need 2 copies

4.0 WASTE MANAGEMENT PRACTICES AND FACILITIES

The waste management facilities at Los Alamos to be permitted consist of the following, as noted in Section 2.0:

- TA-50 Batch Treatment System, Modular Container Storage Buildings, and Chemical Waste Incinerator and Associated Container Storage Areas
- TA-54 Waste Transfer, Packaging and Storage Facilities and Treatment Tanks
- TA-16 Industrial Incinerator
- TA-50 Container Storage Pad.

These Laboratory facilities and related hazardous waste processing activities (treatment and storage) are described in the following sections.

4.1 TA-50 BATCH TREATMENT SYSTEM AND ASSOCIATED CONTAINER STORAGE UNITS

The lower level of Building 1 at TA-50 houses waste treatment facilities for treating radioactive liquid wastes and nonradioactive RCRA-regulated wastes. The hazardous waste treatment facilities are located in a room with approximately 425 square feet of floor area (Figure 4-1). The cement pad underlying the treatment system is presently in good condition, free of any cracks, gaps or holes. The cement pad underlying the treatment system is coated with epoxy (see Appendix I) to prevent damage in the event of a spill. The area can easily be inspected and is free of cracks and other signs of deterioration. The treatment facility includes a versatile batch, wet chemical processing system (Figure 4-2), designed to neutralize or treat acids and bases, cyanides and heavy metal-containing solutions.

Container storage for the Batch Treatment System occurs south of Building 1 in modular storage buildings. Drummed or otherwise containerized hazardous waste scheduled for treatment is stored in the prefabricated units. Each unit is 22 feet, 8 inches by 9 feet by 8 feet, 7½ inches high, and is capable of storing a maximum of 30 55-gallon drums or the equivalent amount of bulk storage containers. Up to three storage units are anticipated to provide storage for the Batch Treatment System. Figure 4-1 shows the location of each storage unit. A complete manufacturer's description of the storage units is presented

5847

in Appendix W. Each storage unit is equipped with an epoxy coated metal chemical separation wall to prevent mixing incompatible materials, a corrosive-resistant fiberglass floor grating, a polypropylene building sump liner, fire extinguisher equipment, and ventilation equipment. Only compatible waste materials will be stored in module compartments. The storage units can be loaded by forklift or by hand.

The batch treatment system consists of a totally enclosed, vented 500-gallon pressure vessel which is lined with a nominal 60-mil (0.060-inch) thick Kynar (polyvinylidene fluoride) carbon-mat-reinforced lining. The pressure vessel is equipped with a sparging loop for treatment gas introduction and an agitator for proper homogenization of tank contents. The vessel is also connected to various plumbing to allow the addition of treatment chemicals under enclosed conditions. The pressure vessel is jacketed and the jacket is designed to be connected to steam, hot water and cold water lines to permit heating or cooling the vessel. A vented, 370-gallon blowdown tank is incorporated into the system. This tank ensures that possible overpressuring of the pressure vessel during waste treatment or filling does not result in leaks of hazardous wastes or damage to the treatment system. A vent gas condenser system for pressure vessel venting and a basket/cartridge filter also complement the system. Vacuum transfer lines for pressure vessel loading from drums or from tank trucks complete the mechanical portions of the batch treatment system. All plumbing and hardware that would be subject to corrosion from untreated liquid waste are Kynar lined.

The batch treatment system has a full package of instrumentation to permit continuous or periodic measurement of appropriate treatment parameters and sample collection. The system and its contents are monitored for pH, oxidation-reduction potential, temperature, pressure and flow volume at appropriate locations in the system. The detailed engineering drawings showing the batch treatment system mechanical components and instrumentation are in Appendix I. Appendix I also contains the detailed specifications and the pressure vessel lining inspection report.

The treatment facility also includes a fume hood area that can accommodate two 55-gallon drums for transfer of liquids from one drum to another under ventilated conditions.

4.1.1 Current Management Practices

Building 1 at TA-50 is fenced and the access gates and building doors are locked and the building patrolled by Los Alamos security personnel during unattended hours. Modular storage units for container storage are locked and located within the fenced area. The batch waste treatment system is used primarily to treat the Electrochemistry Processing chromate and cyanide plating solutions and acid/base copper etching/plating solutions. The treatment system is highly flexible, however, and other wastes, particularly heavy metal solutions, may occasionally be treated. Typically, the chromate and cyanide plating solutions are treated in batches of up to 220 gallons several times a year and the copper etching/plating solutions are treated in 400-gallon batches approximately every two months.

Steel 55-gallon drums will be used to store wastes in the TA-50 modular container storage units. These drums will meet the U.S. Department of Transportation Specification No. 17C or 17H. Corrosive wastes will be stored in DOT 17C or 17H drums with polyethylene liners, if necessary, to prevent corrosion of the metal drums. The drums will be handled and transported in the batch treatment and storage areas by hand trucks or forklifts. Other approved containers may also be stored in the modular storage buildings.

Hazardous wastes are currently received at the batch treatment system in drums or other DOT-approved containers (Appendix I-2); however, connections and necessary equipment are in place for off and on loading trucks by vacuum. Drums are kept closed and stored in the modular storage units until their contents are transferred to the treatment system. Transfer from drums to the batch treatment system occurs within a contained area within Building 1. Drums are unloaded by forklift into a small curbed area and suctioned with a drum pump. The curbed area consists of one and one-half inch angle iron bolted to the concrete floor with a rubber gasket to provide a seal. All components of the unloading area are painted and sealed with an epoxy resin. Wastes are also stored in containers described in Section 4.3 and Appendix I-2. Only compatible wastes are handled at any one time in this area; however, the treatment system is used to treat incompatible wastes with thorough washdown between waste batches. Analyses of wastes are performed

both before and after treatment. The Waste Analysis Plan, Section 3.2, discusses the parameters, rationales, test methods and sampling methods pertinent for characterizing these wastes.

After rendering wastes nonhazardous by treatment (see Section 4.1.2), the resulting liquid is sampled by opening of the valves on the treatment tank. The types and frequency of analyses performed and the analytical methods employed are identical to those noted for the wastes prior to treatment (see Section 3.0). Liquid, post-treatment effluent is placed in the treatment tanks at TA-54, Area L and allowed to evaporate. Residue from effluent evaporation in Area L treatment tanks and sludge generated in the treatment of listed wastes (NMHWMR 201.C.2 through 201.C.4) will be mixed with cement in drums and stored at Area L prior to disposal at a permitted off-site facility. Any effluent or sludge resulting from the treatment of material which is a RCRA waste because it exhibits one of the four characteristics (NMHWMR 201.B) will be handled as hazardous waste if the effluent or sludge continues to exhibit the characteristic. After treatment, wastes are discharged to a holding tank pending results of chemical analysis for disposal requirements. Effluent generated by the treatment of a characteristic waste which does not exhibit the characteristic will be discharged to the industrial waste treatment system.

The fume hood area of the batch treatment room is used for transfer of liquids from one drum to another (as, for example, from a damaged drum to a new drum or to collect liquids for incineration, etc.). This area is typically used when a waste generator within the Laboratory cannot transfer liquids without receiving vapor exposures to chemicals such as xylene or toluene.

4.1.2 Secondary Containment Areas

The eight-inch curb which encloses about 150 square feet of floor space beneath the batch treatment system provides containment for approximately 850 gallons of liquid. This containment volume is greater than the 500-gallon capacity of the batch treatment system. Raised floor drains that empty into the industrial (radioactive) sewer system are located within the curbed area. The level of these drains is about one-half inch below the top of the curb; thus, the serrated tops of the floor drains have been replaced with blind

flanges to prevent inadvertent release of hazardous materials into the industrial waste sewer.

Each modular storage unit south of Building 1 is designed to contain any leaks or spills. The units are constructed of 12-gauge steel covered with two coats of chemical-resistant epoxy. The sub-floor containment areas are also lined with polypropylene, providing a 500-gallon spill containment reservoir. Loading drummed waste into the batch treatment system will take place within the angle-iron bermed area. This loading area provides containment of minor drips and spills associated with waste transfer.

4.1.3 Batch Treatment System Description and Processes

The TA-50 Batch Treatment System is designed to treat and neutralize various types of metal waste streams (cyanide, chromate, heavy metal). Even though the waste streams to be treated in the tank will vary, the specific gravity of all wastes entering the tank will not exceed 1.25. A protective KYNAR lining was chosen for the tank because of its corrosive-resistant capabilities and compatibility with the waste streams to be treated (see Appendix K for the Chemical Resistance Table for compatibility information). The tank shell and liner will be inspected annually (see Section 6.3, Procedures to Prevent Hazards) to ensure that the tank walls and liner have not experienced damage due to corrosion or erosion. The following sections discuss the various types of treatment performed in the batch treatment system.

The reactor tank is supported by four legs that are constructed of lengths of six-inch wide by 0.5-inch thick steel plate welded to form a box. Each leg has a pad with a surface area of 2.5 square feet that rests on the concrete floor of the batch treatment system room. The total weight of the filled tank will not exceed 8,000 pounds (the tank weighs about 2,800 pounds and the weight of the contents will not exceed 5,000 pounds). Thus, each leg will be required to support a load of no more than 2,000 pounds, and each pad will exert a load of no more than 800 pounds per square foot on the floor. The concrete floor design load-bearing capacity is approximately 3,000 pounds per square foot; thus, the floor loading is well below the design capacity of the floor.

4.1.3.1 Cyanide Waste Treatment

Batches of up to 220 gallons of waste cyanide solution are treated at one time in the treatment system. Cyanide solutions are received at the facility in 55-gallon drums. After analysis, the solutions are transferred from the drums into the treatment system tank by transfer pump. Pump specifications and the vendor information on the pumps are included in Appendix I (page I-54). Based on the volume of the solution and its cyanide concentration, measured amounts of sodium hypochlorite or a combination of chlorine gas and sodium hydroxide are added to the tank through pipelines and valves. The subsequent series of reactions of these chemicals with the cyanide in solution results in the essentially complete destruction of the cyanide. The end-products of this process are sodium chloride, carbon dioxide and nitrogen.

4.1.3.2 Chromate Waste Treatment

Chromate plating solutions are treated in batches of up to 150 gallons. These wastes are received in 55-gallon drums and transferred to the waste treatment system tank in the same manner as that used for cyanide wastes. Sulfur dioxide gas or sodium hydrosulfide is introduced into the tank and the pH maintained below 2 by addition of sulfuric acid. Resulting reactions reduce the chromium in the plating solutions from the plus six to the plus three valence state. After reduction of the chromium, sodium hydroxide is added to the tank, raising the pH to about eight and precipitating the chromium as the metal hydroxide. This precipitant is filtered from the tank solution, mixed in a drum with cement and stored at TA-54, Area L for disposal at a permitted facility. If the waste liquid contains any listed hazardous waste, or exhibits one of the four characteristics of hazardous waste, it will be evaporated in the Area L treatment tanks and the residue will also be mixed with cement in drums and stored at Area L prior to disposal at a permitted facility.

4.1.3.3 Acid/Base Heavy Metal Waste Treatment

Acid/base wastes resulting from processes such as copper etching and plating are treated in approximately 400-gallon batches which are stored at Area L. These wastes are transferred to the treatment tank in the same manner as other wastes and are neutralized. Sodium hydroxide is used to neutralize waste acids, and hydrochloric or sulfuric acid are the neutralizing agents for alkaline solutions. In addition to neutralization, acid solutions are treated

to remove metals such as copper, arsenic, lead, silver, etc. by appropriate chemical methods. The removal of metals from the acid wastes is accomplished by precipitation and removal of the insoluble metal hydroxide. Treatment and removal of metals is accomplished by the following simplified steps:

1. Wash all pipelines and tanks that will be used in treatment/transfer of wastes with water.

2. Pump waste into reaction vessel.

3. Adjust the pH to the predetermined point by addition of sodium hydroxide or acid (usually the pH will need to be increased by caustic addition).

4. Add sodium hydrosulfide.

5. Adjust the pH to seven (neutral).

6. Filter sludge in basket filter and solidify with cement in 55-gallon drums for storage at Area L with ultimate disposal at permitted landfill.

7. Effluent is evaporated in Area L treatment tanks and the residue is solidified with cement in 55-gallon drums for storage at Area L prior to disposal at permitted facility.

8. Wash all pipelines and tanks used in process with water.

4.2 TA-50 CHEMICAL WASTE INCINERATOR

The chemical waste incinerator, located in Building 37 at TA-50 (Figure 4-3), is a highly modified, controlled air incinerator rated at a nominal waste feed throughput of 45 kilograms per hour. Containerized liquid and solid waste are also stored in Building 37 until accumulation of sufficient material for an incinerator run. The incinerator is currently permitted to burn radioactive and PCB-contaminated materials. The Laboratory is proposing to permit the incinerator under RCRA to provide for future operating flexibility and minimization of land disposal. The incinerator and flue gas treatment systems are capable of safely combusting a variety of hazardous wastes including low-level radioactive wastes and transuranic contaminated wastes. Since the incinerator is designed to combust materials contaminated with radioactivity, the incinerator is fitted with glove boxes that permit operation and maintenance of components that have the potential of becoming radioactively contaminated.

Personnel access to the incinerator equipment can be achieved with proper protective clothing and respiratory equipment (see Section 6.5.2).

The incinerator process is depicted in Figure 4-4. The incinerator, a controlled air, dual chamber design, is natural gas fired to provide waste ignition and to supply supplemental heat. A detailed description of the incinerator and incinerator process is provided in the trial burn plan (Appendix J); a summary of this information is provided in Section 4.2.3. Minor modifications to the incinerator were conducted after completion of the trial burn. These modifications are described in Appendix J-1.

Solid wastes are loaded into the incinerator in batches by a ram feeder. Liquids are loaded by a pump and gaseous wastes fed by gas container pressure or assisted with a vacuum pump. All wastes are charged to the primary combustion chamber operated at a nominal temperature of 760 to 980°C with air controlled to maintain nearly stoichiometric conditions. Unburned volatile components and entrained particles exit the primary chamber to the secondary chamber where excess air and supplemental heat are introduced to promote complete combustion. The secondary chamber is maintained at a nominal temperature of 870 to 1200°C and provides the needed residence time to assure complete combustion.

The flue gas treatment system consists of a quench column, a venturi scrubber, a packed-column scrubber/mist eliminator, a reheater, HEPA filters, an activated carbon adsorber, additional HEPA filters, and an induced draft blower. The purpose of the flue gas treatment system is to remove particulate matter, condense volatile metals and capture acid gases, such as sulfur dioxide, chlorine and fluorine. After purification by the flue gas treatment system, the gas exiting the filters is discharged to the atmosphere through a stack by an induced draft blower.

Container storage for wastes to be incinerated occurs in Room 117 of Building 37. Figure 4-3 shows the location of the storage area. The storage area occupies 2,000 square feet; 920 square feet of this room is dedicated for chemical waste storage and incinerator staging. Appendix V presents the design criteria for the storage/staging area. Liquid and solid wastes are

transported to Building 37 in 30- or 55-gallon drums meeting DOT Specification Nos. 17C or 17H. Corrosive wastes will be stored in DOT 17C or 17H drums with polyethylene liners, if necessary, to prevent corrosion of the metal drums. Drums will be handled and transported within the Building 37 storage area by hand trucks or forklifts. Other DOT approved containers such as 330-gallon containers described in Appendix I-2 may be utilized for storage of some waste. The room will store a maximum of 34,600 pounds of hazardous waste. A maximum of 63 55-gallon drums or 11 330-gallon containers will be stored in Room 117. Drums may be stored two high. Drums on the top layer will be stored on pallets on top of the first layer by using a forklift. Wastes will be segregated spatially in Room 117 such that only compatible wastes will be stored together.

4.2.1 Secondary Containment Areas

Two 155-gallon KYNAR-lined steel tanks are located in the incinerator facility. These tanks are used for less than 90-day storage of waste and for blending of wastes prior to incineration. The tanks and associated pumps are located within a curbed area having dimensions of 0.42 feet by 9.5 feet by 20.83 feet. Curbing around a door reduces the containment volume by about 8 cubic feet. The curbed area can contain approximately 562 gallons of liquid, an amount in excess of the total volume of waste that may be stored in the waste tanks.

The chemical waste storage area in Building 37 will occupy a room approximately 40 feet by 23 feet. The floor of this room will be recessed 16 inches below steel grating to provide approximately 1,224 cubic feet (9,155 gallons) of secondary containment volume. The concrete slab forming the floor will be continuously poured and free of joints, cracks, or gaps. Exposed concrete floors, walls and ceilings will be coated with plasite-type epoxy finish and will be designed to drain and remove liquids resulting from leaks, spills or precipitation. The sub-floor secondary containment system will be divided into two independent compartments which will provide containment for greater than 10 percent of liquids stored in each cell. Each compartment will have an independent drain sump; only compatible wastes will be stored in each containment cell.

4.2.2 Current Management Practices

Building 37 in TA-50 is fenced with access gates locked during unattended hours. Additionally, the building doors are locked when unattended and the area is patrolled by Los Alamos security personnel.

It is intended that the waste incinerator be used to reduce significantly the volume of hazardous waste requiring off-site land disposal. Incineration, coupled with batch treatment and recycling when feasible, should eventually reduce the volume of landfilled wastes to a minimal level. Some wastes may not be suitable for incineration. These wastes will be identified by actual waste analysis or process knowledge (see Section 3.2) and will be segregated from incinerator-suitable materials (see Section 3.3).

Wastes to be incinerated are stored at the Area L Waste Transfer, Packaging and Storage Facility if storage for greater than 90 days is required or in the Room 117 storage area within Building 37. Solid wastes are received at the incinerator facility in sealed containers which may be opened or sorted as necessary. Prior to incineration, the solid wastes are restricted to an area that has been engineered for proper storage of the material. Liquid wastes are also received in sealed containers. Prior to incineration, the liquid wastes are either retained in the sealed container (if the container is within a shipping cask designed for spill control) or may be transferred by dip tube/pump into the 155-gallon KYNAR-lined holding/ blending tanks. Only compatible wastes are placed in the holding/blending tanks at any one time. Compatibility is assured by mixing only wastes that are in the same packaging categories, as described in Appendix L. Segregation and transfer of the wastes are performed by trained chemical waste technicians inside a properly ventilated enclosure (see Figure 4-3 for locations of emergency equipment). During transfer operations, personnel are equipped with protective clothing and respiratory protection, as required.

The pumps used to transfer liquid wastes into the holding/feed tanks are Lutz brand air-driven centrifugal driven pumps. The pump's suction tube fits directly into the bung hole of the waste drum. These pumps are self-priming, made of Kynar and Hasteloy C276, and transfer liquid at a rate of 25 gallons per minute.

The pH of the circulating flue-gas scrub solution is continuously monitored and adjusted when desired by addition of sodium hydroxide. The specific gravity of the scrub solution is monitored and maintained at or below a value

that would allow the precipitation of solids. The specific gravity of the flue-gas solution is monitored and maintained well below the precipitation threshold value by replacement of the recycled solution with fresh water.

Ash is removed from the incinerator via two knife gate valves directly, by gravity, into a 55-gallon drum. Ash cleanup from the cooled incinerator is accomplished using sweeping wands operated through glove ports. The ash storage is limited to less than 90 days, in accordance with 40 CFR 262.34(a) (NMHWMR 204.B.1) so a RCRA permit is not required for the ash hopper. Since the incinerator is used for volume reduction of transuranic and low-level radioactive wastes, the ash, scrub solution and scrub filter bags are handled as suspect radioactive wastes. Ash is first checked to determine its radionuclide content. Ash that is classified as transuranic waste is solidified by mixing with cement, calcium sulfate, or other DOE-approved immobilizing media, and stored for proper disposal. Ash that is classified as low-level radioactive waste is analyzed according to the procedures in Section 3.0 to determine whether or not a hazardous waste component is present. If the waste is also found to be a hazardous waste, it is handled as a mixed waste. Ash that is not found to be radioactive is analyzed according to the plan presented in Section 3.0. If the ash is hazardous waste, it is handled and disposed in accordance with the waste procedures presented in this document. Thus, the incinerator is used for volume reduction of radioactive and hazardous waste as described above, and the ash is considered potentially to be hazardous waste [40 CFR 261.3 (c)(2)] [NMHWMR 201.A.2.c(2)] and is checked for radioactive and hazardous waste contamination and handled appropriately.

4.2.3 Waste Incinerator Trial Burn Plan and Trial Burn Results

Pursuant to RCRA Part B permit application requirements noted in 40 CFR 270.62 (NMHWMR 302.E.2), a trial burn plan (including a quality assurance plan) has been developed for the Controlled Air Incinerator (CAI) system at Los Alamos and a trial burn has been conducted. The trial burn, results of the trial burn, and quality assurance plans are in Appendix J. The trial burn is summarized below. Startup/shakedown procedures are not applicable because the Laboratory incinerator is an existing facility.

The RCRA Trial Burn of the Chemical Waste Incinerator was conducted during September 1986 in accordance with the Trial Burn Plan. The trial burn was

comprised of four test conditions, two of liquid feed and two of solid feed, during which the primary variable was combustion temperature. Each run consisted of six volatile organic sampling trains and three EPA modified Method 5 test periods. The principal organic hazardous constituents (POHCs) for which the destruction and removal efficiency was determined are carbon tetrachloride and trichloroethylene. During the trial burn, a total of 2,223 pounds of carbon tetrachloride and 1,000 pounds of trichloroethylene were fed into the incinerator.

The trial burn test produced process data that permits calculation of POHC destruction and removal efficiency and hydrogen chloride removal efficiency. The trial burn also documented the process feed and operating conditions that will be used in establishing operating permit conditions and allowed calculation of heat and material balances needed to confirm or assess recorded process conditions. Thus, sampling and analysis procedures were included in the trial burn plan to determine the physical-chemical characteristics of the incinerator feed materials, particularly the POHC concentrations, material feed rates, the composition and flow rates of the stack gases, the amounts of POHC discharged in the stack gases and in the quench-scrubber purge water removed by filters in the air pollution control system and the quench-scrubber water recirculation system. The monitoring procedures were selected to measure concentrations of oxygen in the combustion gases and carbon monoxide in the stack gases. Details and locations of monitoring conducted during the trial burn are presented in the trial burn plan (Appendix J).

Temperatures were continuously monitored and recorded in over twenty locations throughout the CAI process. All temperatures are continuously recorded on strip charts in the control room. The temperature in the primary chamber is automatically modulated by adjustment of the natural gas supply to the chamber to maintain the desired temperature.

Feed rates of waste liquid were measured using mass flowmeters and direct measurement of the liquid level in the feed tank. The destruction efficiency calculations are based on the waste feed volumes determined from these measurements.

During the trial burn, and during normal operation of the incinerator, a log is completed for all operations, including completion of data sheets every two hours and continuous monitoring/recording of major parameters. These logs are a record of operating conditions and provide evidence that the operator has checked and is aware of the actual operating status of the system. The time at which entries are made is shown, as are the actual instrument reading for each variable. If automatic shutdown occurs, the log will state the nature of the shutdown, the time it occurred and the suspected cause. Additionally, unusual conditions or situations such as spills or leaks are noted on the log. Further, once each shift, the shift supervisor inspects the facility for malfunctions, deterioration, operator error and discharges that could lead to discharge of hazardous waste constituents to the environment or to a threat to human health. If it is determined that a spill potential exists, corrective action are taken immediately.

Detailed results of the trial burn are presented in Section D-5h of Appendix J. During the trial burn, the incinerator achieved or exceeded the performance standards of 40 CFR §264.343. Based on these results, Los Alamos wishes to permit the incinerator for waste feed of carbon tetrachloride and lower on the EPA Incinerability Index.

After completion of the RCRA Trial Burn, several modifications have been made to the incinerator; however, the modifications are primarily equipment upgrades and thus are considered minor in nature. Detailed descriptions of these minor modifications are presented in Appendix J-1.

The interim period between completion of the trial burn and receipt of final approval for full operating authority could be several months. During this time, Los Alamos intends to continue operating the incineration system under interim status on a full-time basis for volume reduction of hazardous waste.

4.3 TA-54, AREA L WASTE TRANSFER, PACKAGING AND STORAGE FACILITIES

The waste transfer, packaging and storage facilities are used to store and to package or solidify hazardous chemical wastes. When ready, wastes are transported from the facilities to treatment facilities or off-site for disposal or recycling at a permitted facility. Two structures comprise the Area L waste