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February 16, 2006

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505-6303

Reference: Work Assignment No. 06110.270; State of New Mexico Environment Department, Santa Fe, New Mexico; Support for the LANL Order of Consent; Review of the Middle Mortandad/Ten Site Canyon Aggregate Investigation Report, Los Alamos National Laboratory, New Mexico, Task 3 Deliverable.

Dear Mr. Cobrain:

Attached please find a deliverable for the above-referenced work assignment. The deliverable addresses the review of the "Middle Mortandad/Ten Site Canyon Aggregate Investigation Report," Los Alamos National Laboratory, New Mexico (herein referred to as the Investigation Report).

The review consisted of two steps. First, the technical completeness of the report was evaluated against Section XI.C, Investigation Report, of the March 1, 2005 New Mexico Environmental Department/Los Alamos National Laboratory (NMED/LANL) Order of Consent (herein referred to as the Order). Finally, a technical review of the information and data provided in the report was conducted. A Work Plan was not provided to TechLaw for review; therefore, the Investigation Report was not reviewed to determine whether the methodology and actions outlined in the Work Plan for conducting the Investigation Report were followed.

Section XI.C.5 of the Order requires that the background section of the report include a discussion of the potential sources of contamination, the history of known releases or discharges of contamination, and the known extent of contamination. While the background section did not provide this specific information, references for where in the report this information could be found were provided. Therefore, these criteria were deemed complete and indicated as such on the attached checklist. However, as this assumption required some interpretation of the requirements of the Order, NMED may wish to reconsider our assumption and comment as warranted.

Sections XI.E.1 and XI.E.2 of the Order require that a title page and table of contents be provided for the risk assessment. However, as the risk assessment was provided as an Appendix to the Investigation Report, these requirements were deemed to have been fulfilled in the main

body of the report and that repetition of this material was not necessary for the Appendix. As such, no comments were drafted concerning this and the Checklist is marked as "Not Applicable." However, as this assumption required some interpretation of the requirements of the Order, NMED may wish to reconsider our assumption and comment as warranted.

There is some concern that the extent of polychlorinated biphenyls (PCBs) has not been defined at Area of Concern (AOC) 35-014(g3) within the Ten Site Slope Subarea. Only two samples, (collected in 1995) were analyzed for PCBs. Because the results of the sampling indicated only low levels of PCBs, additional sampling was deemed unnecessary and the site was determined to be adequately characterized with respect to PCBs. Additional review of this area may be warranted.

Overall there were few technical issues noted. The primary concern with the risk assessment was that while most of the areas were identified as industrial use, an industrial use exposure assessment was not conducted. The rationale provided was that present day conditions do not lend themselves toward a worker spending any length of time at the sites. However, the risk assessment should also address reasonable and foreseeable future uses at the sites. Therefore, a comment has been drafted requesting additional lines of evidence to support exclusion of the evaluation of an industrial worker.

The attached deliverable has been formatted to allow easy review of the two steps of the review. The first section of the deliverable addresses the administrative completeness and comparison to the Order. In order to aid this part of the review, a Checklist that provides a brief summary of the key elements of the Order has been provided. The second section of the deliverable addresses any miscellaneous technical comments not previously addressed in the first section of the deliverable.

This deliverable was emailed to you on February 16, 2006 at David.Cobrain@state.nm.us to Ms. Neelam Dhawan at Neelam.Dhawan@state.nm.us. A formalized hard (paper) copy of this letter deliverable will be sent via mail. If you have any questions, please call me at (303) 763-7188 or Ms. Paige Walton at (801) 451-2978.

Sincerely,

June K. Dreith

June K. Dreith
Program Manager

Enclosure
cc: Neelam Dhawan, NMED
Ms. Paige Walton, TechLaw

TASK 3 DELIVERABLE

REVIEW OF THE MIDDLE MORTANDAD/TEN SITE AGGREGATE INVESTIGATION REPORT

Support for the LANL Order of Consent

Submitted by:

TechLaw, Inc.
560 Golden Ridge Road
Suite 130
Golden, CO 80401-9532

Submitted to:

Mr. David Cobrain
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building One
Santa Fe, New Mexico 87505

In response to:

Work Assignment No. 06110.270

February 16, 2006

REVIEW OF THE MIDDLE MORTANDAD/TEN SITE AGGREGATE INVESTIGATION REPORT

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REVIEW OF THE MIDDLE MORTANDAD/TEN SITE AGGREGATE INVESTIGATION REPORT

COMPLETENESS REVIEW

A completeness review of the Investigation Report against the March 1, 2005 NMED/LANL Order on Consent (herein referred to as the Order) was conducted. This review consisted of evaluating whether all of the sections required for an investigation report, as listed in Section XI.C (and associated sections as referenced in the Order) were included in the Investigation Report and whether the basic elements of each section, as specified in the Order, were included. Below is a Checklist designed to follow the general requirements of the Order. Where it is noted that a minimum requirement was not complete, an explanation is provided in the comments following the checklist.

Administrative Completeness Checklist for Review of Investigation Reports with Requirements of the March 1, 2005 NMED/LANL Order of Consent, Section XI.C

Complete? Y/N/NA	Minimum Required Contents
Y	**Title Page (XI.C.1)**
Y	Type of document
Y	Facility name
N/A	Technical Area (TA) designation
N/A	SWMU or AOC name
Y	Any other names
Y	Submittal date
Y	Signature page (name and title of responsible DOE and UC representative)
Y	**Executive Summary (XI.C.2)**
Y	Scope, purpose and results of investigation
Y	Site names
Y	Location
Y	TA designation
Y	Summary of conclusions and recommendations for future
Y	**Table of Contents (XI.C.3)**
Y	Sections, subsections, tables, figures, appendices, attachments
Y	Page numbers
Y	**Introduction (XI.C.4)**
Y	Facility name
Y	TA designation
Y	Unit location
Y	Unit status (e.g., closed, corrective action, etc.)
Y	General information on site usage and status
Y	Purpose and type of site investigation conducted
Y	Type of results presented in report

Y	**Background (XI.C.5)**
Y	Summarization of historical site uses since 1940's
Y	Locations of former and current site structures (including labeled figure)
Y	Locations of subsurface features (discussed and provided on labeled figure)
Y	Discussion of potential sources of contamination
Y	Discussion of history of releases or discharges of contamination
Y	Known extent of contamination
Y	Results of previous investigations (including references to previous reports)
Y	Referenced reports include: page, table, and figure numbers for references
Y	Site plan showing relevant investigation locations
Y	Site plan providing summary data tables
N	**Scope of Activities (XI.C.6)**
	Description of all activities performed during investigation including:
Y	Background information research
N	Implemented H&S measures (discuss whether caused limit of field activities)
N/A	Well/Borehole construction methods
Y	Field data collection
Y	Survey data collection
Y	Chemical analytical testing
N/A	Aquifer testing
N/A	Remediation systems pilot tests
Y	IDW storage or disposal

Mesa Subtop Area

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and pervious investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)

Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Figures: well location, surrounding area, groundwater elevations and flow directions for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
Y	Description of sampling intervals and methods for detected surface and subsurface contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
Y	Laboratory sample selection methods including sample depths for samples sent to laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample

	collection
	and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

Ten Site Slope Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions

	Figures: well location, surrounding area, groundwater elevations and flow directions
Y	for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
	Description of sampling intervals and methods for detected surface and subsurface
Y	contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
	Laboratory sample selection methods including sample depths for samples sent to
Y	laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
	Comparison of analytical results to background levels, cleanup standards, or site cleanup
Y	levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection
	and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)

N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

Mortandad Slope Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Figures: well location, surrounding area, groundwater elevations and flow directions for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)

Y	**Site Contamination (XI.C.9)**
Y	Description of sampling intervals and methods for detected surface and subsurface contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
Y	Laboratory sample selection methods including sample depths for samples sent to laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

Pratt Canyon Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed

N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Figures: well location, surrounding area, groundwater elevations and flow directions for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
Y	Description of sampling intervals and methods for detected surface and subsurface contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods

	Laboratory sample selection methods including sample depths for samples sent to laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

Ten Site Canyon Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)

Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Figures: well location, surrounding area, groundwater elevations and flow directions for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
Y	Description of sampling intervals and methods for detected surface and subsurface contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
Y	Laboratory sample selection methods including sample depths for samples sent to laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup

Y	levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

East Ten Site Slope Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions

	Regional groundwater: depth to water, aquifer thickness, and groundwater flow
Y	directions
	Figures: well location, surrounding area, groundwater elevations and flow directions
Y	for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)
N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
	Description of sampling intervals and methods for detected surface and subsurface
Y	contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
	Laboratory sample selection methods including sample depths for samples sent to
Y	laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup
Y	levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection
	and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)

N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)

Sigma Mesa Subarea

	Field Investigation Results (XI.C.7)
Y	Summary of procedures used
Y	Results of all field investigations including dates of activities
Y	Type and purpose of field investigation performed
N/A	Field screening measurements
N/A	Logging and sampling results
N/A	Pilot test results
N/A	Construction details
N	Conditions observed
N	Field variances due to conditions observed
Y	Surface Conditions (XI.C.7.a)
Y	Description of current site topography, features, and structures
Y	Description of current site uses and operations
Y	Surrounding features with potential impact on contaminant/sediment transport
N/A	Exploratory Drilling or Excavation Investigations (IX.C.7.b)
N/A	Exploratory and Monitoring Well Boring Geophysical Logging (XI.C.7.c)
Y	Subsurface Conditions (XI.C.7.d)
Y	Description of known subsurface lithology and structures (used current and previous investigation data)
Y	Locations of known pipelines and utility lines
Y	Locations of observed geologic structures
Y	Site plan with boring and excavation locations (provided in Figures)
Y	Site plan with above-ground and below-ground structures (provided in Figures)
Y	Cross-section of site or regional subsurface conditions
N/A	Monitoring Well Construction and Boring or Excavation Abandonment (XI.C.7.e)
Y	Groundwater Conditions (XI.C.7.f)
Y	Description of groundwater conditions beneath site
Y	Relation of local to regional groundwater conditions
N/A	Alluvial: depth to water, aquifer thickness, and groundwater flow directions
N/A	Shallow perched groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Regional groundwater: depth to water, aquifer thickness, and groundwater flow directions
Y	Figures: well location, surrounding area, groundwater elevations and flow directions for each hydrologic zone: ***Note: information referenced to another report***
Y	Surface Water Conditions (XI.C.7.g)
Y	Description of surface water conditions
Y	Description of surface water runoff and drainage
Y	Description of surface water sediment transport
N/A	Description of contaminant transport as suspended load and as dissolved phase
N/A	Discussion of fate and transport
N/A	Surface Air and Subsurface Vapor Conditions (XI.C.7.h)

N/A	Material Testing Results (XI.C.7.i)
N/A	Pilot Testing Results (XI.C.7.j)
Y	**Site Contamination (XI.C.9)**
Y	Description of sampling intervals and methods for detected surface and subsurface contamination
Y	Discussion/section only includes factual information (no interpretation of data)
Y	Soil, Rock, and Sediment Sampling (XI.C.9.a)
Y	Description of all soil, rock, and sediment sampling including:
Y	Sample dates
Y	Sample locations
Y	Methods of sample collection
Y	Sampling intervals
Y	Sample logging methods
Y	Screening sample selection methods
Y	Laboratory sample selection methods including sample depths for samples sent to laboratory
Y	Site plan showing sample locations (provided as Figure)
Y	Soil, Rock, and Sediment Field Screening Results (XI.C.9.b)
Y	Description of field screening methods during investigation
Y	Discussion of field screening results (also provided in tabular format)
Y	Limitations of field screening instrumentation and any influencing conditions
Y	Soil, Rock, and Sediment Sampling Analytical Results (XI.C.9.c)
Y	Summarization of analytical results for samples
Y	Description of analytical methods used
Y	Comparison of analytical results to background levels, cleanup standards, or site cleanup levels
Y	Summary table of results data (in Tables)
N	Discussion of any field conditions and sample methods potentially affecting sample collection and/or results
N	Soil analytical data presented with sample location on site map (in Figures)
N/A	Groundwater Sampling (XI.C.9.d)
N/A	Groundwater General Chemistry (XI.C.9.e)
N/A	Groundwater Chemical Analytical Results (XI.C.9.f)
N/A	Surface Water Sampling (XI.C.9.g)
N/A	Surface Water General Chemistry (XI.C.9.h)
N/A	Surface Water Chemical Analytical Results (XI.C.9.i)
N/A	Air and Subsurface Vapor Sampling (XI.C.9.j)
N/A	Air and Subsurface Vapor Field Screening Results (XI.C.9.k)
N/A	Air and Subsurface Vapor Laboratory Analytical Results (XI.C.9.l)
N	**Regulatory Criteria (XI.C.8)**
Y	Defined cleanup standards, risk-based screening levels, and risk-based cleanup goals for each pertinent medium
Y	Table with appropriate cleanup levels or standards
Y	Risk assessment (if appropriate) provided in appendix or separate document
N/A	If separate risk evaluation document, is document referenced and page numbers provided

Y	**Conclusions (XI.C.10)**
Y	Brief summary of investigation activities and discussion of conclusions of the investigation conducted at the site
Y	Comparison of results to applicable cleanup or screening levels and to relevant historical data
Y	Identification of all potential receptors (including groundwater)
Y	Discussion of data gaps
Y	Risk assessment (if applicable) as an appendix to the report
Y	References to the risk assessment only provided in summary and conclusions section of investigation report
	Recommendations (XI.C.11)
Y	Discussion of need for further investigation, corrective measures, risk assessment, and monitoring or discussion
N/A	Recommendation for corrective action completed (based upon conclusions in report) if warranted
Y	Explanation for additional sampling, monitoring, and site closure
N	Corresponding schedule for further action regarding the site
N/A	If no action is recommended, the anticipated schedule for submittal of a petition for a permit modification
Y	**Tables (XI.C.12)**
Y	**Figures (XI.C.13)**
Y	**Appendices (XI.C.14)**
Y	Field Methods (XI.C.14.a)
Y	Boring/Test Pit Logs and Well Construction Diagrams (XI.C.14.b)
Y	Analytical Program (XI.C.14.c)
Y	Analytical Reports (XI.C.14.d)
Y	Other Appendices (XI.C.14.e)

Risk Assessment Report Checklist (Order of Consent Section XI.E)

Complete? Y/N/NA	**Minimum Required Contents**
N/A	**Title Page (XI.E.1)**
Y	**Executive Summary/Abstract (XI.E.2)**
Y	**Table of Contents (XI.E.3)**
Y	**Introduction (XI.E.4)**
Y	**Background (XI.E.5)**
Y	Site Description (XI.E.5.a)
Y	Sampling Results (XI.E.5.b)

Y	**Conceptual Site Model (XI.E.6)**
Y	**Risk Assessment Levels (XI.E.7)**
Y	**Risk Assessment Results (XI.E.8)**
Y	Uncertainty Analysis (XI.E.8.a)
Y	**Conclusions and Recommendations (XI.E.9)**
Y	**Tables (XI.E.10)**
Y	**Figures (XI.E.11)**
Y	**Appendices (XI.E.12)**

DISCUSSION AND JUSTIFICATION OF WHY A SECTION WAS DEEMED INCOMPLETE

Investigation Report

1. **Scope of Activities (XI.C.6), Implemented Health and Safety.** As required in Section XI.C.6 of the Order, the discussion of the scope of activities must provide a brief description of the implemented health and safety measures that affected or limited the completion of any of the field tasks. The omission of this discussion may be the result of no health and safety issues of this nature were encountered during the field activities. Please revise Section 3.0 of the Investigation Report to include a discussion of the implemented health and safety measures that affected or limited the completion of any of the field tasks or please indicate that no health and safety issues of this nature were encountered during the field activities.

2. **Field Investigation Results (XI.C.7), Field Variances.** As required in Section XI.C.7 of the Order, the Investigation Report must discuss any field observations or conditions that altered the planned work or may have influenced the results of the sampling, testing, or logging reported in the Investigation Report. The Investigation Report does not address these issues. If no observations or conditions were noted that may have affected field work, the Investigation Report should indicate this. Please revise the Investigation Report to either discuss any field observations or conditions that altered the planned work or may have influenced the results of the sampling, testing, or logging or to indicate that there were no conditions that altered or affected the planned and implemented field activities. Please note that this comment also applies to Subsection XI.C.7b as related to Sections 5.0 through 11.0 of the Investigation Report.

3. **Regulatory Criteria (XI.C.8).** As required in Section XI.C.8 of the Order, the Investigation Report must contain a section discussing the appropriate regulatory criteria (including cleanup standards, risk-based screening levels, and/or risk-based cleanup goals). While this information could be located in Appendix F, Risk Assessment, there is

no discussion within the main body of the report addressing these issues. Please revise the Investigation Report to provide a brief section that addresses all appropriate regulatory criteria for the site as a whole and for each sub area.

4. **Soil, Rock, and Sediment Sampling and Analytical Results (XI.C.9.c), Figures.** As required in Section XI.C.9.c of the Order, a figure shall be presented with sample locations along with the analytical data. It is assumed that these figures were not provided due to the sheer number of samples and results. However, please clarify why these figures (for each sub area discussed in Section 5.0 through 11.0 of the Investigation Report) were not provided.

5. **Recommendations (XI.C.11), Schedule.** As required in Section XI.C.11 of the Order, a corresponding schedule for further action regarding the site must be provided. It is not clear that this schedule was provided in the Investigation Report. Please clarify where in the Investigation Report this schedule is provided, or revise the report to include a corresponding schedule for further action regarding the site.

REVIEW OF THE MIDDLE MORTANDAD/TEN SITE AGGREGATE INVESTIGATION REPORT

ADDITIONAL TECHNICAL COMMENTS

GENERAL COMMENTS

1. The Executive Summary, Introduction, and Background Sections of the risk assessment provided in Appendix F describe the sectioning of the Middle Mortandad/Ten Site Aggregate into the seven subareas that are to be evaluated. However, the discussions of contaminants, including identification of constituents of potential concern (COPCs) provided in Appendix D, are based on either Technical Areas (TAs) or solid waste management units (SWMUs). The risk assessment does not provide a clear discussion of which SWMUs are identified with which TA and which TA are associated with each subarea. Therefore, it is very difficult to cross reference and understand history and the potential contamination for each subarea. Please revise the introductory or background section of the risk assessment to include a discussion or a table that clearly references which SWMUs and TAs are associated with each of the seven subareas or provide a reference to Table 2.0-1.

2. Several of the individual ecological risk assessments eliminate a chemical as a constituent of potential concern (COPC) due to the fact that the chemical was detected under asphalt or gravel. While present day conditions may indicate that the sample location does not represent a viable pathway, it is not clear how that assumption can be carried forward. For example, will institutional controls be used to ensure that all areas that are current asphalted be maintained in the future to ensure that no new ecological pathways are created? Sufficient justification for excluding these data has not been provided. Please provide some additional lines of evidence for excluding sample data based upon the fact that the media may presently be covered in asphalt or gravel.

3. The description of the land use for several of the subareas includes both industrial and recreational. However, in most cases, the risk assessment screening only evaluated risks to a recreational trail user (adult and child). The discussions on the screening levels indicate that an industrial use scenario, assuming a worker 8 hours per day is not realistic given current or present day conditions. However, it is not clear that an industrial scenario may not be plausible at some time in the future. Unless land use controls are to be placed on these sites limiting occupational use of the site, the assessments should include an evaluation of a worker. Please provide additional lines of evidence for exclusion of an evaluation of the industrial use scenario in the risk screen.

4. Uncertainty Analysis sections for each of the subareas list several constituents that were not evaluated in the ecological screening assessment due to the lack of an ecological screening level (ESL). However, in reviewing the list of chemicals, it is not clear why some of them were excluded. For example, there are available toxicity data for aldrin to calculate an ESL (Sample, *et al*, 1996). Because aldrin is not listed in LANL's EcoRisk database is not reason for excluding a chemical. Please review the list of chemicals, and where toxicity data area available, an ESL should be calculated and the chemical evaluated.

SPECIFIC COMMENTS

1. **Appendix D, Table D-1.1-1, Background/Fallout Values and Background Data for Inorganic Chemicals and Radionuclides Detected in the Mortandad/Ten Site Aggregate**. For several of the radionuclides, the table indicates that background data were not available. This was identified for Am-241, Cs-137, Pu-238, Pu-239, and H-3 for the media "Qbt 2,3,4", "Qbt 1v", and "Qbt 1g/Qct/Qbo". However, in reviewing the referenced 1998 LANL background document, in particular Table 6.0-2, a background value for these media for the above-listed radionuclides was provided. It is noted that the Table 6.0-2 indicates that the values provided are based upon nominal detected activity. However, it is not clear why the background values were not applied. Please clarify whether the background values for radionuclides that were based upon nominal detectable activity were not applied as a measure of conservatism, or provide additional rationale for why these data were not used.

Appendix F – Risk Assessment

2. **Section F-1.0, Introduction, page F-1.** This risk assessment addresses risks to human and ecological receptors via exposure to soil surrounding the actual disposal areas and does not address risk due to exposure to materials within the units. The introduction should clearly state this and indicate that exposure to contaminants disposed in each of the disposal units would result in unacceptable risk and controls will be in place limiting direct contact with buried materials. Please revise the report accordingly.

Minor Comments

5. **Parameters Used to Calculate Chemical SSLs.** The tables provide the input data used to calculate the soil screening limits (SSLs) for the recreational users indicate that the averaging time for carcinogens is 70 years times 365 days. This is correct for an adult user, but for a child, the averaging time should be 6 years times 365 days. Please ensure that these values were used for the child trail user.

6. Conversions of dose into risk were computed using the code RESRAD. While the conversions appear reasonable, none of the RESRAD input/output files were provided for review. Please provide additional information from the RESRAD runs to support the conversions of the dose into risk.