Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

SEP 16 1994

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SEP 16 1994
NM ENVIRONMENT DEPARTMENT
OFFICE OF THE SECRETARY

Kathleen Sisneros, Director
Water and Waste Division
New Mexico Environment Department
1190 St. Francis Drive
Santa Fe, NM 87502

Dear Ms. Sisneros:

The Compliance Order issued by the New Mexico Environment Department requires that the U. S. Department of Energy and the University of California "...update the waste analysis plan in Attachment A of the facility permit. This modification must specify procedures used to sample and analyze wastes as per the Toxicity Characteristic Leachate Procedure." It was mandated that this be done within five working days. This letter requests that our permit be modified as per the enclosed document. The language contained in that document responds to this requirement in the Compliance Order.

For ease of review, we have provided two versions of the document: one a red-line/strike-out version that immediately identifies the proposed changes, and the second a finished version that is "stuffable" into the existing permit. Please note that several changes were made to update the names of organizations, to correct typographical errors, and to make clarifications to the language contained in the document as it was originally written.

We request that you provide us with a current copy of the facility mailing list or, as in the past, allow us to utilize our facility mailing list to contact all interested persons and notify them of this proposed modification.

If you should have any questions concerning this issue, please feel free to contact me at (505) 665-5027, or Jon Mack of my staff at (505) 665-5026.

Sincerely,

Joseph C. Vozella
Acting Asst. Area Manager
Office of Environment and Projects

LAAMEP:7JM-265

Enclosures

cc:
See page 2

16588

SEP 16 1994

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WASTE ANALYSIS PLAN
AND
WASTE SEGREGATION PROCEDURES

PERMIT ATTACHMENT A
NM0890010515-1

Chemical Waste Operations Section
CST-7, Waste Management Group
Los Alamos National Laboratory

ATTACHMENT A
WASTE ANALYSIS PLAN

A.1 Introduction

This Permit Attachment A addresses the waste analysis and waste segregation procedures implemented by Los Alamos National Laboratory (the Laboratory). Only the sampling and analysis procedures for RCRA-controlled hazardous wastes are discussed here.

A.2 Types of Waste Generated at Los Alamos

Hazardous waste generated by Laboratory activities can be considered as three general types: (1) wastes from processing operations, (2) wastes from research and development (R&D) activities, and (3) high explosive (HE) waste. Each of these general types has unique characteristics. Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. R&D wastes, however, are typically lesser volumes of a variety of laboratory reagents, chemicals, solvents and other general laboratory waste. The composition and concentration of contaminants in a given process waste is generally uniform unless modifications to the process are made. Conversely, the waste species from R&D activities continually vary depending on the activities of the rapidly changing R&D efforts at the Laboratory. HE wastes consist of a narrow assemblage of chemicals, the concentrations of which may vary. The chemical assemblage, however, remains fairly constant.

The Laboratory has developed procedures for the identification and segregation of hazardous wastes. When a waste is identified as hazardous, it is diverted to the appropriate method of storage, treatment or disposal based on its characteristics as determined by the Waste Analysis Plan.

Presented below is a description of the types of wastes generated, treated, and stored at the Laboratory and those disposed of at off-site permitted facilities. The wastes are divided according to process or facility activities which generate the wastes.

A.2.1 Wastes from Basic and Applied Chemistry R&D Programs

Primary Laboratory sites for basic and applied chemistry R&D include the Chemistry and Metallurgy Research Building (TA-3-29), the Radiochemistry Laboratory (TA-48), the Sigma Building (TA-3-66), and the Health Research Laboratory (TA-43). Typical nonradioactive chemical wastes consist of large quantities of partly empty small containers of laboratory reagents, solvents, test samples, and other laboratory wastes. Up to several hundred waste types consisting of relatively small quantities of different acids, bases, organics, inorganics, reactive metals and other chemicals require disposal. These R&D wastes represent nearly all of the waste species included in Permit Attachment G.

A.2.2 Surface Finishing Process Wastes

The Electrochemistry Section of the MST-7 Materials Technology: Polymers and Coatings Group, located at TA-3-66, generates plating solutions containing heavy metals. Some of the wastes also contain cyanides. These plating solutions are coded as toxic and reactive wastes D007, D008, D011, F007, and F009. The Print Circuit Board Shop of the MEC-10 Electronic Manufacturing and Technician Resources Group, located at TA-3-40, generates primarily acid/base wastes heavily contaminated with copper. This shop generates plating solutions contaminated with lead and mercury. These wastes are coded as D002, D008, and D009, respectively. The Fabrication Section of the M-7 Detonation Systems Group, located at TA-22-91, generates a copper contaminated ferric chloride etching waste that is corrosive. It is coded D002.

A.2.3 Isotope Separation Wastes

The Isotope and Structural Chemistry Group, INC-4, generates 7N nitric acid and 14N sulfuric acid wastes that are hazardous because of their corrosive characteristic (D002). Based on knowledge of the waste generating process, it has been determined that these wastes do not contain heavy metals.

A.2.4 Shops Department Wastes

The Main Shops Department, Building TA-3-39, houses most of the machine shop capabilities at the Laboratory. Waste materials from machining operations are segregated by the metal they contain when generated. (For example, there are containers for aluminum chips and turnings.) Some machining operations generate waste lithium metal and lithium hydride, both of which are hazardous because of their reactivity (D003). These materials, when generated, are known and are not commingled with other metal wastes. The Main Shops Department also generates waste nonhalogenated solvents (F003) and halogenated degreasers (F001) and solvents (F002).

A.2.5 Explosives Wastes

High explosives (HE) waste is generated by the Dynamics Testing (M) and Design Engineering (WX) Divisions in the course of processing and testing various HE materials. Processing includes pressing, machining, and casting HE. Waste occurs as discrete pieces of HE, as well as chips, machine cuttings, and powder. Solid HE may include off-specification or old explosives, as well as scrap pieces of HE from processing operations. The chips, cuttings, and powder are usually in the form of waterborne suspensions, collected in specially designed accumulating/settling sump tanks. Spent carbon (K045) from the TA-16 wastewater treatment unit is generated approximately twice a year. Wastes also consist of materials contaminated with HE; these may include paper, oil, solvents, wood, machine tools, fixtures, etc. HE-contaminated equipment, tools, and other large items are considered reactive, (D003). HE-contaminated oil may also contain listed solvents, F001, F002, F003, and/or F005, as well as exceeds TCLP levels for barium, (D005). Chemically, the predominant wastes consist of HMX (high

melting explosives), RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentaerythriotol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Nearly all the HE waste substances are ignitable (D001) or reactive (D003) and barium nitrate is a TCLP waste (D005). Residues from HE waste are generated by flashing or burning HE waste at TA-16. These residues are typically present in the uppermost layer of sand that covers the burn pad. The sand from the two pads used to burn pieces of explosives is considered hazardous because of its barium content (D005).

A.2.6 Maintenance Activity Wastes

The Laboratory's Engineering Division and support maintenance contractor, JCI, generate a variety of wastes in the course of performing maintenance work. Hazardous wastes range from residual pesticides and herbicides (e.g. D001 and D016) to paints/thinners (e.g. D001, D008, and F003). Classification of these wastes can generally be performed by process knowledge and the use of Material Safety Data Sheets (MSDSs).

A.2.7 Chemically Contaminated Equipment

In addition to the wastes noted above, various laboratory items that contain chemical residues or are otherwise chemically contaminated may be considered hazardous waste. Empty process tanks are typical contaminated items. Empty drums and containers meet the requirements of HWMR-6 Part 2, 40 CFR Section 261.7 and are therefore not considered hazardous waste. Generation of this type of hazardous waste occurs throughout the Laboratory facilities and produces a wide variety of waste types.

A.2.8 Waste Treatment Residues

Treatment operations at the Laboratory generate solid hazardous waste. These residues include the barium contaminated sand from the explosives burning operation, ash from the incinerator, and sludge from the chemical treatment operations. The classification and volume of this waste varies with the waste that was treated.

A.3 Waste Analysis and Handling Procedures for Storage

This section specifies the procedures for the identification and handling of hazardous waste for storage at the Laboratory. The decision process is summarized in Table A-1.

A.3.1 Waste Identification

When chemical substances are declared to be in excess, the originating group completes a Chemical Waste Disposal Request (Form 10-3A, Figure A-1) and sends the form to the Waste Management Group (CST-7). The request lists the chemical wastes the generating group needs to dispose of, the

quantity and physical form of the wastes, and other pertinent information such as the condition of the containers. Material Safety Data Sheets (MSDSs) and existing analytical data may also be available and attached.

Using 49 CFR § 172.101, the CST-7 staff assigns each chemical waste item (bottle, container, etc.) the appropriate DOT Hazard Class. This assignment and chemical characteristics determine the compatibility of one waste item with another waste item.

Additional information assigned during this review includes EPA hazardous waste codes and transportation information. The completed request form, container marking, and MSDS/analytical data serve as the waste analysis record for the waste to be stored per the following segregation schemes.

A.3.2 Waste Segregation

To prevent adverse interactions of incompatible chemical wastes and to facilitate recycling or treatment of wastes, chemical wastes will be segregated into the following general categories:

- Flammables, such as organic solvents (e.g. acetone, benzene, and toluene);
- Corrosive acidic wastes, including organic and mineral acids;
- Corrosive caustic wastes;
- Oxidizers, such as perchloric or chromic acid, and nonacidic oxidizers, such as permanganates and chlorates;
- Reactive metals and compounds, such as sodium, lithium hydride, and phosphorous trichloride; and
- Non-DOT regulated wastes (e.g. nonreactive metals, salts, neutral compounds, cyanide or sulfide compounds, and poisons).

Utilizing the DOT Hazard Class assigned to the container and Table A-2, an area for storage of the waste is assigned. The organics and oxidizers have subcategories of segregation that will be followed for packaging/compositing of wastes to ensure that potential incompatibles are not combined together.

A.4 Waste Analysis and Handling Procedures for Treatment and Disposal

The Land Disposal Restrictions (LDRs) require that hazardous waste be treated to specified levels or with a specified technology prior to land disposal. The analysis procedures used to determine the LDR treatment standards that are applicable to the waste are described in this section. The decision process for analysis, handling, treatment, and/or disposal is summarized in Table A-1.

Several terms used throughout this section require further explanation.

- LDR is land disposal restricted. When used in this section it refers to all waste currently regulated under 40 CFR Part 268.
- TCLP metals refers to those eight metals regulated under the TCLP characteristic.
- KOP refers to knowledge of process. In the case of original containers of materials, the information from the Chemical Disposal Request Form, as described earlier, is the KOP documentation. All other waste is documented by previous analyses or information provided by the generator.
- Labpack waste refers to waste containers that have been packed with absorbents in "lab pack" containers for safe handling and storage. All containers less than 5 gallons must be lab packed.
- Commercial chemical waste refers to chemical substances still in their original containers that have been declared a hazardous waste.
- References to the use of a Coliwasa sampler also includes the use of coliwasa-type sampling instruments.

A.4.1 Organic Waste

Organic waste is divided into four processing categories: uncomposited labpack chemical waste, drummed waste, composited commercial chemical waste, and composited drummed waste. The following discussions treat each as a unique analysis entity.

A.4.1.1 Uncomposited labpack waste

These wastes are those that, due to their toxicity or their physical (solid) state, will not be composited but will be packaged in lab pack containers with absorbent. Compatible inorganic and organic wastes are packaged together in these lab pack containers. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package, therefore, most of this waste is and will be shipped offsite. The packaging list of bottles and cans in the lab pack container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.1.2 Drummed waste

There are very few ongoing operations at the Laboratory that generate an organic process waste. As a result, each drum of this waste is virtually a unique entity. The exception would be those cases where we know more than one drum of waste came from the same place, e.g. 400 gallons of oil drained from the same machine reservoir. The drums are all sampled using a coliwasa sampler if liquid or a core sampler if solid. Because this waste is destined for incineration, the following parameters are tested for: pH, ash content, viscosity, heat value, TCLP metals, total organic halogen, total organic chlorine, sulfur, and chemical composition. This latter will identify approximately ninety-five percent

of the substances that are present in the waste. Availability of documented KOP will determine if the organic trace analyses need to be performed. Documentation or analyses will identify the presence/absence of organic LDR compounds, trichlorofluoromethane, bromoform, dichlorodifluoromethane and ethylene dibromide. These latter four compounds are only necessary if the waste is to be incinerated onsite. The test methods are listed in Table A-3.

Throughout the year, containers of organic waste mixtures, smaller than a 55-gallon drum, are generated in the many laboratories at the Laboratory. The generator maintains a list of the substances placed in these containers. This allows CST-7 personnel to confirm compatibility of these wastes before they are composited into 55-gallon or larger containers. When the composite receptacle is full, the waste is analyzed as described above for any large container of organic waste.

Solid organic waste is sampled using a core sampler or a grab sampler if the material can not be penetrated by a core sampler. Analytical parameters, frequencies, and test methods would be the same as those outlined above for any large container of waste. Debris that is organically contaminated is analyzed per Section A.4.8.

A.4.1.3 Composited commercial chemical waste

Composited commercial chemical wastes are those bottles and cans of liquid waste that have been combined for the purpose of incineration. Compatibility is ensured by following the procedures in Section A.3.1 and A.3.2. Since all chemicals in a composite drum are known entities, the list of chemicals and their quantity serves as the primary analysis record. This listing is sufficient to allow the identification of any and all LDR waste. When the drum is full, it is sampled with a coliwasa sampler. Since chemical composition is known, only the physical parameters need to be calculated or analyzed for. If any physical characteristics can not be calculated due to the variety of substances placed in the drum, the sample is analyzed for that parameter. Therefore, analysis or calculation would provide pH, flashpoint, ash content, viscosity, heat value, total organic halogens, and total organic chlorine. The methods used for these analyses are specified in Table A-3. This will be done for each container of composited waste since each container is unique. Calculated parameters for waste to be incinerated onsite will be verified according to the schedule in Permit Module V, C.2.

A.4.1.4 Composited drummed waste

Composited drummed waste are those drums of waste for which the analytical data on pH, flashpoint, ash content, viscosity, heat value, total organic halogens, and total organic chlorine already exists. These wastes are combined in either the TA-54, Area L storage tanks or the liquid feed tanks at the incinerator for the purposes of offsite shipment or onsite incineration. Compatibility is ensured by following the procedures in Sections A.3.1 and A.3.2. Chemical and physical parameters can be

calculated from the existing data. If at any time calculations of physical parameters, such as heat value, is inadequate, those identified analyses will be redone. The calculations will be performed on each unique tank of waste. Calculated parameters for waste to be incinerated onsite will be verified according to the schedule in Permit Module V, C.2.

A.4.2 Corrosive Acid Waste

Corrosive acid waste is handled in two primary processing categories: commercial chemical and process waste. The following discussions treat each as a unique analysis entity.

A.4.2.1 Commercial chemical waste

This waste stream consists of unused acids in original containers. The labels on the containers and MSDSs continue to serve as the primary analytical record. Those acids that can be reused by another component of the Laboratory are redistributed for use as a commercial product. Those that can not be reused are treated by elementary neutralization. This occurs primarily at the TA-50 Liquid Waste Treatment Plant but could occur throughout the Los Alamos National Laboratory in individual laboratories.

A.4.2.2 Process Waste

There are three categories of process waste: nonroutine nonmetallic waste, nonroutine metallic waste, and routine waste. Each is discussed separately. Documented KOP will negate the concern for the presence of LDR organic compounds. Therefore, references to LDR in this section refers only to inorganic constituents.

Nonroutine nonmetallic waste is periodically generated throughout the Laboratory. This waste will be analyzed for pH, the TCLP metals, nickel and thallium. This allows confirmation of the presence/absence of LDR material. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

Nonroutine metallic waste is generated primarily by the Laboratory's electroplating operations. At the time of generation, these wastes are identified by the generator as containing heavy metals. The generator may also provide the approximate metal concentration, if the information is available. This waste will be analyzed for pH, TCLP metals, nickel and thallium. This allows confirmation of the presence of LDR material and establishes the parameters that are analyzed for at the completion of treatment. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There are five routinely generated acidic waste streams at the Laboratory: nonmetallic nitric acid, nonmetallic sulfuric acid, nonmetallic acid stream, metallic ferric chloride, and metallic ammonium persulfate. Each of these waste streams has a confirmed basis for RCRA regulation that establishes the parameters of concern for treatment. All three of the nonmetallic acid waste streams are routinely analyzed for pH. The metallic ferric chloride is analyzed for pH, chromium, silver, lead, and copper. The metallic ammonium persulfate is analyzed for pH, lead, and mercury. Annually, all of these streams are all reevaluated for pH, all TCLP metals, nickel, and thallium. This confirms that the waste has not changed in composition and identifies the LDR components. Sampling is conducted with a coliwasa sampler. All test methods are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste or a new waste stream is identified, these wastes will be characterized following the procedures described in the above paragraph. Routine testing parameters will be established and reverified on an annual basis.

A.4.3 Corrosive Caustic Waste

Corrosive caustic waste is divided into two processing categories: commercial chemical waste and process waste. The following discussions treat each as a unique entity for analysis.

A.4.3.1 Commercial chemical waste

This waste stream consists of caustic products (bases) in their original containers. The labels on the containers and MSDSs serve as the primary analytical record. Those bases that can be reused by another component of the Laboratory are redistributed for use as a commercial product. Those that can not be reused are generally treated by elementary neutralization. This occurs primarily at the TA-50 Liquid Waste Treatment Plant but could occur throughout the Laboratory in individual laboratories.

A.4.3.2 Process waste

There are three categories of process waste: nonroutine nonmetallic waste, nonroutine metallic waste, and routine waste. Each is discussed separately. Documented KOP will negate the concern for organic LDR compounds. Therefore, references to LDR in this section refers only to inorganic constituents.

Nonroutine nonmetallic waste is periodically generated throughout the Laboratory. This waste will be analyzed for pH, the TCLP metals, nickel and thallium. This allows confirmation of the presence of LDR material. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

Nonroutine metallic waste is generated primarily by the Laboratory's electroplating operations. At the time of generation, these wastes are identified by the generator as containing heavy metals. This waste will be analyzed for pH, TCLP metals, nickel, thallium, and cyanide. This procedure allows confirmation of the presence of LDR material and establishes the parameters that are analyzed for at the completion of treatment. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There are three routinely generated corrosive base process waste streams at the Laboratory: ammonium etchant, "Replenisher" solution, and "Cuposit." The Replenisher and Cuposit are trade names. The ammonium etchant is analyzed for pH, copper, and lead. The Replenisher is analyzed for pH and lead. The Cuposit is analyzed for pH and mercury. Annually, these waste streams are all reevaluated for pH, all TCLP metals, nickel, and thallium. This allows confirmation of the presence of LDR substances and that the waste has not changed in composition. Sampling is performed with a coliwasa sampler. Test methods used are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste stream, or a new waste stream is identified, these wastes will be characterized following the procedures described in the above paragraphs. Routine testing parameters will be established and reverified on an annual basis.

A.4.4 Oxidizer Waste

Oxidizer waste is divided into two processing categories: acid waste and uncomposited labpack waste. Acid oxidizer waste is handled according to the procedures described in Section A.4.2.

Oxidizer labpack wastes are not composited due to the high fire risk of doing so. These wastes are packaged in lab pack containers with absorbent. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package; therefore, most of this waste is and will be shipped offsite. The packing list of bottles and cans in the lab pack container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.5 Reactive Wastes

Reactive waste has only two processing categories: uncomposited labpack waste and routine process waste. (Explosives waste is treated as a separate category of waste and is discussed in Section A.4.7.) The following discussions treat each as a unique analysis entity.

A.4.5.1 Uncomposited labpack waste

Reactive labpack wastes are not composited due to the high fire and explosion risk of doing so. They are packaged in lab pack containers with absorbent. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package; therefore, most of this waste is and will be shipped offsite. The packing list of bottles and cans in the lab pack container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.5.2 Process waste

The only ongoing operation at the Laboratory that generates a reactive process waste is the machining operations. Periodically, the machinists are required to work with lithium hydride and to a lesser degree lithium metal. This results in drums of lithium hydride dust and lithium chips, respectively. Process knowledge serves as the analytical record for this waste stream.

If large quantities of reactive waste should be produced elsewhere in the Laboratory, documented process knowledge would also be used as the analytical record.

A.4.6 Inorganic Wastes

Inorganic waste is divided into two processing categories: uncomposited commercial chemical waste and process waste. The following discussions treat each as a unique analysis entity.

A.4.6.1 Uncomposited commercial chemical waste

These wastes are generally solid material and therefore do not lend themselves to compositing. They will be packaged in lab pack containers with absorbent. Organic and inorganic wastes that are compatible are lab packed together. The entire container is then usually destined for offsite land disposal. The packing list of bottles and cans in the lab pack container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.6.2 Process waste

Four categories of inorganic process waste exist: liquid waste, primary metal waste, nonroutine solid waste, and routine solid waste. Inorganic liquid waste is generally acidic or basic and is thus treated under the scenarios described in Sections A.4.2 and A.4.3.

Process knowledge is considered adequate for the further treatment/disposal/recycle of waste streams such as lead and mercury.

Nonroutine solid waste is periodically generated throughout the Laboratory. This waste will be analyzed for TCLP metals, nickel, and thallium. This allows confirmation of the presence of inorganic

LDR material. The absence of organics will be established by either documented KOP or analyses. The test methods employed are listed in Table A-3. Sampling is performed using a core sampler if possible, or a grab sampler if it is not possible to penetrate the waste with a core sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There is one routinely generated inorganic solid waste at the Laboratory. It is the barium contaminated sand from the explosives burning operation. Barium is the only established parameter of concern for treatment and therefore is the only parameter routinely analyzed for. Annually, a sample will be analyzed for the other TCLP metals. Sampling is conducted with a core sampler. Test methods are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste stream, or a new waste stream is identified, these wastes will be characterized following the procedures described in the above paragraph. Routine testing parameters will be established and reverified on an annual basis.

A.4.7 Explosives Waste

Due to the limited number of areas producing explosives waste and the safety problems associated with analyzing explosives waste, process knowledge of the waste sent for treatment by open burning or open detonation is the waste analysis record. Table A-4 lists the various explosives used at the Laboratory. Open burning/open detonation is conducted under interim status according to HWMR-5 Part VI, Section 265.282.

A.4.8 Contaminated Solid Waste

The waste included in this category is generally classified as debris. Contaminated soil would be addressed under the respective chemical category as outlined in the above sections. The contaminant of concern is known for all waste in this category, but the substrate can not be readily analyzed. Therefore, until the item in question is cleaned it is treated as a hazardous waste. The types of waste covered by this provision would be tanks and rags.

A.4.9 Waste Treatment Residuals

Waste treatment residuals are the liquid and solid waste streams resulting from the treatment of hazardous wastes. There are currently four types of residual waste streams: the treated liquid and precipitate from chemical treatment operations at either TA-50 or -54 and the scrubber water and ash from the incinerator. Barium contaminated sand is also a treatment residue but because it receives further chemical treatment it is discussed in Section A.4.6.2.

The liquid from chemical treatment operations is tested to insure that (a) treatment is complete and (b) remaining chemical concentrations are within the discharge guidelines established under the NPDES permit for the TA-50 radioactive liquid waste treatment system. Sections A.4.2 and A.4.3 discuss the procedures used to establish those parameters that would be tested for at the conclusion of treatment. If documented KOP can not exclude the presence of F-listed solvents, each batch of treatment supernate will be tested for the compounds listed in 40 CFR § 261.3.(a).2.iv.A and B. Samples from the Batch Waste Treatment Unit are taken from a sampling loop. Samples from the treatment tanks at TA-54 will be taken by either a coliwasa or grab sample. Test methods used are provided in Table A-3. The scrubber water from the incinerator will always be within the discharge guidelines established under the NPDES permit for the TA-50 radioactive liquid waste treatment system thereby negating chemical analysis. The scrubber will be analyzed annually to verify this.

Solids from the chemical treatment operations and the ash from the incinerator are tested for the TCLP metals that were found to be present before treatment. As necessary, these wastes are then cemented or otherwise solidified. The solidified matrix may again be sampled by removing a sample from the mixture before curing. After curing, it is tested for the same TCLP metals. Assuming there are no listed materials present, this would allow a determination to be made as to whether the waste remained a hazardous waste or not. This procedure would be followed for each batch of solids requiring processing.

A.4.10 Unknown Material

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. The individual waste may be tentatively characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. This information is used to restrict the choices of initial waste analysis to a small population of chemicals.

For purposes of managing unknown wastes a small volume is defined at the Laboratory as less than one liquid gallon (or approximately four liters). The rationale for the small volume designation is that this is the minimum quantity of sample that is needed to analyze the waste. At and below this volume limitation, the sample is entirely consumed in the analytical procedure. Small volumes of unknown wastes are analyzed for pH, flashpoint, and reactivity. This allows the material to be categorized for further handling.

Volumes greater than one gallon or four liters of a single unknown waste require a more detailed analytical scheme. These wastes are tested for reactivity, corrosivity, ignitability, TCLP metals, and any other analyses indicated by the initial data gathered on the material. Sufficient detail must be

reported to allow the assignment of the proper EPA hazardous waste code to the waste. All test methods used are outlined in Table A-3.

A.5 Verification Analyses

Knowledge of process is used to identify the waste streams; however, the hazardous constituents must be verified using specified analytical procedures at specified intervals. This section describes the verification process implemented by the Laboratory.

A.5.1 Knowledge of Process

One in each one hundred KOP determinations based on a list compiled by the generator as wastes are accumulated in a compositing container will be verified by quantitative chemical analysis. Factory sealed containers and original containers redistributed for use within the facility will not be included in this analysis. Detection of hazardous constituents above one percent by volume, not recorded in KOP documentation, or variations in concentration greater than twenty five percent from the estimate

$$\frac{C_{meas} - C_{est}}{C_{est}} - 100 \geq 25$$

shall be cause for rejection of the KOP and shall require an investigation into the cause. A written record of the investigation shall be retained with the facility record. Any individual who twice fails to properly document KOP constituents shall be permanently prohibited from KOP certification. An entry to this effect shall be made in the facility record.

Unused commercial chemicals in original containers that have been declared a hazardous waste and accepted by an off site disposal or treatment facility need not be verified unless rejected by the off site treatment facility.

A.5.2 Annual Verification

All routinely generated waste streams that have documented waste profiles will be analyzed annually to verify that they have not changed. Any information that indicates a change in a process that generates a waste that may affect the waste, shall cause the waste to be analyzed not later than the next time the waste is generated. All such analyses shall be recorded in the facility record.

A.5.3 Discharges to the Industrial Wastewater System

In those instances when knowledge of process cannot be used to document the absence of listed hazardous waste solvents in the effluent from the Batch Waste Treatment Unit (BWTU), the Permittee may use the exclusion described in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv). A weekly

composite sample will be analyzed from the headworks of the radioactive liquid waste treatment plant at TA-50-1 for the constituents cited in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(A) and HWMR-5, Part II, 40 CFR Section 261.3(a)(1)(iv)(B). The average concentration of each category ((A) and (B)) will then be computed from the analytical results and the volume of flow at the headworks will be calculated. In an effort to ensure conservency, the lowest weekly volume and the highest weekly concentration of the composite samples from the most recent 3 week period will be used to compare with each batch's concentration from the BWTU.

A sample from the BWTU effluent will also be taken and analyzed for the same constituents referenced in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv). This sample will be taken from the known volume of effluent present in the BWTU prior to discharge. Effluent will then be temporarily stored in Tuff Tanks(®) while awaiting analytical results. The combination of the TA-50-1 average and the weekly average of the BWTU effluent samples will be evaluated to determine if the cited exclusion can be achieved.

In order to obtain the final concentration of solvents entering the headworks, the weight of solvents in each respective category ((HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(A) and HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(B)) for both the BWTU and the TA-50-1 plant will be totaled. The cumulative solvent weight will then be divided by the lowest weekly volume of liquid to be entered into the TA-50-1 plant. This value would then represent the resultant mixture's maximum concentration as it enters TA-50-1 (see equation below). No effluent from the BWTU will be discharged to the TA-50-1 plant if the conditions necessary for the exclusion cannot be satisfied.

The waste generator will document pursuant to Permit Attachment A that process knowledge of the individual waste streams indicates either the absence or presence of spent solvents. If process knowledge confirms the absence of such compounds, the wastes will be discharged without composite weekly samples being collected from the BWTU.

$$V = Volume\ (l)$$

$$C = concentration\ (mg/l)$$

$$C\ final = \frac{[V\ BWTU\ X\ C\ BWTU + C\ TA\text{-}50\ X\ V\ TA\text{-}50]}{V\ BWTU + V\ TA\text{-}50}$$

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

CHEMICAL WASTE DISPOSAL REQUEST
RETURN FORM TO WASTE MANAGEMENT, MS J593
Telephone Number 667-7579

Requested By (Name A)	Telephone Number	Group		Date Sent		Date Tracking Number
Waste Generator (Name B)	Telephone Number	Tech Area	Building	Area/Wing	Room	Date Picked Up/Initials

Line Number	Number of Containers	Volume of Each Container	CHEMICAL NAME[1]	HAZARD[2]
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

I hereby certify that the information supplied above is correct.

Generator Signature	Date

[1]CHEMICAL NAME - Name of single compound, names of all compounds in mixture, trade-name and/or number of commercial product. For trade-name products, attach the manufacturer's MSDS.
[2]For HAZARD insert the appropriate letter: C - corrosive, I - ignitable, R - radioactive, T - toxic, X - reactive, S - solid, L - liquid, G - gas.

HS Form Number 19-3A Part A (4/89)

Figure A-1-Chemical Waste Disposal Request Form

NM0890010515-1

Requested By (Name A)	Telephone Number	Group		Date Sent		Data Tracking Number
Waste Generator (Name B)	Telephone Number	Tech Area	Building	Area/Wing	Room	

Line Number	RQM	Code	DOT Proper Shipping Name	DOT Hazard Class	UN/NA No.	HSE-7 Code	EPA Codes	Handling Code	Weight	Form Number
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

I hereby certify that the information supplied above is correct according to the applicable regulations.

Reviewer Signature	Date

HS Form Number 10-3A Part B (4/89)

Figure A-1 (cont.)

NM0890010515-1

REACTIVITY GROUP NO.	REACTIVITY GROUP NAME	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Acids, Mineral, Nonoxidizing	1												
2	Acids, Mineral, Oxidizing		2											
3	Acids, Organic			3										
4	Alcohols and Glycols				4									
5	Aldehydes					5								
6	Amides						6							
7	Amines, Aliphatic and Aromatic							7						
8	Azo Compounds, Diazo Compounds and Hydrazines								8					
9	Carbamates									9				
10	Caustics										10			
11	Cyanides											11		
12	Dithiocarbamates												12	
13	Esters													13
14	Ethers													
15	Fluorides, Inorganic													
16	Hydrocarbons, Aromatic													
17	Halogenated Organics													
18	Isocyanates													
19	Ketones													
20	Mercaptans and Other Organic Sulfides													
21	Metals, Alkali and Alkaline Earth, Elemental													
22	Metals, Other Elemental & Alloys in Powders, Vapors, or Sponges													
23	Metals, Other Elemental & Alloys in Sheets, Rods, Drops, Ingots, etc													
24	Metals and Metal Compounds, Toxic													
25	Nitrides													
26	Nitrites													
27	Nitro Compounds, Organic													
28	Hydrocarbons, Aliphatic, Unsaturated													
29	Hydrocarbons, Aliphatic, Saturated													
30	Peroxides and Hydroperoxides, Organic													
31	Phenols and Cresols													
32	Organophosphates, Phosphorothioates, Phosphorodithioates													
33	Sulfides, Inorganic													
34	Epoxides													
100	Combustible and Flammable Materials, Miscellaneous													
102	Explosives													
103	Polymerizable Compounds													
104	Oxidizing Agents, Strong													
105	Reducing Agents, Strong													
106	Water and Mixtures Containing Water													
107	Water Reactive Substances													
		1	2	3	4	5	6	7	8	9	10	11	12	13

← EXTREMELY REACTIVE

Figure A-2 Hazardous Waste Compatability Chart

NM0890010515-1

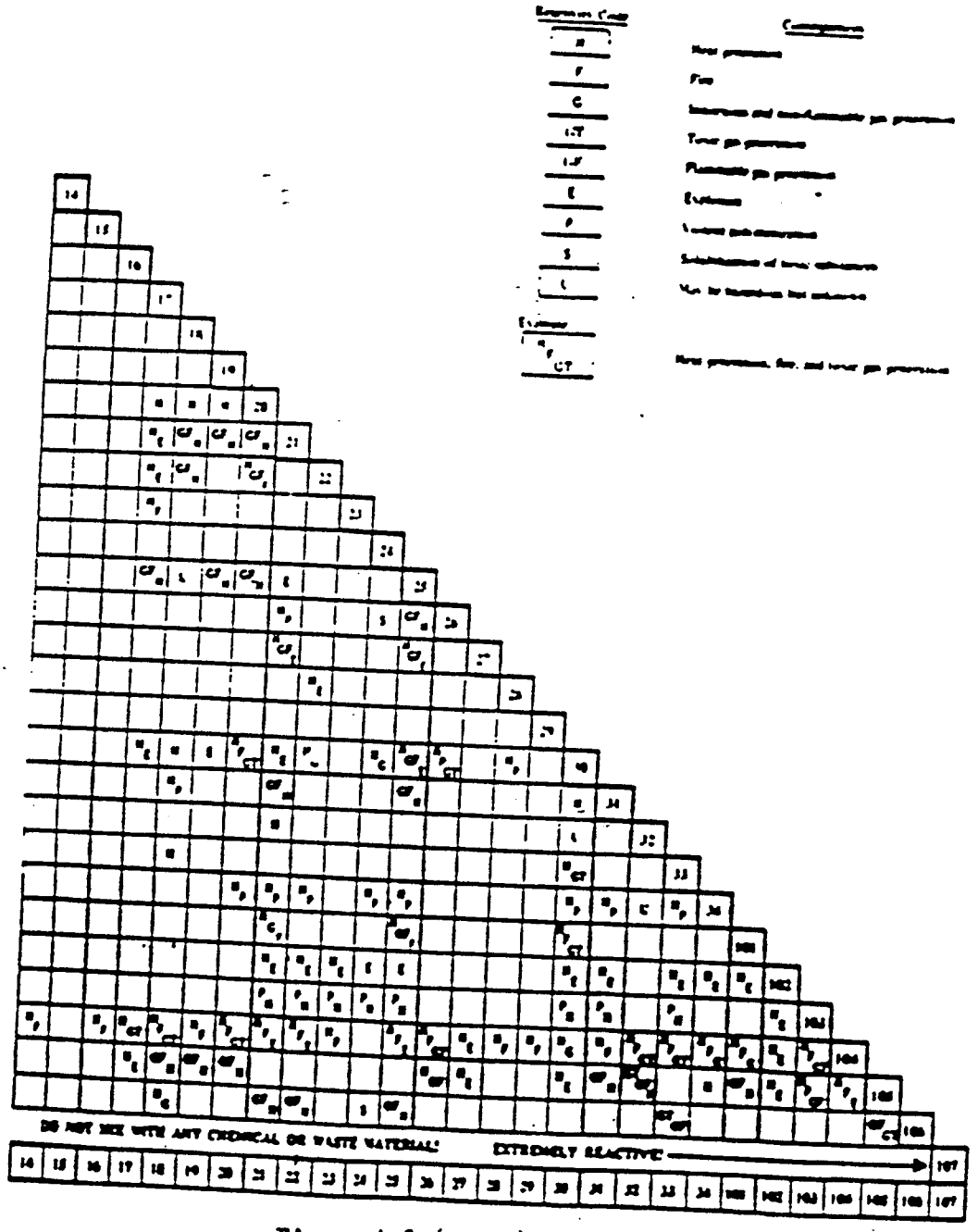

Figure A-2 (cont.)

TABLE A-1

Wastestreams, Analytical Parameters, and Rational

Wastestream	Analytical Parameters	Rationale Reference
Organic Waste		
Uncomposited labpack	Packing list	A.4.1.1
Drummed	pH, TCLP metals, TOX, TOC, ash content, viscosity, heat value, sulfur, chemical composition	A.4.1.2
Composite labpacks and drummed waste	List of chemicals, pH, flashpoint, ash content, viscosity, heat value, TOX, TOC	A.4.1.3, A.4.1.4
Corrosive Acid Waste		
Commercial chemical	pH, as necessary	A.4.2.1
Nonroutine, nonmetallic process waste	pH, TCLP metals, nickel, thallium	A.4.2.2
Nonroutine metallic process waste	pH, TCLP metals, nickel, thallium	A.4.2.2
Routine nonmetallic process waste	pH	A.4.2.2
Ferric chloride	pH, chromium, silver, lead, copper	A.4.2.2
Ammonium persulfate	pH, lead, mercury	A.4.2.2
Corrosive Caustic Waste		
Commercial chemical	pH, as necessary	A.4.3.1
Nonroutine, nonmetallic process waste	pH, TCLP metals, nickel, thallium	A.4.3.2
Nonroutine, metallic process waste	pH, TCLP metals, nickel, thallium	A.4.3.2
Ammonium etchant	pH, copper, lead	A.4.3.2
"Replenisher"	pH, lead	A.4.3.2
"Cuposit"	pH, mercury	A.4.3.2
Oxidizer Waste		
Labpacks	Packing list	A.4.4

TABLE A-1

Wastestreams, Analytical Parameters, and Rationale
(Continued)

Wastestream	Analytical Parameters	Rationale Reference
Reactive Waste		
Labpacks	Packing list	A.4.5.1
Process waste	Knowledge of process	A.4.5.2
Inorganic Waste		
Commercial chemical	Packing list	A.4.6.1
Primary metals	Knowledge of process	A.4.6.2
Nonroutine solid	TCLP metals, nickel, thallium, organics if necessary	A.4.6.2
Barium sand	Barium	A.4.6.2
Explosives Waste	Knowledge of process	A.4.7
Contaminated Debris	Knowledge of process	A.4.8
Waste Treatment Residues		
Chemical treatment liquids/solids	Previously established parameters	A.4.9
Incinerator ash	Previously established parameters	A.4.9
Incinerator scrubber water	Knowledge of process	A.4.9
Unknowns		
Small volume (<1 gal.)	pH, flashpoint, reactivity	A.4.10
Large volume	All parameters necessary to identify waste completely	A.4.10

Table A-2

HAZARDOUS WASTE PACKAGING AND STORAGE SEGREGATION SCHEME

STORAGE CATEGORY	DOT HAZARD CLASS	LAB PACK COMPATIBILITY (*Material within each line item may be packaged together*)
Flammables/Combustibles	Flammable Liquid (3)	All materials assigned the same hazard class/division and generic proper shipping name may be packaged in the same lab pack. Materials assigned to hazard class/divisions 2 or 5.2 may not be packaged in lab packs.
	Flammable Solid (4.1, 4.2)	
	Flammable Gas (2.1)	
Oxidizers	Oxidizer (5.1)	
	Organic Peroxide (5.2)	
	Nonflammable gases that are oxidizers (2.2)	
Acids	Corrosive Material (8)	
	Nonflammable gases that are acids (2.2)	
Caustics (Bases)	Corrosive Material (8)	
	Nonflammable gases that are caustic (2.2)	
Reactives	Flammable Solid (4.3)	
	Nonflammable gases that are reactive (2.2)	
	Explosives (1)	• Explosives (*not accepted at TA-54, Area L*)
ORM-D/Poisons Class 9/Nonregulated	ORM-D, Poisonous Materials (6.1) Poisonous Gas (2.3) Miscellaneous Hazardous Mateiral (9)	All materials assigned the same hazard class/division and generic proper shipping name may be packaged in the same lab pack. Materials assigned to hazard class/divisions 2 or 5.2 may not be packaged in lab packs.

TABLE A-3

Waste Analysis Parameters and Test Methods

Parameter	Test Method	Reference[1]
Ignitability	Pensky-Martens Closed-Cup Method	(L) SW1010 (L) ASTM D93-80
Reactivity	Test method to determine hydrogen cyanide released from waste Test method to determine hydrogen sulfide released from waste	(L,S) SW Chapter 7, p. 5-14
Corrosivity	Electrometric (pH of aqueous solution)	(L) SW9040
Toxicity Characteristic	Toxicity Characteristic Leaching Procedure (TCLP) Extraction	(L,S) SW1311
• Metals	AA Spectroscopy	
Arsenic		(L) SW7060
Barium		(L) SW7081, SW7080
Cadmium		(L) SW7131, SW7130
Chromium		(L) SW7191, SW7190
Lead		(L) SW7421, SW7420
Selenium		(L) SW7740
Silver		(L) SW7761, SW7760
Mercury	Manual Cold Vapor Technique	(L) SW7470
• Volatile Organics	Gas Chromatography/Mass Spectrometry (GC/MS)	
benzene	- Packed Column	(L) SW8240
carbon tetrachloride	- Capillary Column	(L) SW8260
chloroform		
chlorobenzene		
1,2-dichloroethane		
1,1-dichloroethylene (1,1-dichloroethene)		
methyl ethyl ketone (2-butanone)		
tetrachloroethylene (tetrachloroethene)		
trichloroethylene (trichloroethene)		
vinyl chloride		

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Toxicity Characteristic (Continued)		
• Semivolatile Organics o-cresol (2-methylphenol) m-cresol (3-methylphenol) p-cresol (4-methylphenol) 1,4-dichlorobenzene 2,4-dinitrotoluene hexachlorobutadiene (hexachloro-1, 3-butadiene) hexachloroethane hexachlorobenzene nitrobenzene pentachlorophenol pyridine 2,4,5-trichlorophenol 2,4,6-trichlorophenol	GC/MS - Packed Column - Capillary Column	 (L) SW8250 (L) SW8270
• Organochlorine Pesticides endrin lindane (gamma BHC) methoxy-chlor heptachlor toxaphene chlordane	Gas Chromatography	(L) SW8080

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Toxicity Characteristic (Continued)		
• Chlorinated Herbicides 2,4-D 2,4,5-TP (Silvex)	Gas Chromatography	(L)SW8150
Chemical Composition	95 percent organic composition by GC/FID	(L) SW8100
Trace Organic Analysis	Any of the following: Volatile organic compounds - GC/MS Semivolatile organic compounds - GC/MS - Packed column - Capillary column	 (L) SW8240 (L) SW8250 (L) SW8270
Heat Value	Bomb calorimeter	(L) A006, ASTM D240
Organic Chlorine	Halide titration of combustion residue	(L,S) A004, ASTM D2361
Ash Content	Residue after combustion in muffle furnace	(L) A001, ASTM D482 (S) A001, ASTM D3174
Cyanide, Free and Total	Distillation and colorimetric (UV)	(L) SW9012
Chrome	Colorimetric method for hexavalent chromium	(L) SW7196
Sulfide	Colorimetric titration	(L) SW9030

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Total Metals[2]	Acid Digestion	(L,S) SW3020
Arsenic	Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP)	(L) SW6010
Barium		(L) SW6010
Beryllium		(L) SW6010
Cadmium		(L) SW6010
Chromium		(L) SW6010
Lead		(L) SW6010
Nickel		(L) SW6010
Selenium		(L) SW6010
Silver		(L) SW6010
Thallium		(L) SW6010
Zinc		(L) SW6010
Mercury	Manual Cold Vapor Technique	(S) SW7471 (L) SW7470
Free Liquids	Paint Filter Liquids Test	(S) SW9095

[1]"A" refers to *Sampling and Analysis Methods for Hazardous Waste Combustion*, EPA-600/8-84-002, February 1984.
"ASTM" refers to the American Society for Testing Material Standards.
"SW" refers to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd Edition, EPA, July 1992.
"L" refers to liquid waste.
"S" refers to solid waste.
See 55 FR 11863.

[2]See also Atomic Absorption Methods listed under TCLP. You may use AA methods as well as ICP methods.

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS

NAME OR CODE	COMPOSITION
A1 ANFO[a] -	Ammonium nitrate/fuel oil/aluminum power
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	76 wt% Barium nitrate/24 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/5.3 wt% de(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1[a]	AN/$NaNO_3$/TNT/H_2O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder
	NOTE: Although this material may be red in color, it is an explosive and not an inert material.
DINGU	Dinitroglycoluril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8[b]	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28[c]	94 wt% RDX/6 wt% FPC 461
EDC-32[d]	85 wt% HMX/15 wt% Viton A
EDC-37[e]	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
*EDC-38[f]	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/0.5 wt% $CaCl_2$

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS
(CONTINUED)

NAME OR CODE	COMPOSITION
High Energy Propellants[g]	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene
K-10[h]	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt% Estane 5702 F-1
Methane/oxygen[h]	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctyl phthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctyl phthalate/0.4 wt% resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctyl phthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS
(CONTINUED)

NAME OR CODE	COMPOSITION
PETN	Pentaerythritol tetranitrate
Picric Acid	Du Pont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cyclonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerine or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C[a]	Slurry blasting explosive
TAGN[h]	Triaminoguanidine nitrate
TAL-1005E[a]	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNS	Trinitrostilbene
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

[a]For transportation only to and from M- and WX-Division Groups and storage by group WX-3.
[b]EDC-8 is the United Kingdom's version of XTX-8003.
[c]EDC-28 is the United Kingdom's version of PBX-9407.
[d]EDC-32 is the United Kingdom's version of LX-04.
[e]For shipping, storage, and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.
[f]For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.
[g]After approval by the Explosives Development Committee.
[h]For shipping, storage, and experimental evaluations on less than 5-g quantities.

NM0890010515-1

WASTE ANALYSIS PLAN
AND
WASTE SEGREGATION PROCEDURES

PERMIT ATTACHMENT A
NM0890010515-1

Chemical Waste Operations Section
~~HSE-7~~ CST-7, Waste Management Group
Los Alamos National Laboratory

ATTACHMENT A
WASTE ANALYSIS PLAN

A.1 Introduction

This Permit Attachment A addresses the waste analysis and waste segregation procedures implemented by Los Alamos National Laboratory (the Laboratory). Only the sampling and analysis procedures for RCRA-controlled hazardous wastes are discussed here.

A.2 Types of Waste Generated at Los Alamos

~~A.1~~ Hazardous waste generated by Laboratory activities can be considered as three general types: (1) wastes from processing operations, (2) wastes from research and development (R&D) activities, and (3) high explosive (HE) waste. Each of these general types has unique characteristics. Processing wastes typically are significant volumes of material that contain a very limited number of contaminants. R&D wastes, however, are typically lesser volumes of a variety of laboratory reagents, chemicals, solvents and other general laboratory waste. The composition and concentration of contaminants in a given process waste is generally uniform unless modifications to the process are made. Conversely, the waste species from R&D activities continually vary depending on the activities of the rapidly changing R&D efforts at the Laboratory. HE wastes consist of a narrow assemblage of chemicals, the concentrations of which may vary. The chemical assemblage, however, remains fairly constant.

The Laboratory has developed procedures for the identification and segregation of hazardous wastes. When a waste is identified as hazardous, it is diverted to the appropriate method of storage, treatment or disposal based on its characteristics as determined by the Waste Analysis Plan.

Presented below is a description of the types of wastes generated, treated, and stored at the Laboratory and those disposed of at off-site permitted facilities. The wastes are divided according to process or facility activities which generate the wastes.

A.2.1 Wastes from Basic and Applied Chemistry R&D Programs

Primary Laboratory sites for basic and applied chemistry R&D include the Chemistry and Metallurgy Research Building (TA-3-29), the Radiochemistry Laboratory (TA-48), the Sigma Building (TA-3-66), and the Health Research Laboratory (TA-43). Typical nonradioactive chemical wastes consist of large quantities of partly empty small containers of laboratory reagents, solvents, test samples, and other laboratory wastes. Up to several hundred waste types consisting of relatively small quantities of different acids, bases, organics, inorganics, reactive metals and other chemicals require disposal. These R&D wastes represent nearly all of the waste species included in Permit Attachment G.

A.2.2 Surface Finishing Process Wastes

The Electrochemistry Section of the MST-7 Materials Technology: Polymers and Coatings Group, located at TA-3-66, generates plating solutions containing heavy metals. Some of the wastes also contain cyanides. These plating solutions are coded as toxic and reactive wastes D007, D008, D011, F007, and F009. The Print Circuit Board Shop of the MEC-10 Electronic Manufacturing and Technician Resources Group, located at TA-3-40, generates primarily acid/base wastes heavily contaminated with copper. This shop ~~They also~~ generates plating solutions contaminated with lead and mercury. These wastes are coded as D002, D008, and D009, respectively. The Fabrication Section of the M-7 Detonation Systems Group, located at TA-22-91, generates a copper contaminated ferric chloride etching waste that is corrosive. It is coded D002.

A.2.3 Isotope Separation Wastes

The Isotope and Structural Chemistry Group, INC-4, generates 7N nitric acid and 14N sulfuric acid wastes that are hazardous because of their corrosive characteristic (D002). Based on knowledge of the waste generating process, it has been determined that these wastes do not contain heavy metals.

A.2.4 Shops Department Wastes

The Main Shops Department, Building TA-3-39, houses most of the machine shop capabilities at the Laboratory. Waste materials from machining operations are segregated by the metal they contain when generated. (For example, there are containers for aluminum chips and turnings.) Some machining operations generate waste lithium metal and lithium hydride, both of which are hazardous because of their reactivity (D003). These materials, when generated, are known and are not commingled with other metal wastes. The Main Shops Department also generates waste nonhalogenated solvents (F003) and halogenated degreasers (F001) and solvents (F002).

A.2.5 Explosives Wastes

High explosives (HE) waste is generated by the Dynamics Testing (M) and Design Engineering (WX) Divisions in the course of processing and testing various HE materials. Processing includes pressing, machining, and casting HE. Waste occurs as discrete pieces of HE, as well as chips, machine cuttings, and powder. Solid HE may include off-specification or old explosives, as well as scrap pieces of HE from processing operations. The chips, cuttings, and powder are usually in the form of waterborne suspensions, collected in specially designed accumulating/settling sump tanks. Spent carbon (K045) from the TA-16 wastewater treatment unit is generated approximately twice a year. Wastes also consist of materials contaminated with HE; these may include paper, oil, solvents, wood, machine tools, fixtures, etc. HE-contaminated equipment, tools, and other large items are considered reactive, (D003). HE-contaminated oil may also contain listed solvents, F001, F002, F003, and/or F005, as well as exceeds TCLP levels ~~exhibit the characteristic of EP toxicity~~ for barium, (D005). Chemically, the

predominant wastes consist of HMX (high melting explosives), RDX (cyclonite), TNT (2,4,6 trinitrotoluene), PETN (pentaerythriotol tetranitrate), ammonium nitrate, barium nitrate, TATB (triaminotrinitrobenzene), nitrocellulose, tetryl, nitroguanidine and various plastic binders. Nearly all the HE waste substances are ignitable (D001) or reactive (D003) and barium nitrate is a TCLP waste ~~EP toxic~~ (D005). Residues from HE waste are generated by flashing or burning HE waste at TA-16. These residues are typically present in the uppermost layer of sand that covers the burn pad. The sand from the two pads used to burn pieces of explosives is considered hazardous because of its barium content (D005).

A.2.6 Maintenance Activity Wastes

The Laboratory's Engineering Division and support maintenance contractor, JCI ~~Pan Am~~, generate a variety of wastes in the course of performing maintenance work. Hazardous wastes range from residual pesticides and herbicides (e.g. D001 and D016) to paints/thinners (e.g. D001, D008, and F003). Classification of these wastes can generally be performed by process knowledge and the use of Material Safety Data Sheets (MSDSs).

A.2.7 Chemically Contaminated Equipment

In addition to the wastes noted above, various laboratory items that contain chemical residues or are otherwise chemically contaminated may be considered hazardous waste. Empty process tanks are typical contaminated items. Empty drums and containers meet the requirements of HWMR-6 Part 2, 40 CFR Section 261.7 and are therefore not considered hazardous waste. Generation of this type of hazardous waste occurs throughout the Laboratory facilities and produces a wide variety of waste types.

A.2.8 Waste Treatment Residues

Treatment operations at the Laboratory generate solid hazardous waste. These residues include the barium contaminated sand from the explosives burning operation, ash from the incinerator, and sludge from the chemical treatment operations. The classification and volume of this waste varies with the waste that was treated.

A.3 Waste Analysis and Handling Procedures for Storage

This section specifies the procedures for the identification and handling of hazardous waste for storage at the Laboratory. The decision process is summarized in Table A-1.

A.3.1 Waste Identification

When chemical substances are declared to be in excess, the originating group completes a Chemical Waste Disposal Request (Form 10-3A, Figure A-1) and sends the form to the Waste Management Group (CST-7 ~~HSE-7~~). The request lists the chemical wastes the generating group needs to dispose of, the quantity and physical form of the wastes, and other pertinent information such as the condition of the containers. Material Safety Data Sheets (MSDSs) and existing analytical data may also be available and attached.

Using 49 CFR § 172.101, the CST-7 staff assigns each chemical waste item (bottle, container, etc.) the appropriate DOT Hazard Class. This assignment and chemical characteristics determine the compatibility of one waste item with another waste item.

~~Using Part B of the Request Form (Form 10-3A Part B, Figure A-1), HSE-7 staff can assign a Reactivity Group Number (RGN) to each container or bottle. The RGN is found from Figure A-2 (excerpted from EPA-600/2-80-076). The referenced EPA document, "A Method for Determining the Compatibility of Hazardous Waste," serves as the basis for the Laboratory procedure. For additional information, the user is referred to the EPA document cited.~~ Additional information assigned during this review includes EPA hazardous waste codes and transportation information. The completed request form, container marking ~~label~~, and MSDS/analytical data serve as the waste analysis record for the waste to be stored per the following segregation schemes.

A.3.2 Waste Segregation

To prevent adverse interactions of incompatible chemical wastes and to facilitate recycling or treatment of wastes, chemical wastes will be segregated into the following general categories:

- ~~Organics, including solvent wastes such as~~ Flammables, such as organic solvents (e.g. acetone, benzene, and toluene);
- Corrosive acidic wastes, including organic and mineral acids;
- Corrosive caustic wastes;
- Oxidizers, such as perchloric or chromic acid, and nonacidic oxidizers, such as permanganates and chlorates;
- Reactive metals and compounds, such as sodium, lithium hydride, and phosphorous trichloride; and
- Non-DOT regulated wastes (e.g. n~~N~~onreactive metals, salts, ~~and~~ neutral compounds, ~~such as lead and barium salts, and~~ cyanide or sulfide compounds, and poisons) ~~(in <5 gal. quantities only)~~.

Utilizing the ~~RGN~~ DOT Hazard Class assigned to the container and Table A-2, an area for storage of the waste is assigned. The organics and oxidizers have subcategories of segregation that will be followed for packaging/compositing of wastes to ensure that potential incompatibles are not combined together.

A.4 Waste Analysis and Handling Procedures for Treatment and Disposal

The Land Disposal Restrictions (LDRs) require that hazardous waste be treated to specified levels or with a specified technology prior to land disposal. The analysis procedures used to determine the LDR treatment standards that are applicable to the waste are described in this section. The decision process for analysis, handling, treatment, and/or disposal is summarized in Table A-1.

~~The analysis and handling procedures for waste requiring treatment and/or disposal follows. The decision process is summarized in Table A-1.~~

Several terms used throughout this section require further explanation.

- LDR is land disposal restricted. When used in this section it refers to all waste currently regulated under 40 CFR Part 268.
- ~~EP Toxic~~ TCLP metals ~~means~~ refers to those eight metals regulated under the ~~EP Toxic~~ TCLP characteristic.
- KOP refers to knowledge of process. In the case of original containers of materials, the information from the Chemical Disposal Request Form, as described earlier, is the KOP documentation. All other waste is documented by previous analyses or information provided by the generator.
- Labpack waste refers to ~~original containers of hazardous materials no greater than 5 gallons in size.~~ waste containers that have been packed with absorbents in "lab pack" containers for safe handling and storage. All containers less than 5 gallons must be lab packed.
- Commercial chemical waste refers to chemical substances still in their original containers that have been declared a hazardous waste.
- References to the use of a Coliwasa sampler also includes the use of coliwasa-type sampling instruments ~~apparatus~~.

A.4.1 Organic Waste

Organic waste is ~~split~~ divided into four processing categories: uncomposited labpack chemical waste, drummed waste ~~material~~, composited ~~labpack~~ commercial chemical waste, and composited drummed waste. The following discussions treat each as a unique analysis entity.

A.4.1.1 Uncomposited labpack waste

These wastes are those that, due to their toxicity or their physical (solid) state, will not be composited but will be packaged in ~~overpack~~ lab pack containers with absorbent. Compatible inorganic and organic wastes are packaged together in these lab pack containers. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package, therefore, most of this waste is and will be shipped offsite. The packaging list of bottles and cans in the ~~overpack~~ lab pack container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.1.2 Drummed waste

There are very few ongoing operations at the Laboratory that generate an organic process waste. As a result, each drum of this waste is virtually a unique entity. The exception would be those cases where we know more than one drum of waste came from the same place, e.g. 400 gallons of oil drained from the same machine reservoir. The drums are all sampled using a coliwasa sampler if liquid or a core sampler if solid. Because ~~Since~~ this waste is destined for incineration, the following parameters are tested for: pH, ash content, viscosity, heat value, TCLP metals ~~EP toxic metals~~, total organic halogen, total organic chlorine, sulfur, and chemical composition. This latter will identify approximately ninety-five percent of the substances that are present in the waste. Availability of documented KOP will determine if the organic trace analyses need to be performed. Documentation or analyses will identify the presence/absence of organic LDR compounds, trichlorofluoromethane, bromoform, dichlorodifluoromethane and ethylene dibromide. These latter four compounds are only necessary if the waste is to be incinerated onsite. The test methods are listed in Table A-3.

Throughout the year, containers of organic waste mixtures, smaller than a 55-gallon drum, are generated in the many laboratories at the Laboratory. The generator maintains a list of the substances placed in these containers. This allows CST-7 ~~HSE-7~~ personnel to confirm compatibility of these wastes before they are composited into 55-gallon or larger containers. When the composite receptacle is full, the waste is analyzed as described above for any large container of organic waste.

Solid organic waste is sampled using a core sampler or a grab sampler if the material can not be penetrated by a core sampler. Analytical parameters, frequencies, and test methods would be the same as those outlined above for any large container of waste. Debris that is organically contaminated is analyzed per Section A.4.8.

A.4.1.3 Composited ~~labpack~~ commercial chemical waste

Composited ~~labpack~~ commercial chemical wastes are those bottles and cans of liquid waste that have been combined for the purpose of incineration. Compatibility is ensured by following the procedures in Section A.3.1 and A.3.2. Since all chemicals in a composite drum are known entities, the list of chemicals and their quantity serves as the primary analysis record. This listing is sufficient to allow the identification of any and all LDR waste. When the drum is full, it is sampled with a coliwasa sampler. Since chemical composition is known, only the physical parameters need to be calculated or analyzed for. If any physical characteristics can not be calculated due to the variety of substances placed in the drum, the sample is analyzed for that parameter. Therefore, analysis or calculation would provide pH, flashpoint, ash content, viscosity, heat value, total organic halogens, and total organic chlorine. The methods used for these analyses are specified in Table A-3. This will be done for each container of composited waste since each container is unique. Calculated parameters for waste to be incinerated onsite will be verified according to the schedule in Permit Module V, C.2.

A.4.1.4 Composited drummed waste

Composited drummed waste are those drums of waste for which the analytical data on pH, flashpoint, ash content, viscosity, heat value, total organic halogens, and total organic chlorine ~~described in Section A.4.1.3~~ already exists. These wastes ~~and~~ are combined in either the TA-54, Area L storage tanks or the liquid feed tanks at the incinerator for the purposes of offsite shipment or onsite incineration. Compatibility is ensured by following the procedures in Sections A.3.1 and A.3.2. Chemical and physical parameters can be calculated from the existing data. If at any time calculations of physical parameters, such as heat value, is inadequate, those identified analyses will be redone. The calculations will be performed on each unique tank of waste. Calculated parameters for waste to be incinerated onsite will be verified according to the schedule in Permit Module V, C.2.

A.4.2 Corrosive Acid Waste

Corrosive acid waste is handled in two primary processing categories: ~~labpack~~ commercial chemical and process waste. The following discussions treat each as a unique analysis entity.

A.4.2.1 ~~Labpack~~ Commercial chemical waste

This waste stream consists of unused acids in original containers ~~of acid waste~~. The labels on the containers and MSDSs continue to serve as the primary analytical record. Those acids that can be reused by another component of the Laboratory are redistributed for use as a commercial product ~~raw material~~. Those that can not be reused are treated by elementary neutralization. This occurs primarily at the TA-50 Liquid Waste Treatment Plant but could occur throughout the Los Alamos National Laboratory in individual laboratories.

A.4.2.2 Process Waste

There are three categories of process waste: nonroutine nonmetallic waste, nonroutine metallic waste, and routine waste. Each is discussed separately. Documented KOP will negate the concern for the presence of LDR organic compounds. Therefore, references to LDR in this section refers only to inorganic constituents.

Nonroutine nonmetallic waste is periodically generated throughout the Laboratory. This waste will be analyzed for pH, the TCLP ~~EP toxic~~ metals, nickel and thallium. This allows confirmation of the presence/absence of LDR material. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

Nonroutine metallic waste is generated primarily by the Laboratory's electroplating operations. At the time of generation, these wastes are identified by the generator as containing heavy metals. The generator may also provide the approximate metal concentration, if the information is available. This waste will be analyzed for pH, TCLP ~~EP toxic~~ metals, nickel and thallium. This allows confirmation of the presence of LDR material and establishes the parameters that are analyzed for at the completion of treatment. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There are five routinely generated acidic waste streams at the Laboratory ~~Los Alamos~~: nonmetallic nitric acid, nonmetallic sulfuric acid, nonmetallic acid stream, metallic ferric chloride, and metallic ammonium persulfate. Each of these waste streams has a confirmed basis for RCRA regulation that ~~which~~ establishes the parameters of concern for treatment. All three of the nonmetallic acid waste streams are routinely analyzed for pH. The metallic ferric chloride is analyzed for pH, chromium, silver, lead, and copper. The metallic ammonium persulfate is analyzed for pH, lead, and mercury. Annually, all of these streams are all reevaluated for pH, all TCLP ~~EP toxic~~ metals, nickel, and thallium. This confirms ~~allows confirmation~~ that the waste has not changed in composition and identifies the ~~what~~ LDR components ~~are present~~. Sampling is conducted with a coliwasa sampler. All test methods are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste or a new waste stream is identified, these wastes ~~it~~ will be characterized following ~~follow~~ the procedures described ~~pattern established~~ in the above paragraph. Routine testing parameters will be established and reverified on an annual basis.

A.4.3 Corrosive Caustic ~~basic~~ Waste

Corrosive caustic ~~basic~~ waste is divided ~~split~~ into two processing categories: commercial chemical ~~labpack~~ waste and process waste. The following discussions treat each as a unique entity for analysis ~~entity~~.

A.4.3.1 Commercial chemical ~~Labpack~~ waste

This waste stream consists of caustic products (bases) in their original containers ~~of basic waste~~. The labels on the containers and MSDSs serve as the primary analytical record. Those bases that can be reused by another component of the Laboratory are redistributed for use as a commercial product ~~raw material~~. Those that can not be reused are generally treated by elementary neutralization. This occurs primarily at the TA-50 Liquid Waste Treatment Plant but could occur throughout the Laboratory in individual laboratories.

A.4.3.2 Process waste

There are three categories of process waste: nonroutine nonmetallic waste, nonroutine metallic waste, and routine waste. Each is discussed separately. Documented KOP will negate the concern for organic LDR compounds. Therefore, references to LDR in this section refers only to inorganic constituents.

Nonroutine nonmetallic waste is periodically generated throughout the Laboratory. This waste will be analyzed for pH, the TCLP ~~EP toxic~~ metals, nickel and thallium. This allows confirmation of the presence of LDR material. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

Nonroutine metallic waste is generated primarily by the Laboratory's electroplating operations. At the time of generation, these wastes are identified by the generator as containing heavy metals. This waste will be analyzed for pH, TCLP ~~EP toxic~~ metals, nickel, thallium, and cyanide. This procedure allows confirmation of the presence of LDR material and establishes the parameters that are analyzed for at the completion of treatment. The test methods employed are listed in Table A-3. Sampling is performed using a coliwasa sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There are three routinely generated corrosive base process waste streams at the Laboratory: ammonium etchant, "Replenisher" solution, and "Cuposit". The Replenisher and Cuposit are trade names. The ammonium etchant is analyzed for pH, copper, and lead. The Replenisher is analyzed for pH and lead. The Cuposit is analyzed for pH and mercury. Annually, these waste streams are all reevaluated for pH, all TCLP ~~EP toxic~~ metals, nickel, and thallium. This allows confirmation of the

presence of LDR substances and that the waste has not changed in composition. Sampling is performed with a coliwasa sampler. Test methods used are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste stream, or a new waste stream is identified, these wastes ~~it~~ will be characterized following the procedures described ~~pattern established~~ in the above paragraphs. Routine testing parameters will be established and reverified on an annual basis.

A.4.4 Oxidizer Waste

Oxidizer waste is divided ~~split~~ into two processing categories: acid waste and uncomposited labpack waste. Acid oxidizer waste is handled according to the procedures described in ~~per~~ Section A.4.2.

Oxidizer labpack wastes are ~~is~~ not composited due to the high fire risk of doing so. These wastes ~~They~~ are packaged in lab pack ~~overpack~~ containers with absorbent. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package; therefore, most of this waste is and will be shipped offsite. The packing list of bottles and cans in the lab pack ~~overpack~~ container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.5 Reactive Wastes

Reactive waste has only two processing categories: uncomposited labpack waste and routine process waste. (Explosives waste is treated as a separate category of waste and is discussed in Section A.4.7.) The following discussions treat each as a unique analysis entity.

A.4.5.1 Uncomposited labpack waste

Reactive labpack wastes are not composited due to the high fire and explosion risk of doing so. They are packaged in lab pack ~~overpack~~ containers with absorbent. The entire container is then incinerated. The Laboratory's incinerator cannot generally receive such a package; therefore, most of this waste is and will be shipped offsite. The packing list of bottles and cans in the lab pack ~~overpack~~ container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.5.2 Process waste

The only ongoing operation at the Laboratory that generates a reactive process waste is the machining operations. Periodically, the machinists are required to work with lithium hydride and to a lesser degree lithium metal. This results in drums of lithium hydride dust and lithium chips, respectively. Process knowledge ~~and the isolation of these operations when they do occur~~ serves as the analytical record for this waste stream.

If large quantities of reactive waste should be produced elsewhere in the Laboratory, documented process knowledge would also be used as the analytical record.

A.4.6 Inorganic Wastes

Inorganic waste is divided ~~split~~ into two processing categories: uncomposited commercial chemical ~~labpack~~ waste and process waste. The following discussions treat each as a unique analysis entity.

A.4.6.1 Uncomposited commercial chemical ~~labpack~~ waste

These wastes are generally solid material and therefore do not lend themselves to compositing. They will be packaged in lab pack ~~overpack~~ containers with absorbent. Organic and inorganic wastes that are compatible are lab packed together. The entire container is then usually destined for offsite land disposal. The packing list of bottles and cans in the lab pack ~~overpack~~ container serves as the analytical record. This listing is sufficient to allow the identification of any and all LDR waste.

A.4.6.2 Process waste

Four categories of inorganic process waste exist: liquid waste, primary metal waste, nonroutine solid waste, and routine solid waste. Inorganic liquid waste is generally acidic or basic and is thus treated under the scenarios described in Sections A.4.2 and A.4.3.

Process knowledge is considered adequate for the further treatment/disposal/recycle of waste streams such as lead and mercury. ~~In both cases the metal is available as a hazardous waste but that knowledge alone suffices to allow for proper storage, treatment, and disposal.~~

Nonroutine solid waste is periodically generated throughout the Laboratory. This waste will be analyzed for TCLP ~~EP toxic~~ metals, nickel, and thallium. This allows confirmation of the presence of inorganic LDR material. The absence of organics ~~LDR~~ will be established by either documented KOP or analyses. The test methods employed are listed in Table A-3. Sampling is performed using a core sampler if possible, or a grab sampler if it is not possible to penetrate the waste with a core sampler. Because this is defined as a nonroutine waste stream, every unique drum or batch will be sampled.

There is one routinely generated inorganic solid waste at the Laboratory. It is the barium contaminated sand from the explosives burning operation. Barium is the only established parameter of concern for treatment and therefore is the only parameter routinely analyzed for. Annually, a sample will be analyzed for the other TCLP ~~listed~~ metals. Sampling is conducted with a core sampler. Test methods are listed in Table A-3.

If a nonroutine waste stream becomes a routine waste stream, or a new waste stream is identified, these wastes ~~it~~ will be characterized following the procedures described ~~pattern established~~ in the above paragraph. Routine testing parameters will be established and reverified on an annual basis.

A.4.7 Explosives Waste

Due to the limited number of areas producing explosives waste and the safety problems associated with analyzing explosives waste, process knowledge of the waste sent for treatment by open burning or open detonation is the waste analysis record. Table A-4 lists the various explosives used at the Laboratory. Open burning/open detonation is conducted under interim status according to ~~per~~ HWMR-5 Part VI, Section 265.282.

A.4.8 Contaminated Solid Waste

The waste included in ~~covered by~~ this category is generally classified as debris. Contaminated soil would be addressed under the respective chemical category as outlined in the above sections. The contaminant of concern is known for all waste in this category, but the substrate can not be readily analyzed. Therefore, until the item in question is cleaned it is treated as a hazardous waste. The types of waste covered by this provision would be tanks and rags.

A.4.9 Waste Treatment Residuals

Waste treatment residuals are the liquid and solid waste streams resulting from the treatment of ~~a~~ hazardous wastes. There are currently four types of residual waste streams: the treated liquid and precipitate from chemical treatment operations at either TA-50 or -54 and the scrubber water and ash from the incinerator. Barium contaminated sand is also a treatment residue but because it receives further chemical treatment it is discussed in Section A.4.6.2.

The liquid from chemical treatment operations is tested to insure that (a) treatment is complete and (b) remaining chemical concentrations are within the discharge guidelines established under the NPDES permit for the TA-50 radioactive liquid waste treatment system. Sections A.4.2 and A.4.3 discuss~~ed~~ the procedures used to establish those parameters that would be tested for at the conclusion of treatment. If documented KOP can not exclude the presence of F-listed solvents, ~~then~~ each batch of treatment supernate will be tested for the compounds listed in 40 CFR § 261.3.(a).2.iv.A and B. Samples from the Batch Waste Treatment Unit are taken from a sampling loop. Samples from the treatment tanks at TA-54 will be taken by either a coliwasa or grab sample. Test methods used are provided in Table A-3. The scrubber water from the incinerator will always be within the discharge guidelines established under the NPDES permit for the TA-50 radioactive liquid waste treatment system thereby negating chemical analysis. The scrubber will be analyzed annually to verify this.

Solids from the chemical treatment operations and the ash from the incinerator are tested for the TCLP ~~EP toxic~~ metals that were found ~~established~~ to be present before treatment~~ to be present~~. As necessary, these wastes are then cemented or otherwise solidified. The solidified matrix may again be sampled by removing a sample from the mixture before curing. After curing, it is tested for the same TCLP ~~EP toxic~~ metals. Assuming there are no listed materials present, this would allow a determination to be made as to whether the waste remained a hazardous waste or not. This procedure would be followed for each batch of solids requiring processing.

A.4.10 Unknown Material

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. The individual waste may be tentatively characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. This information is used to restrict the choices of initial waste analysis to a small population of chemicals.

For purposes of managing unknown wastes a small volume is defined at the Laboratory ~~LANL~~ as less than one liquid gallon (or approximately four liters). The rationale for the small volume designation is that this is the minimum quantity of sample that ~~which~~ is needed to analyze ~~test if~~ the waste~~ is hazardous~~. At and below this volume limitation, the sample is entirely ~~actually~~ consumed in the analytical procedure. Small volumes of unknown wastes are analyzed for pH, flashpoint, and reactivity. This allows the material to be categorized for further handling.

Volumes greater than one gallon or four liters of a single unknown waste require a more detailed analytical scheme. These wastes are tested for reactivity, corrosivity, ignitability, TCLP ~~EP toxic~~ metals, and any other analyses indicated by the initial data gathered on the material. Sufficient detail must be reported to allow the assignment of the proper EPA h~~H~~azardous w~~W~~aste code ~~Number~~ to the waste. All test methods used are outlined in Table A-3.

A.5 Verification Analyses

Knowledge of process is used to identify the waste streams; however, the hazardous constituents must be verified using specified analytical procedures at specified intervals. This section describes the verification process implemented by the Laboratory.

A.5.1 Knowledge of Process

One in each one hundred KOP determinations based on a list compiled by the generator as wastes are accumulated in a compositing container will be verified by quantitative chemical analysis. Factory sealed containers and original containers redistributed for use within the facility will not be included in this analysis. Detection of hazardous constituents above one percent by volume, not recorded in KOP

documentation, or variations in concentration greater than twenty five percent from the estimate

$$\frac{C_{meas} - C_{est}}{C_{est}} - 100 \geq 25$$

shall be cause for rejection of the KOP and shall require an investigation into the cause. A written record of the investigation shall be retained with the facility record. Any individual who twice fails to properly document KOP constituents shall be permanently prohibited from KOP certification. An entry to this effect shall be made in the facility record.

Unused commercial ~~Lab packed~~ chemicals in original containers that ~~which~~ have been declared a hazardous waste and accepted by an off site disposal or treatment facility need not be verified unless rejected by the off site treatment facility.

A.5.2 Annual Verification

All routinely generated waste streams that have documented waste profiles will be ~~annually~~ analyzed annually to verify that they have not changed. Any information that ~~which~~ indicates a change in a ~~the~~ process that ~~which~~ generates a ~~the~~ waste that ~~and~~ may affect the waste, shall cause the waste to be analyzed not later than the next time the waste is generated. All such analyses shall be recorded in the facility record.

A.5.3 Discharges to the Industrial Wastewater System

In those instances when knowledge of process cannot be used to document the absence of listed hazardous waste solvents in the effluent from the Batch Waste Treatment Unit (BWTU), the Permittee may use the exclusion described in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv). A weekly composite sample will be analyzed from the headworks of the radioactive liquid waste treatment plant at TA-50-1 for the constituents cited in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(A) and HWMR-5, Part II, 40 CFR Section 261.3(a)(1)(iv)(B). The average concentration of each category ((A) and (B)) will then be computed from the analytical results and the volume of flow at the headworks will be calculated. In an effort to ensure conservency, the lowest weekly volume and the highest weekly concentration of the composite samples from the most recent 3 week period will be used to compare with each batch's concentration from the BWTU.

A sample from the BWTU effluent will also be taken and analyzed for the same constituents referenced in HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv). This sample will be taken from the known volume of effluent present in the BWTU prior to discharge. Effluent will then be temporarily stored in Tuff Tanks(®) while awaiting analytical results. The combination of the TA-50-1 average and the weekly

average of the BWTU effluent samples will be evaluated to determine if the cited exclusion can be achieved.

In order to obtain the final concentration of solvents entering the headworks, the weight of solvents in each respective category ((HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(A) and HWMR-5, Part II, 40 CFR Section 261.3(a)(2)(iv)(B)) for both the BWTU and the TA-50-1 plant will be totaled. The cumulative solvent weight will then be divided by the lowest weekly volume of liquid to be entered into the TA-50-1 plant. This value would then represent the resultant mixture's maximum concentration as it enters TA-50-1 (see equation below). No effluent from the BWTU will be discharged to the TA-50-1 plant if the conditions necessary for the exclusion cannot be satisfied.

The waste generator will document pursuant to Permit Attachment A that process knowledge of the individual waste streams indicates either the absence or presence of spent solvents. If process knowledge confirms the absence of such compounds, the wastes will be discharged without composite weekly samples being collected from the BWTU.

$$V = Volume\ (l)$$

$$C = concentration\ (mg/l)$$

$$C\ final = \frac{[V\ BWTU\ X\ C\ BWTU + C\ TA\text{-}50\ X\ V\ TA\text{-}50]}{V\ BWTU + V\ TA\text{-}50}$$

Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

CHEMICAL WASTE DISPOSAL REQUEST
RETURN FORM TO WASTE MANAGEMENT, MS J593
Telephone Number 667-7579

Requested By (Name A)	Telephone Number	Group		Date Sent		Data Tracking Number
Waste Generator (Name B)	Telephone Number	Tech Area	Building	Area/Wing	Room	Date Picked Up/Initials

Line Number	Number of Containers	Volume of Each Container	CHEMICAL NAME[1]	HAZARD[2]
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

I hereby certify that the information supplied above is correct.

Generator Signature	Date

[1]CHEMICAL NAME - Name of single compound, names of all compounds in mixture, trade-name and/or number of commercial product. For trade-name products, attach the manufacturer's MSDS.
[2]For HAZARD insert the appropriate letter: C = corrosive, I = ignitable, R = radioactive, T = toxic, X = reactive, S = solid, L = liquid, G = gas.

HS Form Number 10-3A Part A (4/89)

Figure A-1-Chemical Waste Disposal Request Form

Requested By *(Name A)*	Telephone Number	Group		Date Sent		Data Tracking Number
Waste Generator *(Name B)*	Telephone Number	Tech Area	Building	Area/Wing	Room	

Line Number	RGM	Code	DOT Proper Shipping Name	DOT Hazard Class	UN/NA No.	HSE-7 Code	EPA Codes	Handling Code	Weight	Form Number
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

I hereby certify that the information supplied above is correct according to the applicable regulations.

Reviewer Signature	Date

HS Form Number 10-3A Part B (4/90)

Figure A-1 (cont.)

REACTIVITY GROUP NO.	REACTIVITY GROUP NAME	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Acids, Mineral, Nonoxidizing	1												
2	Acids, Mineral, Oxidizing		2											
3	Acids, Organic			3										
4	Alcohols and Glycols				4									
5	Aldehydes					5								
6	Amides						6							
7	Amines, Aliphatic and Aromatic							7						
8	Azo Compounds, Diazo Compounds and Hydrazines								8					
9	Carbamates									9				
10	Carbonates										10			
11	Caustics											11		
12	Dithiocarbamates												12	
13	Esters													13
14	Ethers													
15	Fluorides, Inorganic													
16	Hydrocarbons, Aromatic													
17	Halogenated Organics													
18	Isocyanates													
19	Ketones													
20	Mercaptans and Other Organic Sulfides													
21	Metals, Alkali and Alkaline Earth, Elemental													
22	Metals, Other Elemental & Alloys in Powder, Vapor, or Sponge													
23	Metals, Other Elemental & Alloys in Sheet, Rod, Strip, Wire, etc													
24	Metals and Metal Compounds, Toxic													
25	Nitrides													
26	Nitriles													
27	Nitro Compounds, Organic													
28	Hydrocarbons, Aliphatic, Unsaturated													
29	Hydrocarbons, Aliphatic, Saturated													
30	Peroxides and Hydroperoxides, Organic													
31	Phenols and Cresols													
32	Organophosphates, Phosphorothioates, Phosphorodithioates													
33	Sulfides, Inorganic													
34	Epoxides													
101	Combustible and Flammable Materials, Miscellaneous													
102	Explosives													
103	Polymerizable Compounds													
104	Oxidizing Agents, Strong													
105	Reducing Agents, Strong													
106	Water and Mixtures Containing Water													
107	Water Reactive Substances													
		1	2	3	4	5	6	7	8	9	10	11	12	13

← EXTREMELY REACTIVE

Figure A-2 Hazardous Waste Compatability Chart

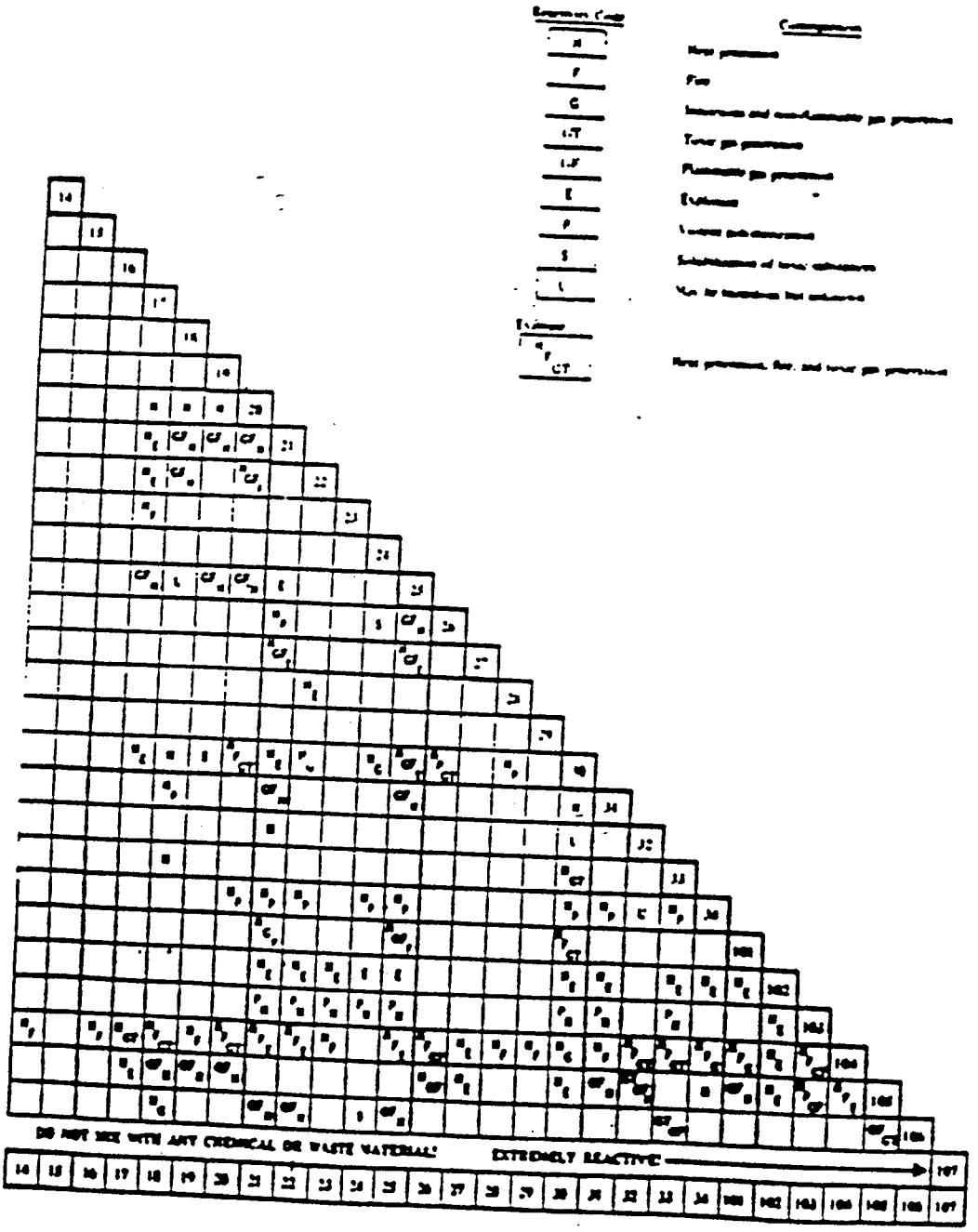

Figure A-2 (cont.)

TABLE A-1

Wastestreams, Analytical Parameters, and Rational

Wastestream	Analytical Parameters	Rationale Reference
Organic Waste		
Uncomposited labpack	Packing list	A.4.1.1
Drummed	pH, TCLP metals, TOX, TOC, ash content, viscosity, heat value, sulfur, chemical composition	A.4.1.2
Composite labpacks and drummed waste	List of chemicals, pH, flashpoint, ash content, viscosity, heat value, TOX, TOC	A.4.1.3, A.4.1.4
Corrosive Acid Waste		
Commercial chemical	pH, as necessary	A.4.2.1
Nonroutine, nonmetallic process waste	pH, TCLP metals, nickel, thallium	A.4.2.2
Nonroutine metallic process waste	pH, TCLP metals, nickel, thallium	A.4.2.2
Routine nonmetallic process waste	pH	A.4.2.2
Ferric chloride	pH, chromium, silver, lead, copper	A.4.2.2
Ammonium persulfate	pH, lead, mercury	A.4.2.2
Corrosive Caustic Waste		
Commercial chemical	pH, as necessary	A.4.3.1
Nonroutine, nonmetallic process waste	pH, TCLP metals, nickel, thallium	A.4.3.2
Nonroutine, metallic process waste	pH, TCLP metals, nickel, thallium	A.4.3.2
Ammonium etchant	pH, copper, lead	A.4.3.2
"Replenisher"	pH, lead	A.4.3.2
"Cuposit"	pH, mercury	A.4.3.2
Oxidizer Waste		
Labpacks	Packing list	A.4.4

TABLE A-1

Wastestreams, Analytical Parameters, and Rationale
(Continued)

Wastestream	Analytical Parameters	Rationale Reference
Reactive Waste		
Labpacks	Packing list	A.4.5.1
Process waste	Knowledge of process	A.4.5.2
Inorganic Waste		
Commercial chemical	Packing list	A.4.6.1
Primary metals	Knowledge of process	A.4.6.2
Nonroutine solid	TCLP metals, nickel, thallium, organics if necessary	A.4.6.2
Barium sand	Barium	A.4.6.2
Explosives Waste	Knowledge of process	A.4.7
Contaminated Debris	Knowledge of process	A.4.8
Waste Treatment Residues		
Chemical treatment liquids/solids	Previously established parameters	A.4.9
Incinerator ash	Previously established parameters	A.4.9
Incinerator scrubber water	Knowledge of process	A.4.9
Unknowns		
Small volume (<1 gal.)	pH, flashpoint, reactivity	A.4.10
Large volume	All parameters necessary to identify waste completely	A.4.10

Table A-2

HAZARDOUS WASTE PACKAGING AND STORAGE SEGREGATION SCHEME

STORAGE CATEGORY	DOT HAZARD CLASS	LAB PACK COMPATIBILITY (*Material within each line item may be packaged together*)
Flammables/Combustibles	Flammable Liquid (3)	All materials assigned the same hazard class/division and generic proper shipping name may be packaged in the same lab pack. Materials assigned to hazard class/divisions 2 or 5.2 may not be packaged in lab packs.
	Flammable Solid (4.1, 4.2)	
	Flammable Gas (2.1)	
Oxidizers	Oxidizer (5.1)	
	Organic Peroxide (5.2)	
	Nonflammable gases that are oxidizers (2.2)	
Acids	Corrosive Material (8)	
	Nonflammable gases that are acids (2.2)	
Caustics (Bases)	Corrosive Material (8)	
	Nonflammable gases that are caustic (2.2)	
Reactives	Flammable Solid (4.3)	
	Nonflammable gases that are reactive (2.2)	
	Explosives (1)	• Explosives (*not accepted at TA-54, Area L*)
ORM-D/Poisons Class 9/Nonregulated	ORM-D, Poisonous Materials (6.1) Poisonous Gas (2.3) Miscellaneous Hazardous Mateiral (9)	All materials assigned the same hazard class/division and generic proper shipping name may be packaged in the same lab pack. Materials assigned to hazard class/divisions 2 or 5.2 may not be packaged in lab packs.

TABLE A-3

Waste Analysis Parameters and Test Methods

Parameter	Test Method	Reference[1]
Ignitability	Pensky-Martens Closed-Cup Method	(L) SW1010 (L) ASTM D93-80
Reactivity	Test method to determine hydrogen cyanide released from waste Test method to determine hydrogen sulfide released from waste	(L,S) SW Chapter 7, p. 5-14
Corrosivity	Electrometric (pH of aqueous solution)	(L) SW9040
Toxicity Characteristic	Toxicity Characteristic Leaching Procedure (TCLP) Extraction	(L,S) SW1311
• Metals	AA Spectroscopy	
Arsenic		(L) SW7060
Barium		(L) SW7081, SW7080
Cadmium		(L) SW7131, SW7130
Chromium		(L) SW7191, SW7190
Lead		(L) SW7421, SW7420
Selenium		(L) SW7740
Silver		(L) SW7761, SW7760
Mercury	Manual Cold Vapor Technique	(L) SW7470
• Volatile Organics	Gas Chromatography/Mass Spectrometry (GC/MS)	
benzene	- Packed Column	(L) SW8240
carbon tetrachloride	- Capillary Column	(L) SW8260
chloroform		
chlorobenzene		
1,2-dichloroethane		
1,1-dichloroethylene (1,1-dichloroethene)		
methyl ethyl ketone (2-butanone)		
tetrachloroethylene (tetrachloroethene)		
trichloroethylene (trichloroethene)		
vinyl chloride		

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Toxicity Characteristic (Continued)		
• Semivolatile Organics	GC/MS	
o-cresol	- Packed Column	(L) SW8250
(2-methylphenol)	- Capillary Column	(L) SW8270
m-cresol		
(3-methylphenol)		
p-cresol		
(4-methylphenol)		
1,4-dichlorobenzene		
2,4-dinitrotoluene		
hexachlorobutadiene		
(hexachloro-1,		
3-butadiene)		
hexachloroethane		
hexachlorobenzene		
nitrobenzene		
pentachlorophenol		
pyridine		
2,4,5-trichlorophenol		
2,4,6-trichlorophenol		
• Organochlorine Pesticides	Gas Chromatography	(L) SW8080
endrin		
lindane (gamma BHC)		
methoxy-chlor		
heptachlor		
toxaphene		
chlordane		

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Toxicity Characteristic (Continued)		
• Chlorinated Herbicides 2,4-D 2,4,5-TP (Silvex)	Gas Chromatography	(L)SW8150
Chemical Composition	95 percent organic composition by GC/FID	(L) SW8100
Trace Organic Analysis	Any of the following: Volatile organic compounds - GC/MS Semivolatile organic compounds - GC/MS - Packed column - Capillary column	 (L) SW8240 (L) SW8250 (L) SW8270
Heat Value	Bomb calorimeter	(L) A006, ASTM D240
Organic Chlorine	Halide titration of combustion residue	(L,S) A004, ASTM D2361
Ash Content	Residue after combustion in muffle furnace	(L) A001, ASTM D482 (S) A001, ASTM D3174
Cyanide, Free and Total	Distillation and colorimetric (UV)	(L) SW9012
Chrome	Colorimetric method for hexavalent chromium	(L) SW7196
Sulfide	Colorimetric titration	(L) SW9030

TABLE A-3

Waste Analysis Parameters and Test Methods (Continued)

Parameter	Test Method	Reference[1]
Total Metals[2]	Acid Digestion	(L,S) SW3020
Arsenic	Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP)	(L) SW6010
Barium		(L) SW6010
Beryllium		(L) SW6010
Cadmium		(L) SW6010
Chromium		(L) SW6010
Lead		(L) SW6010
Nickel		(L) SW6010
Selenium		(L) SW6010
Silver		(L) SW6010
Thallium		(L) SW6010
Zinc		(L) SW6010
Mercury	Manual Cold Vapor Technique	(S) SW7471 (L) SW7470
Free Liquids	Paint Filter Liquids Test	(S) SW9095

[1]"A" refers to *Sampling and Analysis Methods for Hazardous Waste Combustion*, EPA-600/8-84-002, February 1984.
"ASTM" refers to the American Society for Testing Material Standards.
"SW" refers to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, 3rd Edition, EPA, July 1992.
"L" refers to liquid waste.
"S" refers to solid waste.
See 55 FR 11863.

[2]See also Atomic Absorption Methods listed under TCLP. You may use AA methods as well as ICP methods.

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS

NAME OR CODE	COMPOSITION
A1 ANFO[a]	Ammonium nitrate/fuel oil/aluminum power
AN	Ammonium nitrate
ANFO	Ammonium nitrate/fuel oil
Baratol	76 wt% Barium nitrate/24 wt% TNT
BDNPA	Bis(dinitropropyl) acetal
BDNPF	Bis(dinitropropyl) formal
Black powder	74 wt% Potassium nitrate/15.6 wt% charcoal/10.4 wt% sulfur
Boracitol	60 wt% Boric acid/40 wt% TNT
BTX	5,7-Dinitro-1-picrylbenzotriazole
Composition A-3	91 wt% RDX/9 wt% beeswax
Composition A-4	97 wt% RDX/3 wt% beeswax
Composition A-5	98.5 wt% RDX/1.5 wt% beeswax
Composition B and B-3	60 wt% RDX/40 wt% TNT
Composition C-3	88 wt% RDX/12 wt% wax
Composition C-4	91 wt% RDX/2.1 wt% polyisobutylene/1.6 wt% motor oil/5.3 wt% de(2-ethylhexyl) sebacate
Cyclotol, 75/25	75 wt% RDX/25 wt% TNT
Cyclotol, 70/30	70 wt% RDX/30 wt% TNT
DATB	Diaminotrinitrobenzene
DBA-1[a]	AN/$NaNO_3$/TNT/H_2O/thickener
Detasheet C	63 wt% PETN/8 wt% NC/29 wt% elastomeric binder
Detasheet D	75 wt% PETN/25 wt% elastomeric binder
	NOTE: Although this material may be red in color, it is an explosive and not an inert material.
DINGU	Dinitroglycoluril
DNPA	2,2-Dinitropropyl acrylate polymer
DNT	Dinitrotoluene
EDC-8[b]	76 wt% PETN/24 wt% Silicone rubber, MS 2420
EDC-28[c]	94 wt% RDX/6 wt% FPC 461
EDC-32[d]	85 wt% HMX/15 wt% Viton A
EDC-37[e]	91 wt% HMX/1 wt% nitrocellulose/8 wt% K-10 liquid
*EDC-38[f]	94.5 wt% HMX/3.5 wt% K-10 Liquid/2 wt% Polyurethane
HBX-1	40 wt% RDX/38 wt% TNT/17 wt% Al/5 wt% Wax/0.5 wt% $CaCl_2$

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS
(CONTINUED)

NAME OR CODE	COMPOSITION
High Energy Propellants[g]	Solid propellants generally used in missile systems
HMX	Cyclotetramethylenetetranitramine
HNS	Hexanitrostilbene
K-10[h]	65.3 wt% dinitroethylbenzene/34.7 wt% trinitroethylbenzene
LX-04	85 wt% HMX/15 wt% Viton A
LX-07	90 wt% HMX/10 wt% Viton A
LX-14	95.5 wt% HMX/4.5 wt% Estane 5702 F-1
Methane/oxygen[h]	Explosive mixtures of methane and oxygen gases
NC	Nitrocellulose, cellulose nitrate
Nitromethane	Nitromethane
NQ	Nitroguanidine
NTO	1,2,4-nitro-triazole-5-one
Octol	75 wt% HMX/25 wt% TNT
PBX-9001	90 wt% RDX/8.5 wt% polystyrene/1.5 wt% dioctyl phthalate
PBX-9007	90 wt% RDX/9.1 wt% polystyrene/0.5 wt% dioctyl phthalate/0.4 wt% resin
PBX-9010	90 wt% RDX/10 wt% Kel-F 3700 elastomer
PBX-9011	90 wt% HMX/10 wt% Estane 5703 F-1
PBX-9205	92 wt% RDX/6 wt% polystyrene/2 wt% dioctyl phthalate
PBX-9206	92 wt% HMX/8 wt% Kel-F 3700 elastomer
PBX-9401	94.2 wt% RDX/3.6 wt% polystyrene/2.2 wt% trioctyl phosphate
PBX-9404	94 wt% HMX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9405	94 wt% RDX/3 wt% nitrocellulose/3 wt% chloroethyl phosphate
PBX-9407	94 wt% RDX/6 wt% Exon 461
PBX-9501	95 wt% HMX/2.5 wt% Estane/2.5 wt% BDNPA/F
PBX-9502	95 wt% TATB/5 wt% Kel-F 800
PBX-9503	80 wt% TATB Class 2)/15 wt% HMX (Class 2)/5 wt% Kel-F 800
PBXW-113	88 wt% HMX/12 wt% rubber/plasticizer binder
Pentolite	50 wt% PETN/50 wt% TNT

TABLE A-4

ESTABLISHED EXPLOSIVES AT TA-16
NOMINAL COMPOSITIONS
(CONTINUED)

NAME OR CODE	COMPOSITION
PETN	Pentaerythritol tetranitrate
Picric Acid	Du Pont 85 wt% pure
PYX	2,6-Bis(picrylamino)-3,5-dinitropyridine
RDX	Cyclonite, cyclotrimethylenetrinitramine
Smokeless Powder (Single Base)	Standard military grades. Single or multi-perforated grains of colloided nitrocellulose. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
Smokeless Powder (Double Base)	Standard military grades. Single or multi-perforated grains of colloided nitrocellulose containing nitroglycerine or nitroglycol. Stabilizers, plasticizers, inorganic nitrates, and other modifying agents may also be present.
STRATABLAST C[a]	Slurry blasting explosive
TAGN[h]	Triaminoguanidine nitrate
TAL-1005E[a]	Slurry blasting explosive
TATB	Triaminotrinitrobenzene
Tetryl	2,4,6-Trinitrophenylmethylnitramine
TNS	Trinitrostilbene
TNT	Trinitrotoluene
TNT/NC	80 wt% TNT/20 wt% NC
Tritonal	80 wt% TNT/20 wt% aluminum powder
XTX-8003	80 wt% Recrystallized PETN/20 wt% Sylgard 182
XTX-8004	80 wt% RDX/20 wt% Sylgard 182

[a]For transportation only to and from M- and WX-Division Groups and storage by group WX-3.
[b]EDC-8 is the United Kingdom's version of XTX-8003.
[c]EDC-28 is the United Kingdom's version of PBX-9407.
[d]EDC-32 is the United Kingdom's version of LX-04.
[e]For shipping, storage, and experimental evaluation of quantities less than 5 g and for assembly of finished charges into test devices only.
[f]For shipping, storage, and analytical evaluation of molding powder and assembly of finished pieces into test devices.
[g]After approval by the Explosives Development Committee.
[h]For shipping, storage, and experimental evaluations on less than 5-g quantities.

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