LANL TA-16

**Department of Energy**
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

MAY 28 2003

RECEIVED
MAY [redacted]

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Carl Will
Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Dear Mr. Will:

Subject: Response to Notice of Deficiency, Technical Area (TA)-16 Closure Plan for the TA-16-401 and –406 Sand Filters, Los Alamos National Laboratory, EPA ID# NM0890010515

The purpose of this letter is to provide the Department of Energy (DOE) and University of California (UC) response to the subject Notice of Deficiency (NOD) issued by the Hazardous Waste Bureau of the New Mexico Environment Department on April 28, 2003. The NOD, received April 30, 2003, requested additional information regarding the "Los Alamos National Laboratory, Technical Area 16, Closure Plan for the TA-16-401 and –406 Sand Filters," LA-UR-03-2091.

This submittal consists of a response to the two comments contained in the NOD. The revised closure plan pages affected by the NMED comments are appended. Appendix A contains the pages with the changes highlighted. Appendix B contains the pages without highlights. Appendix C contains a certification statement for this response. Three additional paper copies and an electronic copy of the submittal have been included.

If you should have any questions or concerns regarding this submittal, please feel free to contact Gene Turner, DOE, at (505) 667-5794 or Ann Sherrard, UC, at (505) 665-8968.

Sincerely,

Joseph C. Vozella
Assistant Manager for Facility Operations
Los Alamos Site Office

OFO-8GT-001

Enclosures

cc:
See page 2

6415

MAY 28 2003

cc w/enclosures:
Laurie King, Chief (6PD-N)
New Mexico/Federal Facilities Section
Environmental Protection Agency
Region 6 1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

cc w/o enclosures:
Mr. James P. Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303
Ms. Lee Winn
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303
Mr. James P. Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303
G. Turner, OFO, LASO
J. Stetson, PWT, LASO
E. Louderbough, LANL, LC-GL, MS-A187
D. Hayden, ESA-WMM, MS-C930
A. Sherrard, RRES-SWRC, LANL, MS-K490
J. Ellvinger, RRES-SWRC, LANL, MS-K490
G. Bacigalupa, RRES-SWRC, LANL, MS-K490
L. Vigil-Holterman, RRES-SWRC, LANL, MS-K490

# Response to April 28, 2003 Notice of Deficiency Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0

**LA-UR-03-3471**
**May 2003**

Prepared by:
Los Alamos National Laboratory
Solid Waste Regulatory Compliance Group (RRES-SWRC)
Los Alamos, New Mexico 87545

Response to NMED Attachment A

Notice of Deficiency, April 28, 2003
Technical Area (TA)-16 Closure Plan for
The TA-16-401 and –406 Sand Filters, Revision 0.0

## Introduction

The following information is the response by Los Alamos National Laboratory (LANL) to a Notice of Deficiency (NOD) sent by the New Mexico Environment Department (NMED) on April 28, 2003. The full title of the NOD is Notice of Deficiency, Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0, April 28, 2003. The NOD was officially received by the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) on April 30, 2003. The NMED required that LANL respond to the comments by May 30, 2003.

The following section, "NOD Comments and Responses," provides the two NOD comments (in bold and italics) and LANL's responses.

## NOD Comments and Responses

1. ***Permittees shall revise "Table 4 – Analytical Methods and Use of Data" of the Closure Plan to include data for dioxin, furan (SW-846 analytical method 9290 [actually 8290]) and Perchlorate (SW-846 analytical method 314.0). Permittees reason for not analyzing for dioxin and furan was that these constituents would only be generated from burning high explosives (HE). In past operations residual HE was open burned after the liquid passed through the sand filters. Therefore, a potential for these constituents to be deposited on the soil exists due to deposition from air emissions. The Closure Plan should be revised to conduct a minimum amount of sampling for dioxin and furan in the soil regardless of whether there is an evidence of a release from cracks in the metal sand filter structures.***

   LANL took the following actions to respond to this comment:

   - Table 4 was revised to add dioxin, furan, and perchlorate.
   - Perchlorate and dioxin/furan were added to the constituents to be analyzed in Section 4.3.1.
   - Section 4.3.1 was revised to include sampling of dioxin and furan upslope of the sand filters.

   The revised pages are included in Appendix A, with changes highlighted, and in Appendix B without highlights.

2. ***Permittees shall revise "Table 5 – Potential Contaminants and Their Associated SSLs and ESLs" to include dioxin, furan and perchlorate. Permittees' reason for not including perchlorate in Table 5 was that there was no screening level for perchlorate. Soil Screening levels for all three constituents are published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels. These screening levels may be obtained at the following web site: http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm***

   Table 5 was revised to add dioxin, furan, and perchlorate. The revised table is included in Appendix A, with changes highlighted, and in Appendix B without highlights.

# APPENDIX A

# REVISED CLOSURE PLAN PAGES WITH HIGHLIGHTED CHANGES

## 4.3 Analytical Requirements

The analytical techniques used depend on whether the sample is taken to characterize waste or to determine whether environmental media should be removed, as described in Section 4.3.1. Analytical laboratory requirements and QA/quality control (QC) procedures are discussed in Sections 4.3.2 and 4.3.3, respectively.

### 4.3.1 Proposed Analytical Methods

The types of samples to be collected are described in Section 5.0. The selection of the analytical testing methods identified in Table 4 is based on whether samples are taken to characterize waste or to determine whether contaminated environmental media must be removed. If samples are taken to characterize waste, they will be analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and toxicity characteristic (TC) metals and organics by the methods listed in Table 4. If the samples are taken to determine whether environmental media must be removed, they will be analyzed for total metals and organics, and the other constituents shown in Table 5 so that they can be compared to the SSLs and ESLs shown in the table. Only solids will be analyzed for the SSL/ESL comparisons, while both liquids and solids may require analysis for waste characterization purposes. The samples will also be initially analyzed using the DX-2 HE Spot Test, a method used to detect the presence of HE at low parts-per-million levels. If the Spot Test is positive (i.e., HE is present), the samples will be submitted to an off-site laboratory for HE analysis using the methods described in Table 4.

Constituents of concern that would be characteristic of leaks from the sand filters are presented with their respective SSLs and ESLs in Table 5. Except for HE and barium, which is present in legacy explosives formulations, most of the other constituents are present in the incoming wastewater in very low (parts-per-million) concentrations. The predominant types of HE treated at the sand filters are 2,4,6-trinitrotoluene (TNT), cyclotetramethylenetetranitramine (HMX), and cyclotrimethylenetrinitramine (RDX). Other explosives, such as pentaerythrioltetranitrate (PETN), listed in Table 5 would be expected only in trace amounts. Nitrocellulose would be present as a constituent of HE binders. Several other chemicals (e.g., 2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in Table 5 because they are associated with HE. Perchlorate and polychlorinated biphenyls (PCB) are included in Table 5 to cover the possibility that traces of these ~~PCB~~ contaminants~~ed oils~~ may have been in wastewater treated at the sand filters. Dioxin and furan will also be analyzed. These compounds are byproducts of combustion and would not result from leaks. Therefore, they will be analyzed only for samples taken in the first foot of soil to be used to indicate impacts from burning activities, deposited either by airborne or stormwater mechanisms. Deposition may have occurred from past operations at the TA-16 Burn Ground as well as the Cerro Grande Fire. Although RCRA constituents have been measured throughout the TA-16 Burn

Ground area, dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

Table 5 is intended to represent the most likely constituents; however, samples will also be analyzed for the wide variety of VOCs and SVOCs in accordance with Table 4. If other chemicals are detected above soil background levels, they will also be compared to their SSLs and ESLs, as described in Section 5.5.

#### 4.3.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 4, as needed. Analytical laboratories will have undergone audits by LANL to ensure that they have a documented comprehensive QA/QC program; technical analytical expertise; a document control/records management plan; and the capability to perform data reduction, validation, and reporting.

#### 4.3.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m,p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.
[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.
[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.
[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX B

# REVISED CLOSURE PLAN PAGES WITHOUT HIGHLIGHTS

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dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

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| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste. Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m.p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.
[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.
[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.
[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX C

# CERTIFICATION

## CERTIFICATION

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Barbara A Stone for

**James L. Holt**
Associate Director, Operations
Los Alamos National Laboratory
Operator

5/27/03
Date Signed

**Ralph E. Erickson**
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

5/28/03
Date Signed

# Response to April 28, 2003 Notice of Deficiency Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0

**LA-UR-03-3471**
**May 2003**

Prepared by:
Los Alamos National Laboratory
Solid Waste Regulatory Compliance Group (RRES-SWRC)
Los Alamos, New Mexico 87545

Response to NMED Attachment A

Notice of Deficiency, April 28, 2003
Technical Area (TA)-16 Closure Plan for
The TA-16-401 and –406 Sand Filters, Revision 0.0

## Introduction

The following information is the response by Los Alamos National Laboratory (LANL) to a Notice of Deficiency (NOD) sent by the New Mexico Environment Department (NMED) on April 28, 2003. The full title of the NOD is Notice of Deficiency, Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0, April 28, 2003. The NOD was officially received by the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) on April 30, 2003. The NMED required that LANL respond to the comments by May 30, 2003.

The following section, "NOD Comments and Responses," provides the two NOD comments (in bold and italics) and LANL's responses.

## NOD Comments and Responses

1. ***Permittees shall revise "Table 4 – Analytical Methods and Use of Data" of the Closure Plan to include data for dioxin, furan (SW-846 analytical method 9290 [actually 8290]) and Perchlorate (SW-846 analytical method 314.0). Permittees reason for not analyzing for dioxin and furan was that these constituents would only be generated from burning high explosives (HE). In past operations residual HE was open burned after the liquid passed through the sand filters. Therefore, a potential for these constituents to be deposited on the soil exists due to deposition from air emissions. The Closure Plan should be revised to conduct a minimum amount of sampling for dioxin and furan in the soil regardless of whether there is an evidence of a release from cracks in the metal sand filter structures.***

   LANL took the following actions to respond to this comment:

   - Table 4 was revised to add dioxin, furan, and perchlorate.
   - Perchlorate and dioxin/furan were added to the constituents to be analyzed in Section 4.3.1.
   - Section 4.3.1 was revised to include sampling of dioxin and furan upslope of the sand filters.

   The revised pages are included in Appendix A, with changes highlighted, and in Appendix B without highlights.

2. ***Permittees shall revise "Table 5 – Potential Contaminants and Their Associated SSLs and ESLs" to include dioxin, furan and perchlorate. Permittees' reason for not including perchlorate in Table 5 was that there was no screening level for perchlorate. Soil Screening levels for all three constituents are published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels. These screening levels may be obtained at the following web site: http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm***

   Table 5 was revised to add dioxin, furan, and perchlorate. The revised table is included in Appendix A, with changes highlighted, and in Appendix B without highlights.

# APPENDIX A

# REVISED CLOSURE PLAN PAGES WITH HIGHLIGHTED CHANGES

## 4.3 Analytical Requirements

The analytical techniques used depend on whether the sample is taken to characterize waste or to determine whether environmental media should be removed, as described in Section 4.3.1. Analytical laboratory requirements and QA/quality control (QC) procedures are discussed in Sections 4.3.2 and 4.3.3, respectively.

### 4.3.1 Proposed Analytical Methods

The types of samples to be collected are described in Section 5.0. The selection of the analytical testing methods identified in Table 4 is based on whether samples are taken to characterize waste or to determine whether contaminated environmental media must be removed. If samples are taken to characterize waste, they will be analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and toxicity characteristic (TC) metals and organics by the methods listed in Table 4. If the samples are taken to determine whether environmental media must be removed, they will be analyzed for total metals and organics, and the other constituents shown in Table 5 so that they can be compared to the SSLs and ESLs shown in the table. Only solids will be analyzed for the SSL/ESL comparisons, while both liquids and solids may require analysis for waste characterization purposes. The samples will also be initially analyzed using the DX-2 HE Spot Test, a method used to detect the presence of HE at low parts-per-million levels. If the Spot Test is positive (i.e., HE is present), the samples will be submitted to an off-site laboratory for HE analysis using the methods described in Table 4.

Constituents of concern that would be characteristic of leaks from the sand filters are presented with their respective SSLs and ESLs in Table 5. Except for HE and barium, which is present in legacy explosives formulations, most of the other constituents are present in the incoming wastewater in very low (parts-per-million) concentrations. The predominant types of HE treated at the sand filters are 2,4,6-trinitrotoluene (TNT), cyclotetramethylenetetranitramine (HMX), and cyclotrimethylenetrinitramine (RDX). Other explosives, such as pentaerythrioltetranitrate (PETN), listed in Table 5 would be expected only in trace amounts. Nitrocellulose would be present as a constituent of HE binders. Several other chemicals (e.g., 2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in Table 5 because they are associated with HE. Perchlorate and polychlorinated biphenyls (PCB) are included in Table 5 to cover the possibility that traces of these ~~PCB~~ contaminants~~ed oils~~ may have been in wastewater treated at the sand filters- Dioxin and furan will also be analyzed. These compounds are byproducts of combustion and would not result from leaks. Therefore, they will be analyzed only for samples taken in the first foot of soil to be used to indicate impacts from burning activities, deposited either by airborne or stormwater mechanisms. Deposition may have occurred from past operations at the TA-16 Burn Ground as well as the Cerro Grande Fire. Although RCRA constituents have been measured throughout the TA-16 Burn

Ground area, dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

Table 5 is intended to represent the most likely constituents; however, samples will also be analyzed for the wide variety of VOCs and SVOCs in accordance with Table 4. If other chemicals are detected above soil background levels, they will also be compared to their SSLs and ESLs, as described in Section 5.5.

### 4.3.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 4, as needed. Analytical laboratories will have undergone audits by LANL to ensure that they have a documented comprehensive QA/QC program; technical analytical expertise; a document control/records management plan; and the capability to perform data reduction, validation, and reporting.

### 4.3.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m,p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.

[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.

[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.

[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX B

# REVISED CLOSURE PLAN PAGES WITHOUT HIGHLIGHTS

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dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

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#### 4.3.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

•

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m.p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.
[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.
[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.
[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX C

# CERTIFICATION

## CERTIFICATION

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Barbara A. Stone for

**James L. Holt**
Associate Director, Operations
Los Alamos National Laboratory
Operator

5/27/03
Date Signed

**Ralph E. Erickson**
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

5/28/03
Date Signed

# Response to April 28, 2003 Notice of Deficiency Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0

**LA-UR-03-3471**
**May 2003**

Prepared by:
Los Alamos National Laboratory
Solid Waste Regulatory Compliance Group (RRES-SWRC)
Los Alamos, New Mexico 87545

Response to NMED Attachment A

Notice of Deficiency, April 28, 2003
Technical Area (TA)-16 Closure Plan for
The TA-16-401 and –406 Sand Filters, Revision 0.0

## Introduction

The following information is the response by Los Alamos National Laboratory (LANL) to a Notice of Deficiency (NOD) sent by the New Mexico Environment Department (NMED) on April 28, 2003. The full title of the NOD is Notice of Deficiency, Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0, April 28, 2003. The NOD was officially received by the U.S. Department of Energy (DOE) Los Alamos Site Office (LASO) on April 30, 2003. The NMED required that LANL respond to the comments by May 30, 2003.

The following section, "NOD Comments and Responses," provides the two NOD comments (in bold and italics) and LANL's responses.

## NOD Comments and Responses

1. ***Permittees shall revise "Table 4 – Analytical Methods and Use of Data" of the Closure Plan to include data for dioxin, furan (SW-846 analytical method 9290 [actually 8290]) and Perchlorate (SW-846 analytical method 314.0). Permittees reason for not analyzing for dioxin and furan was that these constituents would only be generated from burning high explosives (HE). In past operations residual HE was open burned after the liquid passed through the sand filters. Therefore, a potential for these constituents to be deposited on the soil exists due to deposition from air emissions. The Closure Plan should be revised to conduct a minimum amount of sampling for dioxin and furan in the soil regardless of whether there is an evidence of a release from cracks in the metal sand filter structures.***

   LANL took the following actions to respond to this comment:

   - Table 4 was revised to add dioxin, furan, and perchlorate.
   - Perchlorate and dioxin/furan were added to the constituents to be analyzed in Section 4.3.1.
   - Section 4.3.1 was revised to include sampling of dioxin and furan upslope of the sand filters.

   The revised pages are included in Appendix A, with changes highlighted, and in Appendix B without highlights.

2. ***Permittees shall revise "Table 5 – Potential Contaminants and Their Associated SSLs and ESLs" to include dioxin, furan and perchlorate. Permittees' reason for not including perchlorate in Table 5 was that there was no screening level for perchlorate. Soil Screening levels for all three constituents are published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels. These screening levels may be obtained at the following web site: http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm***

   Table 5 was revised to add dioxin, furan, and perchlorate. The revised table is included in Appendix A, with changes highlighted, and in Appendix B without highlights.

# APPENDIX A

# REVISED CLOSURE PLAN PAGES WITH HIGHLIGHTED CHANGES

## 4.3 Analytical Requirements

The analytical techniques used depend on whether the sample is taken to characterize waste or to determine whether environmental media should be removed, as described in Section 4.3.1. Analytical laboratory requirements and QA/quality control (QC) procedures are discussed in Sections 4.3.2 and 4.3.3, respectively.

### 4.3.1 Proposed Analytical Methods

The types of samples to be collected are described in Section 5.0. The selection of the analytical testing methods identified in Table 4 is based on whether samples are taken to characterize waste or to determine whether contaminated environmental media must be removed. If samples are taken to characterize waste, they will be analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and toxicity characteristic (TC) metals and organics by the methods listed in Table 4. If the samples are taken to determine whether environmental media must be removed, they will be analyzed for total metals and organics, and the other constituents shown in Table 5 so that they can be compared to the SSLs and ESLs shown in the table. Only solids will be analyzed for the SSL/ESL comparisons, while both liquids and solids may require analysis for waste characterization purposes. The samples will also be initially analyzed using the DX-2 HE Spot Test, a method used to detect the presence of HE at low parts-per-million levels. If the Spot Test is positive (i.e., HE is present), the samples will be submitted to an off-site laboratory for HE analysis using the methods described in Table 4.

Constituents of concern that would be characteristic of leaks from the sand filters are presented with their respective SSLs and ESLs in Table 5. Except for HE and barium, which is present in legacy explosives formulations, most of the other constituents are present in the incoming wastewater in very low (parts-per-million) concentrations. The predominant types of HE treated at the sand filters are 2,4,6-trinitrotoluene (TNT), cyclotetramethylenetetranitramine (HMX), and cyclotrimethylenetrinitramine (RDX). Other explosives, such as pentaerythrioltetranitrate (PETN), listed in Table 5 would be expected only in trace amounts. Nitrocellulose would be present as a constituent of HE binders. Several other chemicals (e.g., 2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in Table 5 because they are associated with HE. Perchlorate and polychlorinated biphenyls (PCB) are included in Table 5 to cover the possibility that traces of these ~~PCB~~ contaminants~~ed oils~~ may have been in wastewater treated at the sand filters Dioxin and furan will also be analyzed. These compounds are byproducts of combustion and would not result from leaks. Therefore, they will be analyzed only for samples taken in the first foot of soil to be used to indicate impacts from burning activities, deposited either by airborne or stormwater mechanisms. Deposition may have occurred from past operations at the TA-16 Burn Ground as well as the Cerro Grande Fire. Although RCRA constituents have been measured throughout the TA-16 Burn

Ground area, dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

Table 5 is intended to represent the most likely constituents; however, samples will also be analyzed for the wide variety of VOCs and SVOCs in accordance with Table 4. If other chemicals are detected above soil background levels, they will also be compared to their SSLs and ESLs, as described in Section 5.5.

#### 4.3.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 4, as needed. Analytical laboratories will have undergone audits by LANL to ensure that they have a documented comprehensive QA/QC program; technical analytical expertise; a document control/records management plan; and the capability to perform data reduction, validation, and reporting.

#### 4.3.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m,p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.
[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.
[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.
[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

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| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste. Physical/Chemical Methods," *SW-846*.
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| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m.p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.

[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.

[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.

[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX C

# CERTIFICATION

## CERTIFICATION

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Barbara A. Stone for

**James L. Holt**
Associate Director, Operations
Los Alamos National Laboratory
Operator

5/27/03
Date Signed

**Ralph E. Erickson**
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

5/28/03
Date Signed

# Response to April 28, 2003 Notice of Deficiency Technical Area (TA)-16 Closure Plan for The TA-16-401 and –406 Sand Filters, Revision 0.0

**LA-UR-03-3471**
**May 2003**

Prepared by:
Los Alamos National Laboratory
Solid Waste Regulatory Compliance Group (RRES-SWRC)
Los Alamos, New Mexico 87545

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The following section, "NOD Comments and Responses," provides the two NOD comments (in bold and italics) and LANL's responses.

## NOD Comments and Responses

1. ***Permittees shall revise "Table 4 – Analytical Methods and Use of Data" of the Closure Plan to include data for dioxin, furan (SW-846 analytical method 9290 [actually 8290]) and Perchlorate (SW-846 analytical method 314.0). Permittees reason for not analyzing for dioxin and furan was that these constituents would only be generated from burning high explosives (HE). In past operations residual HE was open burned after the liquid passed through the sand filters. Therefore, a potential for these constituents to be deposited on the soil exists due to deposition from air emissions. The Closure Plan should be revised to conduct a minimum amount of sampling for dioxin and furan in the soil regardless of whether there is an evidence of a release from cracks in the metal sand filter structures.***

   LANL took the following actions to respond to this comment:

   - Table 4 was revised to add dioxin, furan, and perchlorate.
   - Perchlorate and dioxin/furan were added to the constituents to be analyzed in Section 4.3.1.
   - Section 4.3.1 was revised to include sampling of dioxin and furan upslope of the sand filters.

   The revised pages are included in Appendix A, with changes highlighted, and in Appendix B without highlights.

2. ***Permittees shall revise "Table 5 – Potential Contaminants and Their Associated SSLs and ESLs" to include dioxin, furan and perchlorate. Permittees' reason for not including perchlorate in Table 5 was that there was no screening level for perchlorate. Soil Screening levels for all three constituents are published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels. These screening levels may be obtained at the following web site: http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm***

   Table 5 was revised to add dioxin, furan, and perchlorate. The revised table is included in Appendix A, with changes highlighted, and in Appendix B without highlights.

# APPENDIX A

# REVISED CLOSURE PLAN PAGES WITH HIGHLIGHTED CHANGES

## 4.3 Analytical Requirements

The analytical techniques used depend on whether the sample is taken to characterize waste or to determine whether environmental media should be removed, as described in Section 4.3.1. Analytical laboratory requirements and QA/quality control (QC) procedures are discussed in Sections 4.3.2 and 4.3.3, respectively.

### 4.3.1 Proposed Analytical Methods

The types of samples to be collected are described in Section 5.0. The selection of the analytical testing methods identified in Table 4 is based on whether samples are taken to characterize waste or to determine whether contaminated environmental media must be removed. If samples are taken to characterize waste, they will be analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and toxicity characteristic (TC) metals and organics by the methods listed in Table 4. If the samples are taken to determine whether environmental media must be removed, they will be analyzed for total metals and organics, and the other constituents shown in Table 5 so that they can be compared to the SSLs and ESLs shown in the table. Only solids will be analyzed for the SSL/ESL comparisons, while both liquids and solids may require analysis for waste characterization purposes. The samples will also be initially analyzed using the DX-2 HE Spot Test, a method used to detect the presence of HE at low parts-per-million levels. If the Spot Test is positive (i.e., HE is present), the samples will be submitted to an off-site laboratory for HE analysis using the methods described in Table 4.

Constituents of concern that would be characteristic of leaks from the sand filters are presented with their respective SSLs and ESLs in Table 5. Except for HE and barium, which is present in legacy explosives formulations, most of the other constituents are present in the incoming wastewater in very low (parts-per-million) concentrations. The predominant types of HE treated at the sand filters are 2,4,6-trinitrotoluene (TNT), cyclotetramethylenetetranitramine (HMX), and cyclotrimethylenetrinitramine (RDX). Other explosives, such as pentaerythrioltetranitrate (PETN), listed in Table 5 would be expected only in trace amounts. Nitrocellulose would be present as a constituent of HE binders. Several other chemicals (e.g., 2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in Table 5 because they are associated with HE. Perchlorate and polychlorinated biphenyls (PCB) are included in Table 5 to cover the possibility that traces of these ~~PCB~~ contaminants~~ed oils~~ may have been in wastewater treated at the sand filters Dioxin and furan will also be analyzed. These compounds are byproducts of combustion and would not result from leaks. Therefore, they will be analyzed only for samples taken in the first foot of soil to be used to indicate impacts from burning activities, deposited either by airborne or stormwater mechanisms. Deposition may have occurred from past operations at the TA-16 Burn Ground as well as the Cerro Grande Fire. Although RCRA constituents have been measured throughout the TA-16 Burn

Ground area, dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

Table 5 is intended to represent the most likely constituents; however, samples will also be analyzed for the wide variety of VOCs and SVOCs in accordance with Table 4. If other chemicals are detected above soil background levels, they will also be compared to their SSLs and ESLs, as described in Section 5.5.

### 4.3.2 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in Table 4, as needed. Analytical laboratories will have undergone audits by LANL to ensure that they have a documented comprehensive QA/QC program; technical analytical expertise; a document control/records management plan; and the capability to perform data reduction, validation, and reporting.

### 4.3.3 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m,p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.
[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.
[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.
[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX B

# REVISED CLOSURE PLAN PAGES WITHOUT HIGHLIGHTS

## 4.3 Analytical Requirements

The analytical techniques used depend on whether the sample is taken to characterize waste or to determine whether environmental media should be removed, as described in Section 4.3.1. Analytical laboratory requirements and QA/quality control (QC) procedures are discussed in Sections 4.3.2 and 4.3.3, respectively.

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Constituents of concern that would be characteristic of leaks from the sand filters are presented with their respective SSLs and ESLs in Table 5. Except for HE and barium, which is present in legacy explosives formulations, most of the other constituents are present in the incoming wastewater in very low (parts-per-million) concentrations. The predominant types of HE treated at the sand filters are 2,4,6-trinitrotoluene (TNT), cyclotetramethylenetetranitramine (HMX), and cyclotrimethylenetrinitramine (RDX). Other explosives, such as pentaerythrioltetranitrate (PETN), listed in Table 5 would be expected only in trace amounts. Nitrocellulose would be present as a constituent of HE binders. Several other chemicals (e.g., 2,4-dinitrotoluene and 2,6-dinitrotoluene) are included in Table 5 because they are associated with HE. Perchlorate and polychlorinated biphenyls (PCB) are included in Table 5 to cover the possibility that traces of these contaminants may have been in wastewater treated at the sand filters. Dioxin and furan will also be analyzed. These compounds are byproducts of combustion and would not result from leaks. Therefore, they will be analyzed only for samples taken in the first foot of soil to be used to indicate impacts from burning activities, deposited either by airborne or stormwater mechanisms. Deposition may have occurred from past operations at the TA-16 Burn Ground as well as the Cerro Grande Fire. Although RCRA constituents have been measured throughout the TA-16 Burn Ground area,

dioxin and furan have not been measured. While it is not the intent of this closure to characterize contamination patterns from legacy operations (as discussed earlier this will be addressed through corrective action) a limited number of samples upslope would be useful to help put dioxin and furan into perspective. Therefore, three samples will be taken to the north across the face of the slope behind the sand filters, the primary direction that pollutants from the sand filters, as well as legacy burning in the same locations, should have deposited. The first will be taken approximately 200 feet north of the sand filters. Two additional samples will be taken at 100 ft intervals directly west of the first samples. This will provide a cross-section of the area impacted by stormwater upgradient of the sand filters. The data will be included in the Closure Report.

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Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. The types of field QC samples that will be collected include trip blanks, field blanks, and field duplicates, as appropriate. Table 6 presents a summary of QC sample types, analysis, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples.

Analytical data generated as a result of the activities described in this closure plan will be verified and validated by the analytical laboratory. Data reduction will involve the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests. At a minimum, analytical reports will include: a listing of each analyte; the analytical result for each analyte; units; the dilution factor, if any; the detection limit; and any laboratory-assigned qualifiers or codes. The results from QC samples such as blanks, spikes, calibrations, and reference to standard methods will also be included.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 4**
**Analytical Methods and Use of Data**

| Parameter | Matrix[1] | Analytical Method[2] | Use of Data |
|---|---|---|---|
| HE and associated compounds | Solid and liquid | SW-8330<br>SW-8332 | • Comparison to SSLs/ESLs<br>• Waste characterization |
| PCBs | Solid | SW-8082 | • Comparison to SSLs/ESLs |
| TC Metals (except mercury) | Solid | SW-1311/8270C | • Waste characterization |
| | Liquid | SW-8270C | |
| TC Metals[3] – mercury | Solid | SW-1311/7471A | • Waste characterization |
| | Liquid | SW-7470A | |
| Total Metals | | | • Comparison to SSLs/ESLs |
| Barium | Solid | SW-7080A or -7081 | |
| Cadmium | Solid | SW-7130 or -7131A | |
| Chromium | Solid | SW-7190 or -7191 | |
| Lead | Solid | SW-7420 or -7421 | |
| Silver | Solid | SW-7760A or 7761 | |
| Mercury | Solid | SW-7471A or 7470A | |
| TC Organics[3] | Solid | SW-1311/8270C | • Waste Characterization |
| | Liquid | SW-8270C | |
| VOCs | Solid and liquid | SW-8260B | • Comparison to SSLs/ESLs<br>• Waste Characterization |
| SVOCs | Solid and liquid | SW-8270C | • Comparison to SSLs/ESLs<br>• Waste characterization |
| Dioxin/Furan | Solid | SW-8290 | • Comparison to EPA SSLs |
| Perchlorate | Solid | SW-314 | • Comparison to EPA SSLs |

[1] Only solids (soil and tuff) will be analyzed for comparison with SSLs and ESLs.
[2] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[3] If total metals and organics have already been analyzed and all fall below TC regulatory levels, the totals analysis may be used instead of performing the TC analysis. EPA allows the totals analyzed for solids to be divided by 20 to represent the TC regulatory limits. Totals for liquids are not adjusted.

**Table 5**
**Potential Contaminants and Their Associated SSLs and ESLs**

| Parameter | SSL | ESL | Method[b] (Nominal[c] Detection Limit in mg/kg) |
|---|---|---|---|
| | (mg/kg)[a] | | |
| *Organics* | | | |
| Acetone | None | 3.7 E+00 | SW-8260B (5 E-02) |
| Benzene | 5.6 E+00 | 5.5 E+01 | SW-8260B (5 E-03) |
| Chloroform | 3.0 E-01 | 2.8 E+01 | SW-8260B (5 E-03) |
| 1,2-Dichloroethane | 7.2 E+00 | 4.7 E+00 | SW-8260B (5 E-03) |
| Methylene chloride | 2.7 E+03 | 7.0 E+00 | SW-8260B (1 E-02) |
| Methyl ethyl ketone | 8.9 E+04 | 1.3 E+03 | SW-8260B (2 E-02) |
| o-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (5 E-03) |
| m,p-Xylene | 6.3 E+01 | 1.1 E+00 | SW-8260B (1 E-02) |
| *HE and Associated Compounds* | | | |
| 2,4-Dinitrotoluene | 3.0 E+02 | 1.0 E+00 | SW-8330 (5 E-02) |
| 2,6-Dinitrotoluene | None | 6.5 E-01 | SW-8330 (5 E-02) |
| 1,3-Dinitrobenzene | None | 2.1 E-04 | SW-8330 (5 E-02) |
| HMX | 7.4 E+03 | 4.2 E+01 | SW-8330 (5 E-02) |
| Nitrobenzene | 2.1 E+01 | 2.2 E+00 | SW-8330 (5 E-02) |
| Nitroglycerine | 1.5 E+03 | 1.4 E+02 | SW-8332 (5 E-02) |
| PETN | None | 1.4 E+04 | SW-8330 (2 E-01) |
| RDX | 1.9 E+02 | 9.1 E+00 | SW-8330 (5 E-02) |
| TNT | 7.4 E+01 | 7.0 E-01 | SW-8330 (5 E-02) |
| Tetryl | None | 2.0 E+00 | SW-8330 (5 E-02) |
| 1,3,5-Trinitrobenzene (sym-TNB) | None | 1.5 E+01 | SW-8330 (5 E-02) |
| *Metals* | | | |
| Barium | 1.5 E+04 | 2.4 E+00 | SW-7080A or -7061A (2 E-01) |
| Cadmium | 1.9 E+02 | 1.0 E-01 | 7130 or7131A (5 E-02) |
| Chromium | 6.6 E+02 | 2.0 E-01 | 7190 or 7191(1 E-01) |
| Lead | 1.0 E+03 | 5.6 E+01 | 7420 or 7421 (2 E-02) |
| Mercury | 2.0 E+01 | 5.0 E-02 | 7471A (5 E-02) |
| Silver | 1.2 E+03 | 5.0 E-02 | 7760 or 7761 (1 E-01) |
| *PCBs* | | | |
| Arochlor-1016 | 8.9 E+00 | 2.5 E-02 | SW-8082 (1 E-02) |
| Arochlor-1221 | 9.2 E+00 | None | SW-8082 (2 E-02) |
| Arochlor-1232 | 9.2 E+00 | None | SW-8082 (1 E-02) |
| Arochlor-1242 | 9.2 E+00 | 4.1 E-02 | SW-8082 (1 E-02) |
| Arochlor-1248 | 2.5 E+00 | 7.2 E-03 | SW-8082 (1 E-02) |
| Arochlor-1254 | 2.5 E+00 | 2.2 E-02 | SW-8082 (1 E-02) |
| Arochlor-1260 | 2.5 E+00 | 4.4 E-01 | SW-8082 (1 E-02) |
| Miscellaneous[d] | | | |
| Dioxin | 1.8 E-05 | - | SW-8290 (1.3 E-07) |
| Furan | 9.5 E-00 | - | SO-8290 (1.3 E-07) |
| Perchlorate | 1.1 E+02 | - | SW-314 (4 E-03) |

[a] mg/kg = milligrams per kilogram.

[b] "SW" refers to EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methocs," *SW-846*.

[c] The actual detection limit will be dependent on the composition of the matrix and any interfering compounds. Data are not considered valid unless the detected value is twice the detection limit, although some EPA standard methods suggest that the value should be 5-10 times the detection limit.

[d] NMED has requested that these chemicals be compared to screening levels published in the most recent U.S. Environmental Protection Agency Region VI Human Health Medium-Specific Screening Levels rather than the NMED SSLs. These screening levels may be obtained at http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm.

# APPENDIX C

# CERTIFICATION

## CERTIFICATION

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Barbara A. Stone for

**James L. Holt**
Associate Director, Operations
Los Alamos National Laboratory
Operator

5/27/03
Date Signed

**Ralph E. Erickson**
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

5/28/03
Date Signed