw as determined at the point of waste origination. The NASA WSTF ETU RCRA Subpart CC Compliance Plan to allow operation of the ETU as an exempt unit follows.

2.0 Approach

The procedures allow the VO concentration, at the point of waste origination, to be determined by either direct measurement or the owner's or operator's "knowledge of the waste". Per 40 CFR 265.1084 (a)(4) and EPA-453/R-94-076b, "Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) – Background Information for Promulgated Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers", page 6-30., "acceptable knowledge" can include:

- Documentation that lists the raw materials or intermediate products fed to the process showing that no organics are used in the process generating the waste;
- Previous test data for other locations managing the same type of waste stream;
- Material balances for the source, process generating the hazardous waste stream;
- Constituent-specific chemical test data for the hazardous waste stream from previous testing that are still applicable to the current waste; and
- Other knowledge based on information included in manifests, shipping papers, or waste certification notices.

A flow chart of the overall waste determination procedure is presented in Attachment 1. Whenever possible, "acceptable knowledge" will be used to meet the regulatory requirements. In cases where process information does not provide sufficient detail to constitute "acceptable knowledge", NASA will either:

- Provide supporting constituent-specific chemical test data by methods other than 25D (such as EPA Method 9060 (total organic carbon),or hydrazines by HPLC);
- Perform sampling and analysis by EPA Method 25D; or
- Select an alternate method of disposal.

3.0 EPA Method 25 Sampling and Analysis

Per 40 CFR 265.1084 (a)(3)(ii)(C) a "site sampling plan" shall be prepared by the owner or operator that describes the procedures by which representative samples of the waste stream are collected such that a minimum loss of organics occurs throughout the sample collection and handling process, and by which sample integrity is maintained. A copy of the written "site sampling plan" shall be maintained on-site in the facility operating

record. The WSTF "site sampling plan" per the requirements of 40 CFR 265.1084 (a)(3)(ii)(C) follows.

3.1 EPA Method 25D Analytical Requirements

In accordance with CFR 265.1084 (a)(3)(iii)(A), all analyses shall be performed under the requirements as specified by 40 CFR Part 60, Appendix A and the conditions set forth by the U.S. EPA Document, "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", EPA Publication SW-846. The analytical requirements for procurement of a commercial analytical laboratory to perform EPA Method 25D analyses at minimum include:

1) The laboratory shall be an EPA certified commercial laboratory with a QA/QC program that meets or exceeds the criteria established by the EPA and major state agencies including the New Mexico Environment Department: and shall ensure that all reported data are scientifically valid, legally defensible and of known precision and accuracy.

2) All potential vendors (analytical laboratories) are required to submit a copy of their quality assurance plan for review by WSTF at least ten (10) days prior to awarding of the contract. Laboratories not complying with this requirement shall not be considered.

3) The laboratory shall be obligated to initiate and complete preparation and/or analysis within the holding times as specified by the method. WSTF will supply advanced notice of the sample delivery. The laboratory shall provide a turnaround time of thirty (30) days.

4) The laboratory shall dispose of all of WSTF's samples sixty (60) days after the analytical report is issued unless otherwise directed by WSTF. The laboratory shall ensure that all samples are disposed of in a manner consistent with the requirements of the U.S. EPA and other applicable federal, state or local requirements.

5) The laboratory shall provide prepared sample containers/sample vials as specified by the method per 40 CFR Part 60, Appendix A.

6) The laboratory will provide duplicate prepared sample containers/sample vials. The duplicates will be analyzed only in the event any of the sample vials are damaged during shipment or a mishap during analysis.

7) Unless otherwise approved by WSTF, the laboratory shall provide shall provide prepared lab blanks, trip blanks and field blanks for QA/QC purposes. The laboratory shall analyze the field blanks. Trip blanks will be analyzed only if the field blanks show contamination. Lab blanks will only be analyzed if the trip blanks shows contamination.

8) The laboratory shall provide all sample shipping coolers and packaging. All shipping coolers, packaging, markings, labeling, etc. shall be in accordance with the Department of Transportation regulations for the shipment of hazardous waste samples.

9) The laboratory shall submit the analytical results to WSTF in the form of a report. The report shall include the following:

- Laboratory identification
- Analytical method identification
- Laboratory sample number and WSTF sample number (optional)
- A sample description
- Date received
- Date analyzed
- Analytical results (including the results of QA/QC samples)
- Reporting units
- Method detection limits or instrument detection limit
- Relevant comments with respect to the sample(s) and/or analytical conditions
- Completed copies of the "Chain of Custodies"
- Laboratory approval signatures

3.2 EPA Method 25D Sampling Requirements

All sampling techniques and equipment shall conform to the instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 Appendix A, section 8.1, "Sampling", paragraphs 8.1.2.1 through 8.1.6. The general sampling procedures/requirements are as follows

1) All sampling shall be performed by qualified waste samplers (minimum of 8 hrs training).

2) All sampling techniques and equipment used during sampling shall conform to instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 Appendix A.

3) All waste discharged to the ETU is aqueous waste (single phase, homogenous, and well mixed) and generated from batch processes. Assemble a sampling apparatus as shown in Figure 25D-5 of EPA Method 25D in 40 CFR 60 Appendix A and Attachment 2 of this compliance plan. The EPA Method 25D sampling apparatus that includes:

- 0.25" ID Teflon sampling tube; and

- 0.25" ID 304 SS cooling coil with a thermocouple at the coil outlet.

4) Prepared EPA Method 25D sample vials are prepared by the commercial laboratory. Store vials on ice until one (1) hour before the sampling event or as specified by the commercial laboratory.

5) Contact the responsible section supervisor or designated alternate. Section supervisor or designated alternated will escort Environmental Department samplers during the sampling operation. For each sampling event the section supervisor shall be responsible for ensuring the samples are representative of the waste stream and for providing the following minimum information:

   - The waste quantity represented by the samples; and

   - Details of the operating conditions for the source or process generating the waste represented by the samples.

6) One (1) hour before the sampling event, remove selected sample vials from ice and allow the vials to reach room temperature.

7) Set up work station and sampling apparatus at the "point of waste origination" as directed by Environmental Department personnel. The sample shall be taken at a point which is most representative of the unexposed waste.

8) Purge the sampling apparatus with a minimum of four (4) apparatus volumes of waste. Collect the waste in a container and dispose as directed by Environmental Department personnel. Check the temperature as indicated by the thermocouple thermometer. During the sampling event the temperature should be kept below 10°C. Open field blank as recommended by the commercial laboratory.

9) After purging, stop flow and direct the sample tube to a prepared sample vial. Keep the sample tube below the surface of the PEG during sampling to minimize contact with the atmosphere. Sample at a flowrate such that the temperature as indicated by the thermocouple thermometer is less than 10°. Add just enough sample media to completely fill the sample vial. Try to minimize headspace; however, do not remove or lose any PEG from the sample vial. Cap the vial within five (5) seconds of filling the vial and store on ice. Do not add any extra labels, seals or tape to the sample vials. Open field blanks as directed by the Environmental Department personnel and/or the analytical laboratory.

10) Repeat Step 5 as required. Take eight (8) sample vials of sample media (as recommended by the commercial laboratory), four (4) for the samples and four (4) for the duplicate samples (under normal circumstances duplicate samples will not be analyzed).

11) Annotate the evaporation tank logbook with a brief description of the sampling operation which includes the type of sampling, WIWPS #, point of waste origination, TPS #, date, and personnel present during the sampling event.

- Sample parameter;
- Sample preservation;
- Sample I.D. # (commercial lab # and corresponding WSTF # (optional));
- Sample location (WIWPS # and point of waste origination);
- Lab performing analyses; and
- Type of sample (sample or duplicate)

12) For all samples, follow "chain-of-custody" procedures. Ensure the "chain-of-custody" identifies the commercial lab id number, corresponding WSTF ID number and location.

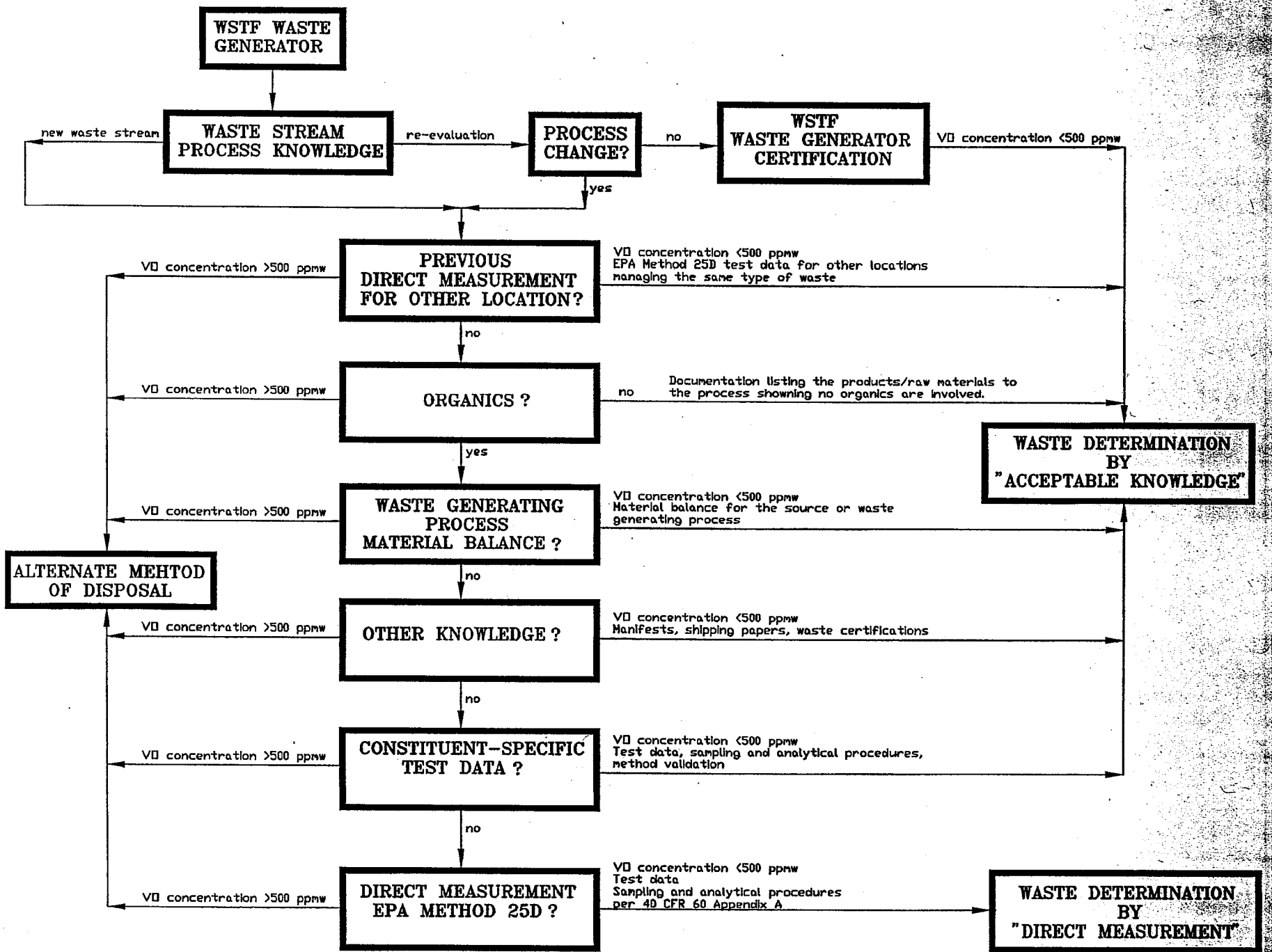
4.0 Waste Determination Review and Update

The annual review and update of the waste determinations is performed during the annual review of the WIWPS as discussed per section 6.3.1.4 of the WAP. Per 40 CFR 264.1082(c)(1), the owner or operator is required to review and update the waste determinations at least once every 12 months following the initial waste determination. Guidance with respect to the review and update of the waste determinations was provided per NMED correspondence, "Waste Determination Procedures Pursuant to 40 CFR 265.1084" dated April 23, 1996. Per the NMED correspondence, "If the initial waste determination was performed using the approved EPA test method, a simple statement on record that the process has not changed and that therefore knowledge of process is used to make the determination will normally be acceptable in subsequent years". This guidance was used to establish a general format for updating compliance documentation for the waste determinations performed by both "direct measurement" and "acceptable knowledge". A copy of the NMED correspondence is provided in Attachment 3.

Attachment 1

Waste Determination Flow Chart

WASTE DETERMINATION FLOW CHART



Attachment 2

EPA Method 25D

Sampling Procedure

and

Sampling Apparatus

NASA JSC WSTF

TEST PREPARATION SHEET

(1) TPS NUMBER 2-HWM 950343 MOD. R	(2) PAGE 1 of 8
(3) A - CONFIGURATION CHANGE	
(3) B - NO CONFIGURATION CHANGE	X
(4) SYSTEM/TEST STAND: 200 Area Hazardous Waste Evaporation Tank System	(5) QA COORDINATION: VO Apr 21 '95
(6) MIPS: ✓ NONE	STEPS	ALL

(7) TITLE

EPA Method 25D Sampling the 200 Area Hazardous Waste Drain Line Waste Streams

(8) DRAWING(S), DOCUMENT(S), OCP(S), PART NO(S) AND DCN(S): 40 CFR 265 Subpart CC, 40 CFR 60 appendix A (EPA METHOD 25D), US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods	(9) FILE NAME

(10) TASK ORDER NUMBER: 038-JAA-00	(11) NEED DATE: 4/21/95	(12) SPECIAL SAFETY REQUIREMENTS	X	YES
				NO

(13) PREPARED BY: Tanaka EXT.	(14) DATE CLOSED BY QA	CONTRACTOR: Tanaka 4/19/95 QA

(15) CONSTRAINTS

None

(16) SUMMARY/STATUS/INSTRUCTIONS:

SCOPE:

The following repetitive TPS authorizes sampling and analyses per EPA Method 25D of waste streams that are discharged to the 200 Area Hazardous Waste Drain Lines.

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
Tanaka 4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2440M-950343 R	2 of 8

(19) QA COORDINATION	(20) MIPS				
	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY

EQUIPMENT:

All sampling techniques and equipment used to sample the 200 Area Hazardous Waste Drain Line waste streams shall conform to the instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 appendix A.

EPA Method 25D sampling apparatus that includes:
- 0.25" ID teflon sampling tube; and
- 0.25" ID 304 SS cooling coil with a thermocouple at the coil outlet.

Prepared EPA Method 25D sample vials. Store vials on ice until one (1) hour before the sampling event.

Ice chest with ice.

MANPOWER REQUIREMENTS:

2 - Waste Samplers certified per WSTF Operations Certification Plan, Appendix VI, Category 2.5 - Waste Sampler. (8 to 16 hours/each)

NOTE:

ENVIRONMENTAL DEPARTMENT PERSONNEL PERFORMING THE SAMPLING PROCEDURES OF THIS TPS WILL CHARGE TASK ORDER 038-JAA00.

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/20/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HOM950343 R	3 of 8
(19) QA COORDINATION (QA 6)	(20) MIPS: NONE ✓ / STEPS / ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
	ENVIRONMENTAL DEPARTMENT WASTE SAMPLERS		
	SAFETY NOTES:		
	THE FOLLOWING MINIMUM SAFETY EQUIPMENT IS REQUIRED DURING SAMPLE COLLECTION.		
	A. TYVEX OR SPLASH SUITS. B. RUBBER GLOVES. C. FACE SHIELD OR GOGGLES. D. INTERSCAN WHEN HYDRAZINE WASTES ARE SAMPLED. E. BREATHING AIR IS REQUIRED ANY TIME HYDRAZINE LEVELS AS INDICATED BY INTERSCAN EQUALS OR EXCEEDS 0.1 ppm OR AS DIRECTED BY THE CONTRACTOR ENVIRONMENTAL DEPARTMENT. F. "TWO MAN OPERATION" IS REQUIRED. G. ORGANIC RESPIRATOR AS DIRECTED BY THE CONTRACTOR ENVIRONMENTAL DEPARTMENT.		
1.	Contact the responsible section supervisor or designated alternate. Section supervisor or designated alternated will escort Environmental Department samplers during the sampling operation. For each sampling event the section supervisor shall provide the following minimum information: A. The waste quantity represented by the samples; and B. Details of the operating conditions for the source or process generating the waste represented by the samples.		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HWM-950343 R	4 of 8

(19) QA COORDINATION	(20) MIPS				
6	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
2.	One (1) hour before the sampling event, remove selected sample vials from ice and allow the vials to reach room temperature.		
3.	Set up work station and sampling apparatus at the "point of waste origination" as directed by Environmental Department personnel. The sample shall be taken at a point which is most representative of the unexposed waste.		
4.	Purge the sampling apparatus with a minimum of four (4) apparatus volumes of waste. Collect the waste in a container and dispose as directed by Environmental Department personnel. Check the temperature as indicated by the thermocouple thermometer. During the sampling event the temperature should be kept below 10°C. NOTE: DURING THE SAMPLING EVENT ENSURE THE FOLLOWING: A. THE SAMPLE TUBE IS KEPT BELOW THE SURFACE OF THE POLYETHYLENE GYLCOL (PEG). B. THE TEMPERATURE AT THE COOLING COIL OUTLET IS LESS THAN 10°C. C. PEG IS NOT LOST OR REMOVED FROM THE SAMPLE VIAL. D. HEAD SPACE IS MINIMIZED. E. SAMPLE VIALS ARE CAPPED IMMEDIATELY AFTER SAMPLING AND STORED ON ICE. F. DO NOT ADD ANY EXTRA LABEL, SEALS OR TAPE TO THE SAMPLE VIALS.		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HWM-950348 R	5 of 8

(19) QA COORDINATION	(20) MIPS				
QA 6 Apr 21 '95	✓	NONE		STEPS	ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
5.	After purging, stop flow and direct the sample tube to a prepared sample vial. Keep the sample tube below the surface of the PEG during sampling to minimize contact with the atmosphere. Sample at a flowrate such that the temperature as indicated by the thermocouple thermometer is less than 10°C. Add just enough sample media to completely fill the sample vial. Try to minimize headspace; however, do not remove or lose any PEG from the sample vial. Cap the vial within five (5) seconds of filling the vial and store on ice. Do not add any extra labels, seals or tape to the sample vials. Open field blanks as directed by Environmental Department personnel.		
6.	Repeat step 5 as required. Take eight (8) sample vials of sample media, four (4) for the samples and four (4) for the duplicate samples (under normal circumstances duplicate samples will not be analyzed).		
7.	Annotate the evaporation tank logbook with a brief description of the sampling operation which includes the type of sampling, WIWPS #, point of waste origination, TPS #, date, and personnel present during the sampling event. ENSURE THE FOLLOWING ARE NOTED IN THE LOGBOOK: A. Sample parameter; B. Sample preservation; C. Sample I.D. # (commercial lab # and corresponding WSTF #); D. Sample location (WIWPS # and point of waste origination);		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
24WM-950343 R	6 of 8

(19) QA COORDINATION	(20) MIPS				
QA 6 Apr 21 '95	✓	NONE		STEPS	ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
	E. Lab performing analyses; and F. Type of sample (sample or duplicate)		
8.	Repeat steps 1 through 7 for other waste streams or locations as directed by the Environmental Department.		
	NOTE: FOR ALL SAMPLES, FOLLOW "CHAIN-OF-CUSTODY" PROCEDURES. ENSURE THE "CHAIN OF CUSTODY" IDENTIFIES THE COMMERCIAL LAB ID NUMBER, CORRESPONDING WSTF ID NUMBER AND LOCATION.		
9.	Deliver the samples and the corresponding "Chain of Custody" documentation to the warehouse for shipment.		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HWM-950343 R	7 of 8

(19) QA COORDINATION	(20) MIPS				
	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY

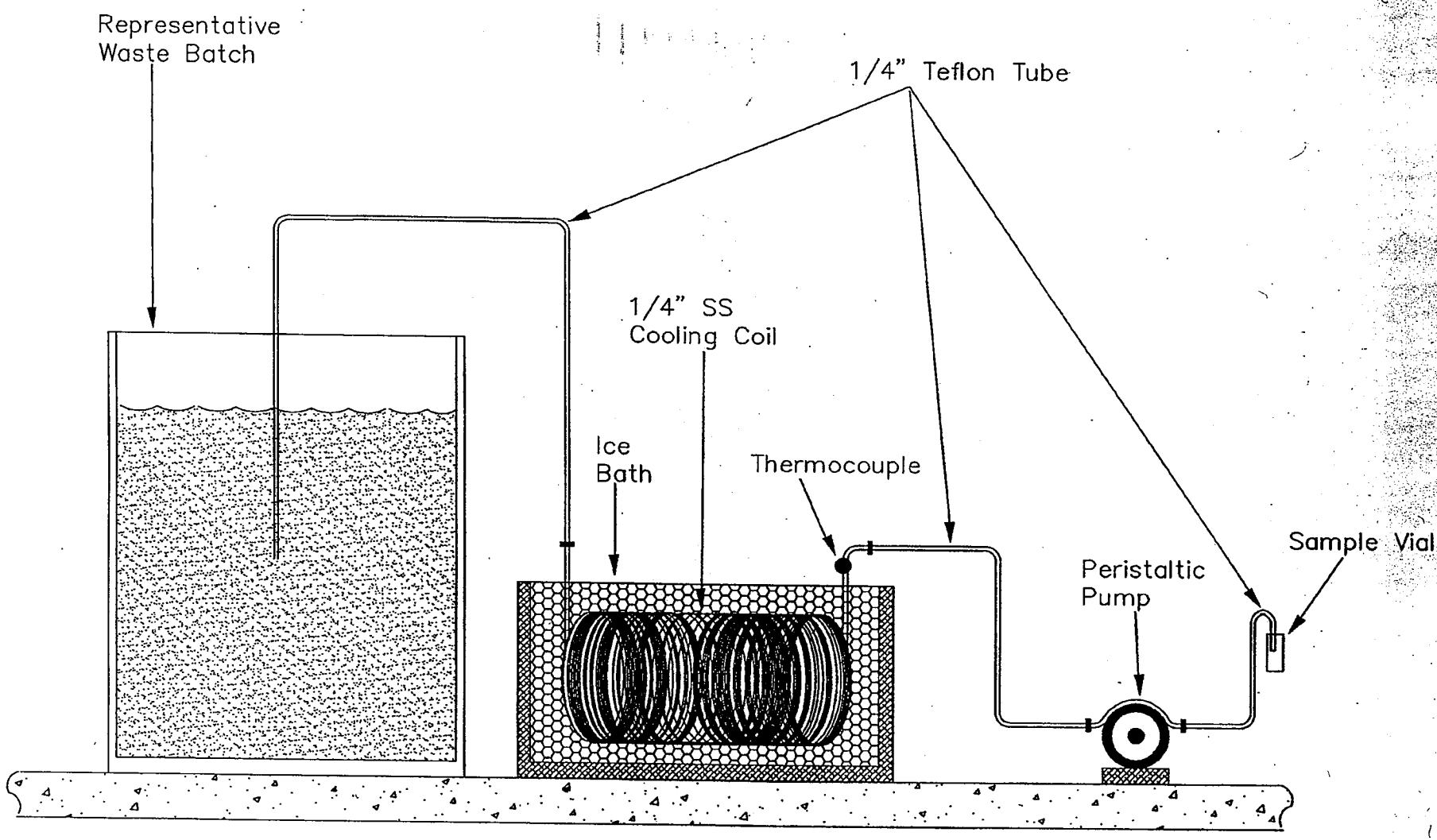
EPA METHOD 25D SIGNOFF SHEET

	WIWPS#'s/ DESCRIPTION	E. D. AUTHORIZATION
	(20-01-01) Rinse Water (1-A → 4B)	Tanaka
	Clean Room Cleaning Tanks	
Oakite 33	(20-01-11) Oakite 33 Acid (5A — 8B)	Tanaka
	Clean Room Cleaning Tanks	
Oakite 126	(20-01-10) ~~Oakite 33~~ (9A - 12B) Oakite 126	Tanaka
	Clean Room Cleaning Tanks	
	(20-01-18) Simple Green	Tanaka
	Clean Room/Lab Con (13A — 16B)	
	(20-01-38) Citric Acid	Tanaka
	Clean Room/Lab Con (17A — 20B)	
	(20-01-13) Oakite Rustripper	Tanaka
	Clean Room/Lab Con (21A — 24B)	
	Phenolic Filter (25A — 28B)	Tanaka
	(20-03-15) (20-03-31)	
	Water Exhaust OEI	Tanaka
	(29A — 32B	
	Clean Lab Aqueous Waste 20-04-01	Tanaka
	20-04-81	
	Met Lab Phenolic Filter	Tanaka
	(37A — 40B)	
	Silkscreen Remover	Tanaka
	(41A — 44B)	
16	Simple Green	Tanaka 9/12/95
	Oakite 33	Tanaka 9/12/95
	Chem Lab Fuel Scrubber	Tanaka 9/12/95
	10% HDMH	Tanaka 9/12/95
	10% MMH	Tanaka 9/12/95
	10% HZ	Tanaka 9/12/95
	Clean Room Oakite 31	Tanaka 4/16/96
	500 Area FTF Treated Fuel	Tanaka 4/16/96
20-01-45	Clean Room Brulin 815 GD	Tanaka 8/28/96
	Close This TPS Effective	January 21, 1998
	Tanaka 1/21/98 Cont- Sig	D Chandler NASA Sig

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
Tanaka 4/20/95	D Chandler 4/21/95
DC Ann 4/20/95	

JSTF-392 (7/91)

EPA Method 25D Sampling Apparatus



Attachment 3

NMED Correspondence

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

VIA TELEFAX

April 23, 1996

Mr. D. Tanaka
Allied Signal Team
White Sands Test Facility
FAX No. (505) 527-8925

Dear Mr. Tanaka:

RE: Waste Determination Procedures pursuant to 40 CFR §265.1084

This telefax transmittal is in response to your request for NMED's interpretation of §265.1084(a)(2)(ii)(A). NMED interprets this section to mean that once an initial waste determination of the average VO concentration for a batch is made by laboratory analysis, an update of the information by use of knowledge of process is acceptable assuming the process generating the waste does not change. Therefore, if an initial waste determination was performed by using the approved EPA test method, a simple statement on record that the process has not changed and that therefore knowledge of process is used to make the determination will normally be acceptable in subsequent years. Please be reminded that the generator or manager of the waste is responsible for being correct when using knowledge of process.

Please be aware that the New Mexico Hazardous Waste Management Regulations (20 NMAC 4.1) will not adopt the Subpart CC regulations until at least October 1, 1996. Therefore, these regulations will not be enforceable by NMED until they are adopted into 20 NMAC 4.1 If you have any further questions or need additional clarification, please contact me at (505) 827-1558.

Sincerely,

Coby Muckelroy

Coby Muckelroy
RCRA Inspection/Enforcement Program Manager
Hazardous and Radioactive Materials Bureau

Appendix 6-E

NASA/WSTF ETU
Fuel Waste Water Management Plan

200 AREA EVAPORATION TANK UNIT (ETU)

FUEL WASTE WATER MANAGEMENT PLAN

1.0 Introduction

Fuel contaminated waste water (P068, U098 and U133 listed hazardous wastes) is restricted from discharge to the ETU. NASA has developed this 200 Area ETU Fuel Waste Water Management Plan to segregate and define the P068, U098 and U133 listed hazardous waste waters from non-hazardous waste water which can be discharged to the ETU.

2.0 Fuel Decontamination and Disassembly Waste Water

WSTF decontamination processes involve the management of P068, U098 and U133 listed hazardous wastes. Per the "Mixture Rule", 40 CFR 261.3 (a)(2)(iv) and (b)(2), a solid waste mixed with a listed hazardous waste (hazardous wastes listed in 40 CFR 261 subpart D) is a hazardous waste. Per the "Mixture Rule", these waste codes could potentially be carried through other subsequent processes that are discharged to the ETU. To demonstrate compliance, this Plan incorporates the following approach to segregate and define the P068, U098 and U133 listed hazardous wastes associated with WSTF's propellant decontamination and disassembly process.

2.1 Empty Container Rule

NASA manages the fuel decontamination and disassembly processes according to the "Empty Container Rule", 40 CFR 261.7(a)(1) and 40 CFR 261.7(b)(3)

40 CFR 261.7(a)(1):

"Any hazardous waste remaining in either (i) an empty container or (ii) an inner liner removed from an empty container, as defined in paragraph (b) of this section, is not subject to regulation under parts 261 through 265, or part 268, 270 or 124 of this chapter or to the notification requirements of section 3010 of RCRA."

40 CFR 261.7(b)(3):

"A container or an inner liner removed from a container that has held an acute hazardous waste listed in §§261.31, 261.32, or 261.33(e) is empty if:

(i) The container or inner liner has been triple rinsed using a solvent capable of removing the commercial chemical product or manufacturing chemical intermediate;

(ii) The container or inner liner has been cleaned by another method that has been shown in the scientific literature, or by tests conducted by the generator, to achieve equivalent removal; or

(iii) In the case of a container, the inner liner that prevented contact of the commercial chemical product or manufacturing chemical intermediate

with the container has been removed."

40 CFR 260.10 defines a container as follows,

"Container means any portable device, in which a material is stored, transported, treated, disposed of, or ***otherwise handled*** *(emphasis added)".*

NASA interprets the definition of a container per 40 CFR 260.10 to include containers and container-like equipment involved in product propellant handling. This includes, but not limited to, hoke bottles, laboratory equipment, valves, piping, and other aerospace components.

2.2 WSTF Decontamination and Disassembly Process Description

A flowchart describing the decontamination and disassembly process is presented in Attachment 1. A general description of the steps involved in the process follows.

1. WSTF containers and container-like equipment involved in product fuel propellant handling (including items such as sample (Hoke) bottles, laboratory equipment, valves, piping, fittings, and other aerospace components) are removed from service.

2. Within 24 hours, the containers and container-like equipment are triple rinsed or pressure rinsed at locations including but not limited to the 300, 400, and 800 Area fuel decon stations, the Fuel Treatment Unit (FTU) or 200 Area fuel hoods. Through this process these items are rendered RCRA empty per 40 CFR 261.7(b)(3)(i) and (b)(3)(ii).

3. Under the "Empty Container Rule" the rinsate from triple or pressure rinsing (rinsate from the first three rinses) is listed hazardous waste (P068, U098 and U133 waste codes). After decontamination (triple or pressure rinsing is complete) any waste residues and the container and container-like equipment are not regulated under RCRA.

4. The non-regulated containers and container-like equipment/components are transported to the 200 Area Components Services Section for disassembly, rinsing, and aerospace cleaning. Under the "Empty Container Rule", the rinsate from the fourth rinse and liners/softgoods materials removed during disassembly are non-hazardous. Although non-hazardous, WSTF may manage these waste streams as hazardous waste. The waste may be declared to be hazardous (P068, U098, U133 waste coded) to support off-site disposal.

5. All subsequent cleaning processes or other operations are no longer associated with, defined as, or declared P068, U098 and U133 listed hazardous wastes.

2.3 Equivalency of the Method

Under 40 CFR 261.7 (b)(3), a container is a RCRA "Empty Container" if:

- the container has been triple rinsed, or

- the container has been cleaned by another method that has been shown by scientific literature, or by tests conducted by the generator, to achieve equivalent removal.

Triple rinsing and pressure rinsing are approved by Federal agencies in the U.S. and Canada for the rinsing or decontamination of pesticide containers prior to disposal. NASA will perform tests to demonstrate that the WSTF fuel decontamination process achieves removal equivalent to triple rinsing. Published data (Iowa State University, PAT 1442, revised June 2000) indicates that the 3rd rinse contains less than 2 ppm of the active ingredient (one ounce the 3rd rinse from a pesticide container contains 0.00005 grams). The non-regulated 4th rinse can be assumed to contain at least an order of magnitude less than the 3rd rinse. NASA will perform a series of tests to demonstrate that rinsate from the 4th rinse of the process will be not detectable or less than 0.5 ppm hydrazine, 0.1 ppm monomethyl hydrazine, and 0.04 ppm 1,1-Dimethylhydrazine.

3.0 Non-Hazardous Contact Contaminated Waste Water

Non-hazardous contact contaminated waste water (waste water that is not a hazardous waste as defined by 40 CFR 261.3) includes:

- Accumulated precipitation and precipitation run-off from the ETU and FTU, and

- Non-hazardous waste water, generated from test or test support activities, which has the potential to contain trace levels of hydrazine constituents (low ppm to ppb concentrations).

3.1 Accumulated Precipitation and Precipitation Run-Off

Demonstration of compliance for accumulated precipitation and precipitation run-off from the ETU and FTU will be performed by "acceptable knowledge". Pertinent regulatory citations with respect to the management of these waste streams follow.

40 CFR 261.3(c)(2)(i) states:

> *"Except as otherwise provided in paragraph (c)(2)(ii), (g) or (h) of this section, any solid waste generated from the treatment, storage, or disposal of a hazardous waste, including any sludge, spill residue, ash emission control dust, or leachate* ***(but not including precipitation run-off)(emphasis added)*** *is a hazardous waste. (However, materials that are reclaimed from solid wastes and that are used beneficially are not solid wastes and hence are not hazardous wastes under this*

provision unless the reclaimed material is burned for energy recovery or used in a manner constituting disposal.)"

40 CFR 264.193(c)(4) states:

"Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation. Spilled or leaked waste and accumulated precipitation must be removed from the secondary containment system within 24 hours, or in as timely a manner as is possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the Regional Administrator that removal of the released waste or accumulated precipitation cannot be accomplished within 24 hours.

[Note: If the collected material is a hazardous waste under part 261 of this chapter, it is subject to management as a hazardous waste in accordance with all applicable requirements of parts 262 through 265 of this chapter. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of sections 301, 304, and 402 of the Clean Water Act, as amended. If discharged to a Publicly Owned Treatment Works (POTW), it is subject to the requirements of section 307 of the Clean Water Act, as amended. If the collected material is released to the environment, it may be subject to the reporting requirements of 40 CFR part 302.]"

Per 40 CFR 261.3(c)(2)(i) and the note per 40 CFR 264.193(c)(4), accumulated precipitation and precipitation run-off is not presumed to be hazardous waste. Accumulated precipitation and precipitation run-off from the ETU and FTU would be hazardous waste only when mixed with a listed hazardous waste.

The ETU and FTU are managed in accordance with 40 CFR 264 Subpart J and inspected daily in accordance with 40 CFR 264.193(f)(1) through (f)(4) and 264.195(b). All spills or leaks are cleaned up within 24 hours in accordance with 40 CFR 264.193(c)(4). From "Acceptable Knowledge", it is known that the accumulated precipitation and precipitation run-off from the ETU and FTU are not mixed with listed hazardous wastes (P068, U098 and U133). Therefore, accumulated precipitation and precipitation run-off from the ETU and FTU will be discharged directly to the ETU.

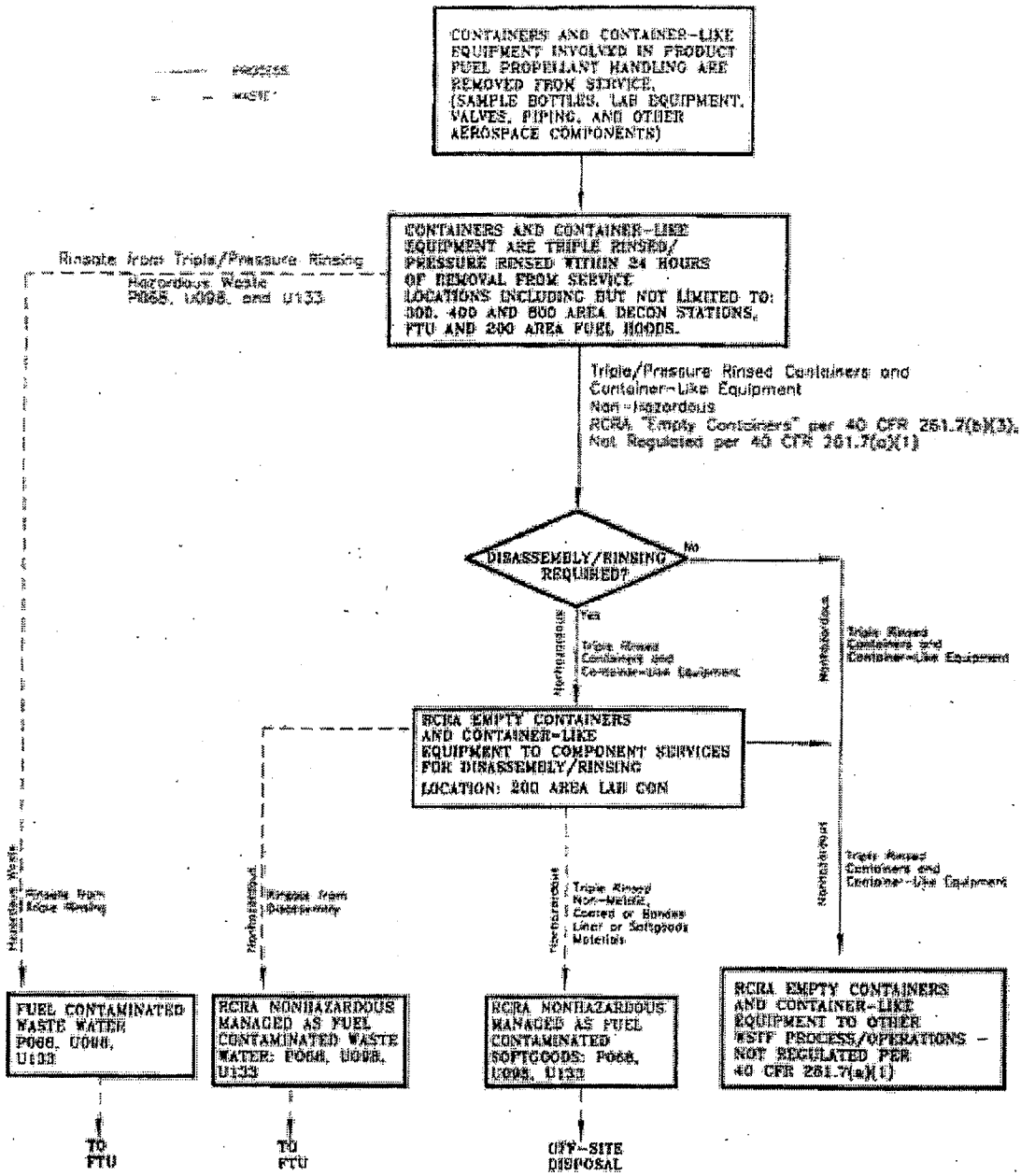
3.2 Non-Hazardous Contact Contaminated Waste Water

For non-hazardous waste water generated from test or test support activities that has the potential to contain trace levels of hydrazine constituents, NASA will demonstrate compliance by sampling and analysis by Hydrazines by HPLC. Contact contaminated waste water shown by sampling and analysis to be not detected or less than 0.5 ppm hydrazine, 0.1 ppm monomethyl hydrazine and 0.04 ppm 1,1-Dimethylhydrazine will be discharged to the ETU. All other waste waters with concentrations above this level will be declared or managed as listed hazardous waste (P068, U098 and U133).

ATTACHMENT 1

WSTF FUEL DECONTAMINATION AND DISASSEMBLY PROCESS FLOW SCHEMATIC

WSTF FUEL DECONTAMINATION AND DISASSEMBLY PROCESS FLOW SCHEMATIC



Appendix 6-F

NASA/WSTF ETU
Corrosive Waste Water Management Plan

NASA WSTF ETU
CORROSIVE WASTE WATER
MANAGEMENT PLAN

1.0 Introduction

The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA Subpart CC regulations) and under the provisions of 40 CFR 268.50 (e) (LDR regulations). All waste discharged to the ETU is limited to waste with an average volatile organic (VO) concentration of less than 500 ppmw as determined at the point of waste origination. The LDR treatment standard, with respect to corrosivity, is met prior to, or immediately after, discharge to the ETU. All other treatment standards are met prior to discharge to the ETU. The waste discharged to the ETU is limited to investigative derived waste (IDW), oxidizer contaminated waste water and corrosive wastes that meet LDR treatment standards. RCRA metals (waste codes D004, D005, D006, D007, D008, D009, D010, and D011), and inorganic UHCs above LDR treatment standards are restricted from discharge to the ETU. To assure compliance with the LDR regulations, all corrosive waste discharged to the ETU will be below LDR treatment standards or treated below LDR treatment standards for metals (in exempt units regulated under 40 CFR 262.34) prior to discharge to the ETU. Under 40 CFR 268.7(a)(5), a WAP is required for treatment in exempt units to meet LDR treatment standards. NASA has developed the Corrosive Waste Management Plan to provide details with respect to the management of corrosive waste water discharged to the ETU and a WAP for the treatment of corrosive waste with potential inorganic UHCs. The NASA WSTF Corrosive Waste Management Plan follows.

2.0 ETU Waste

The corrosive waste and non-hazardous waste water discharged to the ETU includes the following waste categories:

- Acidic Cleaning Solution
- Ammonia Waste Water
- Caustic Cleaning Solution
- Citric Acid Cleaning Solution
- Pickling/Etching Solution
- Nitric Hydrofluoric Acid
- Clean Room Rinse Water (non-hazardous)
- Contact Contaminated Waste Water (non-hazardous)
- Detergent-Type Waste Water (non-hazardous)
- Met Lab Waste Water
- Chem. Lab Waste Water

A general description of the waste categories discharged to the ETU is presented in Table 6.2 of the WAP. Typical waste generation scenarios are presented in Appendix 6-A of the WAP.

3.0 Corrosive Waste - ETU LDR Compliance

The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA Subpart CC regulations) and under the provisions of 40 CFR 268.50 (e) (LDR regulations). All waste discharged to the ETU is limited to waste with an average volatile organic (VO) concentration of less than 500 ppmw as determined at the point of waste origination. The LDR treatment standard, with respect to corrosivity, is met prior to, or immediately after, discharge to the ETU. All other treatment standards are met prior to discharge to the ETU.

All corrosive waste (containing potential inorganic UHCs) discharged to the ETU will be below LDR treatment standards for inorganic UHCs or treated below LDR treatment standards for inorganic UHCs (in containers regulated under 40 CFR 262.34). The regulations allow waste generators to use testing, knowledge of the waste, or both to demonstrate compliance with LDR treatment standards. Details of what constitutes "acceptable knowledge" are provided in section 6.3.2 of the WAP.

Whenever possible, "acceptable knowledge" will be used to document compliance with LDR treatment standards. A flow chart of the overall approach to demonstrate compliance with LDR treatment standards and the management of corrosive waste, with potential to contain organic UHCs above LDR treatment standards, is presented in Attachment 1. The steps in the process follow.

1) Whenever possible "acceptable knowledge" will be used to demonstrate compliance. Product information/MSDSs and the waste generating process are reviewed to identify organic UHCs. Organic UHCs are defined as organic constituents identified per 40 CFR 268.48 that have a reasonable potential to be present. Corrosive waste with potential to contain organic UHCs above LDR treatment standards will be shipped off-site for disposal.

2) Product information/MSDSs and the waste generating process are reviewed to identify potential inorganic UHCs. Inorganic UHCs are defined as inorganic constituents identified per 40 CFR 268.48 that have a reasonable potential to be present. If inorganic UHCs are not involved in the waste generating process, the corrosive waste will be discharged to the ETU.

3) In cases where "acceptable knowledge" can not be used to document compliance with LDR treatment standards, sampling and analysis will be performed with respect to the potential inorganic UHCs present in the corrosive waste. If inorganic UHCs (as demonstrated by sampling and analysis) are below LDR treatment standards, the waste will be discharged to the ETU.

4) Sampling and analysis by conventional methods may be inconclusive or is not feasible. Under some circumstances, sampling and analysis by conventional methods to document compliance with the LDR treatment standards may not

conclusively demonstrate compliance. Many of the commercial products used in standard operations contain a high concentration of detergents and surfactants. Due to matrix interference, conventional analytical methods such as EPA Method 1311/6010 may have laboratory reporting limits that are higher than the LDR treatment standard as specified per 40 CFR 268.48. As a result, the analytical data may not conclusively demonstrate that the inorganic UHCs are below LDR treatment standards. Under these conditions, the compliance will be documented by one of the following or the waste will be shipped off-site for disposal:

- The potential inorganic UHCs will be assumed or declared to be present at levels above LDR treatment standards and the waste will be treated to below LDR treatment standards as described in Section 5.0.
- Compliance documentation will be based on constituent-specific sampling and analysis (acceptable knowledge) will be performed by methods other than those referenced in SW-846, or
- Worst case test data (acceptable knowledge) showing that under worst case conditions the potential inorganic UHCs will be below LDR treatments standards.

5) At WSTF, waste water from laboratory and laboratory-scale processes is generated in milliliter to liter quantities from a continuous series of steps in a laboratory procedure. Under strict interpretation, each slightly different step in a laboratory process has the potential to be interpreted as a unique waste generating process and a unique point of generation. Although the aggregated waste is nonhazardous, some of the individual steps in the laboratory process may have the potential to be corrosive and contain inorganic UHCs. The segregation, sampling and analysis of each slightly different step in a laboratory process that generates waste water may not be feasible. Under these conditions, the potential inorganic UHCs will be assumed or declared to be present at levels above LDR treatment standards. The waste will either be shipped off-site for disposal or treated as described in Section 5.0.

4.0 Corrosive Waste Water Treatment Process- Regulatory Approach

Characteristic hazardous wastes can be treated so that the waste no longer exhibits the characteristics of a hazardous waste. For characteristic hazardous waste to become non-hazardous, the generator must remove the characteristics of a hazardous waste and comply with the applicable LDR treatment standards per 40 CFR 268.48. In some cases, compliance with LDR treatment standards is difficult using conventional sampling and analytical methods. An optional approach is to assume or declare that the corrosive waste contains inorganic UHCs above LDR treatment standards and treat the waste to below LDR treatment standards. The regulatory approach follows.

4.1 Corrosive Treatment

Per 40 CFR 268.40(a), a prohibited waste identified in the table "Treatment Standards for Hazardous Wastes" may be land disposed only if it meets the requirements found in the table. For corrosive waste, the treatment standard is the technology standard "DEACT". Per 40 CFR 268.42, Table 1, "DEACT" is defined as,

"Deactivation to remove the hazardous characteristics of a waste due to its ignitability, corrosivity, and/or reactivity."

Corrosive waste can be treated by "NEUTR". Per 40 CFR 268.42, Table 1, "NEUTR" is defined as

"Neutralization with the following reagents ***(or waste reagents) (emphasis added)*** *or combinations of reagents: (1) Acids; (2) bases; or* ***(3) water (including wastewaters) (emphasis added)*** *resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals."*

A pertinent citation with respect to the EPA's interpretation (Federal Register, June 1, 1990, Vol. 55, No. 106, 22549) is as follows:

"As a result, EPA is promulgating a general treatment standard for wastes in the D002 Acid and Alkaline Subcategories that allow the use of any appropriate treatment technology, namely "Deactivation (DEACT to Remove the Characteristic of Corrosivity". ***This means that the facility may use any treatment (including neutralization achieved through mixing with other wastewaters) that results in a pH above 2 but less than 12.5 and thereby removes the characteristic of corrosivity (emphasis added).***"

A description of the treatment process is provided in Section 5.0. Deactivation or neutralization of corrosive waste will be performed using waste reagents (waste acidic or caustics solutions) or combination of waste reagents and water (including wastewaters). Neutralization will be achieved when the resulting solutions reaches a pH of greater than 2 but less than 12.5 as measured in the aqueous residuals. At this point the corrosive waste will be rendered non-hazardous.

4.2 The LDR Dilution Prohibition

The "LDR Dilution Prohibition" per 40 CFR 268.3(a) prohibits dilution as a substitute for adequate treatment. 40 CFR 268.3(a) states as follows:

"Except as provided in paragraph (b) of this section, no generator, transporter, handler, or owner or operator of a treatment, storage, or disposal facility shall in any way dilute a restricted waste or the residual from treatment of a restricted waste ***as a substitute for adequate treatment (emphasis added)*** *to achieve compliance with subpart D of this part, to circumvent the effective date of a prohibition in subpart C of this part, to otherwise*

avoid a prohibition in subpart C of this part, or to circumvent a land disposal prohibition imposed by RCRA section 3004."

The treatment process will aggregate waste to allow the use of waste reagents and wastewaters for deactivation of corrosive wastes as discussed in Section 4.1, and for centralized treatment of potential inorganic UHCs.

The EPA's interpretation with respect to the "LDR Dilution Prohibition" as it applies to centralized treatment is provided by the June 1, 1990, Federal Register, Vol. 55, No. 106, 22664- 22666. Pertinent citations are as follows:

"In interpretive preamble discussions, the Agency explained that these rules are not intended to discourage legitimate centralized treatment, and ***that aggregation of wastes preceding legitimate centralized treatment is not considered to be impermissible dilution (emphasis added).***"

"*The existing rules on dilution and EPA's interpretive statements regarding those rules indicate that* ***the dilution prohibition has a two-fold objective: (1) To ensure that prohibited wastes are actually treated: and (2) to ensure that prohibited wastes are treated by methods that are appropriate for that type of waste. The EPA has acknowledged that prohibited wastes which are aggregated are not diluted impermissibly if they are treated legitimately in a centralized treatment system, irrespective of the dilution inherent in such a system. Thus, if "dilution" is a legitimate type of treatment or a necessary pretreatment step in a legitimated treatment system, such dilution is permissible (emphasis added).***"

"The Agency is able to provide limited additional guidance today on the issue of when treatment methods involving dilution are permissible. The issue frequently arises when prohibited wastes are aggregated for the purposes of treatment. First, ***if the wastes are all legitimately amenable to the same type of treatment, and this is a method of treatment is utilized for the aggregated wastes, the aggregation step is not impermissible dilution (emphasis added).***"

The inorganic UHCs are amenable to the same type of treatment technology. Legitimate treatment technologies for inorganic UHCs can include technologies such as metal recovery and stabilization. Per 40 CFR 268.42 Table 1, metal recovery or "RMETL" is defined as:

"Recovery of metals or inorganics utilizing one or more of the following direct physical/removal technologies: (1) ***Ion exchange (emphasis added);*** *(2)resin or solid (i.e., zeolites) adsorption; (3)reverse osmosis; (4) chelation/solventextraction; (5) freeze crystalization; (6)ultrafiltration and/or (7) simple precipitation(i.e., crystalization) Note: This does not preclude the use of other physical phase separation or concentration techniques such as decantation, filtration (including ultrafiltration), and centrifugation, when used in conjunction with the above listed recovery technologies."*

The treatment process will aggregate waste for centralized treatment of potential inorganic UHCs by ion exchange. Based on the EPA's intent and interpretation of the "LDR Dilution Prohibition", the waste aggregation associated with the treatment process is not in violation of 40 CFR 268.3(a).

4.3 "90-Day Generator Rule"

The treatment process will treat corrosive waste in containers under the provisions of the "90 Day Generator Rule" which allows on-site treatment in tanks or containers with out a permit. 40 CFR 262.34 (a) states as follows:

"Except as provided in paragraphs (d), (e), and (f) of this section, a generator may ***accumulate (emphasis added)*** *hazardous waste on-site for 90 days or less without a permit or without having interim status, provided that:*

(1) The waste is placed:

> *(i) In containers and the generator complies with the applicable requirements of subparts I, AA, BB, and CC of 40 CFR part 265; and/or*
>
> *(ii) In tanks and the generator complies with the applicable requirements of subparts J, AA, BB, and CC of 40 CFR part 265 except §§265.197(c) and 265.200;*

The EPA's interpretation of the above regulation is provided by the March 24, 1986 Federal Register, Vol. 51., No. 56, 10168. A pertinent citation follows:

"Of course, no permitting would be required if a generator chooses to treat their hazardous waste in the generator's accumulation tanks or containers in conformance with the requirements of 40 CFR 262.34 and Subparts J or I of Part 265. ***Nothing in 40 CFR 262.34 precludes a generator from treating waste when it is in an accumulation tank or container covered by that provision. Under the existing Subtitle C system, EPA has established standards for tanks and containers which apply to both the storage and treatment of hazardous waste (emphasis added).*** *"*

The treatment process will treat waste in containers in accordance with the requirements of 40 CFR 262.34 and 40 CFR 265 Subpart I. Per 40 CFR 260.10, a container is defined as follows:

"Container means any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled".

5.0 Corrosive Waste Water Treatment Process WAP

WSTF treats corrosive waste in containers regulated under 40 CFR 262.34 to meet LDR treatment standards. Under 40 CFR 268.7(a)(5), a WAP is required for treatment in units

regulated under 40 CFR 262.34 to meet LDR treatment standards. This section provides the WAP for the WSTF Corrosive Waste Water Treatment Process and serves to provide facility procedures to assure compliance with LDR requirements.

5.1 Description of Processes and Activities

Corrosive waste water is generated from the 200 Area Clean Room, Chemistry Laboratory, and Metallurgy Laboratory. The description of the associated facility processes and activities that generate corrosive waste or corrosive waste water is provided in Section 6.1.2 of the WSTF WAP.

5.2 Identification of Hazardous Wastes Managed At WSTF

The identification of hazardous wastes managed at WSTF is provided in Section 6.2.1 of the WSTF WAP. A general description of the waste categories managed at the ETU is provided in Table 6.2. The potential waste categories associated with the corrosive waste water treatment process and the approximate quantities are presented in Table 1.

Table 1 - Corrosive Waste Water Treatment Potential Waste Categories

Waste Generator	**Waste Category**	**Approximate Quantities (gallons)**	
		weekly	**annual**
200 Area Clean Room	Acidic Cleaning Solution	58	3,000
	Caustic Cleaning Solution	87	4,500
	Citric Acid Cleaning Solution	19	1,000
	Pickling/Etching Solution	1	50
	Nitric Hydrofluoric Acid	2	110
	Detergent-Type Waste Water (non-hazardous)	29	1,500
	Clean Room Rinse Water (non-hazardous)	962	50,000
	Total:	1158	60,160
Metallurgy Laboratory	Met Lab Waste Water	19	1,000
Chemistry Laboratory	Chem Lab Waste Water	192	10,000

5.3 Description of Hazardous Waste Management Units

WSTF will utilize acceptable knowledge and perform sampling and analysis as required to characterize the waste and identify potential UHCs at the point of waste generation. Prior to discharge to the ETU, all corrosive waste with potential UHCs will be treated by deactivation or neutralization so that the waste no longer exhibits the characteristics of corrosivity and is in compliance with LDR treatment standards. Deactivation or neutralization of corrosive waste will be performed using primarily waste reagents (waste acidic or caustics solutions) or combination of waste reagents and water (including wastewaters). Neutralization will be achieved when the resulting solutions reaches a pH of greater than 2 but less than 12.5 as measured in the aqueous residuals. At this point the corrosive waste will be rendered non-hazardous. The waste will be aggregated to allow the use of waste reagents and waste waters for the deactivation of corrosive waste and for centralized treatment of potential UHCs. A general description follows.

Rinse water and corrosive waste from the Building 200, Room 111 cleaning tank assembly and Lab Con Highbay will be aggregated for centralized treatment. The lift station that serves the Building 200, Room 111 cleaning tank assembly will be plumbed to a container managed in accordance with 40 CFR 262.34. Waste from the Lab Con Highbay area will be pumped directly to the same container that serves the lift station.

The approximate waste quantities are presented in Table 1. About 1,200 gallons of waste are generated from the Clean Room per week consisting of about 80% Clean Room Rinse Water (tap water and ultra pure rinse water) and the remainder consisting of primarily acidic, caustic or detergent waste waters which are either slightly corrosive or non-hazardous.

The waste will be aggregated and neutralized in a 3,000 gallon container (polyethylene, stainless steel, or carbon steel with a chemical resistant coating or lining). When the container has reached 75% capacity (about a 2 week accumulation period), the container will be transported to a designated area for treatment of potential inorganic UHCs.

A conceptual design of the Clean Room treatment process is presented in Attachment 2. The system consists of four basic processes. A general description follows:

1. pH adjustment - After accumulation, the resulting pH will be within the range 3 to 8 or adjusted to within the pH range of 3 to 8 (or as specified by the ion exchange resin manufacturer). Caustic (waste reagents or sodium hydroxide) or acidic (waste reagents or hydrochloric acid) will be pumped into the container to adjust the pH as required to support the ion exchange process.
2. Filtration for solid particulate removal.
3. Carbon filtration for removal of organics and other compounds that could attack or foul the exchange resins, and

4. Ion exchange for removal of target metals – The process consists of passing an influent stream through a columnar fixed –bed type unit filled with the exchange resin specially designed to target only the ions required to be removed from the waste stream. Cation exchange resins are resins that attract positive ions such as nickle, copper, lead, cadimuim, and trivalent chrome. These types of resins prefer metals over ions such as H^+ or Na^+ ions that initially present at the resin ion exchange sites. During the exchange process, the metal ions replace the H^+ or Na^+ ions at the exchange sites and the H^+ or Na^+ ions are released to effluent stream. Anion exchange resins utilized the same basic process, but remove anions such as sulfate, chloride, hexavalent chrome, etc. and release ions such as OH^-.

The system design assures a constant, controllable flow rate (within the range of 2 to 10 gallons per minute) that allows optimum contact with the exchange resin. Typically the ion exchange process consists of two stages (identical fixed bed units) in series. The design capacity of the system is based on the ion exchange capacity of a single stage. The ion exchange or contaminant removal process occurs in the first stage. The second stage is installed as an added safeguard to prevent the breakthrough of contaminants in the final effluent.

The effluent from the first stage will be sampled to determine when breakthrough occurs. Breakthrough occurs when the concentration of the target ion in the effluent from the first stage reaches a predetermined limit (such as LDR treatment standards). At this time the exchange media or columns in the first stage are removed for off-site disposal, the exchange media or columns in the second stage are shifted to the first stage position and virgin media or columns are installed in the second stage position.

For every batch of treated waste, the pH will be measured prior to treatment (after accumulation), after pH adjustment (if required) and prior to discharge to the ETU. Inorganic UHCs will be sampled and analyzed prior to discharge to the ETU. During the treatment process, the treated effluent will be transferred into a second container. The treated effluent will be held until receipt of analytical data demonstrates that the potential inorganic UHCs have been treated to below LDR treatment standards. At that time the waste will either retreated (if required) or discharged to the ETU. The entire process from the start of accumulation to discharge to the ETU will be completed in about 30 days, well within the 90 day regulatory time frame.

For every batch of treated waste, the pH will be measured prior to treatment (after accumulation), after pH adjustment (if required) and prior to discharge to the ETU. Inorganic UHCs will be sampled and analyzed prior to discharge to the ETU.

The treatment of waste water from the Chemistry and Metallurgy Laboratories follows a similar approach and as previously described, will utilize exchange media specially designed to remove the potential inorganic UHCs. The waste water will be accumulated in container(s) managed in accordance with 40 CFR 262.34. The containers are sized to allow the entire process from the start of accumulation to discharge to the ETU will be completed in about 30 days, well within the 90 day regulatory time frame. Waste water

from the Chemistry Laboratory will be accumulated in a 500 gallon container (polyethylene, stainless steel, or carbon steel with a chemical resistant coating or lining) and waste from the Metallurgy Laboratory will be collected in a 50 gallon container (polyethylene, stainless steel, or carbon steel with a chemical resistant coating or lining). The approximate waste quantities are presented in Table 1. The treatment systems will utilize scaled-down versions of the system used to treat waste from the Clean Room (treatment rate within the range of one-half to one gallon per minute). A conceptual design of the treatment systems are presented in Attachments 3 and 4.

5.4 Criteria and Rationale for Parameter Selection and Special Parameter Selection Requirements

The criteria and rationale for parameter selection, and special parameter selection requirements are addressed per Section 6.4.1 of the site WAP.

5.5 Sampling Strategies and Equipment, Sample Preservation and Storage and Sampling QA/QC Procedures

Details with respect to sampling strategies, equipment, sample preservation, storage and sampling QA/QC are addressed per sections 6.4 and 6.5 of the site WAP.

5.6 Re-Evaluation Frequencies

Annual re-evaluation of the treatment process and associated waste streams will be performed per Section 6.3.1.4 of the site WAP.

5.7 Special Procedural Requirements

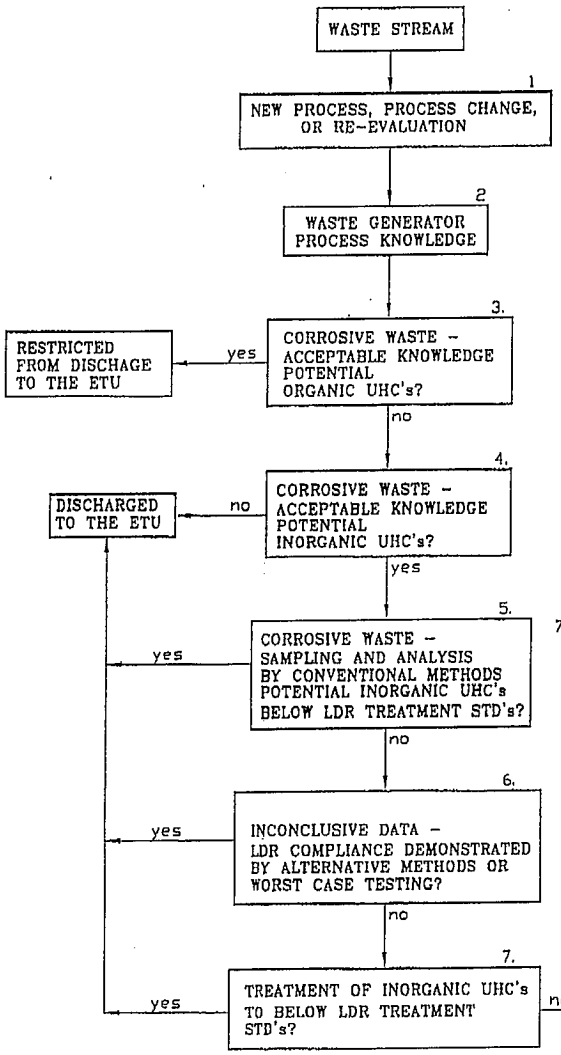
WSTF does not receive waste from off-site generators, therefore, no special procedures for the receipt of off-site waste is required. The general requirements for ignitable, reactive, or incompatible wastes per 40 CFR 264.17(b) and 40 CFR 270.14 (b)(9) are addressed in Section 11.1 of the site WAP..

5.8 Compliance with LDR Requirements

WSTF treats corrosive waste in containers regulated under 40 CFR 262.34 to meet applicable LDR treatment standards. This WAP serves to document the procedures for complying with the LDR regulations. Section 3.0 addresses the regulatory methods of treatment, the "LDR Dilution Prohibition" and provisions for treatment with out a permit under the "90 Day Generator Rule". Section 5.0 defines the treatment process for the treatment for corrosivity and for inorganic UHCs. Prior to discharge to the ETU all waste will be non-corrosive and all potential inorganic UHCs will documented by sampling and analysis to be below LDR treatment standards.

Appendix 1
ETU Corrosive Waste
LDR Compliance Flow Chart

ETU CORROSIVE WASTE LDR COMPLIANCE FLOW CHART



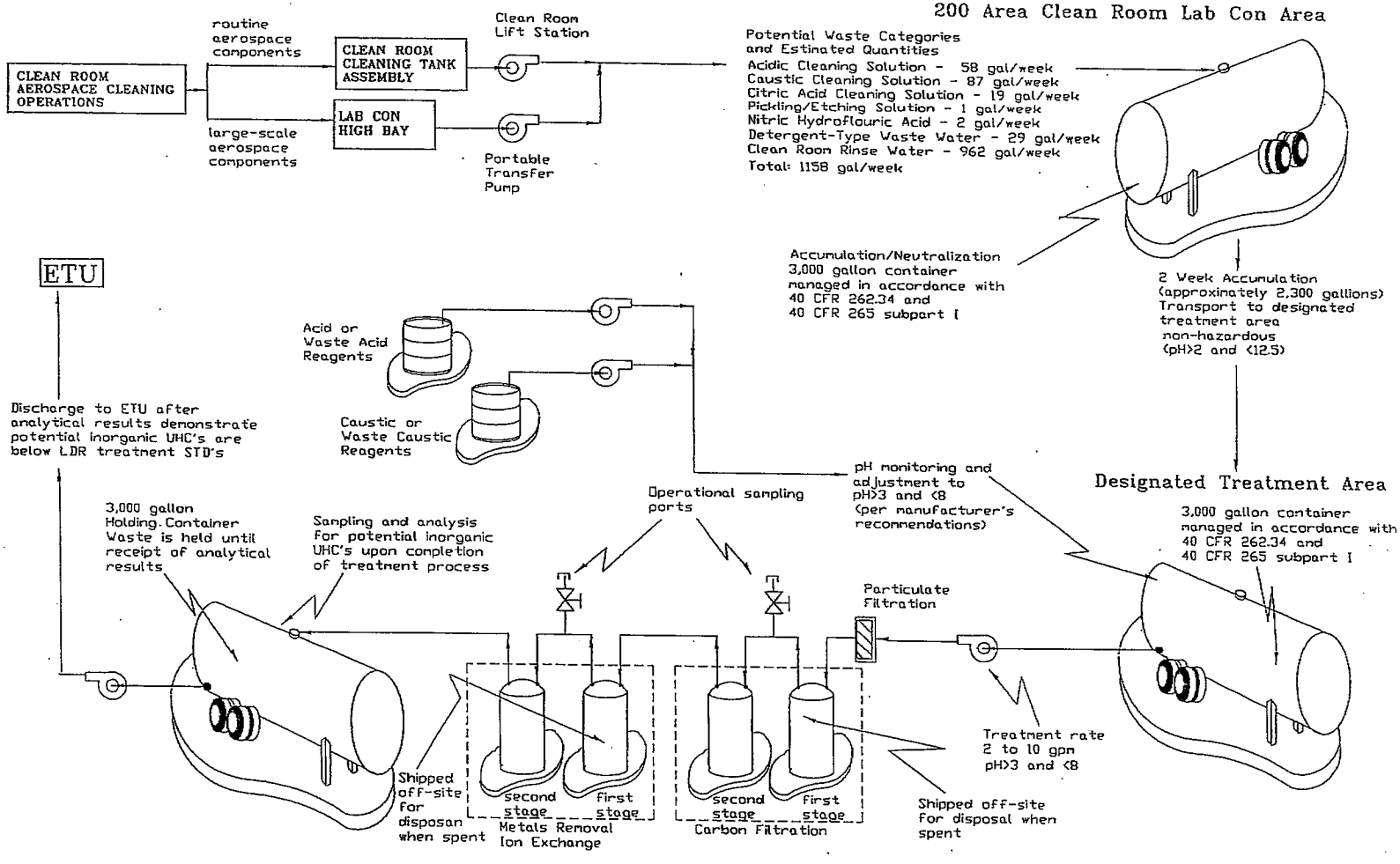
NOTES:

1. For new projects, Environmental Department support during the planning and design phase (design reviews, system safety analysis, test readiness reviews, etc.) Annual re-evaluation of the waste generating process per section 6.3.1.4 of the WAP.
2. Waste generating process information such as test plans, test reports, test procedures, test specifications, engineering calculations, material balances raw materials, intermediate materials, by-products, final products, manufacturer's product information, process reactions, MSDS's, and analytical data.
3. WSTF Environmental Department review of process knowledge with respect to organic constituents listed in 40 CFR 268.48.
4. WSTF Environmental Department review of process knowledge with respect to inorganic constituents listed in 40 CFR 268.48.
5. Conventional analytical methods such as EPA Method 1311/6010.dtext
6. Inconclusive data due to matrix interference or laboratory procedures where the waste generating process and point of generation are not clearly defined. Potential inorganic UHC's are declared or assumed to be present above LDR treatment standards.
7. Potential inorganic UHC's treated by ion exchange

Appendix 2

200 Area Clean Room
Conceptual Design of Treatment Process

200 AREA CLEAN ROOM – CONCEPTUAL DESIGN OF TREATMENT PROCESS

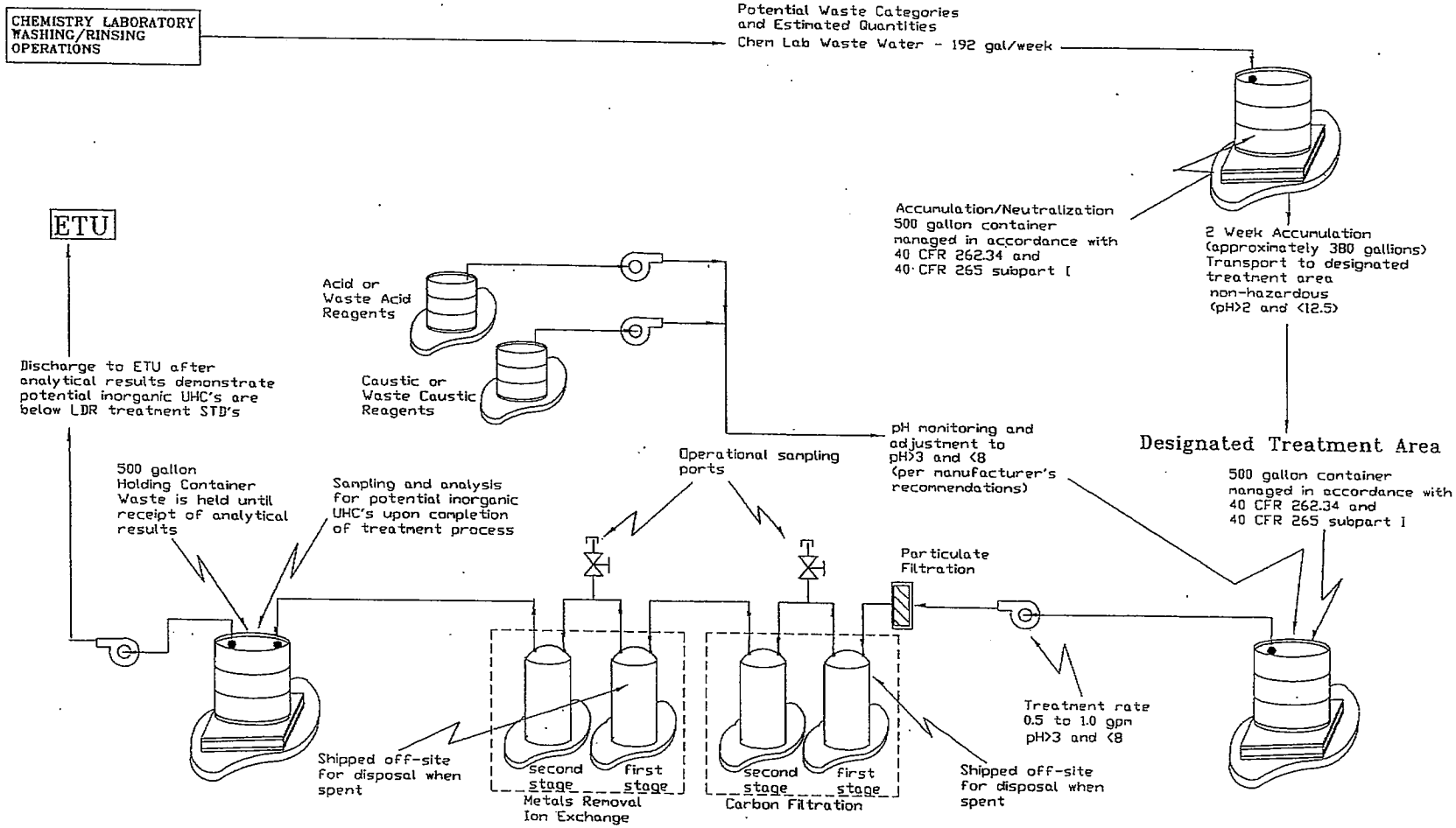


Appendix 3

200 Area Chemistry Laboratory
Conceptual Design of Treatment Process

200 AREA CHEMISTRY LABORATORY – CONCEPTUAL DESIGN OF TREATMENT PROCESS

200 Area Chemistry Laboratory Area

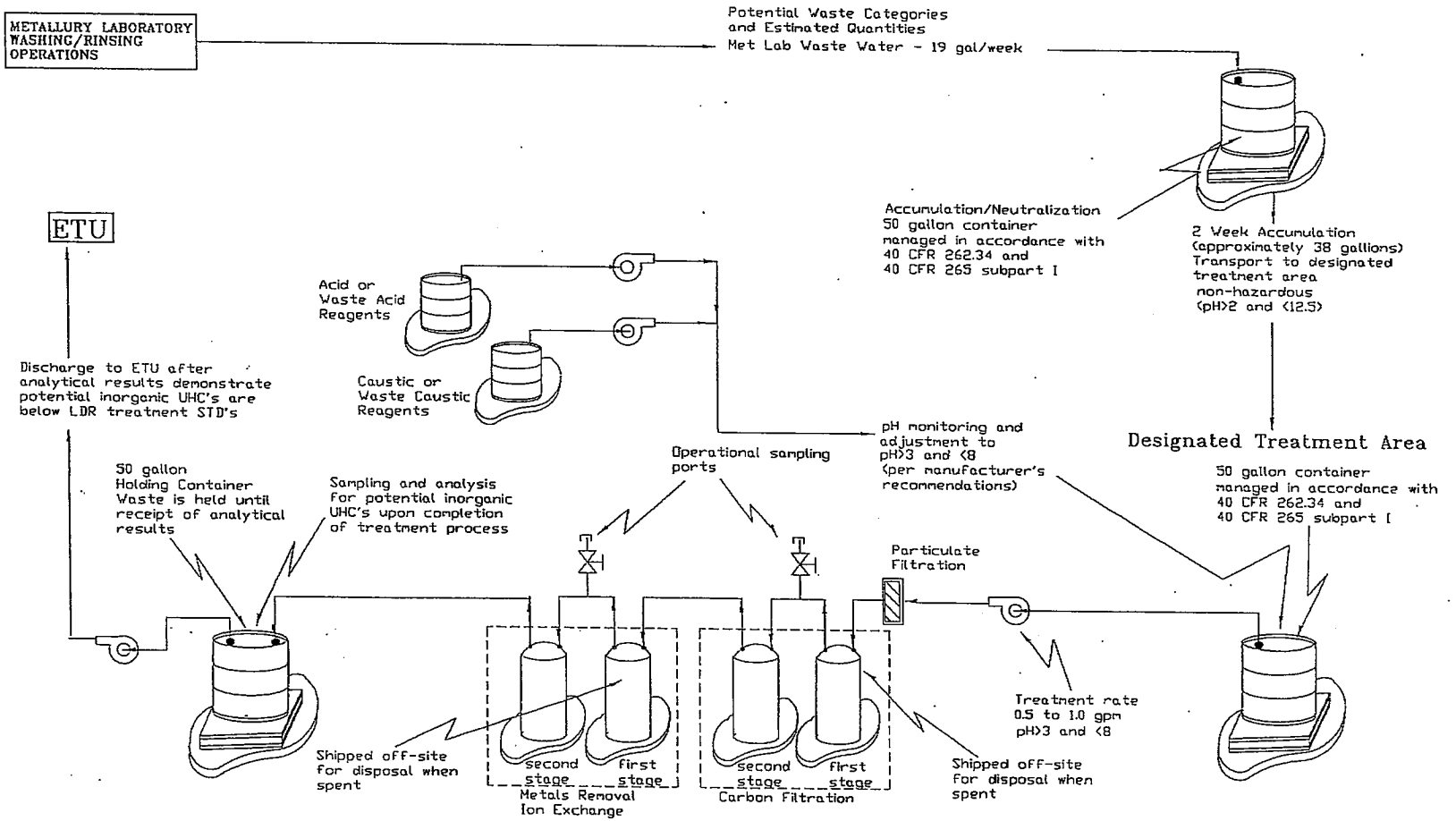


Appendix 4

200 Area Metallurgy Laboratory
Conceptual Design of Treatment Process

200 AREA METALLURGY LABORATORY – CONCEPTUAL DESIGN OF TREATMENT PROCESS

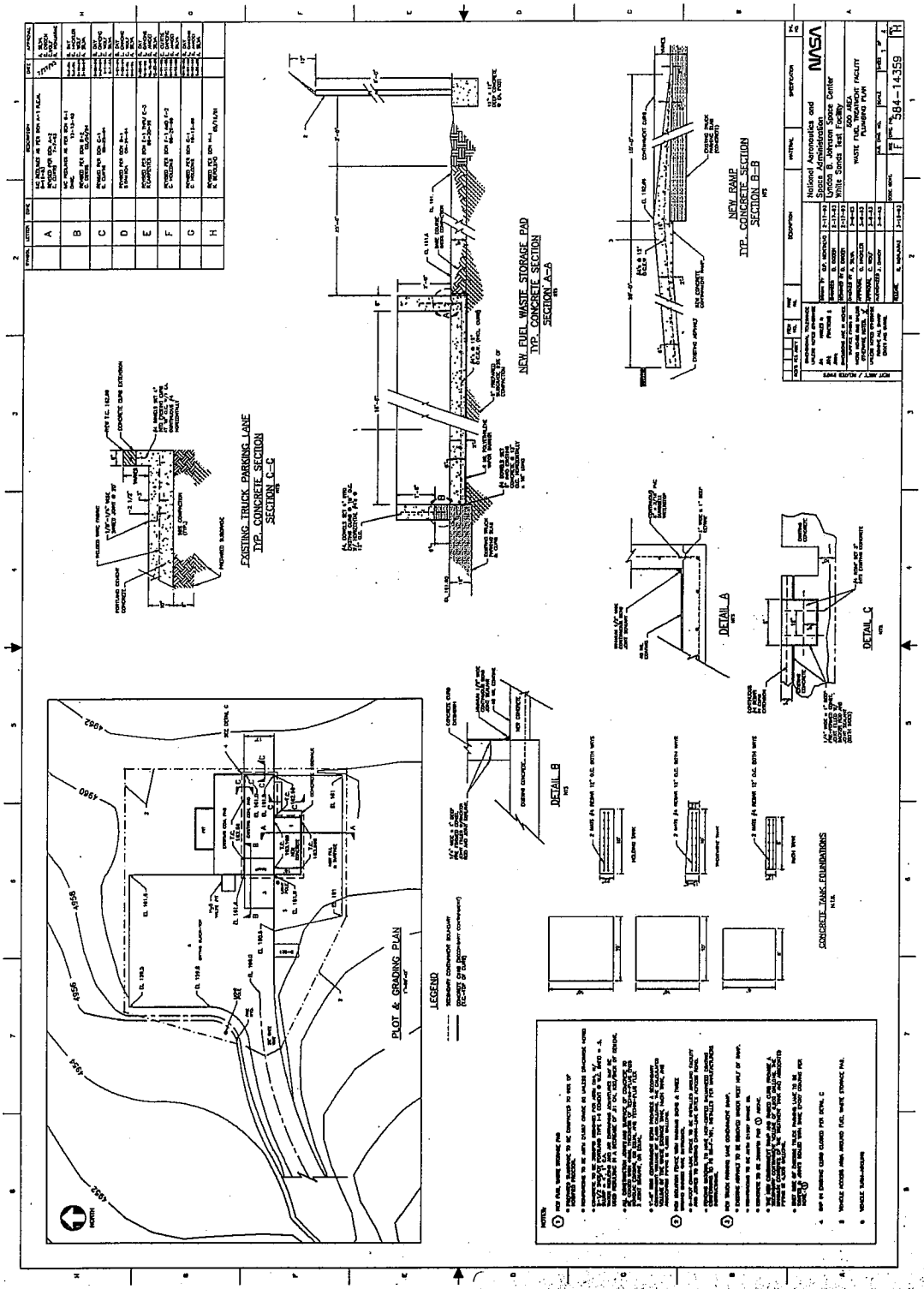
200 Area Metallurgy Laboratory Area



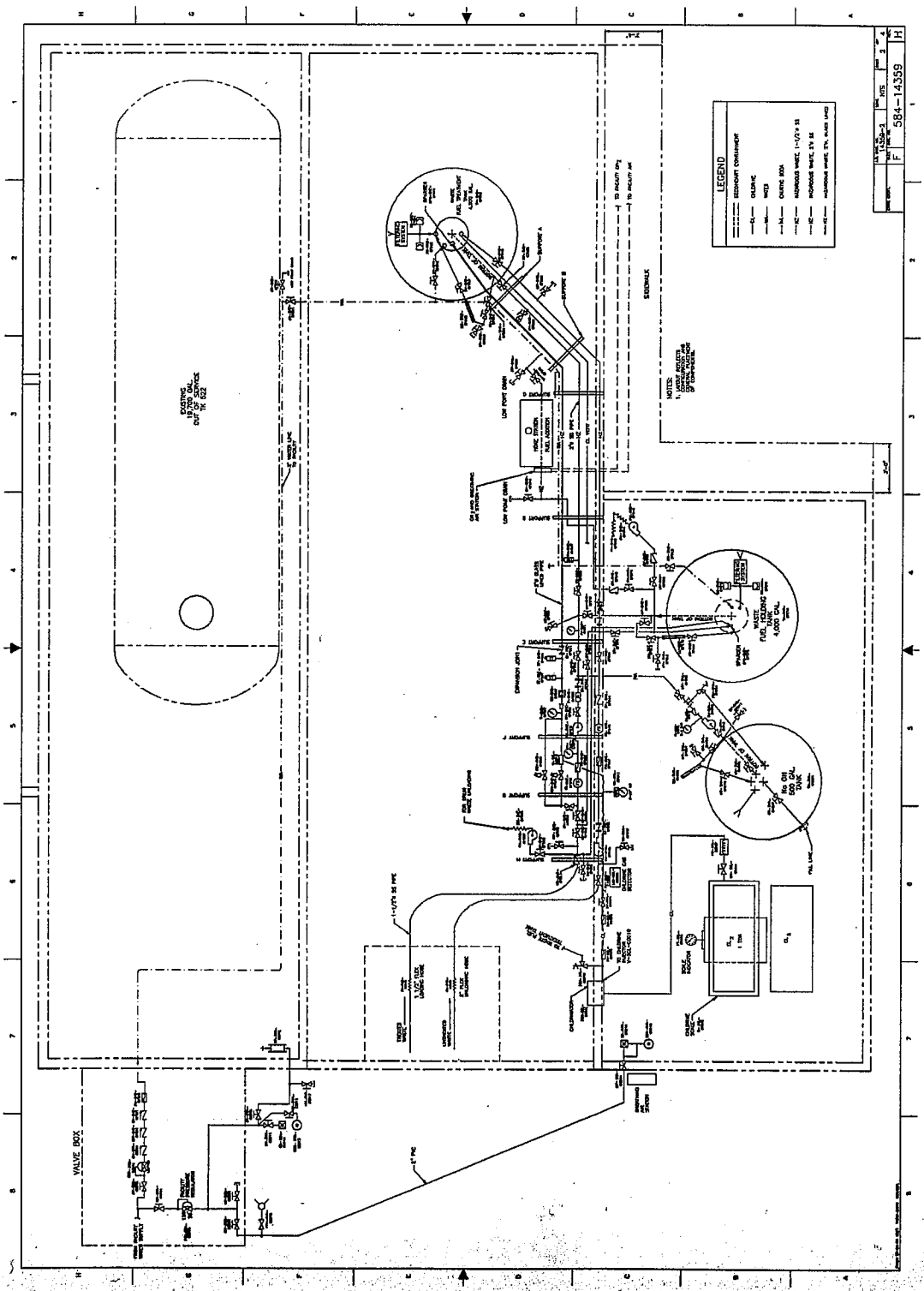
Appendix 6-G

FTU Diagrams

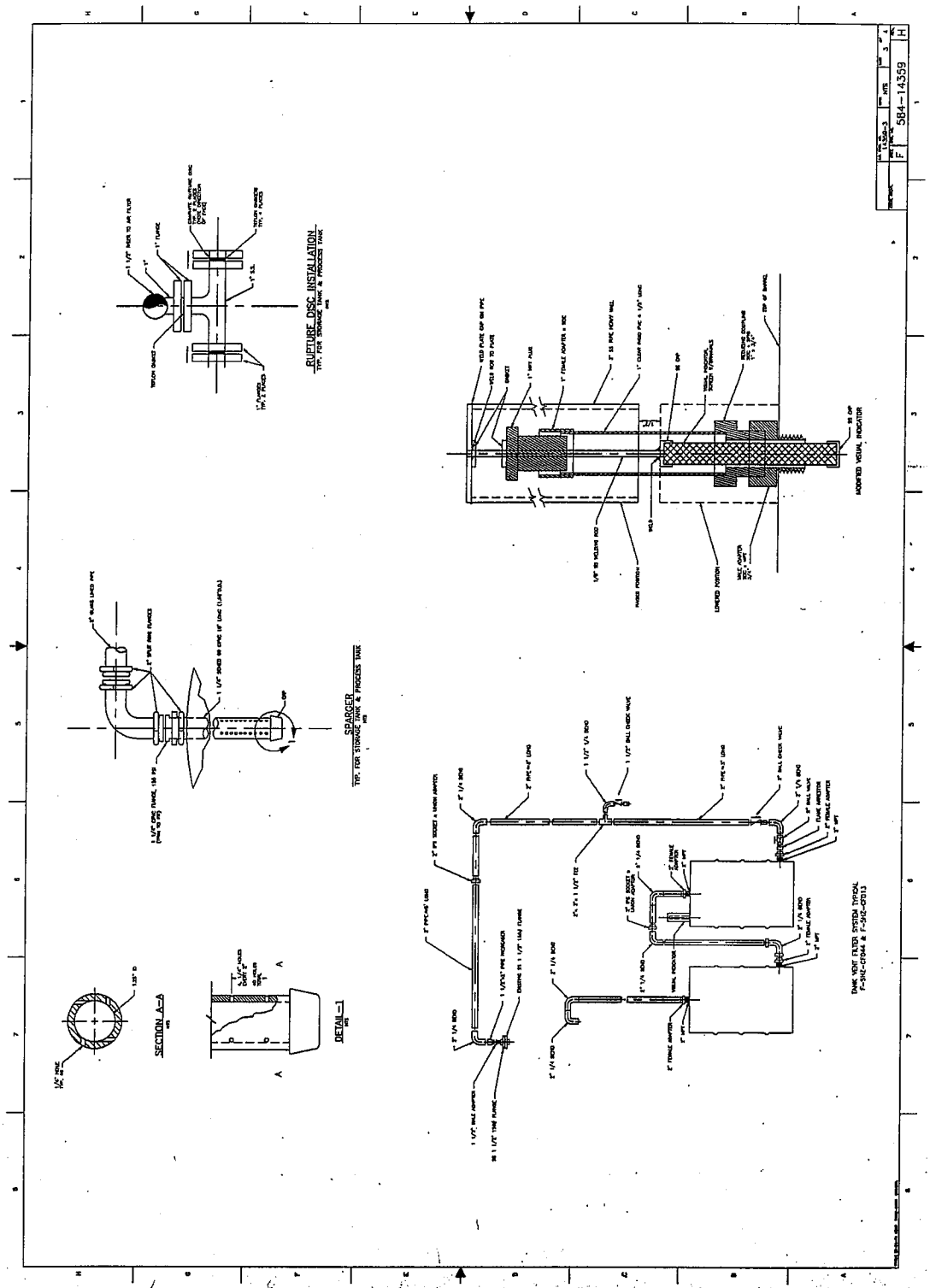
FTU Civil Construction Diagram



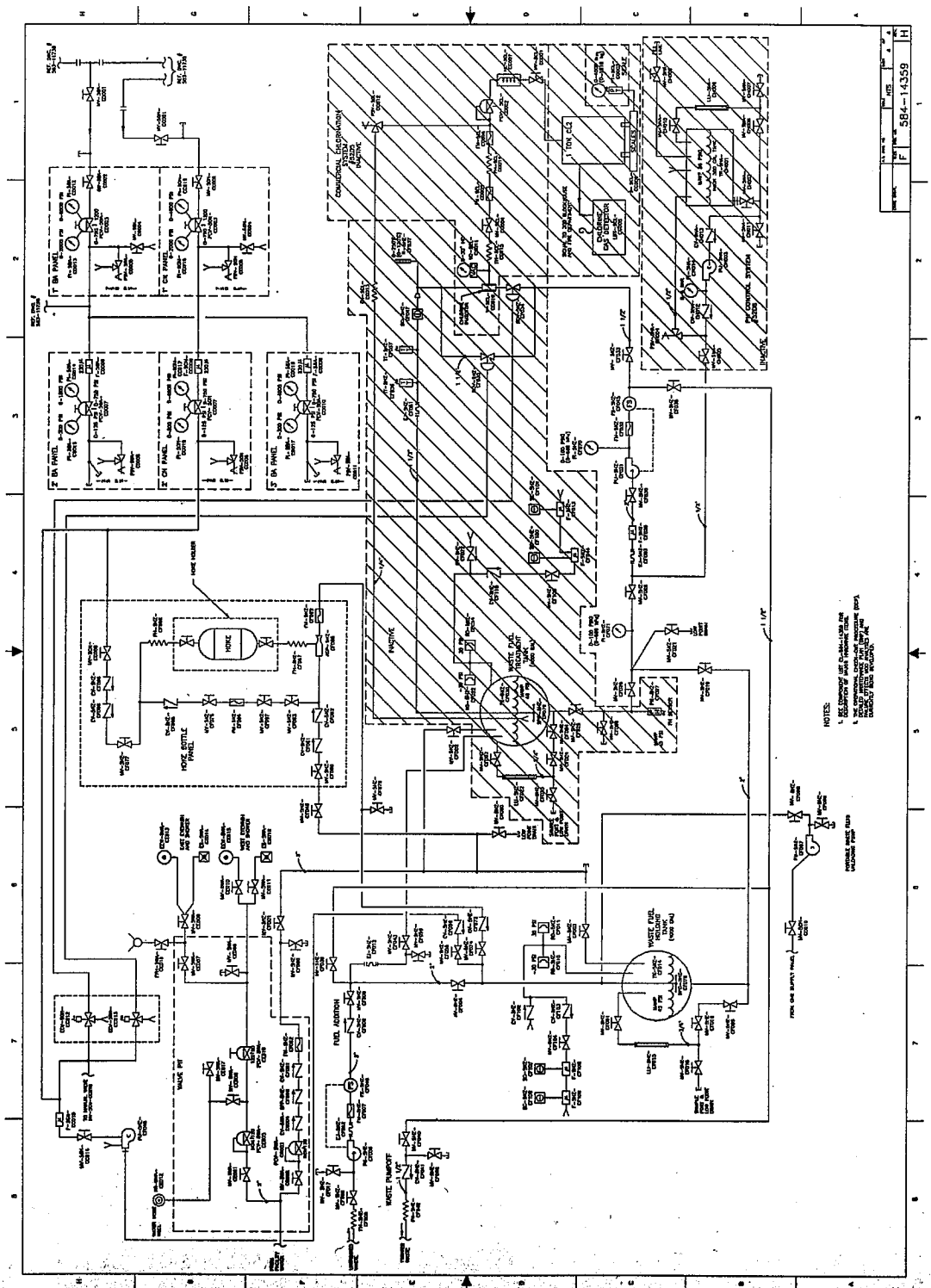
FTU Process Piping Diagram



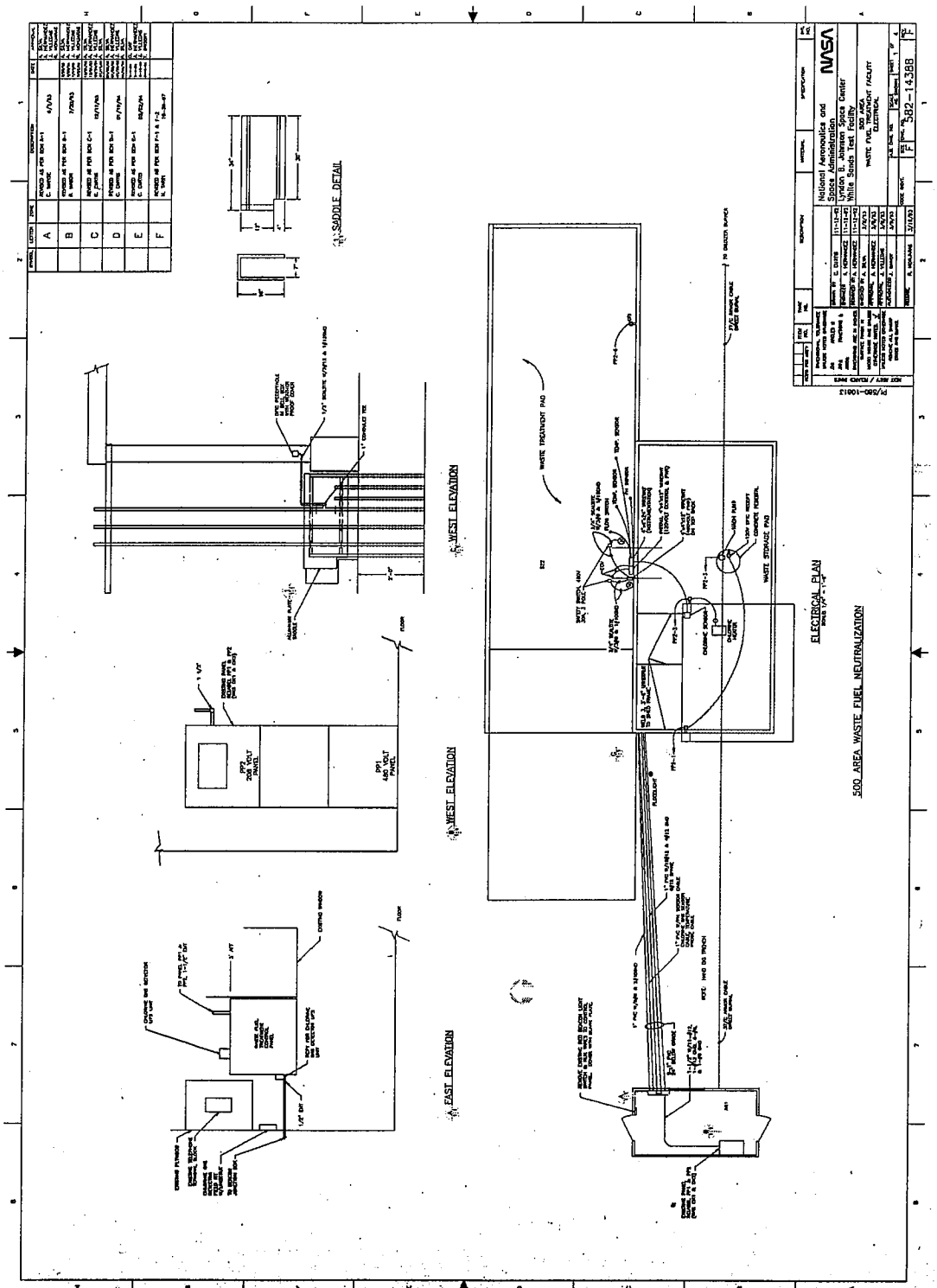
FTU Supplemental Construction Diagram



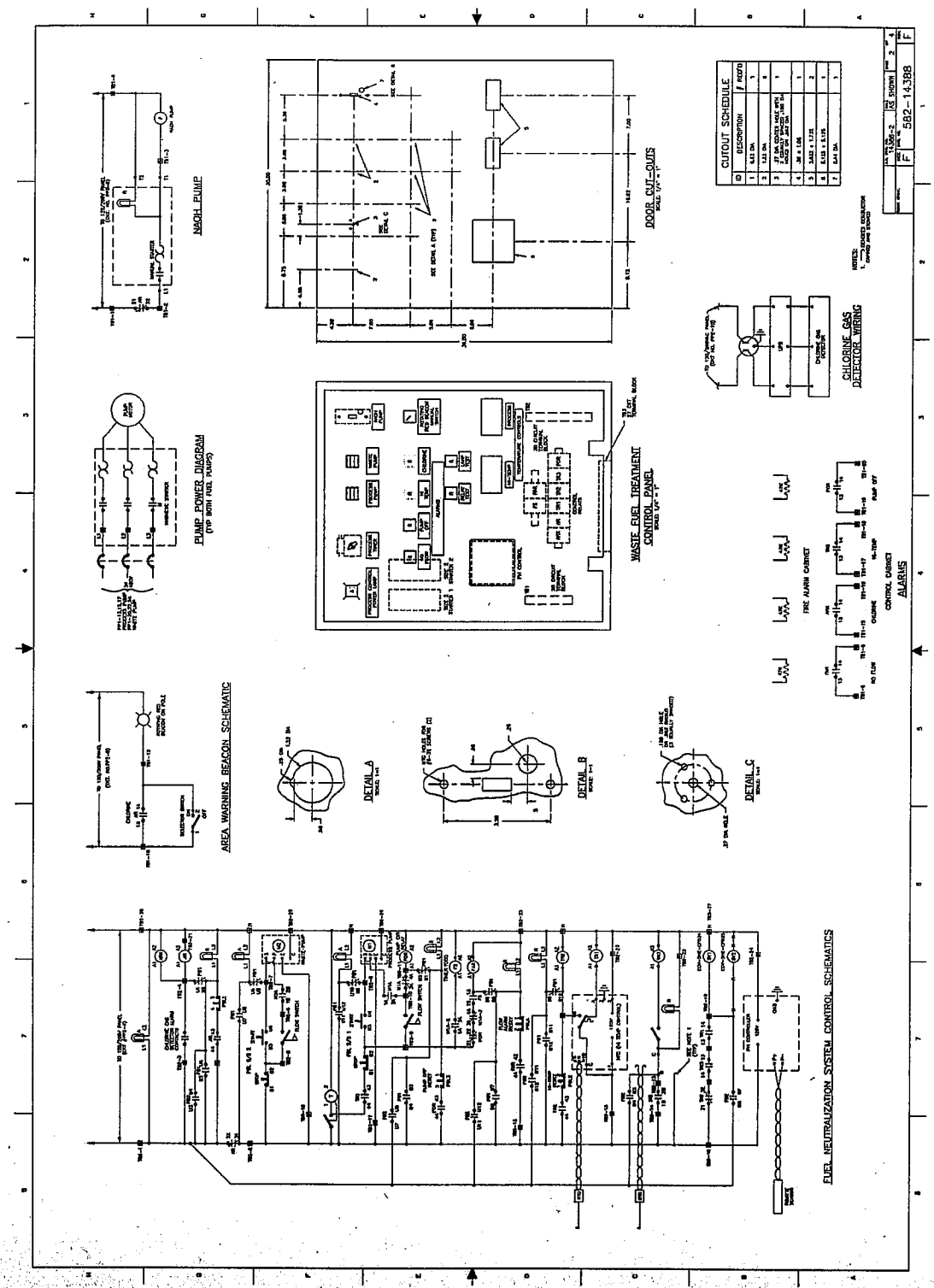
FTU Pressure Vessel/System Certification Diagram



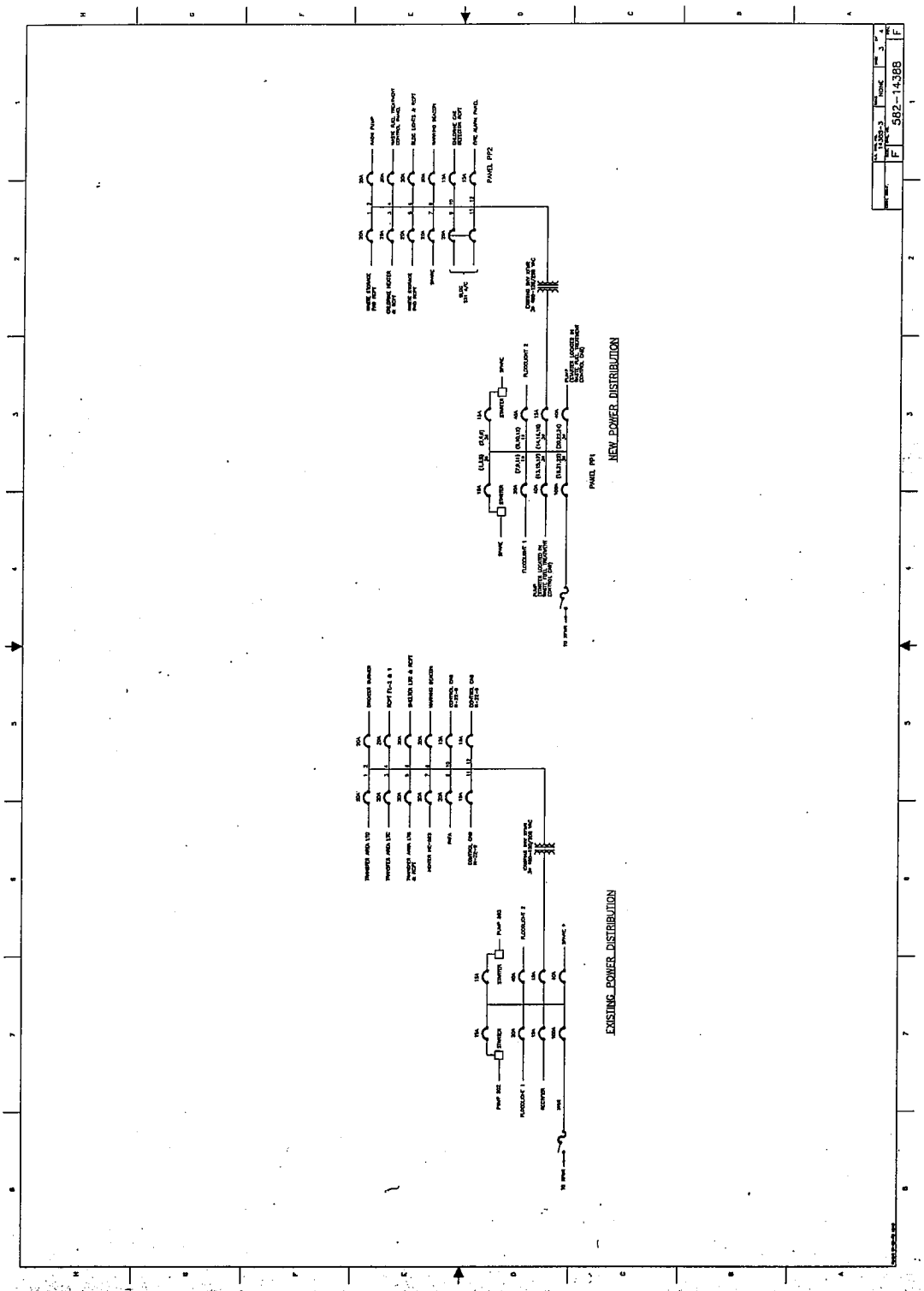
FTU Electrical Diagram #1



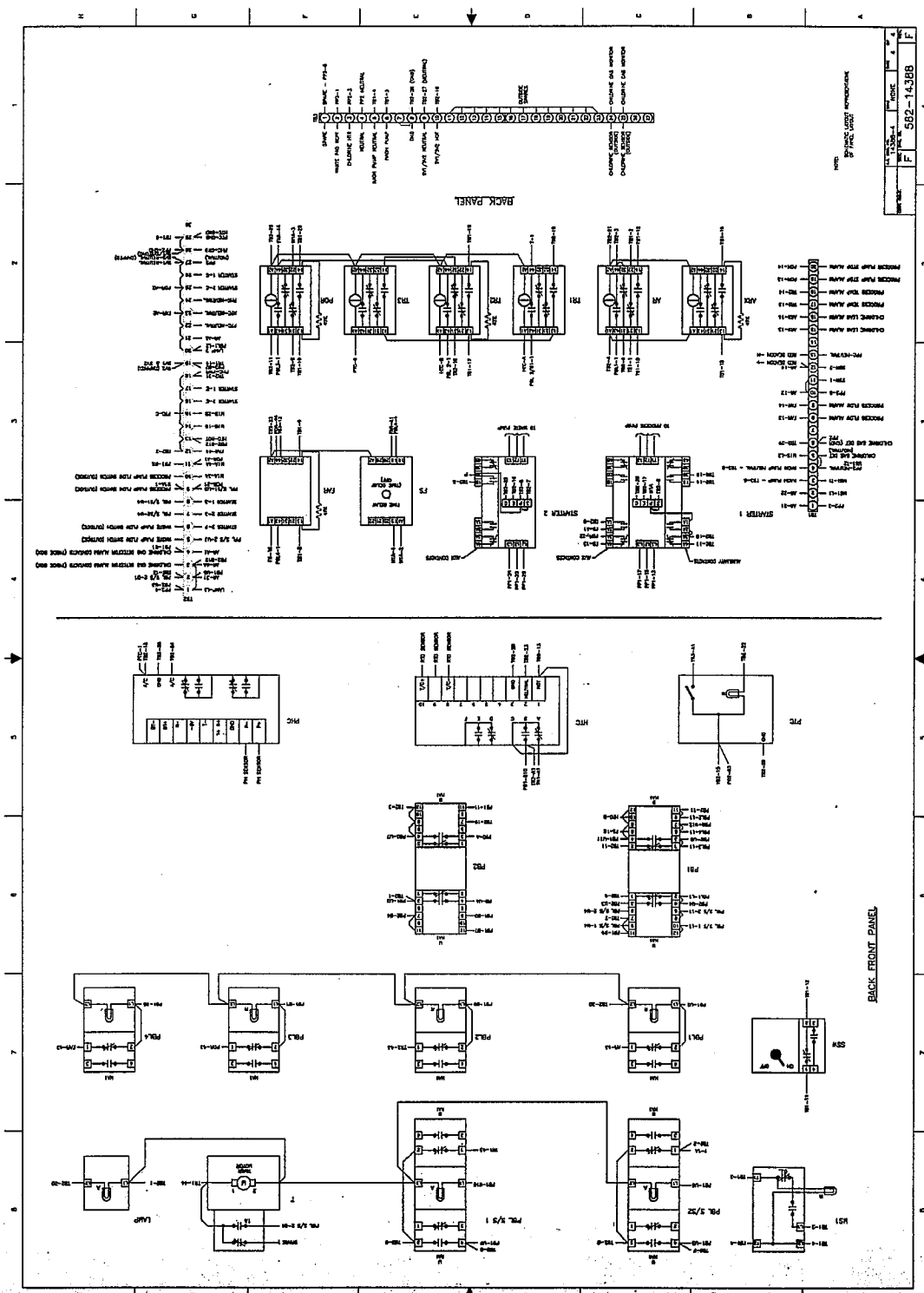
FTU Electrical Diagram #2



FTU Electrical Diagram #3

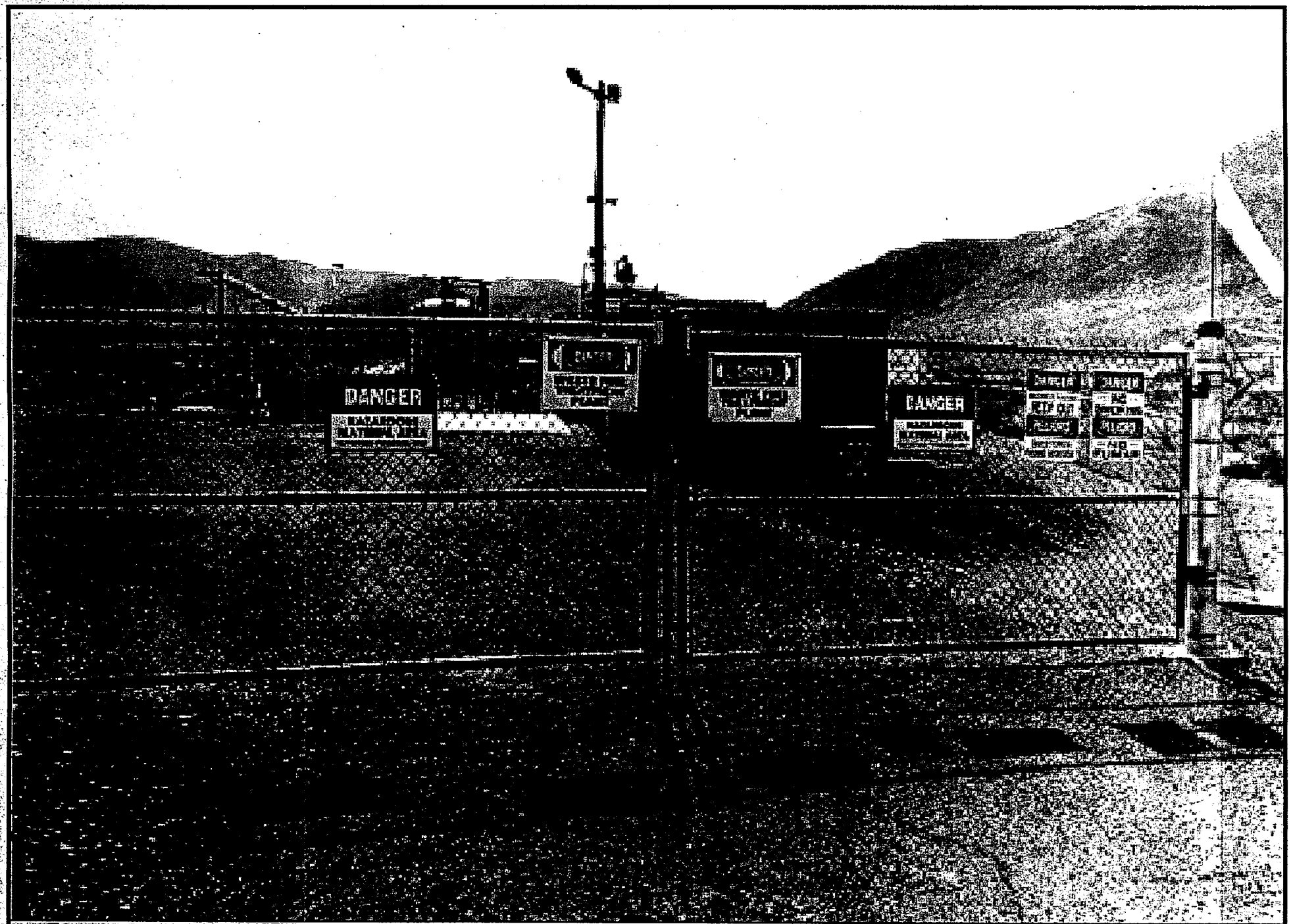


FTU Electrical Diagram #4

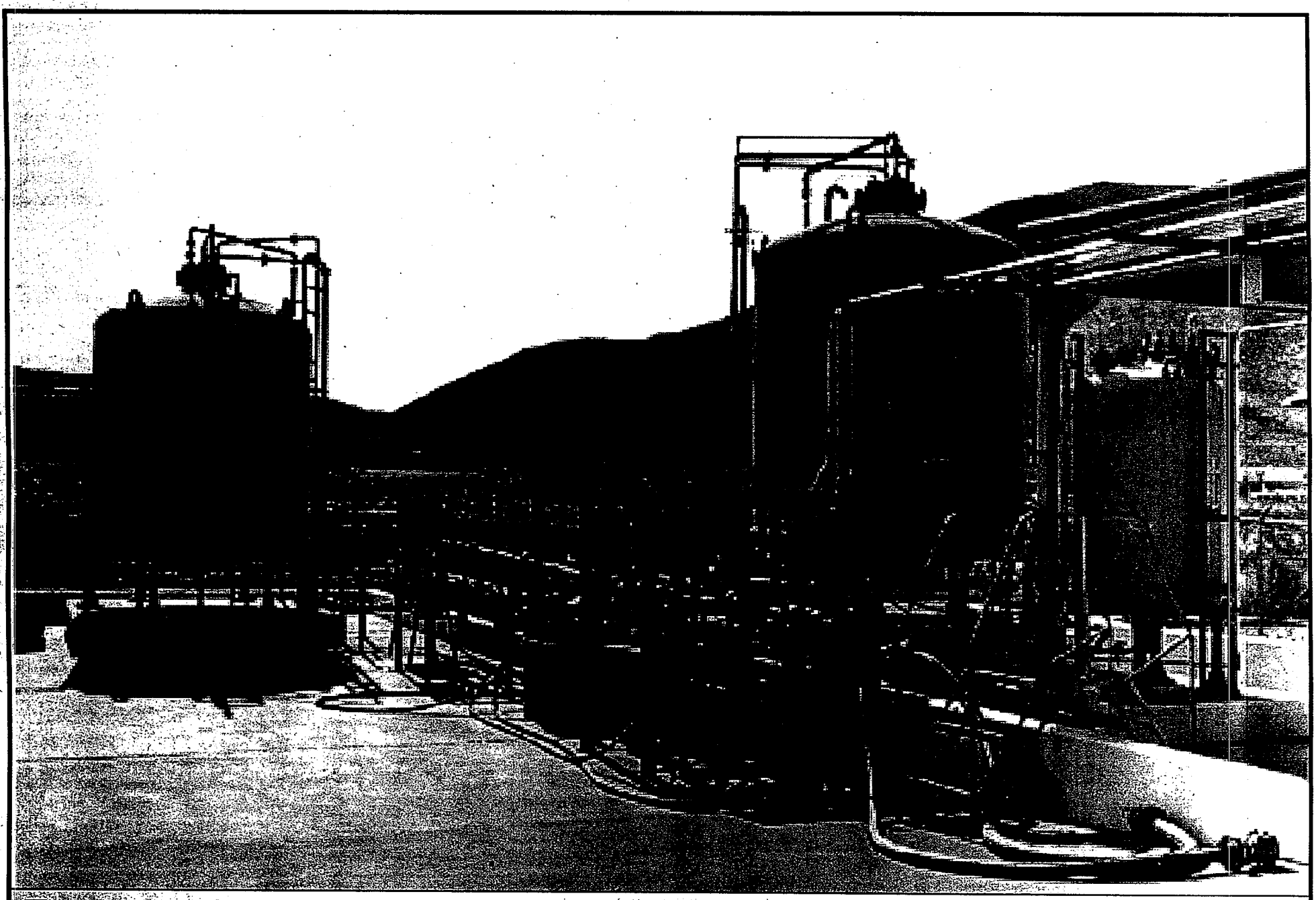


Appendix 6-H

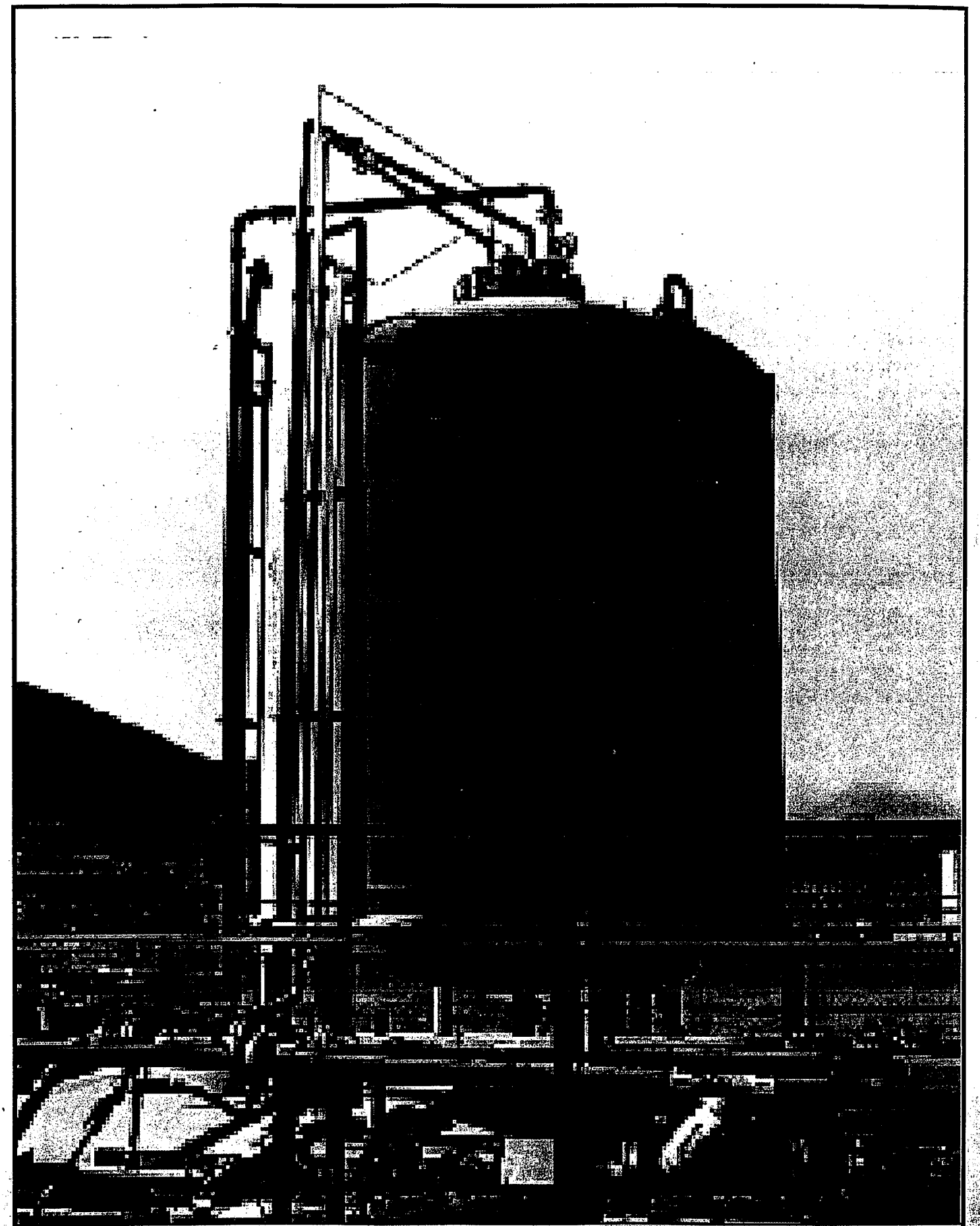
FTU Photos



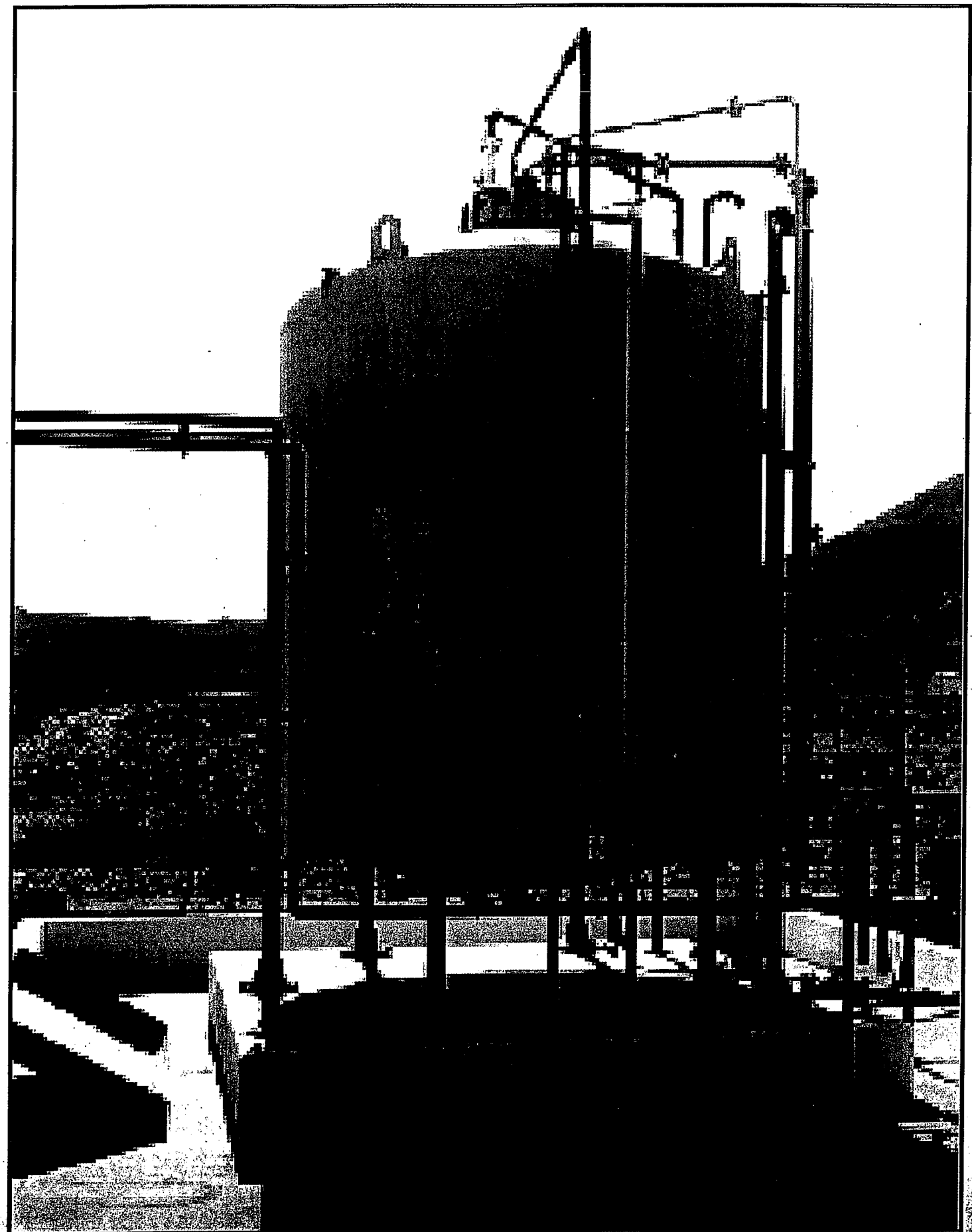
Front entrance to the WSTF waste fuel treatment unit (FTU). This view incorporates the required fencing and signage, bldg. 521, light tower and tanks. (June 2002)



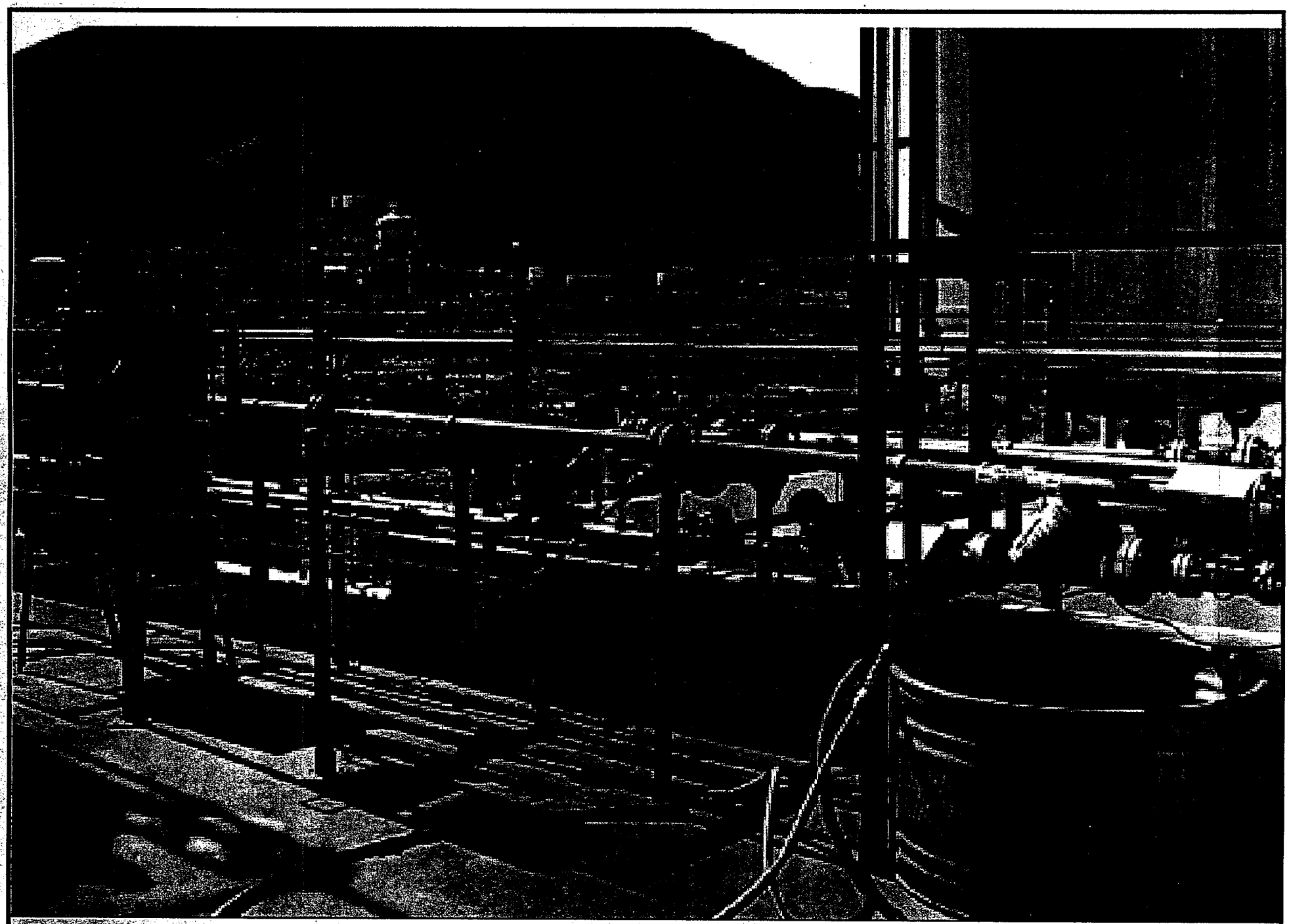
FTU work area. Active storage tank is to the right behind the process piping. Inactive caustic tank is to the right of the active storage tank. Inactive treatment tank is at the end of the tanker slot/work area. Large flex hoses are the tanker on-load and off-load hoses. Small flex hoses are the container on-load and off-load hoses. Stile crosses secondary containment wall. Secondary containment is sealed with epoxy/novalac coating (gold color on concrete). (June 2002)



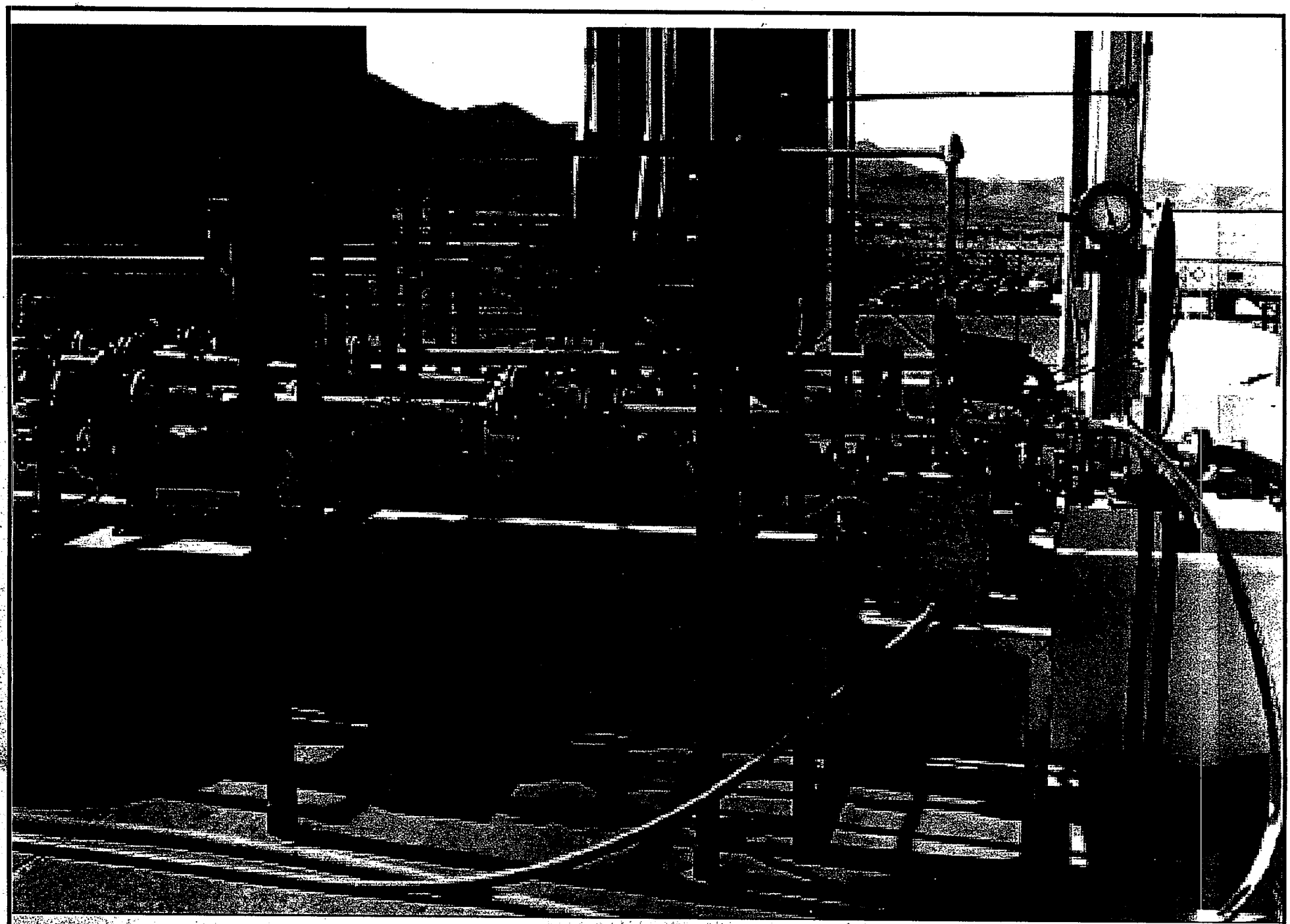
Active storage tank showing sight glass, vent, and addition piping. Pipe rack showing filter, pressure gauge, pipe labels, and low-point drain. (June 2002)



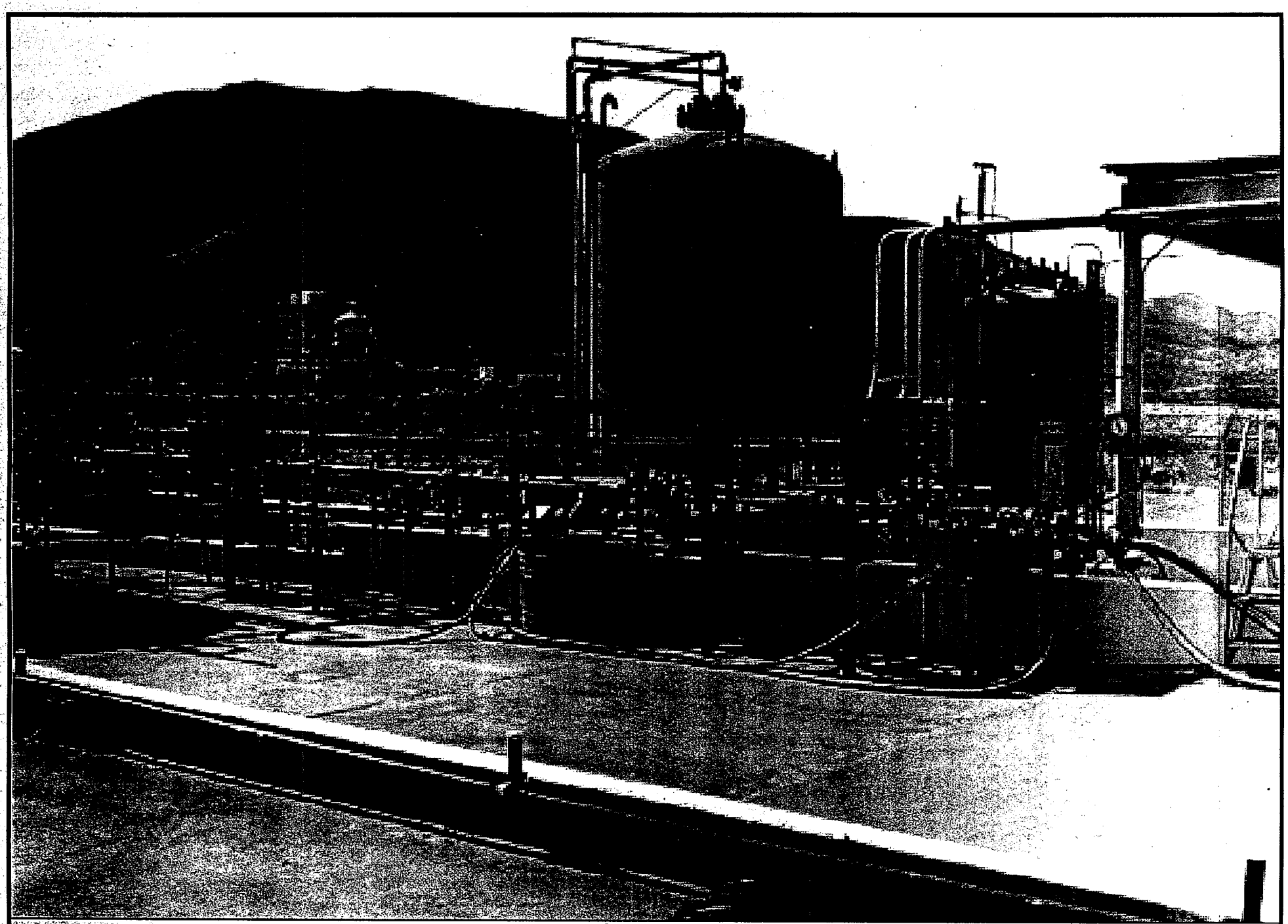
Inactive treatment tank showing red valve lockouts w/yellow tags, tank pedestal, sight glass, and circulation piping. Site process water is copper line coming from overhead left. (June 2002)



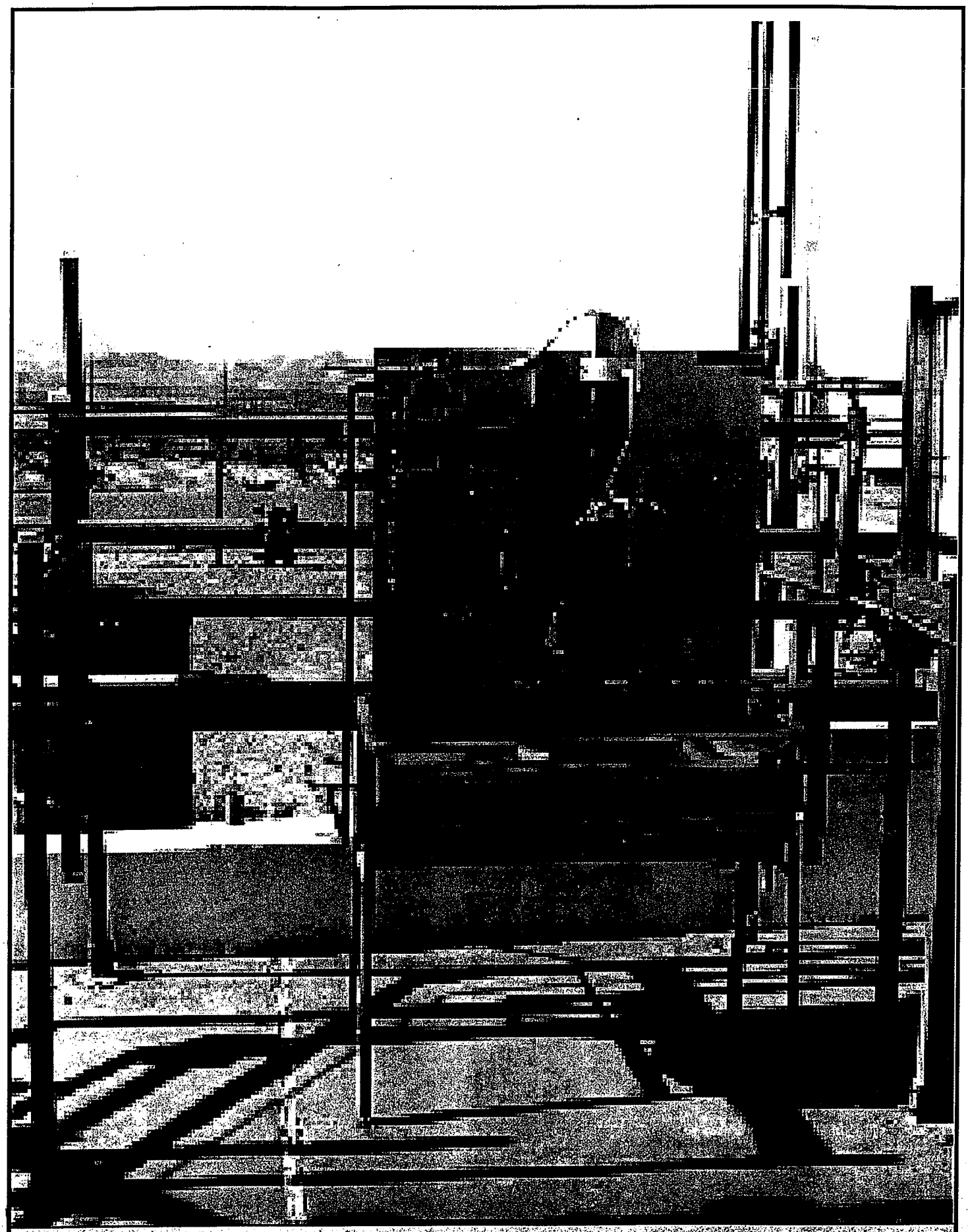
FTU process piping rack showing active storage tank in rear. Also showing is the breathing air and GN2 panels with the HOKE station panel with S.S. sink in the background. Also shown are the secondary containment gold and white coatings. (June 2002)



Process piping with active storage tank and inactive caustic tank in background. Pumps on pedestals are Cranes (green) and Aro (behind galvanized sheet metal box). Crane pump emergency shut-off boxes are gray boxes on the pipe supports. (June 2002)



Active storage tank in background. Breathing air and gaseous nitrogen panels on left side. Test Stand 302 in far background. Water hose reel is in foreground with the copper site-water line. (June 2002)



HOKE panel with S.S. sink containment. Shows HOKE holder, flow meters, aspirator, and water bypass components. Also shows coal tar urethane joint in flooring. (June 2002)

Appendix 6-I

WSTF Job Instruction
WJI-CHEMLAB-0268

White Sands Test Facility
Job Instruction

Issued: 09/15/99
Expires: N/A

WJI-CHEMLAB-0268.B

DETERMINATION OF PROPELLANT HYDRAZINES IN AQUEOUS SOLUTION USING HEWLETT PACKARD HPLC 1100 SERIES WITH AMPEROMETRIC DETECTION

Work-Authorizing Document: Laboratory Work Order

Prepared By: ORIGINAL SIGNED BY: _____
Wendy L. A. Fleming
Chemist
ATSC Team

Reviewed By: ORIGINAL SIGNED BY: _____
Catherine A. Hart
Quality Assurance
ATSC Team

Approved By: ORIGINAL SIGNED BY: _____
Andy Randall, Supervisor
Chemistry and Metallurgy Section
ATSC Team

ORIGINAL SIGNED BY: _____
David Baker
Laboratory Manager
NASA Laboratories Office

Rescissions: None.

Record of Revision

Issue	Date Revised	Pages Affected	Description of Changes
WJI-CHEMLAB-0268.B	09/15/99	All	Corrections and Updated Procedures

1. PURPOSE

The purpose of this WJI is to establish a routine procedure for the operation of the Hewlett Packard 1100 Series equipped with a Hewlett Packard 1049A Programmable Electrochemical Detector for the determination of hydrazine, monomethylhydrazine, and 1, 1-dimethylhydrazine in aqueous solutions.

2. REFERENCES

2.1 RD WSTF-0004, *WSTF Laboratories Department Chemical Hygiene Plan*

2.2 WJI-LSAFETY-0229, *Hazardous Chemical Spill Procedures*

2.3 User's Manual, *Hewlett Packard 1049A*

2.4 Installation and Maintenance Manual, *Autosampler*

2.5 User's Manual, *Hewlett Packard 1100 Series*

2.6 User's Manual, *Understanding Your ChemStation*

2.7 Johnson, D. L. and D. L. Baker. *Determination of Hydrazine, MMH, and UDMH in Aqueous Solution Using Cation Exchange HPLC with Amperometric Detection; Application to Airborne Propellant.* CPIA-PUB-588, August 1992.

2.8 Luskus, L. J. and H. J. Kilian. *Field Sampling and Analysis of Hydrazines and UDMH Vapors in Air: The Firebrick Method.* USAF School of Medicine. Report SAM-TR-82-29, October 1982.

3. ABBREVIATIONS AND ACRONYMS

CIC	Chemist in Charge
ICS	Instrument Check Standard
HPLC	High Performance Liquid Chromatography
LWO	Laboratory Work Order
MMH	Monomethylhydrazine
MSDS	Material Safety Data Sheet
S/N	Serial Number
OSHA	Occupational Safety and Health Administration
PVC	Poly Vinyl Chloride
RPD	Relative Percent Difference
UDMH	1, 1-dimethylhydrazine
WJI	White Sands Test Facility Job Instruction

4. ATTACHMENTS

4.1 Attachment A, Validation Data and Calibration Data

5. SAFETY REQUIREMENTS

5.1 OSHA Requirements

To meet the OSHA requirements of the Office of the Federal Register National Archives and Records Administration Title 29, Part 1910, Section 1450 "Occupational Exposure to Hazardous Chemicals in Laboratories," the *WSTF Laboratories Chemical Hygiene Plan* and all relevant MSDS's must be read.

5.2 Personal Protective Equipment

The following personal protective equipment must be worn when handling standards and samples to prevent exposure to hazardous substances:

- Safety goggles
- Lab coat
- Vinyl or PVC gloves when handling dilute solutions
- Pylox or butyl rubber gloves, in addition to goggles, face shield and rubber apron when handling neat propellants

Hydrazines used in this method are known or suspected carcinogens. Chemicals that are encountered in this procedure include:

- Hydrazine
- Monomethylhydrazine
- 1, 1-dimethylhydrazine
- Phosphoric acid
- Potassium phosphate, monobasic
- Potassium chloride
- Isopropanol

The samples and standards analyzed in this procedure are generally preserved by acidification to pH<2 with hydrochloric acid. When unacidified samples are encountered, they should be kept in a hood in sealed vials and analyzed as soon as possible.

6. GENERAL

6.1 Methodology

This method is used for the quantitative determination of propellant hydrazines at trace concentrations. Analytes are separated by cation exchange chromatography in a potassium phosphate buffer at pH 2.3 and detected amperometrically on a platinum working electrode. Retention times vary as the column ages. Hydrazine is the first analyte to elute, then MMH, followed by UDMH. This method measures free hydrazines.

6.2 Personnel Qualifications

Personnel performing the operation must be qualified as a Liquid Chromatograph Analyst according to the *WSTF Certification Plan* and demonstrate the ability to meet the performance criteria summarized in Table 1.

6.3 Quality Control

Data quality from this analysis is monitored by the analysis of check standards, blanks, spikes, duplicates, and control samples. Table 1 specifies the minimum required QA/QC samples. The analysis of additional QA/QC samples is up to the discretion of the CIC.

Table 1. QA/QC Requirements for Fuels by HPLC

Control Type	Minimum Frequency	Control Limits	Comments
Instrument Check Std.	Beginning and end of analysis	± 15% of Known Value	Verify Calibration
Reagent Blanks	Beginning and end of analysis	< Reporting Limit	Establish the System is Clean
Spiked Samples	Chemist's discretion	75% - 125%	Verify Accuracy
Duplicate Samples	Chemist's discretion	RPD ≤ 20%	Verify Precision

6.3.1 CALIBRATE BEFORE USE

The HP HPLC 1100 Series is a calibrate before use instrument. Quantitative analysis is achieved by the comparison of the instrument's response to a sample versus a calibration curve obtained by using propellant grade fuels conforming to their current Mil Specs. The identity of the fuels and the traceability to the Mil Spec analysis of the fuels must be recorded in the Analytical Laboratory Liquid Chromatography Standards Logbook. The identity of the instrument check standard(s) (and the calibration standards, if applicable) and the corresponding

samples analyzed must be recorded in the HP 1100 HPLC Calibrate Before Use Logbook with enough information provided to achieve traceability of samples to standards. At a minimum the logbook will include the following:

- Date of Analysis
- Analysts Initials
- Date last calibrated.
- ICS concentration and preparation date.
- Samples Analyzed (or reference to samples). At a minimum annotate the sequence file name.

Calibration reports/curves must be maintained in the Calibration Logbook. This logbook will include, at a minimum, the instrument's ID number, a reference to previous Calibration Logbooks, and a complete record of all calibration activities performed to date, including identification and source of standards. The calibration standard preparation dates will also be included.

All instrument maintenance must be recorded in the instrument maintenance logbook.

6.3.2 INSTRUMENT CHECK STANDARD

One ICS must be run at the beginning of an analytical batch. The CIC will determine the appropriate ICS concentration to be analyzed. It must contain all the fuels that are analyzed in the batch. The result must be within ± 15 percent of the nominal value. If not within accepted limits, re-analyze the check standard. If the results are still outside accepted limits, notify the CIC for resolution of the problem. The instrument may require recalibration.

The check standard must be run at the end of the batch to verify system calibration throughout the analyses. If the check standard fails, all results for samples analyzed after the last passing check standard are considered invalid and these samples must be reanalyzed or appropriately qualified.

6.3.3 BLANK

After calibration has been verified, a reagent blank must be analyzed before any samples to ensure the system is free of contamination. The reagent blank must be run at the end of the batch to verify system cleanliness throughout the analyses. Eluent should be run as the reagent blank. If an analyte is found at a level ≥ the reporting limit all results for samples analyzed after the last passing blank are considered invalid and these samples must be reanalyzed or appropriately qualified.

still a listed waste regardless of the concentrations of the hazardous constituents in the mixture. Classification of these wastes requires a knowledge-based evaluation of the waste source and waste generating process with respect to the listing descriptions provided per 40 CFR 261.31, 261.32, and 261.33.

Knowledge of the waste and its constituents is also used to determine whether a waste exhibits a waste characteristic of ignitability, corrosivity, reactivity, or toxicity as defined by 40 CFR Subpart C. All D003 determinations for reactivity are knowledge-based. The regulations do not specify specific methods for determining reactivity. The reactivity of wastes is classified by comparing generator knowledge with the description of reactivity per 40 CRF 261.23.

Classification of characteristic wastes with respect to ignitability, corrosivity, and toxicity can be performed through knowledge of the raw materials, intermediate materials, by-products, process reactions, and products. This knowledge of the waste, and waste constituents, can be used to determine whether or not the waste would exhibit any of the characteristics of a hazardous waste as defined by 40 CFR 261.21, 261.22, and 261.24. In most cases, this can be accomplished by using information provided by the manufacturer or scientific literature and comparing the physical and chemical properties of the raw materials and constituents in the waste with characteristics that would make the waste hazardous.

Some wastes generated at WSTF can not be characterized by acceptable knowledge alone. Classification of these wastes will be accomplished by a combination of acceptable knowledge and analytical testing. For example, if the generator has process knowledge that certain toxic constituents could not be present in a waste, a TCLP analysis can be performed for the constituents that may potentially exist. A representative sample of the waste can be collected and analyzed, in accordance with Section 6.4 and Section 6.5 of this plan, to support appropriate waste management. Subsequent waste from similar processes can then be characterized by acceptable knowledge based on the initial analysis. Additional samples will be collected when:

- WSTF questions the identity of constituents of a waste;
- There is a process change such that the characteristics of the waste may change and insufficient Acceptable Knowledge is available to adequately characterize the waste; or
- Confirmation is required to ensure historical analysis remain current and accurate.

Individual waste streams are tracked and documented by WSTF Individual Waste Profile Sheets (WIWPS) as described in Section 6.3.1. Through revision and review, the actual WIWPS form may change as required to document regulatory compliance or provide more accurate process-specific information.

6.3.1 WSTF Individual Waste Profile Sheets (WIWPS)

WIWPS provide a tool to document and track specific waste streams at WSTF. The WIWPS form has been divided into two parts. The first part is to document generator process knowledge and communicate this information to the contractor Environmental Department for proper waste characterization. The second part of the form is to document the characterization of the waste as well as proper handling, storage, and disposal procedures. All WIWPS forms are filled out and submitted electronically and maintained in a tracking database as part of the facility operating record. Completed WIWPS forms, along with all other documents supporting acceptable knowledge of the waste stream, are filed in the facility operating record. The generator responsible for waste stream producing processes and Environmental Department reviewer are to be designated by their respective management/supervision.

6.3.1.1 WIWPS Form - Part One

Prior to waste stream generation, the generator is responsible for completing the first part of the WIWPS form. This part of the form will provide process knowledge to allow contractor Environmental Department personnel to properly characterize the waste. Obtaining waste generator process knowledge is the first step in the process of waste characterization shown in Figure 6.1.

Generator process knowledge to be provided with this portion of the form includes:

- Facility Area;
- Work area;

- Responsible section;
- Name of waste stream;
- Description of process generating the waste stream;
- List of known hazardous constituents and their concentrations (or possible ranges of concentrations);
- Waste description including physical state, pH, specific gravity, flashpoint, solubility, and reactivity (if applicable or available);
- Other comments, to include other process knowledge and/or analytical documentation (as available)
- Expected annual quantity generated and units of measure;
- Material Safety Data Sheet (MSDS) number (WSTF MSDS System);
- Authorized representative certification of the waste descriptions; and
- Date of completion of generator portion of the form.

Once this portion of the WIWPS is complete, the generator submits it to the WSTF contractor Environmental Department.

6.3.1.2 WIWPS Form - Part Two

Designated contractor Environmental Department personnel review the information provided in part one to determine if the information provided is complete and adequate to characterize the waste and determine proper management and disposal procedures. If insufficient information has been provided, the waste generator will be required to provide additional information. If adequate process knowledge does not exist, appropriate sampling will be required and performed according to Section 6.4 of this plan.

In order to determine proper management procedures, process knowledge and sample analysis data, if required, will be reviewed in order to determine if the waste is hazardous and if it is a listed or characteristic waste. The process shown in Figure 6.1 is used to make these determinations. Once these determinations are made, the second portion of the WIWPS is completed. Information to be provided, as applicable, on the second part of the form includes:

- Waste category;
- Status of waste stream (active for new waste streams);
- Environmental Department representative (as assigned by supervisor);
- How to accumulate the waste and in what accumulation area;
- EPA Waste ID Number(s);
- Specific/Non-Specific source listed waste name;
- UHC Determination;
- List of supporting documents and their locations:
- Required waste collection method (at the point of generation);
- Waste/Satellite accumulation area;
- On-Site storage area;
- Subpart CC information;
- Disposal method;
- Vendor profile number; and
- Other comments (as required).

Once the waste stream has been characterized and proper management and disposal procedures have been determined, these requirements are communicated to the waste generator and procedures are implemented before waste is generated.

6.3.1.3 Waste Stream Occurrences

Part one of the WIWPS form will indicate if the waste stream is recurring or a one-time occurrence. One-time profile sheets will become obsolete after the waste has been collected and disposed of according to the profile. Profiles of recurring waste streams will remain active as long as the process remains and waste is generated using that process. Recurring WIWPS forms will be reviewed, and revised as required, at least annually. All WIWPS will be numbered with two digits, a dash, two more digits, another dash, and two last digits. One-time profiles will contain a 99 after the first dash.

6.3.1.4 WIWPS Review

The WIWPS will be reviewed by the generator annually or when there is a significant change, or proposed change, to the waste generating process, which ever occurs first. Results of reviews require the concurrence of the contractor environmental organization. Upon reviewing the WIWPS, the waste generator verifies the information on Part one of the WIWPS form and makes changes as required. The form is then re-submitted to the WSTF contractor Environmental Department. Designated Environmental Department personnel review the information provided and determine if the waste characterization has changed. Part two of the WIWPS form is then reviewed, and revised as required. If WIWPS review and revision require changes to management or disposal procedures for the waste stream, these requirements are communicated to the waste generator and procedures are modified immediately. The date of the review and the name of the reviewer are entered on the form before it is filed in the operating record.

6.3.2 Acceptable Knowledge

Acceptable knowledge is information considered adequate to provide knowledge-based assessments of waste streams. Acceptable knowledge includes both process knowledge and waste analyses obtained from similar waste streams.

Process knowledge is detailed information on processes that generate waste subject to characterization or detailed information from processes similar to the generating process. Process knowledge includes:

- Historical data obtained for the waste generating process (including data obtained from off-site disposal facilities);
- Material safety data sheets;
- Knowledge of wastes when the processes and procedures and well documented and defined;
- Container labeling information and/or vendor-supplied information for commercial products and materials;
- Detailed information on the waste stream obtained from published manuals, technical documents, or documented waste analyses;
- Material balances for processes that have well-documented procedures and products; and
- Engineering production data.

When WSTF utilizes acceptable knowledge to characterize a waste stream, all supporting information or locations of reference documents utilized will be filed in the WIWPS operating record. Examples of information or references to information in the WIWPS operating record may include:

- MSDSs;
- Standard operating procedures which delineate products and procedures used;
- Waste stream logbooks;
- Test plans and/or project reports;
- Published manuals, technical documents, or data concerning a waste generating process or a similar process;
- Laboratory notebooks that detail research processes and materials used;
- Previous analytical data relevant to the waste stream (including results from historical waste stream analyses, previous analyses performed for the waste stream by off-site disposal facilities, and results for waste stream that have similar constituents and/or processes);
- Chemical inventories;
- Documented interviews or written correspondence with knowledgeable technical personnel; and

- Vendor-supplied data and information.

Acceptable knowledge may also be utilized in cases where the chemical/physical nature of a waste stream may make the use of sampling and analysis undesirable. This is especially the case for situations where the health and safety of sampling personnel are of concern. In cases where the waste stream is an explosive material, neat hydrazine-based fuels, or other acutely hazardous material, acceptable knowledge may be used to meet all or part of the waste characterization requirements.

WSTF will also utilize data, where appropriate from data collected from similar site waste streams that utilize similar processes or the same type of waste streams. The nature of work performed at WSTF involves the site-wide use of many common reagents, materials, and processes.

When there is insufficient information to make a waste determination based on solely acceptable knowledge, the contractor Environmental Department will perform the necessary sampling and analysis in accordance with Section 6.4 of this document.

6.4 Sampling and Analysis of Wastes

When there is insufficient information to adequately characterize a waste stream based on acceptable knowledge, the contractor Environmental Department will perform the appropriate sampling and analysis. Sampling and analytical procedures utilized for characterizing waste types will be based on the physical, chemical, and hazardous properties of the waste.

Samplers will collect a representative sample of the waste by a means that preserves its original physical form and composition. Analytical methods for the characterization of wastes will be performed using EPA-recommended methods, when those methods are available.

The following general sampling strategies will be used for waste sampling, unless alternative sampling strategy are more appropriate based on specific historical, process, safety, or waste information:

- Waste generation will be minimized during sampling activities;
- If the sampling or analysis of the waste would pose a serious threat to human health, the samplers will back out and forego sampling and analysis until either the hazard is mitigated or more appropriate PPE is made available;
- For solid waste whose surface is suspected to be contaminated with RCRA-regulated waste, such as contaminated equipment, surface wipe samples or decontamination effluent samples may be taken;
- Samples may be collected from each phase of wastes that exist in multiple solid, liquid, and/or gas phases;
- For liquid waste items in multiple containers, one sample may be taken for each 55 gallons of waste; and
- All handling of samples and analysis activities will be conducted in a manner that is consistent with EPA methods and protocols.

NASA will utilize laboratories for qualitative and quantitative chemical analyses in the specified methods (EPA-recommended or an equivalent) that have:

- A documented quality assurance/quality control program;
- Technical analytical expertise;
- A document control/records management plan; and
- The capability to perform data reduction, validation, and reporting.

The selection and development of analytical testing methods for waste streams will be based on the following considerations:

- The physical form of the waste;
- Constituents of interest;
- Required detection limits (e.g., regulatory thresholds); and

- Verification of compliance with LDR treatment standards, waste classification, waste codes, and underling hazardous constituents.

These factors contributed to the selection of the analytical methods specified in Section 6.3 of this Plan

6.4.1 Waste Analyses - 264.13(b)(1) and 264.13(b)(2)

As discussed previously, the use of acceptable knowledge for many WSTF waste streams provides sufficient information to characterize many of them. When there is insufficient acceptable knowledge of a new or recurring waste stream, WSTF will perform the necessary sampling and analysis at the point of generation to supplement the available acceptable knowledge. Table 6.6 provides a summary of commonly used waste characterization analytical methods at WSTF. Table 6.7, Table 6.8, and Table 6.9 provide a summary of process wastes that enter the ETU, the FTU, and, except for waste explosives, wastes that are commonly processed through the 90-Day CSU. Table 6.7, Table 6.8, and Table 6.9 provide a summary of the general process wastes entering each of these areas, provide the basis for waste designations, identify potential waste codes and classifications, and analytical methods that could be used to supplement acceptable knowledge (when acceptable knowledge is insufficient).

Table 6.7, Table 6.8, and Table 6.9 do not provide an all-inclusive list of waste streams and analyses that are to be performed at WSTF. These tables do provide the basic framework that is used to make decisions concerning waste analyses. The individual WIWPS will contain waste stream-specific information concerning waste analyses that need to be performed.

There may be cases where WSTF will need to utilize analytical methodologies that are not referenced by Table 6.6, Table 6.7, Table 6.8, or Table 6.9. In these cases WSTF will utilize analytical methods recommended by SW-846 or other EPA sources (if EPA-recommended methods are available).

6.4.2 Frequency of Waste Analyses - 264.13(b)(4)

Scheduled sampling of recurring waste streams will not normally be required when the documentation, procedures, chemicals, and materials used for a process do not change. Both generators and the contractor Environmental Department will review each waste stream and the associated WIWPS on at least an annual basis. The review shall include a confirmation of the acceptable knowledge or analyses used for the waste stream. Waste streams for which the contractor Environmental Department determines that scheduled sampling for specified parameters are required will be denoted in the corresponding WIWPS and the waste stream Additional characterization by either acceptable knowledge or sampling and analysis shall be performed whenever the process or operation has changed. Examples of process changes include introduction of new chemicals or materials to a waste generating process or changes to procedures which may alter the chemical constituents or their concentration in a waste stream. The following criteria will be used to indicate that a process or operation has changed and the waste stream needs to be re-characterized:

- A projected change of pH greater than two standard pH units over the range of conditions expected for a waste stream;
- An anticipated change of flashpoint greater than ten degrees Fahrenheit for a waste stream;
- The waste is expected to exhibit a hazardous characteristic not previously identified; or
- The waste is anticipated to contain UHCs not previously present in the waste;
- The volatile organic concentration of the waste will potentially increase to 500 ppmw or greater.

Annual sampling of the ETU will be performed for operational verification purposes. Samples will be collected for the upper aqueous and lower phase of both tanks. Samples will be collected for the analyses methods specified in Table 6.7.

Sampling for the first analysis of wastes discharged to the FTU will be performed every time prior to transfer to the FTU. The frequency of this first waste analysis is determined by the frequency of the waste generation event, i.e. a fuel waste is ready to be transferred to the FTU. When an event occurs, the waste is analyzed pursuant to the method specified in Table 6.8.

The sampling frequency for the second analysis, i.e. characterization of the waste in the FTU tanks for process knowledge verification, will be when an active tank is half full or every six months, whichever comes first. The waste is analyzed pursuant to the method specified in Table 6.8.

The sampling frequency for the third analysis, i.e. characterization of the waste for off-site disposal, will be every time an active tank is full and ready for off-site disposal or annually, whichever comes first. The waste is analyzed pursuant to the method specified in Table 6.8.

Table 6.6 Summary of Commonly Used Waste Characterization Analytical Methods Used at WSTF

Test Parameter	Analytical Method(s)	Rationale for Use
pH (electrometric)	Aqueous Samples - Method 9040 or equivalent Solid Phase Samples - Method 9045 or equivalent pH Paper -Method 9041 or equivalent	To determine if a waste exhibits the corrosivity characteristic based on pH.
Volatile Organics	Method 1311/Method 8260 or equivalent	To quantitate either TCLP or total volatile organics in a waste stream.
Volatile Organics	Method 25D or equivalent	To determine compliance with Subpart CC.
Total Organic Carbon	Method 9060 or equivalent	To determine the amount of total organic carbon in a waste stream.
Semi-Volatile Organics	Method 1311/Method 8270 or equivalent	To quantitate either TCLP or total semi-volatile organics in a waste stream.
Metals		To quantitate either TCLP or total metals in a waste stream.
Arsenic	Methods 1311/6010, 7060, 7061, or equivalent	
Barium	Methods 1311/6010, 7080, 7081, or equivalent	
Cadmium	Methods 1311/6010, 7130, 7131, or equivalent	
Chromium	Methods 1311/6010, 7190, 7191, or equivalent	
Lead	Methods 1311/6010, 7420, 7421, or equivalent	
Mercury	Methods 1311/6010, 7471, 7472, or equivalent	
Selenium	Methods 1311/6010, 7740, 7741, 7742, or equivalent	
Silver	Methods 1311/6010, 7760, 7761, or equivalent	
Hydrazine Fuels	WJI-CHEMLAB-0268 (WSTF methodology)	To quantitate hydrazine fuel concentrations in a waste stream.
Flash Point	Method 1010, 1020, ASTM D-3278-78, or equivalent	To determine if a waste displays the characteristic of ignitability.
Specific Gravity	ASTM D891-86 or equivalent	To determine if changes of density are occurring in a waste stream.
Explosive Residues	Method 8330	To determine if explosive residues are present in a waste stream.

Table 6.7 Evaporation Tanks

Table 6.7 – Evaporation Tanks

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Acidic Cleaning Solution	Acceptable knowledge - Supplemented by sampling and analysis (as required) - MSDS/Product Information phosphoric acid based cleaning sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards	D002 (C) D005 (E) D007[1] (E) Nickel[1] (UHC) Volatiles[2]	WW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Ammonia Waste Water	Acceptable knowledge – Ammonia and water are the only constituents involved in the process, supplemented by sampling and analysis (as required).	Corrosive - D002	WW	pH
Caustic Cleaning Solution	Acceptable knowledge - MSDS/Product Information phosphoric acid based cleaning – sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	D002 (C) D007[1] (E) Nickel[1] (UHC) Volatiles[2]	WW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Citric Acid Solution	Acceptable knowledge - MSDS/Product Information phosphoric acid based cleaning – sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	D002 (C) D007[1](E) Nickel[1] (UHC) Volatiles[2]	NWW	pH and EPA Method 25D (volatiles)
Pickling/Etching Solution	Acceptable knowledge - A solution of hydrochloric acid and ferric chloride used to remove imbedded machining contaminants such as iron. This waste is generated during cleaning operations, such as the WSTF's component services precision cleaning process supplemented by sampling and analysis (as required).	D002 (C) D004[1] (E) D006[1] (E) D007 [1] (E) Lead[1] (E) D008[1] (E) D010[1] (E) D011 [1] (E) Nickel[1] - (UHC)	WW	pH, TCLP Metals
Oxidizer Contaminated Waste Water	Acceptable knowledge - Supplemented by sampling and analysis (as required).	D002 (C)	WW	pH
Nitric Hydrofluoric Acid	Acceptable knowledge - Nitric hydrofluoric acid based cleaning solution including, but not limited to, commercial products such as Bradford Derustit Corp. Derustit SS-3 and Oakite Products Deoxidizer -SS. This waste is generated during cleaning operations including, but not limited to, the WSTF's component services precision cleaning process for newly welded stainless steel supplemented by sampling and analysis (as required)	D002 (C) D007[1](E) Nickel[1] (UHC)	WW	pH, TCLP Metals
Contaminated Groundwater	Acceptable knowledge – Groundwater analytical data	F001 F002	WW	N/A

Table 6.7 – Evaporation Tanks

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Clean Room Rinse Water	Acceptable knowledge – Constituents involved in the process are water ultra-pure water and drag-out from acid, caustic and detergent cleaning supplemented by sampling and analysis (as required).	Non-Hazardous	WW	pH
Contact-Contaminated Waste Water	Acceptable knowledge – Non-hazardous waste water, including but not limited to, accumulated precipitation and test or process waste water with remote the potential to become contaminated with waste constituents restricted from discharge to the ETU supplemented by sampling and analysis (as required).	Non-Hazardous	WW	HZ by HPLC
Detergent-Type Waste Water	Acceptable knowledge - MSDS/Product Information – detergent based cleaning solution sampling and analysis as required to demonstrate inorganic UHCs are below or treated below LDR Treatment Standards supplemented by sampling and analysis (as required).	Non-Hazardous	NWW	pH, TCLP Metals, and EPA Method 25D (volatiles)
Met Lab Waste Water	Acceptable knowledge - Waste water generated during metallurgical laboratory metal/material preparation, metal etching and equipment maintenance. supplemented by sampling and analysis (as required)	D002[4] (C)		
Chem. Lab Waste Water	Acceptable knowledge - Waste water generated during chemistry laboratory rinsing/cleaning operations and equipment maintenance supplemented by sampling and analysis (as required)	D002[4] (C)		
Evaporation Tank Water	Acceptable knowledge – WIWPS discharged to ETU and ITU analytical data supplemented by sampling and analysis for inorganic UHCs supplemented by sampling and analysis (as required).	F001, F002, P078, P076	WW	TCLP Volatiles, TCLP Semi-volatiles, and TCLP Metals
Evaporation Tank Sludge	Acceptable knowledge – WIWPS discharged to ETU and ETU analytical data supplemented by sampling and analysis for inorganic UHCs. (as required).	F001, F002, P078, P076	NWW	TCLP Volatiles, TCLP Semi-volatiles, and TCLP Metals

[1] Inorganic constituent(s) (identified per 40 CFR 268.48 with a reasonable potential to be present) to be demonstrated by sampling and analysis or "acceptable knowledge" to be below or treated to below LDR treatment standards.

[2] Volatile organic constituents to be demonstrated by sampling and analysis or "acceptable knowledge" to be below the 500 ppmw regulatory limit for volatile organics as specified by the RCRA subpart CC regulations.

[3] Organic constituent(s) (identified per 40 CFR 268.48 with a reasonable potential to be present) demonstrated by groundwater sampling and analysis compliant with LDR regulations.

[4] Aggregated waste water from laboratory operations, the majority of which is non-hazardous, but has the potential to exhibit the characteristic of corrosivity at some points of generation.

[5] Hydrazine constituents (with a remote potential to be present in non-hazardous waste water) demonstrated by sampling and analysis or "acceptable knowledge" to be ND or below 0.5 ppm.

Table 6.8 Fuel Wastes

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW4	Potential Analytical Methods
Fuel Contaminated Water	Acceptable knowledge - Supplemented by sampling and analysis (as required). P068, U098, and U133 are the only constituents involved in the process.	P068 (H) U098 (T) U133 (T)	NWW/WW	WSTF-HPLC Waste
Waste Fuel	Acceptable knowledge – P068, U098, and U133 waste products	P068 (H) U098 (T) U133 (T)	NWW/WW	NA

Table 6.9 Containerized Waste

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Recycled Degreasing Solvents	Acceptable knowledge - Product information, MSDSs, supplemented by sampling and analysis (as required).	D001(I)	NWW	Flash point
Isopropyl Alcohol	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) and process knowledge supplemented by sampling and analysis (as required).	D001(I) High Toc	NWW	Flash point
Liquid Paints	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal), product information and MSDSs, supplemented by sampling and analysis (as required).	D001(I) D006-D009 (E), D035 (E) (UHC)	NWW	Flash point, TCLP Metals, and TCLP Volatiles
Waste Organic Acids Solutions	Acceptable knowledge - Process knowledge and product information and MSDS, supplemented by sampling and analysis (as required).	D002 (C) (UHC)		pH and TCLP Volatiles
Nitric Hydrofluoric Acid	Acceptable knowledge- Nitric Hydrofluoric Acid solution in contact with primarily stainless steels, supplemented by sampling and analysis (as required).	D002 (C) D005 (E) D007 (E) Nickel (UHC)	WW	pH
Passivating Solution	Acceptable knowledge – Nitric Acid/ Sodium Dichromate solution in contact with primarily stainless steels supplemented by sampling and analysis (as required).	D002 (C) D005 (E) D007 (E) Nickel (UHC)	WW	pH
Pickling/Etching Solution	Acceptable knowledge – Strong inorganic acid solutions in contact with primarily stainless steels, supplemented by sampling and analysis (as required).	D002 (C) D004-D011 (E) Nickel (UHC)	WW	pH

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Organics	Acceptable knowledge - Evaluation of the waste generating process, historical data from fingerprint analysis (off-site disposal) and product information and MSDS, supplemented by sampling and analysis (as required).	D001 (I), F001-F005 (T), D035 (E) (UHC)	NWW	Flash point and TCLP Volatiles
Lead Acid Batteries	Acceptable knowledge - Product information, and MSDS.	D002 (C), D008 (E)	NWW	pH and TCLP Metals
Caustic Paint Remover	Acceptable knowledge - Product information, and MSDS supplemented by sampling and analysis (as required).	D002 (C), D006-D009 (E) (UHC)	NWW	pH, TCLP Metals, and TCLP Volatiles
Lithium Batteries	Acceptable knowledge - Product information, and MSDS	D003 (R)	NWW	NA
Machine Shop Oils	Acceptable knowledge – Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D005 (E), D007 (E), D008 (E), DO37 (E) (UHC)	NWW	TCLP Metals and TCLP Volatiles
NiCad Batteries	Acceptable knowledge - Product information, and MSDS.	D006 (E) (UHC)	NWW	TCLP Metals
Cured Paints	Acceptable knowledge – Historical data from fingerprint analysis (off-site disposal) and product information and MSDS supplemented by sampling and analysis (as required).	D006 (E), D007 (E), D008 (E), D009 (E), D035 (E), and (UHC)	NWW	TCLP Metals
Oily Sludge	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D006-D008 (E) (UHC)	NWW	TCLP Metals
Recycled Carburetor Cleaner	Acceptable knowledge - Product information, and MSDS supplemented by sampling and analysis (as required).	NA		NA
Hazardous Refuse	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D007 (E), D008 (E), D011 (E), D035 (E), D022 (E), F001-F005 (T) (UHC)	NWW	TCLP Metals and TCLP Volatiles
Lead Contaminated Refuse	Acceptable knowledge – Process knowledge. Materials are only in contact with lead-type hazardous waste constituents. Product information, and MSDS supplemented by sampling and analysis (as required).	D008 (E)	NWW	TCLP Metals
Mercury In Manufactured Articles	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal) supplemented by sampling and analysis (as required).	D009 (E)	NWW	TCLP Metals
Mercury, Metallic	Acceptable knowledge – Product information and MSDS supplemented by sampling and analysis (as required).	D009 (E)	NWW	TCLP Metals
Vacuum Pump Oil	Acceptable knowledge - Historical data from fingerprint analysis (off-site disposal), product information and MSDS supplemented by sampling and analysis (as required).	F001-F005 (T) (UHC)	NWW	TCLP Volatiles

Table 6.9 – Containerized Waste

Waste Category	Rationale for Waste Designation	Potential EPA Waste Codes and Classification	LDR, WW or NWW	Potential Analytical Methods
Reused Degreasing Solvents	Acceptable knowledge - Product information and MSDS supplemented by sampling and analysis (as required).	NA	NWW	NA
Fuel Contaminated Soft goods	Acceptable knowledge – Process knowledge, materials are only in contact with hydrazine-type hazardous waste constituents supplemented by sampling and analysis (as required).	P068 (H), U098 (T), U133 (T)	NWW	Hydrazine Fuels
Waste Explosives	Acceptable knowledge supplemented by sampling and analysis (as required).	D003 (R)	NWW	Explosive residue

6.4.3 Special Parameter Requirements

There will be cases where either WSTF will need to quantitate a non-regulated constituent or the detection limits for a EPA recommended method are unacceptably high for a regulated constituent or constituents. In these cases, WSTF will attempt have the laboratory modify an existing EPA method or utilize the best available non-EPA method for the constituent(s).

Quantification of hydrazine fuel waste waters provides an excellent example of the use of a non-EPA method to quantitate constituents at WSTF. No EPA recommended methods can achieve the required sensitivities and turn-around times required to manage hydrazine fuel contaminated wastewaters at WSTF. This method is required to not only to aid in waste determinations for waste streams, but to also ensure safety in the handling of the waste. WSTF-specific procedure, "Determination of Propellant Hydrazine's in Aqueous Solution Using Hewlett Packard HPLC 1100 Series with Amperometric Detection" (WJICHEMLAB-0268), is used to determine if hydrazine fuels are present. This method is provided in Appendix 6-I of this document.

When WSTF determines that special analyses are required for waste determinations, NMED will be apprised of the need for the special analytical methodology and asked for concurrence.

6.5 QA/QC Procedures

Quality assurance for non-sampling activities outlined in this waste analysis plan will be based on compliance with the applicable regulations and permit conditions and documentation of this compliance. Quality assurance required for sampling and analyses is described by the following sections.

6.5.1 Data Quality Objectives

Table 6.10 provides a summary of the seven steps of the data quality objective process. These steps will be utilized in developing sampling and analytical requirements for waste streams when acceptable knowledge is insufficient to characterize the waste steam. The data quality objectives process provided in Table 6.10 was outlined in the RCRA Waste Sampling Draft Technical Guidance, EPA 530-D-02-002 (August 2002). The DQO process will be applied each time sampling of a waste stream is required in a manner commensurate with the complexity of the waste in question.

Table 6.10 Data Quality Objectives Process

DQO Step	Description	Purpose
1	State the Problem	Summarize the contamination problem that will require environmental data and identify the resources available to resolve the problem.
2	Identity the Problem	Identify the decision that requires new environmental data to address the contamination problem.
3	Identify Inputs to the Decision	Identify the information needed to support the decision and specify which inputs require new environmental measurements or waste generation/process knowledge.
4	Define the Study Boundaries	Specify the spatial and temporal aspects of the waste or environmental media that data must represent to support the decision.
5	Develop a Decision Rule	Develop a logical if/then statement that defines the conditions that would cause the decision maker to choose among alternative actions.
6	Specify Limits on Decision Errors	Specify the decision maker's acceptable limits on decision errors, which are used to establish performance goals for limiting uncertainty in data.
7	Optimize the Design for Obtaining Data	Identify the most resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs. To identify a resource-effective data collection design for generating data that are expected to satisfy the DQOs.

6.5.2 Selecting Sampling Procedures and Equipment - § 264.13(b)(3)

Due to the diversity of WSTF waste streams, the type(s) of sampling procedures employed will be variable. The sampling procedures comprise the sampling strategy or data collection design used to ensure the representativeness of the samples and the sampling techniques and equipment used to support the chosen data collection design. The sampling procedure selection process is addressed in Step 3, as well as, Step 7 of the DQO process. In Step 3, sampling protocols and equipment capable of meeting the data requirements are identified and documented. In Step 7, data collection design or sampling strategy is optimized after the outputs of the first six steps of the DQO process are completed and reviewed. Sampling procedures and equipment will be selected in accordance with 40 CFR 261, Appendix I, Test Methods for Evaluating Solid Wastes, Physical/ Chemical Methods EPA (SW-846), the RCRA Waste Sampling Draft Technical Guidance EPA 530-D-02-002, the Standard Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities (ASTM 6232).

6.5.3 Sample Preservation and Storage

The most appropriate sampling preservation and storage for each waste stream will be selected as a part of Step 3 of the DQO process. The sample preservation and storage protocols recommended by Chapters Two, Three, and Four of SW-846 will be used for most samples collected. If more appropriate, guidance from the Standard Guide for Sampling Waste and Soil for Volatile Organic Compounds (ASTM D 4547-98) or other EPA-recommended guidance may be utilized for the preservation of waste samples.

6.5.4 Selection of Analytical Laboratories

Off-site analytical laboratories used by WSTF must be contracted in accordance with Federal Acquisition Regulations. As a part of the procurement process, WSTF provides candidate laboratories with a Statement of Work for the work to be contracted. Any successful bidder must adequately address the requirements of the Statement of Work, prior to award of the contract. The following provides typical elements contained within analytical statements of work:

- The laboratory is required to provide a copy of the laboratory quality assurance plan;
- The laboratory must indicate what laboratory-specific standard operating procedures will be used and provide them if requested;
- WSTF specifies the analytical method(s) to be used;
- WSTF identifies the approximate number of samples to be submitted for each method;
- WSTF identifies the sample matrix or matrices;
- WSTF estimates the approximate time period of sample submission;
- WSTF provides required quantitation and method detection limits;
- The laboratory must provide current laboratory quantitation and detection limits for specified methods and matrices and if unavailable for specific analytes, the laboratory must estimate the time required to establish these limits;
- The laboratory must provide the procedures and frequencies for establishing method detection and quantitation limits;
- The laboratory must provide an analyte list (if different from list specified in method);
- WSTF identifies any additional analytes required for specific analyses;
- Data package requirements are specified by WSTF;
- WSTF requires that the laboratory report data below the quantitation limit, but above the method detection limit;
- The laboratory is required to specify sample container and preservation requirements (if they are different than EPA guidance, the discrepancy is discussed with the laboratory); and
- WSTF specifies laboratory turn-around time requirements.

6.5.5 Sample Control

Strict chain of custody controls are utilized for all samples collected at WSTF. Each sample is recorded on a designated chain of custody form or work order that includes chain of custody data. Chain of custody forms are used to track possession of

samples from the time of collection through sample analysis and the reporting of analytical results to WSTF by on-site and offsite laboratories. Chain of custody forms provide legal documentation of possession throughout the entire sampling and analysis process. Each form will contain the following information as applicable to on-site and off-site laboratories:

- Sample shipment information;
- Unique sample number of each sample;
- Sample type/matrix;
- Sample collection location;
- Number of containers for each sample;
- Required chemical analyses;
- Date of sample shipment; and
- Signature(s), date(s), and time(s) of all personnel involved in sample custody.

A chain of custody form is completed for each shipment of samples and is included in the ice chest during shipment or delivery to the analytical laboratory. A copy of the form is retained at WSTF with the shipping documentation. The original chain of custody accompanies the samples to the analytical laboratory, and is eventually returned with the analytical report from the laboratory to become a part of the permanent sampling and analytical records maintained at WSTF. The current WSTF chain of custody form is provided in Appendix 6-J.

6.5.6 Data Verification, Validation, and Assessment

Upon receipt of analytical data from the laboratories, data verification and validation will be performed to ensure that the sampling and analysis protocols were followed and that the measurement systems performed in accordance with required DOQ criteria.

NASA will review data to ensure that the laboratory(s) have performed the analyses in accordance with the appropriate sampling/quality assurance projects plan(s) and in accordance with the referenced EPA or equivalent method(s).

Review of data may include, but is not limited to, ensuring that the acceptable recovery ranges for surrogates (where applicable) and ensuring laboratory control samples and spiked samples, as well as the acceptable relative percent difference for duplicate laboratory control samples and matrix spike duplicates, are within acceptable limits. The laboratory shall qualify data for which these measurements are out of control and also provide narratives explaining the qualifier(s). The laboratory must also state what corrective actions, if appropriate, were taken when the limits are exceeded. The laboratory must provide results for all analyte concentrations observed at levels below the quantitation limit, but above the method detection limit and qualify these data appropriately.

Upon completion of the data review, data qualifiers where appropriate are included with the data. Data qualifiers are used to identify various out of control conditions for the data quality. Table 6.11 provides a summary of common WSTF Data Qualifiers.

Table 6.11 WSTF Data Qualifiers

Table 6.11 - WSTF Data Qualifiers	
Qualifier	**Description**
*	User defined qualifier. See quality assurance narrative.
A	The result of an analyte for a laboratory control sample (LCS), an initial calibration verification (ICV) or continuing calibration verification (CCV) was outside standard limits.
AD	Relative percent difference for analyst (laboratory) duplicates was outside standard limits.
EB	The analyte was detected in the equipment blank.
FB	The analyte was detected in the field blank.
G	The result is an estimated value greater than the upper calibration limit.

Table 6.11 – WSTF Data Qualifiers	
Qualifier	**Description**
J	The result is an estimated value less than the quantitation limit, but greater than or equal to the detection limit.
NA	The value/result was either not analyzed for or not applicable.
ND	The analyte was not detected above the detection limit.
Q	The result for a blind control sample was outside standard limits.
QD	The relative percent difference for a field duplicate was outside standard limits.
R	The result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
RB	The analyte was detected in the method blank.
S	The result was determined by the method of standard addition.
SP	The matrix spike recovery and/or the relative percent difference for matrix spike duplicates was outside standard limits.
T	The sample was analyzed outside the specified holding time.
TB	The analyte was detected in the trip blank.
TIC	The analyte was tentatively identified by a GC/MS library search and the amount reported is an estimated value.
i	The quantitation limit and method detection limit have been elevated due to a matrix interference.
D	The reported result is from a dilution.

6.5.7 Corrective Action

Data Quality Indicators (DQIs) are used to determine the usability of data for hazardous waste purposes. When DQIs indicate that an accurate waste determination cannot be performed, corrective actions may include re-sampling, sample clean up prior to analyses, and/or the use of data with reliance upon narrative explanations. When all the pertinent corrective actions have been taken to qualify the analytical data and the data is still not within acceptable limits, NASA may augment the determination with acceptable knowledge for purposes of a hazardous waste determination.

6.5.8 Records Management

All analytical records associated with any permitted treatment or storage units located at WSTF will be kept until in the unit's operating record until closure of the facility.

6.6 Special Procedural Requirements

6.6.1 Procedures for Ignitable, Reactive, and Incompatible Wastes

Analytical procedures for ignitable, reactive, and incompatible waste at the WSTF ensure proper storage and facilitate disposal of wastes as per 40 CFR 264.17 (b) by preventing reactions which:

- Generate extreme heat or pressure, fire or explosions, or violent reactions;
- Produce uncontrolled toxic or flammable fumes or gasses;
- Damage the structural integrity of the containers or the storage unit; and
- Threaten the human health or environment.

The analysis ensure proper waste handling of ignitable, reactive, and incompatible waste as per 40 CFR 264.17 (a) and that potentially incompatible wastes are not stored or treated in the same area.

WSTF shall use the following methods to characterize ignitable, reactive, and incompatible wastes:

- Acceptable knowledge of process;
- Chemical analysis;
- Published information; and
- Chemical fingerprint analyses.

6.6.2 Procedures to Ensure Compliance with Land Disposal Restrictions

At the point of generation, and before shipping hazardous waste off-site, WSTF will make a determination if the waste requires treatment prior to land disposal. As per the Land Disposal Regulations at 40 CFR 268.7, hazardous waste must meet the applicable LDR treatment standards under Subpart D of 40 CFR 268. This determination will be made by acceptable knowledge and/or testing. If it is determined that the wastes do not meet applicable LDR standards based upon acceptable knowledge or analytical results, no further analysis is required. Additional testing will only be required at the disposal facility subsequent to treatment to determine that the waste treatment residuals meet treatment standards.

Standards will be determined for each waste having a treatment standard established in Subpart D of 40 CFR 268. Underlying hazardous constituents will be determined for all characteristic waste as per 40 CFR 268.9. Analytical results used in making these determinations will be retained in the facility operating record.

Waste exceeding treatment standards is shipped off of the facility for treatment at a permitted RCRA facility. The waste treatment residuals are tested prior to landfill. LDR notification will be accomplished as per 40 CFR 268.7(a)(2).

Wastes that have been determined through analysis to meet treatment standards as per Subpart D of 40 CFR 268, will be land disposed in a permitted facility without any further treatment. LDR certification, to include 40 CFR 268.7(a)(3) supporting documentation, will be prepared and forwarded to any receiving facility as required.

Treatment of waste at the FTU occurs solely to render such waste less hazardous; safer to store, transport, or dispose of; and amenable for storage in accordance with the definition of treatment found at 40 CFR 260.10. Waste stored at the FTU is transported off-site annually or sooner, as storage capacity dictates, to a permitted TSD facility for treatment that is compliant with 40 CFR 268 standards. This treatment is typically accomplished by, but not limited to, combustion in an incinerator.

Treatment of waste for the ETU to meet LDR standards of 40 CFR 268 will include but not be limited to DEACT or neutralization (either at the point of generation or immediately after discharge to the ETU and ADGAS treatment (at the point of generation prior to discharge to the ETU). Other potential treatment methods for wastes above LDR treatment standards include, but are not limited to, ion exchange (at the point of generation prior to discharge to the ETU) for metals recovery and carbon adsorption treatment of IDW waste codes F001 and F002 (at the point of generation prior to discharge to the ETU).

Treatment of waste transported off-site to a permitted TSD will be in accordance with the appropriate standard set forth in 40 CFR 268. These treatments will include, but not be limited to, combustion in an incinerator; deactivation by combustion in an incinerator; recovery and retort of mercury; neutralization; stabilization and macroencapsulation, and thermal recovery of metals.

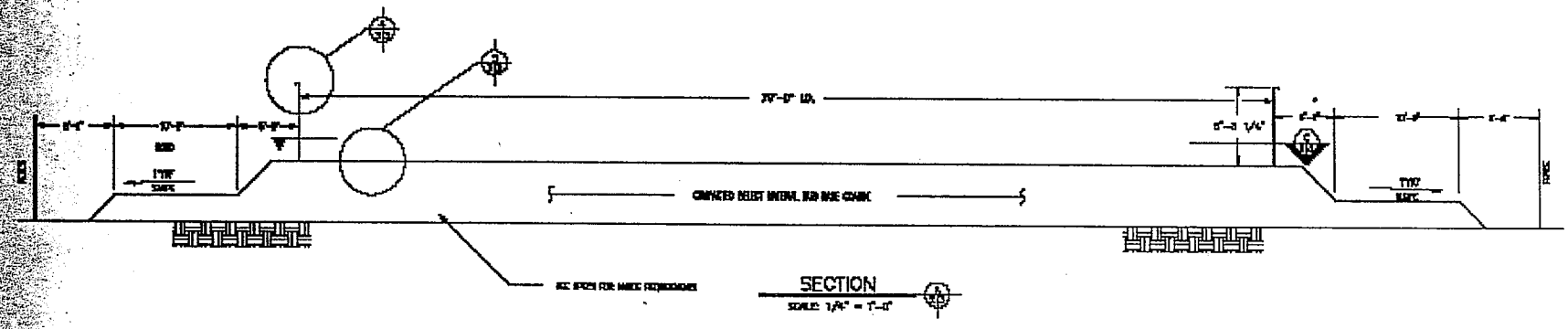
Wastes with a characteristic of ignitability and a USEPA waste code of D001, will be treated by combustion in an incinerator. This treatment will include degreasing solvents; isopropyl alcohol; pumpable paints; organics; and non-pumpable paints.

Wastes that meet the requirements of 40 CFR 268.3(c) in that the waste stream consists primarily of organic materials such as wood, paper, cloth, plastic, etc. , or has a heat of combustion greater than 5,000 BTU's per pound, will also be treated by combustion in an incinerator. This treatment will include vacuum pump oils; fuel contaminated soft goods (combustion is also a designated treatment for the USEPA waste codes P068, U098 and U133 of this waste; hazardous refuse; and lead contaminated soft goods.

Waste organic acid solutions and caustic paint removers will be deactivated by neutralization or combustion in an incinerator. Lithium batteries will be deactivated by combustion in an incinerator. Metallic mercury will be treated by recovery or retort of mercury while mercury in manufactured articles will be treated by incineration of mercury or recovery or retort of mercury.

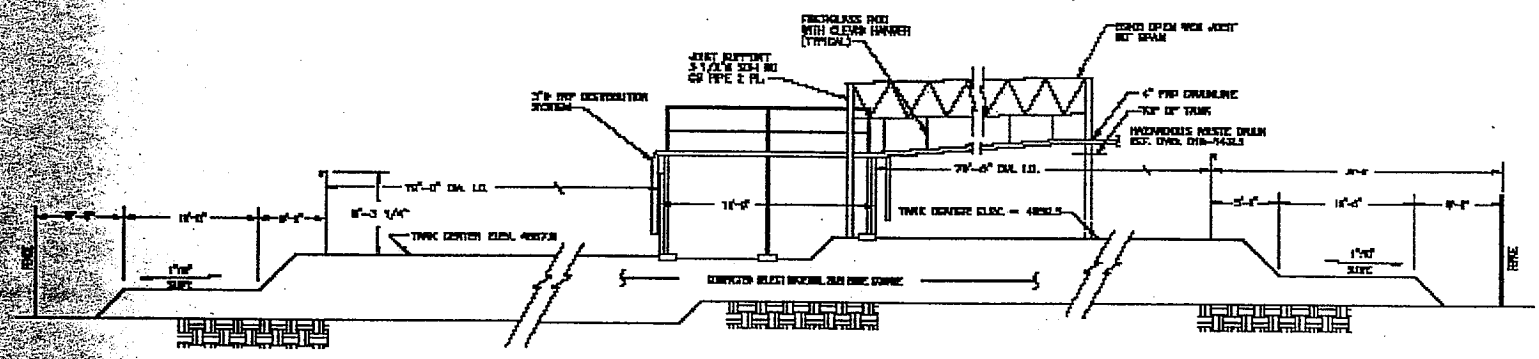
Appendix 6-B

ETU Drawings and Diagrams



SECTION

SCALE: 1/4" = 1'-0"



SECTION

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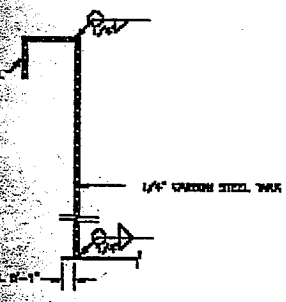
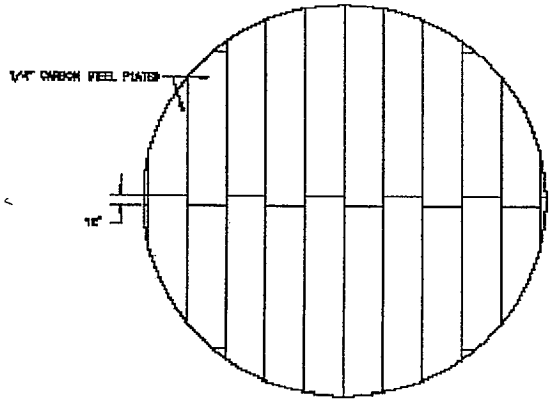


DETAIL -- STIFFENING RING

SCALE: 3/4" = 1"

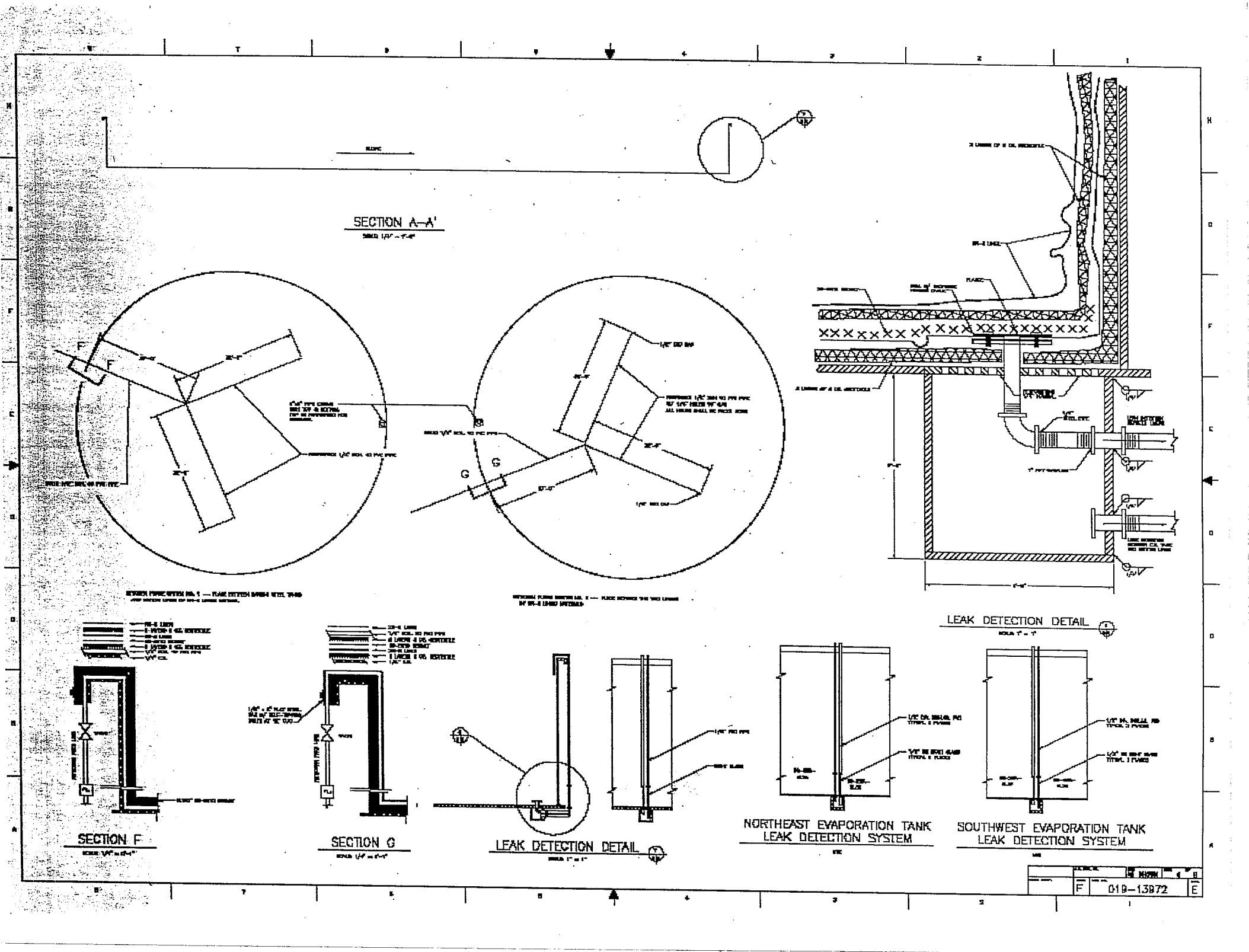
DETAIL -- C.S. PLATE OVERLAP W/ WELD

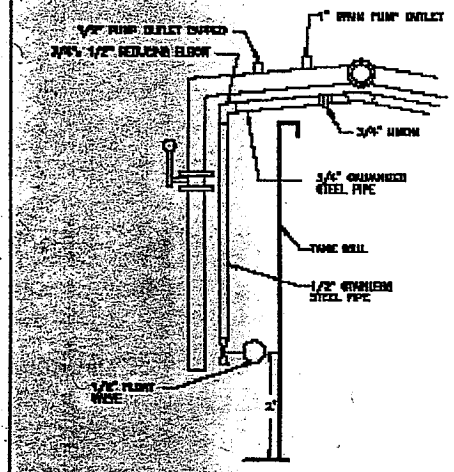
SCALE: 1/4" = 1"



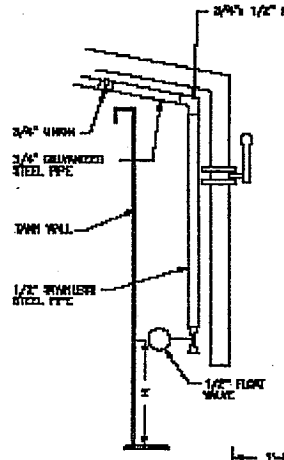
SECTION

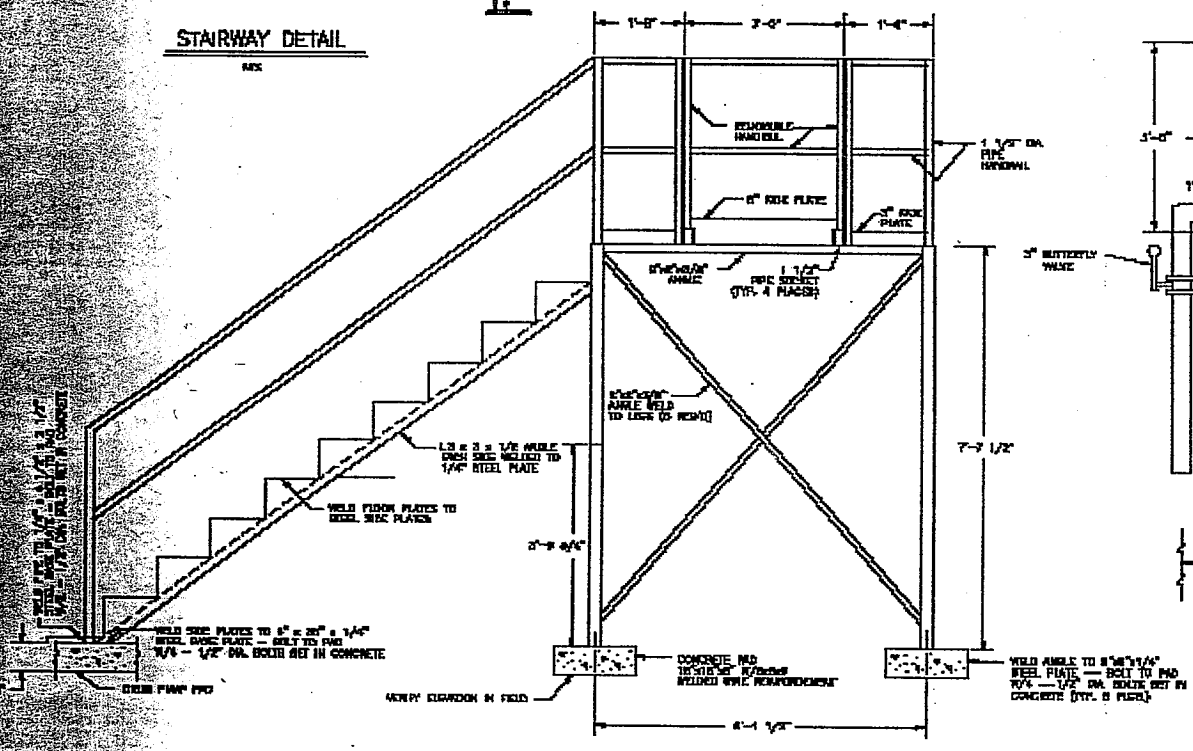
	F	D19-13972	


SECTION A–A'
LEAK DETECTION DETAIL
SECTION F
SECTION G
LEAK DETECTION DETAIL
NORTHEAST EVAPORATION TANK
LEAK DETECTION SYSTEM
SOUTHWEST EVAPORATION TANK
LEAK DETECTION SYSTEM
F
019–13872

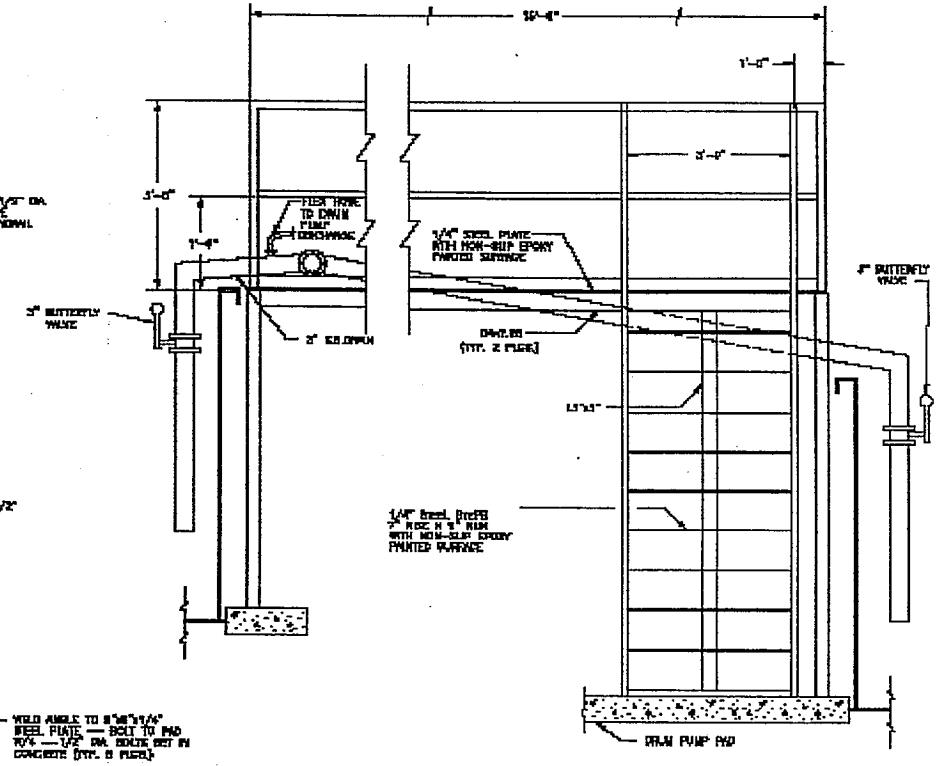


STAIRWAY DETAIL



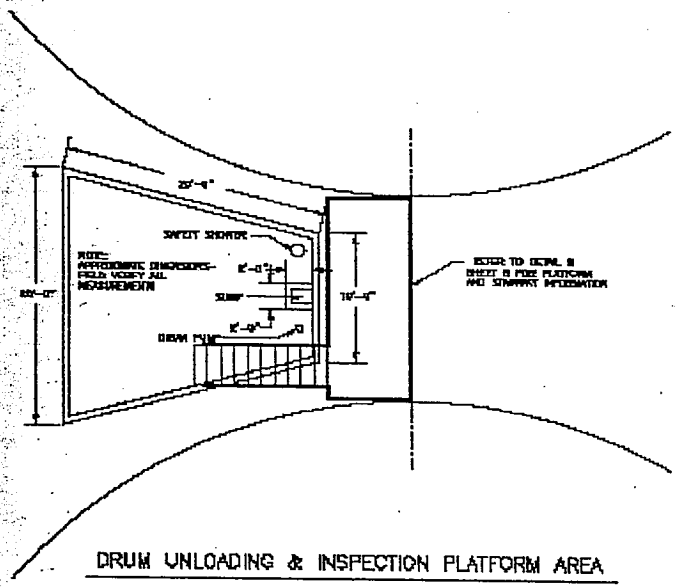


DETAIL — LADDER & WORKING PLATFORM



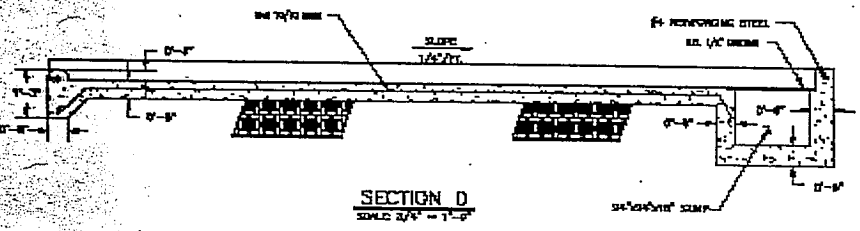
STAIRWAY DETAIL

	A. E. DWG. NO.	SHEET NO.	REVISION
CONSTRUCTION	DISTRICT F	DWG. NO. 018-18978	



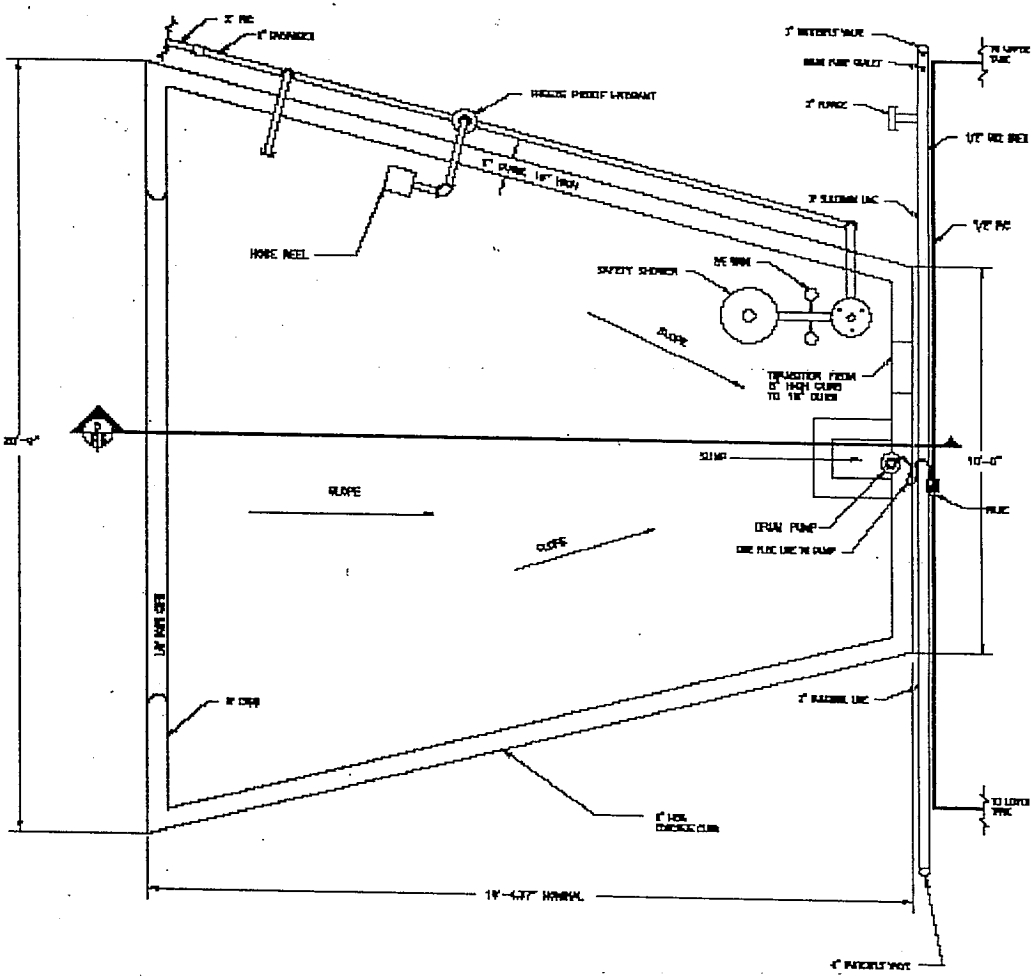
DRUM UNLOADING & INSPECTION PLATFORM AREA

SCALE: 1/4" = 1'-0"



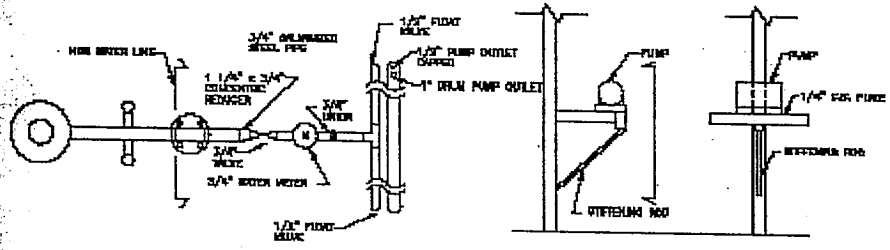
SECTION D

SCALE: 3/4" = 1'-0"



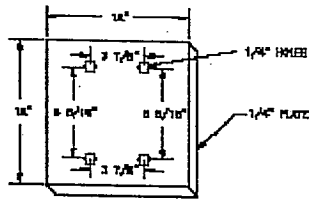
DRUM UNLOADING AREA

SCALE: 3/4" = 1'-0"



DRUM UNLOADING AREA

NTS



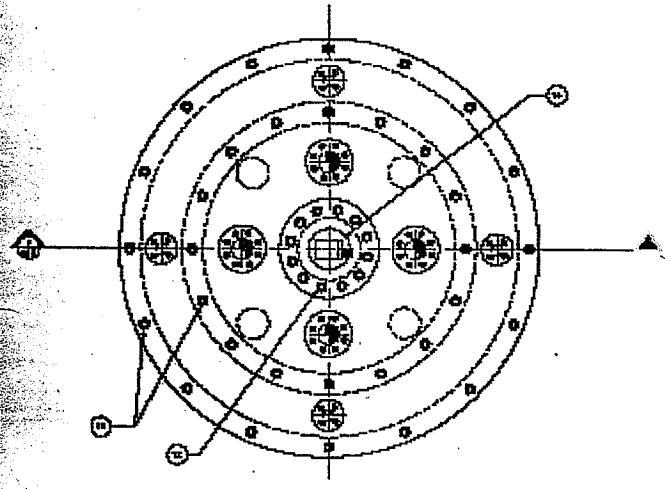
DRUM PUMP MOUNTING PLATE

NTS

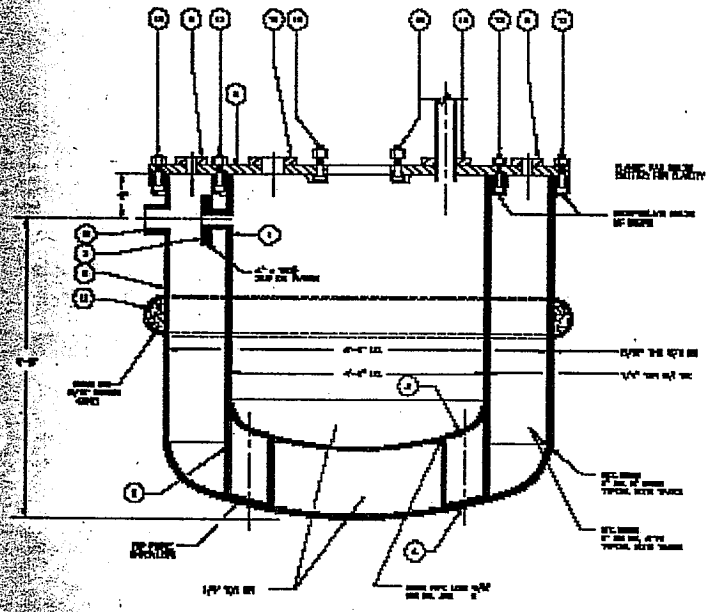
NOTES:

1. ALL EXPOSED WATER LINES OUTSIDE OF TANK WALL TO BE INSULATED WITH 8MM INSULATION.
2. FLOAT VALVE WILL BE SET TO MAINTAIN 9 FEET OF LIQUID IN TANKS (3" FROM BOTTOM, 4" FROM TOP).
3. INSTALLATION WILL BEGIN WITH REPLACEMENT OF ELBOW AT TOP OF SAFETY SHOWER LINE WITH A TEE.

	P. W. PROJ. NO.	SHEET NO.	REV. NO.
CHECK WORKS	DRG. NO. F	PROJ. NO. 019-13972	REV. E



SUMP TANK PLAN VIEW

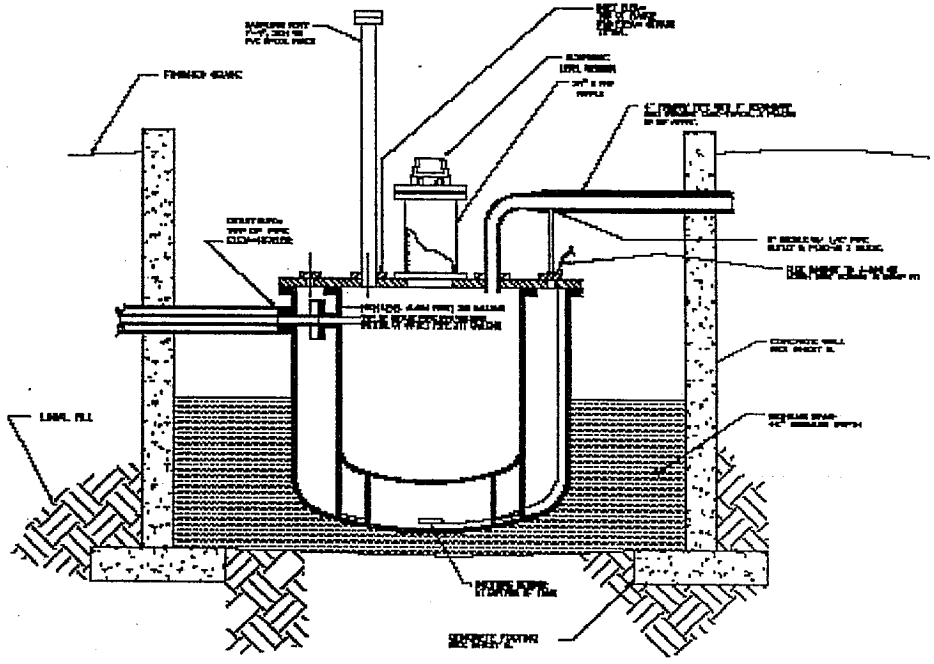


SUMP TANK ELEVATION

GENERAL NOTES:

NOTE:

APPURTENANCE AND MATERIAL SCHEDULE			
ITEM	QUAN.	SIZE	DESCRIPTION
1	1		
2	1		
3	1		
4	1		
5	1		
6	4		
7	1	4"	
8	1	3"	
9	8	3"	
10	1	4"	
11	1		
12	12		
13	24		
14	1		

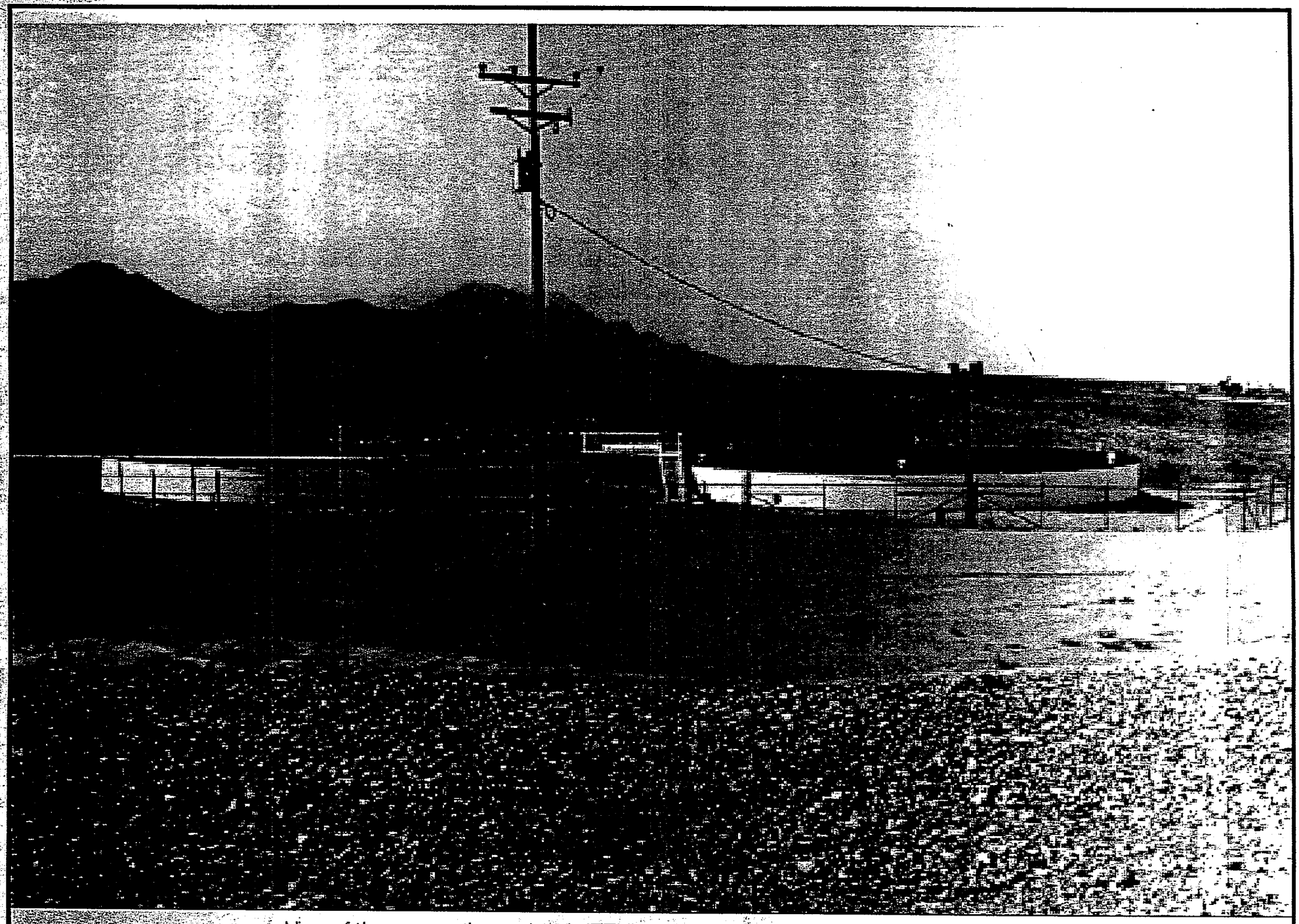


ASSEMBLY VIEW

		F	019-44313

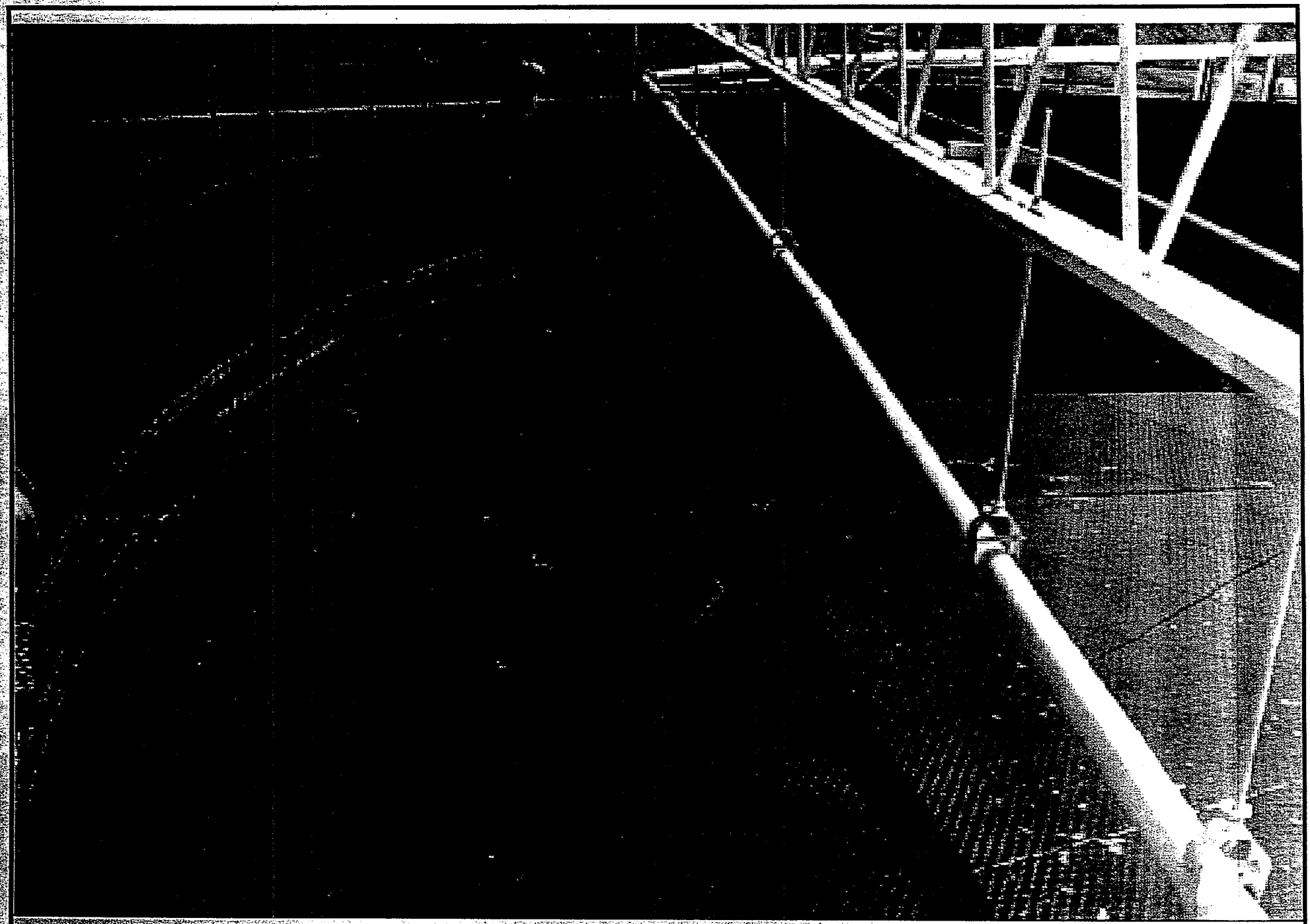
Appendix 6-C

ETU Photos

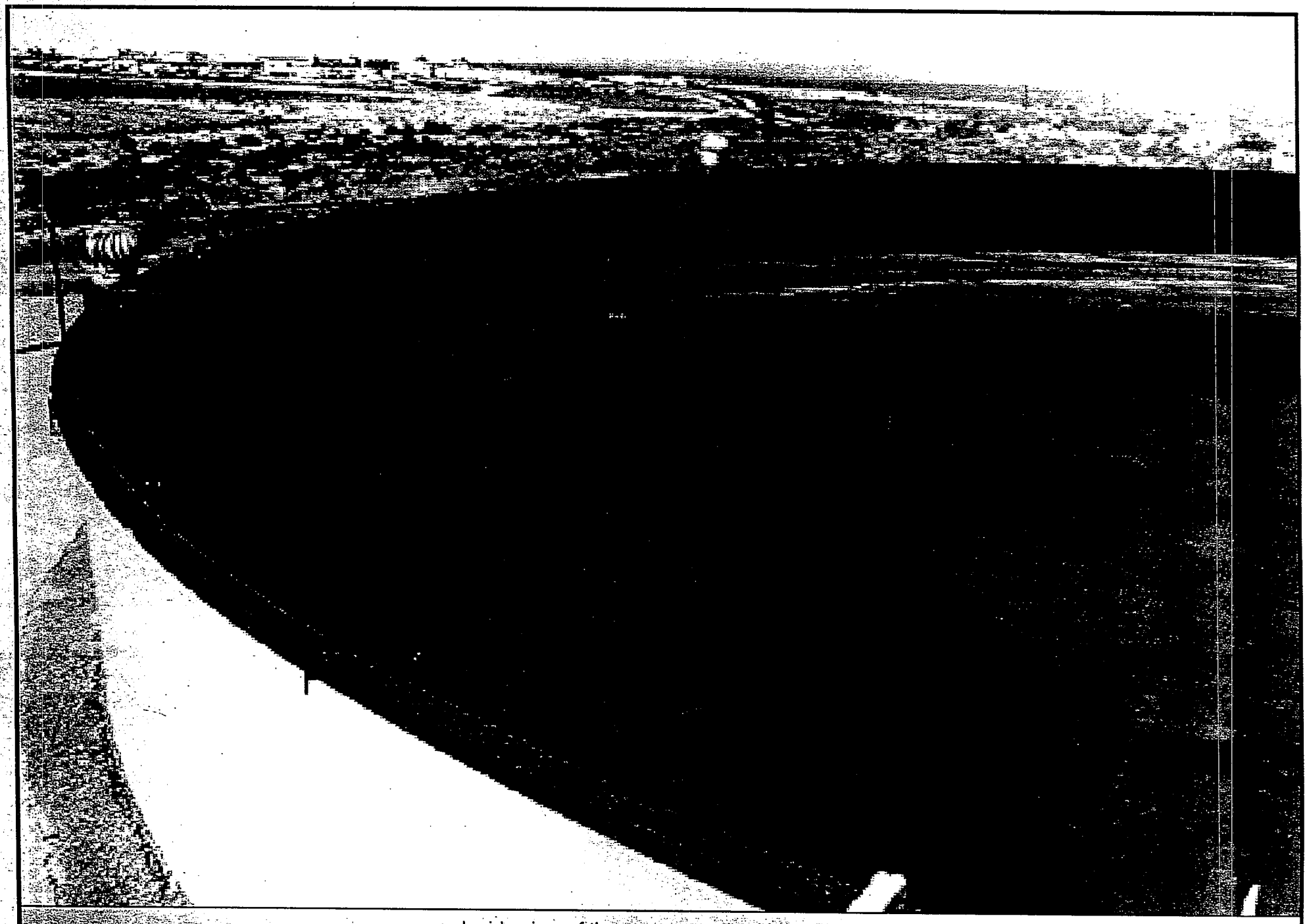


View of the evaporation tank unit (ETU) showing the entrance gates. (June 2002)

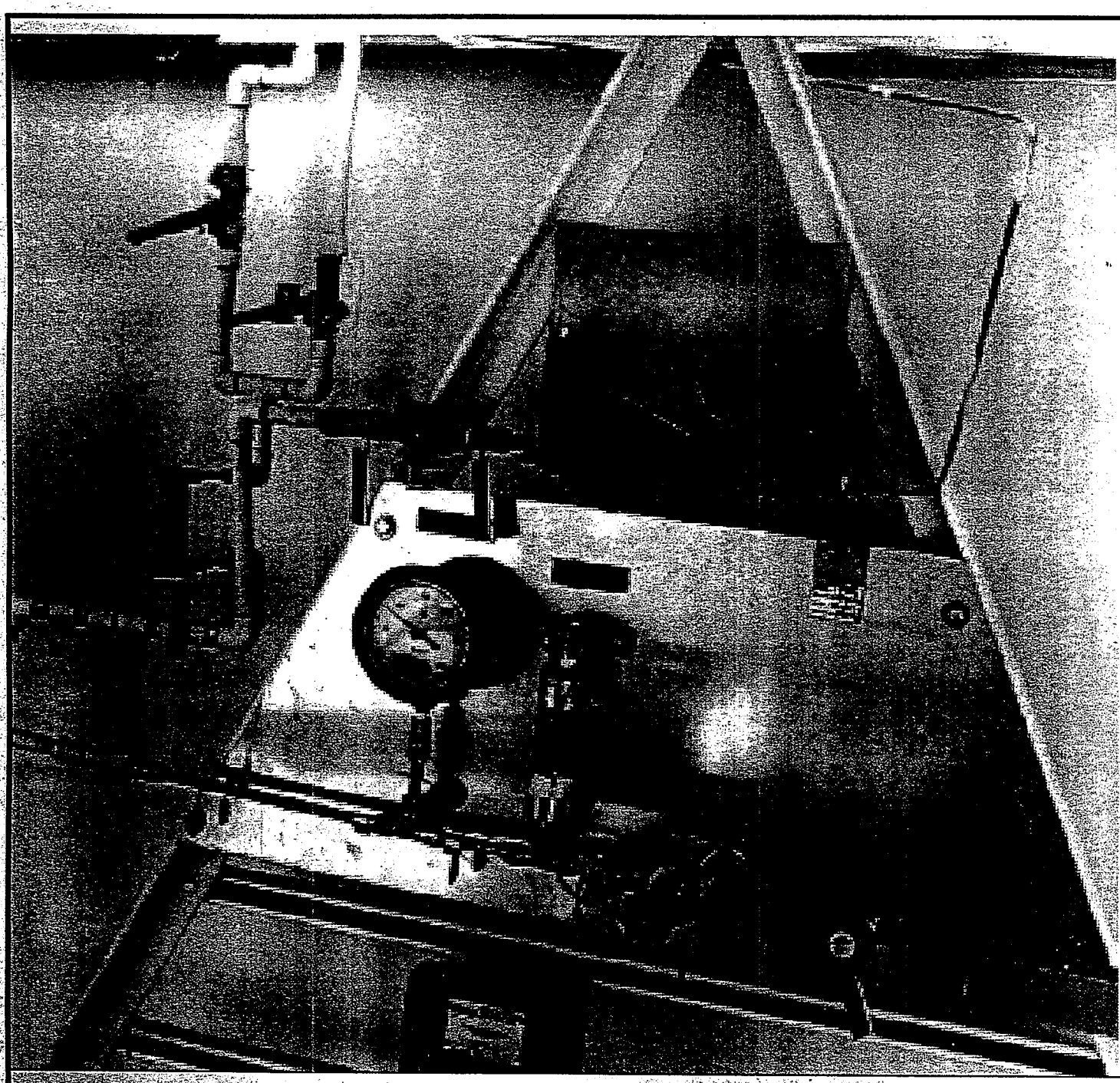
View of the ETU showing the two tanks, incoming drainline, and drainline support truss. (June 2002)



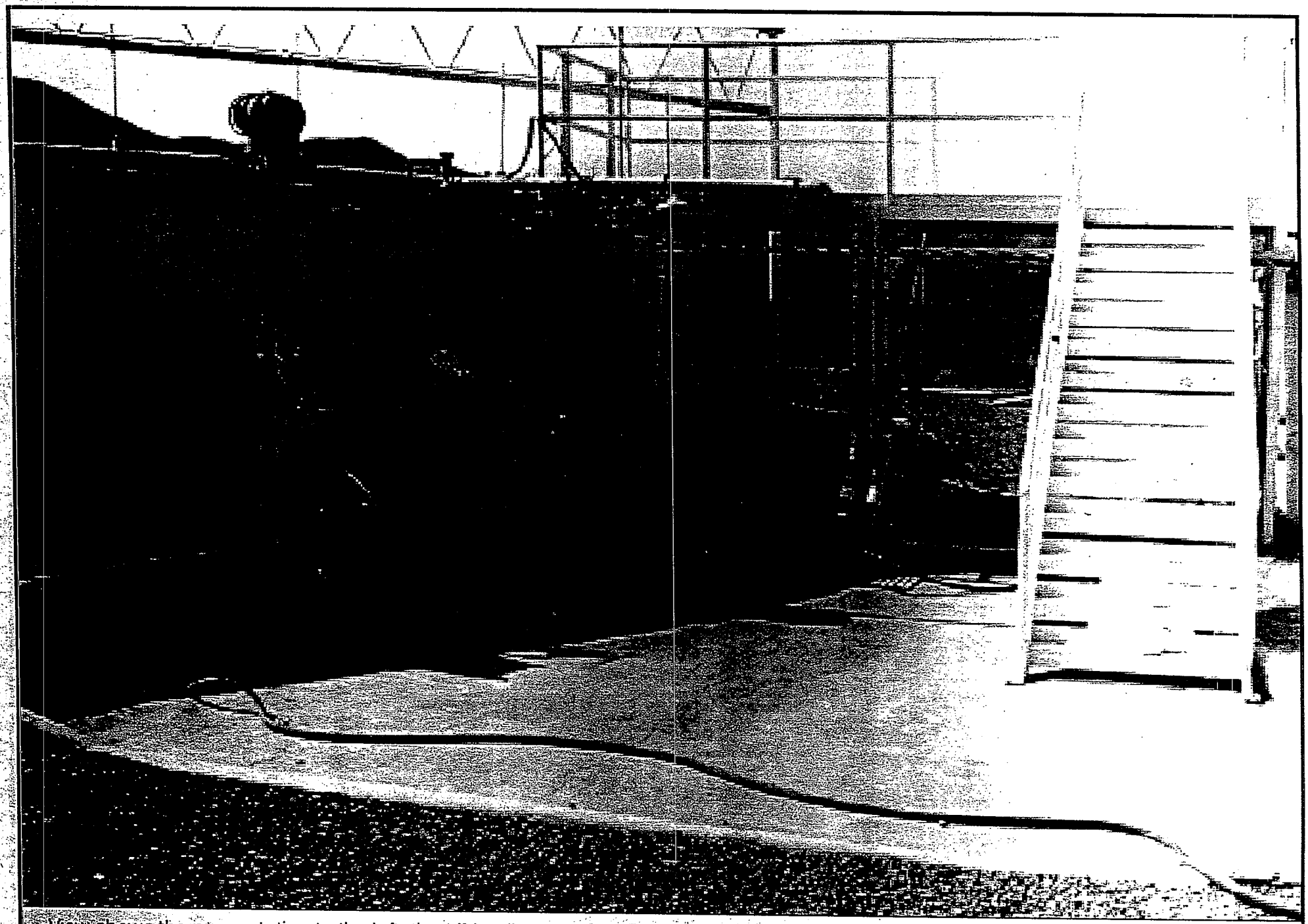
Inside view of the eastern tank. (June 2002)



Inside view of the western tank. (June 2002)



Front view of the nitrogen panel. (June 2002)



View shows the pump station to the left, the off-loading pad in the center, and the stairway and working platform to the right. (June 2002)

Appendix 6-D

NASA/WSTF ETU
RCRA Subpart CC Compliance Plan

Appendix 6-D NASA/WSTF ETU
RCRA Subpart CC Compliance Plan

1.0 Introduction

The ETU is operated as an exempt unit in accordance with 40 CFR 264.1082(c)(1) (RCRA Subpart CC regulations) and under the provisions of 40 CFR 268.50 (e) (LDR regulations). To assure compliance the RCRA subpart CC regulations, all waste discharged to the ETU will be limited to waste with an average volatile organic (VO) concentration of less than 500 ppmw as determined at the point of waste origination. The NASA WSTF ETU RCRA Subpart CC Compliance Plan to allow operation of the ETU as an exempt unit follows.

2.0 Approach

The procedures allow the VO concentration, at the point of waste origination, to be determined by either direct measurement or the owner's or operator's "knowledge of the waste". Per 40 CFR 265.1084 (a)(4) and EPA-453/R-94-076b, "Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF) – Background Information for Promulgated Organic Air Emission Standards for Tanks, Surface Impoundments, and Containers", page 6-30., "acceptable knowledge" can include:

- Documentation that lists the raw materials or intermediate products fed to the process showing that no organics are used in the process generating the waste;
- Previous test data for other locations managing the same type of waste stream;
- Material balances for the source, process generating the hazardous waste stream;
- Constituent-specific chemical test data for the hazardous waste stream from previous testing that are still applicable to the current waste; and
- Other knowledge based on information included in manifests, shipping papers, or waste certification notices.

A flow chart of the overall waste determination procedure is presented in Attachment 1. Whenever possible, "acceptable knowledge" will be used to meet the regulatory requirements. In cases where process information does not provide sufficient detail to constitute "acceptable knowledge", NASA will either:

- Provide supporting constituent-specific chemical test data by methods other than 25D (such as EPA Method 9060 (total organic carbon),or hydrazines by HPLC);
- Perform sampling and analysis by EPA Method 25D; or
- Select an alternate method of disposal.

3.0 EPA Method 25 Sampling and Analysis

Per 40 CFR 265.1084 (a)(3)(ii)(C) a "site sampling plan" shall be prepared by the owner or operator that describes the procedures by which representative samples of the waste stream are collected such that a minimum loss of organics occurs throughout the sample collection and handling process, and by which sample integrity is maintained. A copy of the written "site sampling plan" shall be maintained on-site in the facility operating

record. The WSTF "site sampling plan" per the requirements of 40 CFR 265.1084 (a)(3)(ii)(C) follows.

3.1 EPA Method 25D Analytical Requirements

In accordance with CFR 265.1084 (a)(3)(iii)(A), all analyses shall be performed under the requirements as specified by 40 CFR Part 60, Appendix A and the conditions set forth by the U.S. EPA Document, "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", EPA Publication SW-846. The analytical requirements for procurement of a commercial analytical laboratory to perform EPA Method 25D analyses at minimum include:

1) The laboratory shall be an EPA certified commercial laboratory with a QA/QC program that meets or exceeds the criteria established by the EPA and major state agencies including the New Mexico Environment Department: and shall ensure that all reported data are scientifically valid, legally defensible and of known precision and accuracy.

2) All potential vendors (analytical laboratories) are required to submit a copy of their quality assurance plan for review by WSTF at least ten (10) days prior to awarding of the contract. Laboratories not complying with this requirement shall not be considered.

3) The laboratory shall be obligated to initiate and complete preparation and/or analysis within the holding times as specified by the method. WSTF will supply advanced notice of the sample delivery. The laboratory shall provide a turnaround time of thirty (30) days.

4) The laboratory shall dispose of all of WSTF's samples sixty (60) days after the analytical report is issued unless otherwise directed by WSTF. The laboratory shall ensure that all samples are disposed of in a manner consistent with the requirements of the U.S. EPA and other applicable federal, state or local requirements.

5) The laboratory shall provide prepared sample containers/sample vials as specified by the method per 40 CFR Part 60, Appendix A.

6) The laboratory will provide duplicate prepared sample containers/sample vials. The duplicates will be analyzed only in the event any of the sample vials are damaged during shipment or a mishap during analysis.

7) Unless otherwise approved by WSTF, the laboratory shall provide shall provide prepared lab blanks, trip blanks and field blanks for QA/QC purposes. The laboratory shall analyze the field blanks. Trip blanks will be analyzed only if the field blanks show contamination. Lab blanks will only be analyzed if the trip blanks shows contamination.

8) The laboratory shall provide all sample shipping coolers and packaging. All shipping coolers, packaging, markings, labeling, etc. shall be in accordance with the Department of Transportation regulations for the shipment of hazardous waste samples.

9) The laboratory shall submit the analytical results to WSTF in the form of a report. The report shall include the following:

- Laboratory identification
- Analytical method identification
- Laboratory sample number and WSTF sample number (optional)
- A sample description
- Date received
- Date analyzed
- Analytical results (including the results of QA/QC samples)
- Reporting units
- Method detection limits or instrument detection limit
- Relevant comments with respect to the sample(s) and/or analytical conditions
- Completed copies of the "Chain of Custodies"
- Laboratory approval signatures

3.2 EPA Method 25D Sampling Requirements

All sampling techniques and equipment shall conform to the instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 Appendix A, section 8.1, "Sampling", paragraphs 8.1.2.1 through 8.1.6. The general sampling procedures/requirements are as follows

1) All sampling shall be performed by qualified waste samplers (minimum of 8 hrs training).

2) All sampling techniques and equipment used during sampling shall conform to instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 Appendix A.

3) All waste discharged to the ETU is aqueous waste (single phase, homogenous, and well mixed) and generated from batch processes. Assemble a sampling apparatus as shown in Figure 25D-5 of EPA Method 25D in 40 CFR 60 Appendix A and Attachment 2 of this compliance plan. The EPA Method 25D sampling apparatus that includes:

- 0.25" ID Teflon sampling tube; and

- 0.25" ID 304 SS cooling coil with a thermocouple at the coil outlet.

4) Prepared EPA Method 25D sample vials are prepared by the commercial laboratory. Store vials on ice until one (1) hour before the sampling event or as specified by the commercial laboratory.

5) Contact the responsible section supervisor or designated alternate. Section supervisor or designated alternated will escort Environmental Department samplers during the sampling operation. For each sampling event the section supervisor shall be responsible for ensuring the samples are representative of the waste stream and for providing the following minimum information:

   - The waste quantity represented by the samples; and

   - Details of the operating conditions for the source or process generating the waste represented by the samples.

6) One (1) hour before the sampling event, remove selected sample vials from ice and allow the vials to reach room temperature.

7) Set up work station and sampling apparatus at the "point of waste origination" as directed by Environmental Department personnel. The sample shall be taken at a point which is most representative of the unexposed waste.

8) Purge the sampling apparatus with a minimum of four (4) apparatus volumes of waste. Collect the waste in a container and dispose as directed by Environmental Department personnel. Check the temperature as indicated by the thermocouple thermometer. During the sampling event the temperature should be kept below 10°C. Open field blank as recommended by the commercial laboratory.

9) After purging, stop flow and direct the sample tube to a prepared sample vial. Keep the sample tube below the surface of the PEG during sampling to minimize contact with the atmosphere. Sample at a flowrate such that the temperature as indicated by the thermocouple thermometer is less than 10°. Add just enough sample media to completely fill the sample vial. Try to minimize headspace; however, do not remove or lose any PEG from the sample vial. Cap the vial within five (5) seconds of filling the vial and store on ice. Do not add any extra labels, seals or tape to the sample vials. Open field blanks as directed by the Environmental Department personnel and/or the analytical laboratory.

10) Repeat Step 5 as required. Take eight (8) sample vials of sample media (as recommended by the commercial laboratory), four (4) for the samples and four (4) for the duplicate samples (under normal circumstances duplicate samples will not be analyzed).

11) Annotate the evaporation tank logbook with a brief description of the sampling operation which includes the type of sampling, WIWPS #, point of waste origination, TPS #, date, and personnel present during the sampling event.

- Sample parameter;
- Sample preservation;
- Sample I.D. # (commercial lab # and corresponding WSTF # (optional));
- Sample location (WIWPS # and point of waste origination);
- Lab performing analyses; and
- Type of sample (sample or duplicate)

12) For all samples, follow "chain-of-custody" procedures. Ensure the "chain-of-custody" identifies the commercial lab id number, corresponding WSTF ID number and location.

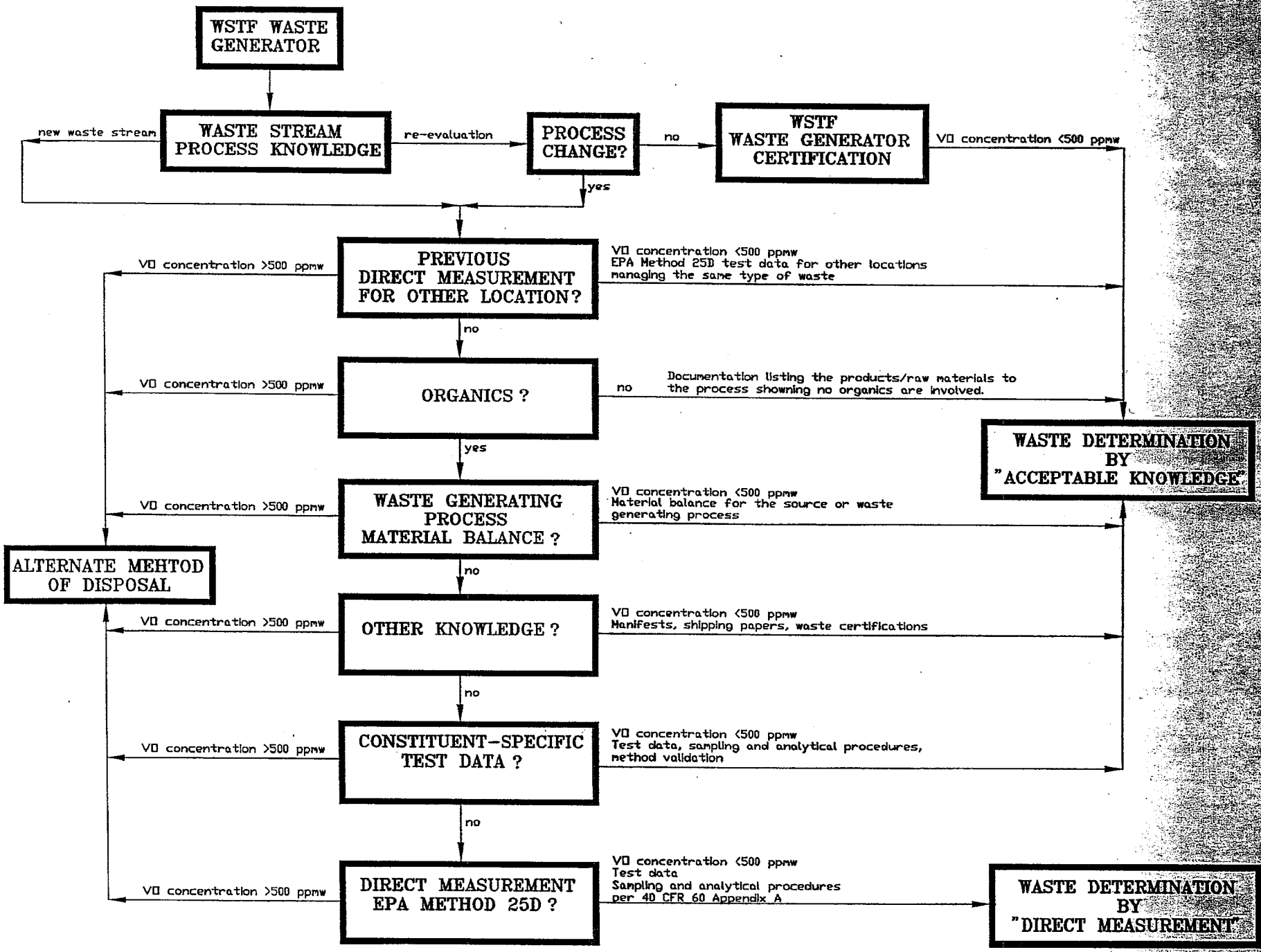
4.0 Waste Determination Review and Update

The annual review and update of the waste determinations is performed during the annual review of the WIWPS as discussed per section 6.3.1.4 of the WAP. Per 40 CFR 264.1082(c)(1), the owner or operator is required to review and update the waste determinations at least once every 12 months following the initial waste determination. Guidance with respect to the review and update of the waste determinations was provided per NMED correspondence, "Waste Determination Procedures Pursuant to 40 CFR 265.1084" dated April 23, 1996. Per the NMED correspondence, "If the initial waste determination was performed using the approved EPA test method, a simple statement on record that the process has not changed and that therefore knowledge of process is used to make the determination will normally be acceptable in subsequent years". This guidance was used to establish a general format for updating compliance documentation for the waste determinations performed by both "direct measurement" and "acceptable knowledge". A copy of the NMED correspondence is provided in Attachment 3.

Attachment 1

Waste Determination Flow Chart

WASTE DETERMINATION FLOW CHART



Attachment 2

EPA Method 25D

Sampling Procedure

and

Sampling Apparatus

NASA JSC WSTF

TEST PREPARATION SHEET

(1) TPS NUMBER - MOD.	(2) PAGE
2-HWM 950343 R	1 of 8

(3) A - CONFIGURATION CHANGE	
(3) B - NO CONFIGURATION CHANGE	X

(4) SYSTEM/TEST STAND	(5) QA COORDINATION	(6) MIPS				
200 Area Hazardous Waste Evaporation Tank System	VO Mar 21 '95	✓	NONE		STEPS	ALL

(7) TITLE

EPA Method 25D Sampling the 200 Area Hazardous Waste Drain Line Waste Streams

(8) DRAWING(S), DOCUMENT(S), OCP(S), PART NO(S) AND DCN(S)	(9) FILE NAME
40 CFR 265 Subpart CC, 40 CFR 60 appendix A (EPA METHOD 25D), US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods	

(10) TASK ORDER NUMBER	(11) NEED DATE	(12) SPECIAL SAFETY REQUIREMENTS		
038-JAA-00	4/21/95		X	YES
				NO

(13) PREPARED BY	EXT.	(14) DATE CLOSED BY QA	CONTRACTOR	QA
Tanaka			Tanaka 4/4/95	

(15) CONSTRAINTS

None

(16) SUMMARY/STATUS/INSTRUCTIONS:

SCOPE:

The following repetitive TPS authorizes sampling and analyses per EPA Method 25D of waste streams that are discharged to the 200 Area Hazardous Waste Drain Lines.

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
Tanaka 4/20/95	[illegible] 4/21/95
[signature] 4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HOM-950343 R	2 of 8

(19) QA COORDINATION	(20) MIPS				
	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY

EQUIPMENT:

All sampling techniques and equipment used to sample the 200 Area Hazardous Waste Drain Line waste streams shall conform to the instructions provided in the US EPA Document SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods and the requirements of EPA Method 25D in 40 CFR 60 appendix A.

EPA Method 25D sampling apparatus that includes:
- 0.25" ID teflon sampling tube; and
- 0.25" ID 304 SS cooling coil with a thermocouple at the coil outlet.

Prepared EPA Method 25D sample vials. Store vials on ice until one (1) hour before the sampling event.

Ice chest with ice.

MANPOWER REQUIREMENTS:

2 - Waste Samplers certified per WSTF Operations Certification Plan, Appendix VI, Category 2.5 - Waste Sampler. (8 to 16 hours/each)

NOTE:

ENVIRONMENTAL DEPARTMENT PERSONNEL PERFORMING THE SAMPLING PROCEDURES OF THIS TPS WILL CHARGE TASK ORDER 038-JAA00.

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/20/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HWM250343 R	3 of 8
(19) QA COORDINATION 6	(20) MIPS ✓ NONE STEPS ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
	ENVIRONMENTAL DEPARTMENT WASTE SAMPLERS **SAFETY NOTES:** THE FOLLOWING MINIMUM SAFETY EQUIPMENT IS REQUIRED DURING SAMPLE COLLECTION. A. TYVEX OR SPLASH SUITS. B. RUBBER GLOVES. C. FACE SHIELD OR GOGGLES. D. INTERSCAN WHEN HYDRAZINE WASTES ARE SAMPLED. E. BREATHING AIR IS REQUIRED ANY TIME HYDRAZINE LEVELS AS INDICATED BY INTERSCAN EQUALS OR EXCEEDS 0.1 ppm OR AS DIRECTED BY THE CONTRACTOR ENVIRONMENTAL DEPARTMENT. F. "TWO MAN OPERATION" IS REQUIRED. G. ORGANIC RESPIRATOR AS DIRECTED BY THE CONTRACTOR ENVIRONMENTAL DEPARTMENT.		
1.	Contact the responsible section supervisor or designated alternate. Section supervisor or designated alternated will escort Environmental Department samplers during the sampling operation. For each sampling event the section supervisor shall provide the following minimum information: A. The waste quantity represented by the samples; and B. Details of the operating conditions for the source or process generating the waste represented by the samples.		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
STWM-950343 R	4 of 8

(19) QA COORDINATION	(20) MIPS				
	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
2.	One (1) hour before the sampling event, remove selected sample vials from ice and allow the vials to reach room temperature.		
3.	Set up work station and sampling apparatus at the "point of waste origination" as directed by Environmental Department personnel. The sample shall be taken at a point which is most representative of the unexposed waste.		
4.	Purge the sampling apparatus with a minimum of four (4) apparatus volumes of waste. Collect the waste in a container and dispose as directed by Environmental Department personnel. Check the temperature as indicated by the thermocouple thermometer. During the sampling event the temperature should be kept below 10°C.		

NOTE:

DURING THE SAMPLING EVENT ENSURE THE FOLLOWING:

A. THE SAMPLE TUBE IS KEPT BELOW THE SURFACE OF THE POLYETHYLENE GYLCOL (PEG).
B. THE TEMPERATURE AT THE COOLING COIL OUTLET IS LESS THAN 10°C.
C. PEG IS NOT LOST OR REMOVED FROM THE SAMPLE VIAL.
D. HEAD SPACE IS MINIMIZED.
E. SAMPLE VIALS ARE CAPPED IMMEDIATELY AFTER SAMPLING AND STORED ON ICE.
F. DO NOT ADD ANY EXTRA LABEL, SEALS OR TAPE TO THE SAMPLE VIALS.

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2440M-952348 R	5 of 8

(19) QA COORDINATION	(20) MIPS				
QA 6 Apr 21 '95	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
5.	After purging, stop flow and direct the sample tube to a prepared sample vial. Keep the sample tube below the surface of the PEG during sampling to minimize contact with the atmosphere. Sample at a flowrate such that the temperature as indicated by the thermocouple thermometer is less than 10°C. Add just enough sample media to completely fill the sample vial. Try to minimize headspace; however, do not remove or lose any PEG from the sample vial. Cap the vial within five (5) seconds of filling the vial and store on ice. Do not add any extra labels, seals or tape to the sample vials. Open field blanks as directed by Environmental Department personnel.		
6.	Repeat step 5 as required. Take eight (8) sample vials of sample media, four (4) for the samples and four (4) for the duplicate samples (under normal circumstances duplicate samples will not be analyzed).		
7.	Annotate the evaporation tank logbook with a brief description of the sampling operation which includes the type of sampling, WIWPS #, point of waste origination, TPS #, date, and personnel present during the sampling event. ENSURE THE FOLLOWING ARE NOTED IN THE LOGBOOK: A. Sample parameter; B. Sample preservation; C. Sample I.D. # (commercial lab # and corresponding WSTF #); D. Sample location (WIWPS # and point of waste origination);		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

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NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2440M-950343 R	6 of 8

(19) QA COORDINATION	(20) HITS				
QA 6 Apr 21 '95	✓ NONE		STEPS		ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY
	E. Lab performing analyses; and F. Type of sample (sample or duplicate)		
8.	Repeat steps 1 through 7 for other waste streams or locations as directed by the Environmental Department.		
	NOTE: FOR ALL SAMPLES, FOLLOW "CHAIN-OF-CUSTODY" PROCEDURES. ENSURE THE "CHAIN OF CUSTODY" IDENTIFIES THE COMMERCIAL LAB ID NUMBER, CORRESPONDING WSTF ID NUMBER AND LOCATION.		
9.	Deliver the samples and the corresponding "Chain of Custody" documentation to the warehouse for shipment.		

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
4/20/95	4/21/95
4/20/95	

WSTF-392 (7/91)

NASA JSC WSTF

TEST PREPARATION SHEET

(17) TPS NUMBER - MOD.	(18) PAGE
2HWM-950343 R	7 of 8

(19) QA COORDINATION	(20) HIPS				
	✓	NONE		STEPS	ALL

(21) ITEM NUMBER	(22) DESCRIPTION	(23) PERFORMED BY	(24) INSPECTED BY

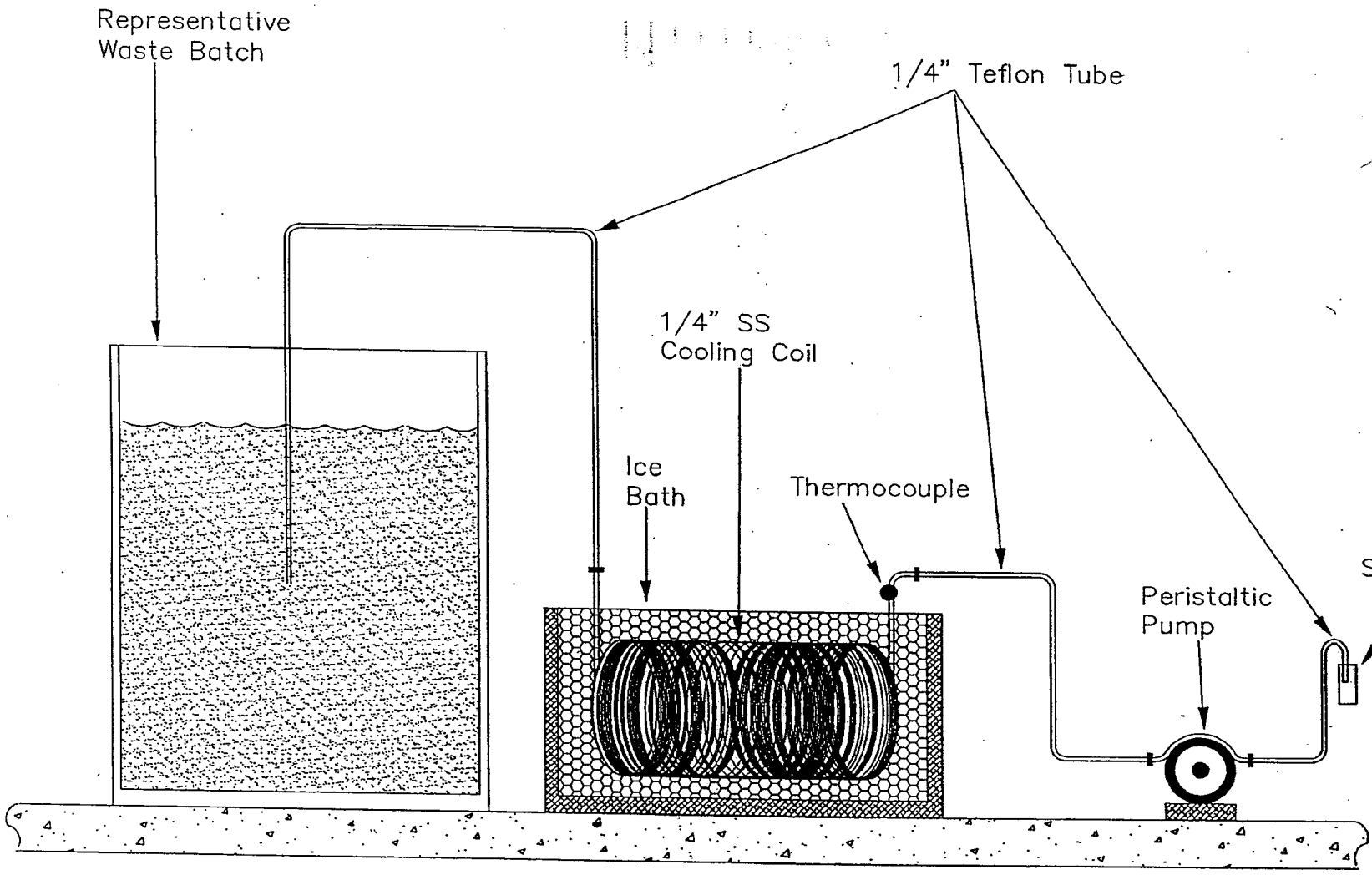
EPA METHOD 25D SIGNOFF SHEET

WIWPS#'s/ DESCRIPTION	E. D. AUTHORIZATION
(20-01-01) Rinse Water (1-A → 4B)	Tanaka
Clean Room Cleaning Tanks	
Oakite 33 (20-01-11) Oakite ~~33~~ Acid (5A — 8B)	Tanaka
Clean Room Cleaning Tanks	
Oakite 126 (20-01-10) ~~Oakite 33~~ (9A — 12B) Oakite 126	Tanaka
Clean Room Cleaning Tanks	
(20-01-18) Simple Green	Tanaka
Clean Room/Lab Con (13A — 16B)	
(20-01-38) Citric Acid	Tanaka
Clean Room/Lab Con (17A — 20B)	
(20-01-13) Oakite Rustripper	Tanaka
Clean Room/Lab Con (21A — 24B)	
Phase Filter (25A — 28B)	Tanaka
(20 — 03-15) (20-03-31)	
Water Exhaust Oil	Tanaka
(29A — 32B	
CleanLab Square Wastes 20-04-01	Tanaka
20-04-01	
MetLab Phase Filter	Tanaka
(37A — 40B)	
5% Screen Room Wash	Tanaka
(41A — 44B)	
1% Simple Green	Tanaka 9/12/95
Oakite 33	Tanaka 9/12/95
Chem Lab Fuel Scrubber	Tanaka 9/12/95
10% UDMH	Tanaka 9/12/95
10% MMH	Tanaka 9/12/95
10% HZ	Tanaka 9/12/95
Clean Room Oakite 31	Tanaka 4/16/96
500 Aqua FTF Treated Fuel	Tanaka 7/14/96
20-01-45 CleanLab Brulin 815 GD	Tanaka 8/28/96
~~Close This TPS Effective~~	January 21 1998
Tanaka 1/21/98 Cont-Sig	WASA Sig

CONTRACTOR AUTHORIZED SIGNATURES	NASA AUTHORIZED SIGNATURES
Tanaka 4/20/95	D Chandler 4/21/95
DC Lowe 4/20/95	

JSTF-392 (7/91)

EPA Method 25D Sampling Apparatus



Attachment 3

NMED Correspondence

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous & Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Santa Fe, New Mexico 87502
(505) 827-1557
Fax (505) 827-1544

GARY E. JOHNSON
GOVERNOR

MARK E. WEIDLER
SECRETARY

EDGAR T. THORNTON, III
DEPUTY SECRETARY

VIA TELEFAX

April 23, 1996

Mr. D. Tanaka
Allied Signal Team
White Sands Test Facility
FAX No. (505) 527-8925

Dear Mr. Tanaka:

RE: Waste Determination Procedures pursuant to 40 CFR §265.1084

This telefax transmittal is in response to your request for NMED's interpretation of §265.1084(a)(2)(ii)(A). NMED interprets this section to mean that once an initial waste determination of the average VO concentration for a batch is made by laboratory analysis, an update of the information by use of knowledge of process is acceptable assuming the process generating the waste does not change. Therefore, if an initial waste determination was performed by using the approved EPA test method, a simple statement on record that the process has not changed and that therefore knowledge of process is used to make the determination will normally be acceptable in subsequent years. Please be reminded that the generator or manager of the waste is responsible for being correct when using knowledge of process.

Please be aware that the New Mexico Hazardous Waste Management Regulations (20 NMAC 4.1) will not adopt the Subpart CC regulations until at least October 1, 1996. Therefore, these regulations will not be enforceable by NMED until they are adopted into 20 NMAC 4.1 If you have any further questions or need additional clarification, please contact me at (505) 827-1558.

Sincerely,

Coby Muckelroy
RCRA Inspection/Enforcement Program Manager
Hazardous and Radioactive Materials Bureau

Appendix 6-E

NASA/WSTF ETU
Fuel Waste Water Management Plan