



State of New Mexico
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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 4, 2000

Dr. Inés Triay, Manager
Carlsbad Field Office
Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Mr. Joe Epstein, General Manager
Westinghouse Waste Isolation Division
P.O. Box 2078
Carlsbad, New Mexico 88221-5608

**RE: REVIEW AND COMMENTS ON FACILITY WORK PLAN, SAMPLING AND ANALYSIS PLAN
WIPP HAZARDOUS WASTE FACILITY PERMIT
EPA I.D. NUMBER NM4890139088**

Dear Dr. Triay and Mr. Epstein:

The New Mexico Environmental Department (NMED) Hazardous Waste Bureau has completed the review of two corrective action documents submitted for the Waste Isolation Pilot Plant (WIPP). The Department of Energy/Carlsbad Field Office and Westinghouse Waste Isolation Division (Permittees) prepared both reports as required by Module VII (Corrective Action for Solid Waste Management, Sections VII.M.1 and .2) of the WIPP Hazardous Waste Facility Permit. The two reports are "WIPP Facility Work Plan for Solid Waste Management Units and Areas of Concern" (Work Plan), received by NMED on February 24, 2000 (report dated February 2000) and "WIPP Sampling and Analysis Plan for Solid Waste Management Units and Areas of Concern" (Sampling and Analysis Plan), received by NMED on May 24, 2000 (report dated May 2000). The scope of both reports is limited to those Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) identified in the permit.

The Work Plan describes the facility-wide approach to future investigations at the SWMUs and AOCs. The Sampling and Analysis Plan describes in greater detail the approach of investigations (past and proposed) at each of the SWMUs and AOCs. In general, NMED has found both documents are sufficiently complete to proceed with the proposed investigations; however, in

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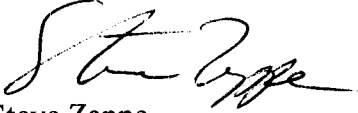


Dr. Inés Triay
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order for these documents to meet NMED standards for technical adequacy, the following comments need to be addressed. While some of the comments are for informational purposes that may not require a response, others are of a more technical nature and require a response from the Permittees.

Please respond to the attached comments to NMED within thirty (30) calendar days from the date this letter is received. Should you have any questions or require additional explanation on any of the items discussed in this letter, please contact Will Fetner at 505-827-1558, extension 1038.

Sincerely,



Steve Zappe
Project Leader
Hazardous Waste Bureau

Attachments:

- NMED Comments on Work Plan and SAP
- NMED Figures 1 through 4
- NMED Draft Soil Screening Levels (Appendix A only)

cc: James Bearzi, NMED HWB
John Kieling, NMED HWB
William Fetner, NMED HWB
Robert S. Dinwiddie, NMED HRMB
Susan McMichael, NMED OGC
David Neleigh, EPA Region 6
Connie Walker, TechLaw
File: WIPP Red '00

NMED comments on the Work Plan

1. General comment - Based on current NMED policy, chemicals of concern detected in soil samples must be compared against the more stringent residential risk-based screening levels established by NMED (Soil Screening Levels, attached) or, for chemicals with no NMED values, EPA Region 6 (Human Health Medium-Specific Screening Levels) and not with industrial criteria as referenced in the Work Plan. This policy is based on the fact that, at the present time, NMED has no mechanism or authority to impose or enforce land-use restrictions at any facility in the State. NMED is unable to accept guarantees that the current land use of an individual site or facility will not change over time, even if such guarantees are a matter of federal law. As a result, NMED requires the Permittees to evaluate the more conservative assumption (i.e., residential) for soil screening values. NMED notes that soil analytical data available thus far from all the SWMUs and AOCs do not exceed the residential risk-based soil screening levels and, therefore, this requirement should not affect the general approach of investigations as proposed by the Permittees and those recommended in these comments.
2. Section 2.2, first sentence, page 6 - Section 2.1.4 should be referenced instead of 2.1.3.
3. Section 3.0, second bullet under DCQAP objectives, page 7 - Please provide more details or be more specific about the meaning of this particular item.
4. Section 3.1.2, first sentence of the second paragraph under the title "Completeness", page 9 - Please justify how the 85 percent completeness goal was derived.
5. Section 3.2.9, first sentence, page 14 - Note that laboratory bottleware typically consist of glass containers for the analysis of organic and inorganic soil samples; polyethylene containers are used for the analysis of inorganic water samples.
6. Section 3.2.12, page 15 - Clarification: since a number of soil samples have shown concentrations of contaminants above background levels (i.e., barium, chromium, lead, nickel and methanol), the possibility of generating contaminated materials does exist. At a minimum, field personnel should use Level D personal protection equipment and all waste generated from the investigations should be temporarily stored on-site pending analysis of samples.
7. Section 3.3, first paragraph, page 15 - It is the Permittees' responsibility to make sure that the selected analytical laboratory meets the minimum requirements set forth by EPA's Contract Laboratory Program (CLP).

NMED comments on the Sampling and Analysis Plan

1. Table of Contents, page i - “Acronyms and Abbreviations” are located in page xi and “Definitions” are located in page xiii.
2. Section 1.1, second sentence, page 1 - In addition to total metals, the objective of the SAP should include defining the extent of specific organic compounds, such as methanol detected in SWMU 004a (Portacamp Storage Yard, West Side).
3. Section 1.3.1.1, fifth bullet, page 3 - Remove the asterisks “**” for SWMU 001L (WIPP-12/P-5) since additional soil sampling to determine the extent of barium is proposed for this site.
4. Section 1.3.2, third paragraph, page 4 - The Permittees will need to provide additional documentation to justify “closure” and, therefore, No Further Action (NFA) for the relevant sites. Provide hard copy documentation from “another regulatory authority” that state that the specific sites were properly closed under their authority and why they are exempt from RCRA. If possible, also include more detailed information on the procedures used to “close” these sites (provide guideline(s)/rule(s), etc). This information should be included in the NFA request report for these sites.
5. Section 1.3.2.2, third sentence, page 5 - Note that there was a minor detection of thallium [0.13 parts per million (ppm)] in SWMU 001s (ERDA-9). The Permittees need to reference this exception in the text of this section.
6. Section 1.4.2, page 6 - See above NMED’s Comment #1 on the Work Plan. Residential (not industrial) risk-based soil screening levels established by NMED (or EPA Region 6, as applicable) will be used as action levels.
7. Section 1.4.4, page 6 - NMED agrees with the Permittees’ definition of “study boundary” (physical boundary) as contained in this section. However, horizontal and vertical boundaries should also be based on the extent of contaminant migration, if any. Therefore, should contamination (chemicals of concern showing concentrations above background levels) be found beyond the initial horizontal and vertical boundaries, these boundaries should be expanded accordingly to accommodate the extent of the contaminant plume.
8. Section 1.4.5, last two sentences, pages 6 and 7 - As previously stated, residential (not industrial) risk-based soil screening levels established by NMED (or EPA Region 6, as applicable) will be used as action levels. For those sites with constituent concentrations exceeding screening criteria, ecological risks must be evaluated in addition to human

health risk evaluations (in order to protect both human health and the environment) before NFA can be requested.

9. Section 1.4.6, next to last sentence, page 7 - See above NMED's Comment #1 on the Work Plan [residential (not industrial) risk-based soil screening levels established by NMED (or EPA Region 6, as applicable) will be used as action levels].
10. Section 1.4.7, third sentence, page 7 - Random sampling design does not seem appropriate. Sampling locations should target areas of concern (where soil impacts would most likely be found) and other areas that would fully delineate the extent of the contaminant plume, if one exists.
11. General comment - The SAP should include map(s) showing the location of all the SWMUs and AOCs in respect to each other and to other relevant WIPP surface features (buildings and other structures, access roads, drainage features, etc.).
12. Section 1.5, last sentence, page 7 - Table 27.1 should be introduced in the text of this section so it can be used as reference to subsequent sections (Sections 2.0 through 24.0).
13. Sections 2.0, 3.0, 6.0, 11.0, and 14.0 through 16.0, "Sampling" sections - The number of samples that are reported to have been collected under the "Sampling" section versus those shown on the respective figure and table need to be consistent. All samples locations (at minimum the 1996 sampling events for sites 001g, 001h, 001L, 001x and 004a) need to be shown on the respective table and figure including a summary of analytical results.
14. Figure 2.1, page 11 - Note that the industrial criteria for lead is 1,000 ppm according to the NMED Soil Screening Levels table (vs. 780 ppm shown on the figure). The residential criteria for lead is 400 ppm. The figure should list the residential criteria.
15. General comment - In reference to those sites that have been closed under another authority, under the "Nature and Extent of Contamination" section, the SAP should mention results of analyses that were below method detection limits (or below background levels) and, therefore, further support a NFA request (i.e., thallium and mercury results).
16. Section 6.1.2, page 24 - It is not clear in this section if WIPP-12 borehole was a continuation of the P-5 borehole (the location of P-5 needs to be shown on Figure 6.1). Are there any details on the total depth of P-5? How does the closure of the P-5 site by USGS in 1976 relate to subsequent drilling of WIPP-12 on the same pad from 1978 through 1982?

17. Figure 6.1 and Section 6.2.3.1, pages 26 and 28, respectively - NMED recommends the following:
- Advance at least one borehole and collect two samples (shallow and deep) from each of the two WIPP-12 mud pits that were not previously sampled (see attached NMED Figure 1 which is based on Figure 6.1 of the SAP for location). These samples should be analyzed for total barium and lead.
 - Collect a “deeper” sample at the location of Hole 6 in order to delineate the vertical extent of total barium contamination [suggested depth - 8 to 9 feet below land surface (bls)].
 - Collect sufficient samples “around” Hole 6 location so as to fully determine the horizontal extent of barium impacts (see attached NMED Figure 1 for suggested locations).
 - The Permittees should keep in mind that any drainage feature or “low point” that may lead away from Hole 6 should also be evaluated and/or sampled in order to determine if any migration of contaminants has occurred due to surface runoff.
18. General comment - Under the “Nature and Extent of Contamination” section of those SWMUs that will be further investigated, the Permittees should specify the following in the text: 1) which borehole location exceeded background levels and 2) that the analytes that were detected above background levels were also significantly below the residential risk-based soil screening levels established by NMED (or EPA Region 6, as applicable).
19. Section 11.2.1.2, first paragraph, page 38 - In order to be consistent, please state in the text the number of samples (and QA/QC) collected from this SWMU. Please correct typographical error on second sentence: should be SWMU 001q instead of SWMU 001p. Also specify that the samples were collected only from the mud pit that was used (primary pit), if this is the case.
20. Figure 11.1 and Section 11.2.3.1, pages 40 and 42, respectively - NMED recommends the following:
- Collect a “deeper” sample at the previous sample location in order to delineate the vertical extent of total chromium, nickel and lead contamination (suggested depth - 4 to 5 feet bls).

Attachment – NMED Comments on Work Plan and SAP

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- Collect enough samples “around” previous sample location so as to fully determine the horizontal extent of total chromium, nickel and lead impacts (for suggested locations, see attached NMED Figure 2 which is based on Figure 11.1 of the SAP).
 - The Permittees should keep in mind that any drainage feature or “low point” that may lead away from DOE-1 mud pit should also be evaluated and/or sampled in order to determine if any migration of contaminants has occurred due to surface runoff.
21. Table 11.1, page 41 - The table should include nickel concentrations that also exceeded background concentrations.
 22. Section 11.2.3.2, first sentence, page 43 - Samples should be analyzed for total chromium, nickel and lead, not barium.
 23. Section 12.2.2.1, third sentence, page 45 - Emphasize that thallium was detected only slightly above the method detection limit.
 24. Figure 14.1 and Section 14.2.3.1, pages 50 and 53, respectively - NMED recommends the following:
 - Collect a “deeper” sample at the location of Hole 4 in order to delineate the vertical extent of total barium, chromium and lead contamination (suggested depth - 8 to 9 feet bls).
 - Collect enough samples “around” Hole 4 location so as to fully determine the horizontal extent of total barium, chromium and lead impacts (for suggested locations, see attached NMED Figure 3 which is based on Figure 14.1 of the SAP).
 25. The Permittees should keep in mind that any drainage feature or “low point” that may lead away from Hole 4 should also be evaluated and/or sampled in order to determine if any migration of contaminants has occurred due to surface runoff.
 26. Sections 15.2.1.2 and 15.2.2.1, pages 55 and 56, respectively - Numerous parameters (VOCs, metals and PCBs) were sampled at this SWMU; the text should specify the analyses performed on the samples. Regarding the last sentence of Section 15.2.1.2: Figure 15.1 does not show lead concentrations but does present nickel concentrations that are not mentioned in the text. Third sentence of Section 15.2.2.1: Table 15.1 does not (but should) include lead concentrations.

27. Table 15.1, Section 15.2.3.1 and Figure 15.1, pages 57, 58 and 59, respectively - NMED recommends the following:
- To be consistent with other SWMUs (SWMU 001L and 001q), lead concentrations should be included in Table 15.1 and Figure 15.1 even if all concentrations of lead were below background.
 - On Figure 15.1, show NMED residential risk-based soil screening level for nickel and show background concentration for lead.
 - Collect “deeper” samples at the locations of Holes 1 through 4 in order to delineate the vertical extent of total chromium, nickel and methanol contamination (suggested depths - 8 to 9 feet bls).
 - Collect enough samples “around” previous sample locations exceeding background levels so as to fully determine the horizontal extent of total chromium, nickel and methanol impacts (for suggested locations, see attached NMED Figure 4 which is based on Figure 15.1 of the SAP).
 - The Permittees should keep in mind that any drainage feature or “low point” that may lead away from the SWMU 004a storage yard should also be evaluated and/or sampled in order to determine if any migration of contaminants has occurred due to surface runoff
28. Section 15.2.3.1, third sentence, page 58 - To be consistent with previous sample intervals, the second set of subsurface samples should be collected 60 to 72 inches bls instead of the proposed 48 to 60 inches bls.
29. Table 16.1, page 61 - The table should include lead concentrations (<5 ppm) analyzed in the NMED sample collected from 12-24 inches bls.
30. Figure 16.1, page 63 - Please show the Permittees’ and NMED’s sample locations on this figure, if known.
31. Section 16.2.3, page 62 - Based on historical information provided for this site, NMED does not see the need to perform additional sampling at the subject SWMU. This suggestion is based on: 1) the evaporation pond presumably received only grey water from personnel showers and currently receives storm water and domestic water resulting from fire flow performance testing, and 2) detected concentrations of lead and nickel are only slightly above background concentrations. NMED believes that enough information is

available from this site to warrant NFA. However, the Permittees may proceed with the proposed scope of work if they believe that additional sampling is warranted for this SWMU.

32. Section 25.1, last paragraph, second sentence, page 82 - in addition to metals, VOCs need to be included in the text (i.e., methanol at SWMU 004a).
33. Section 25.3.2, first paragraph, page 83 - See above NMED's Comment #7 on the Work Plan.
34. Section 26.1, third paragraph, page 85 - Please clarify the Permittees' reporting intentions. The Permittees are intending to submit to NMED a draft SAP that will summarize the results of investigations at each of the SWMUs; however, there is no mention how the final report will be structured.

NMED would like to receive one RFI report for all of the SWMUs and AOCs. The report should be structure as described in Module VII.O and VII.U.5 of the WIPP Hazardous Waste Facility Permit. The report should contain detailed historical information, describe previous and recent sampling efforts and results, and contain recommendations. All recommendations (i.e., NFA, proposal for additional investigations, etc.) need to be fully supported in the report. For those SWMUs that exceed the NMED residential screening criteria for soils, human health and ecological risks will have to be evaluated and included in the final report.

35. Section 27.0, page 87 - For consistency, name the six AOCs (in the first paragraph, next to last sentence) and the four SWMUs (in the second paragraph, next to last sentence).
36. Appendix A, Section 2.2.2, first sentence, page 92 - Text should also include mercury in the evaluation of data distributions.
37. General comments on those SWMUs that will be further investigated (SWMUs 001L, 001q, 001x, 004a and, if applicable, 007b):
 - Permittees need prior NMED approval before any significant changes are made to the scope of work (i.e., reduction of sampling locations, modifying sample analyses, etc.).
 - Relevant surface features (i.e., borehole locations, mud pits, site boundaries, access roads, etc.) and sample locations (previous and proposed sample locations) need to be surveyed for each site by professional surveyors. This will assure that accurate scaled site maps are provided in the final report(s).

NMED Figures

WIPP Sampling and Analysis Plan
Solid Waste Management Units and Areas of Concern
DOE/WIPP 00-2014, Rev. 0

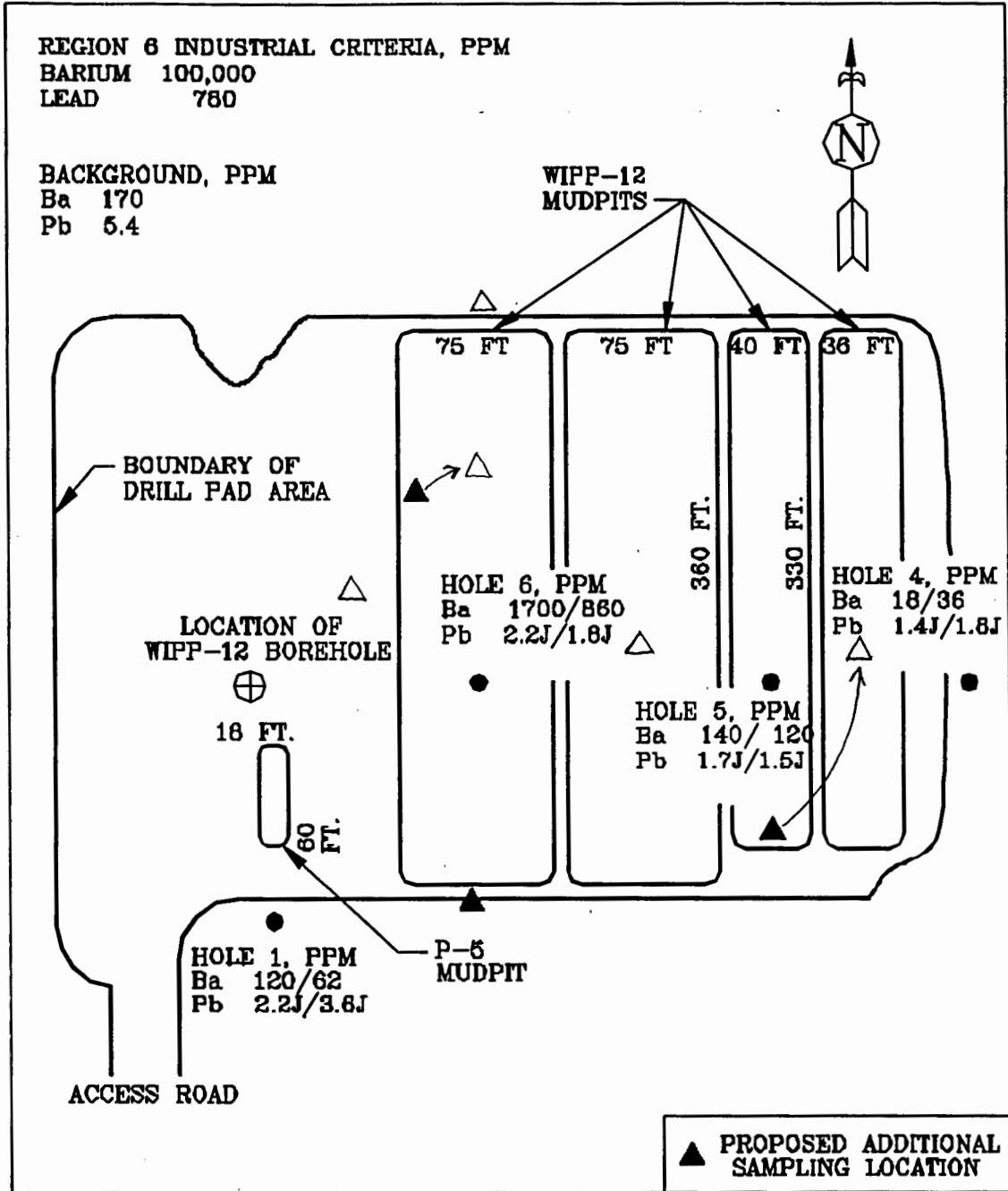


Figure 6.1 - Sample Location Map – SWMU 001L (WIPP-12 & P-5)

△ = ADDITIONAL SAMPLE LOCATIONS PROPOSED BY NMED
 (NOTE THAT TWO DOE PROPOSED SAMPLE LOCATIONS HAVE BEEN
 RE-LOCATED) WAF 9/13/00

NMED FIGURE 1

WIPP Sampling and Analysis Plan
Solid Waste Management Units and Areas of Concern
DOE/WIPP 00-2014, Rev. 0

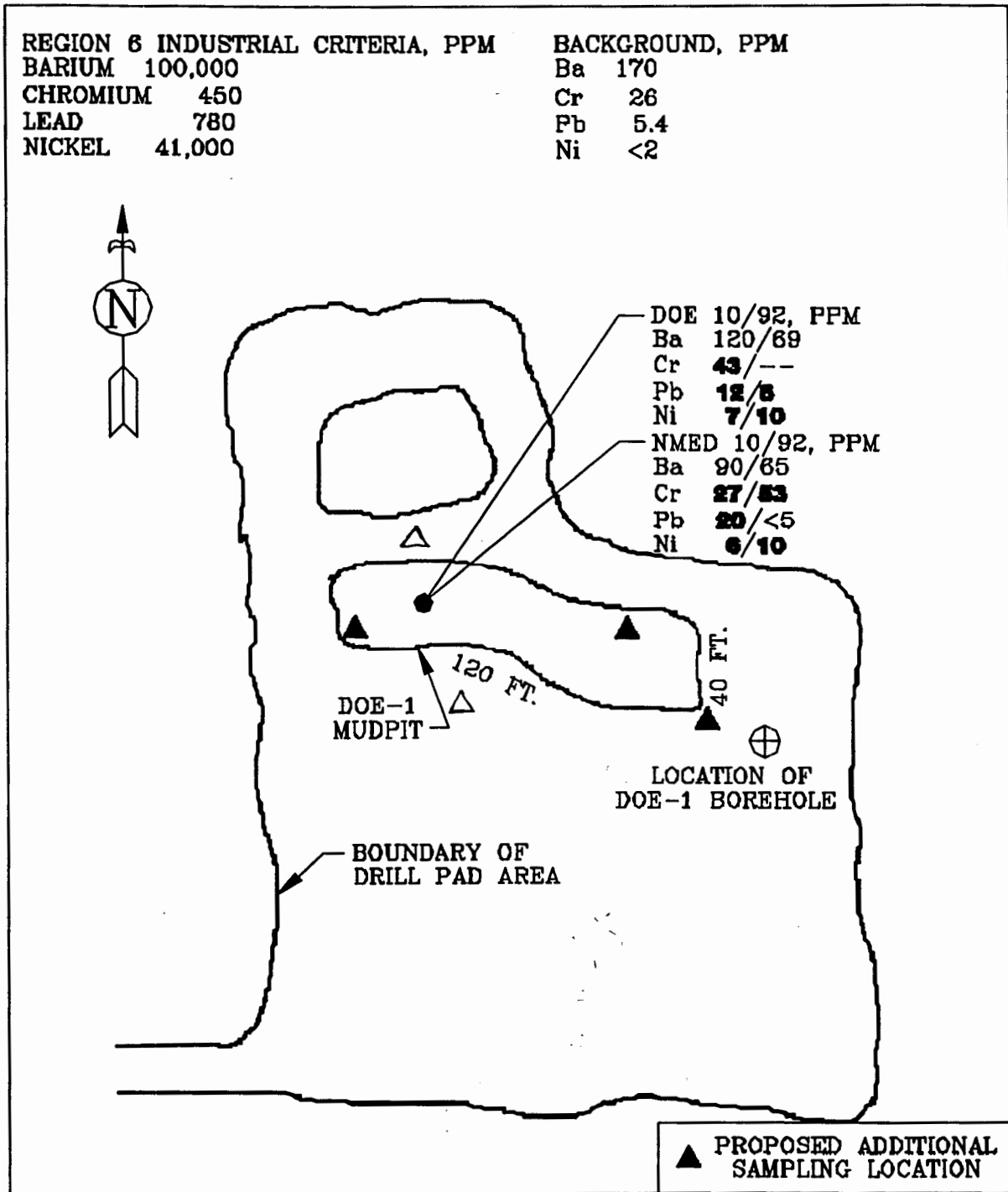


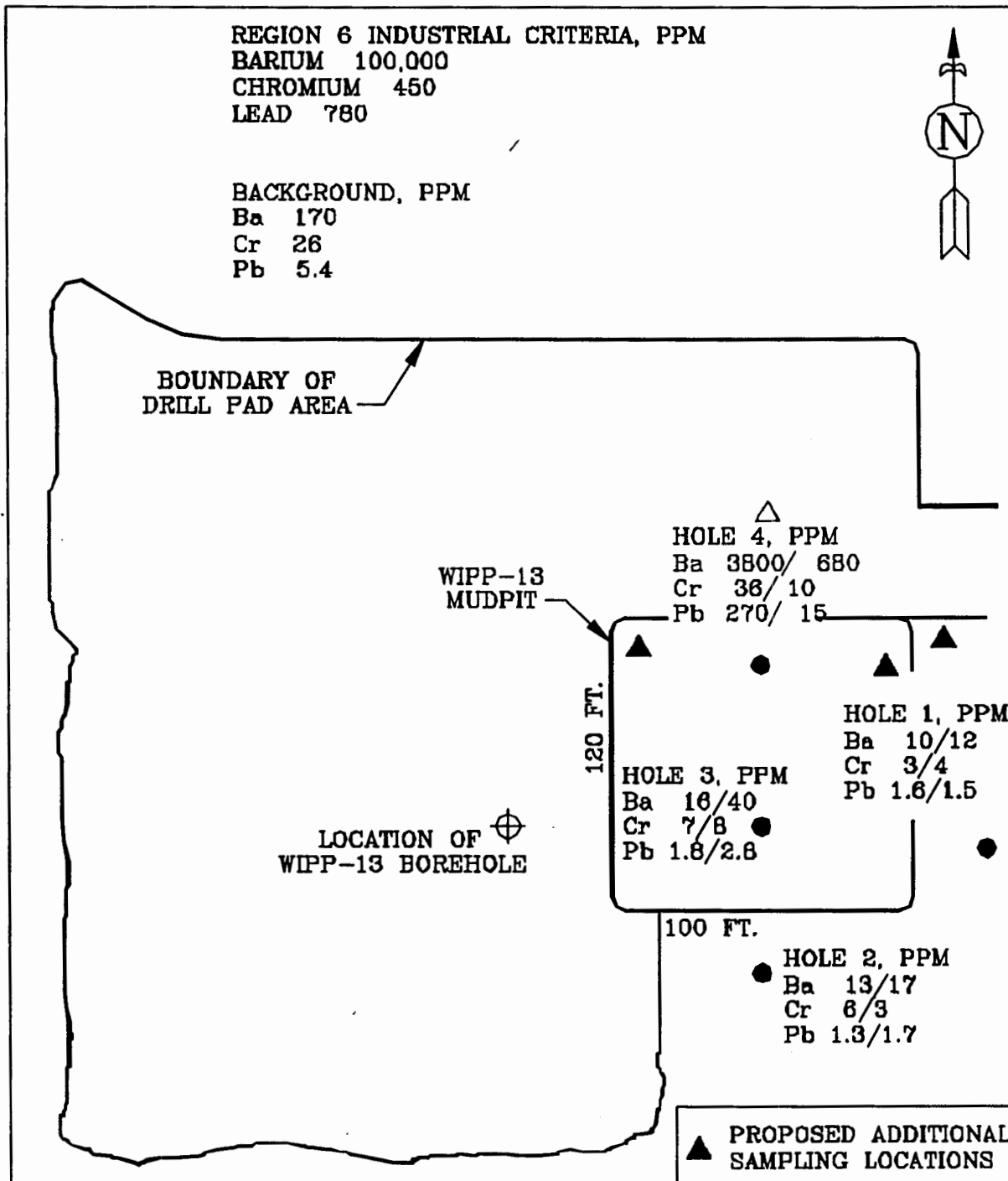
Figure 11.1 - Sample Location Map – SWMU 001q (DOE-1)

△ = ADDITIONAL SAMPLE LOCATIONS PROPOSED BY NMED *with 9/17/00*

NMED FIGURE 2

WIPP Sampling and Analysis Plan
Solid Waste Management Units and Areas of Concern
DOE/WIPP 00-2014, Rev. 0

hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. Figure 14.1 is a site map showing sample locations and barium, chromium, and lead concentrations for sample locations at SWMU 001x.



△ = ADDITIONAL SAMPLE LOCATION PROPOSED BY NMEB ^{WMP 9/13/00}

Figure 14.1 - Sample Location Map – SWMU 001x (WIPP-13)

NMEB FIGURE 3

**WIPP Sampling and Analysis Plan for
Solid Waste Management Units and Areas of Concern
DOE/WIPP 00-2014, Rev. 0**

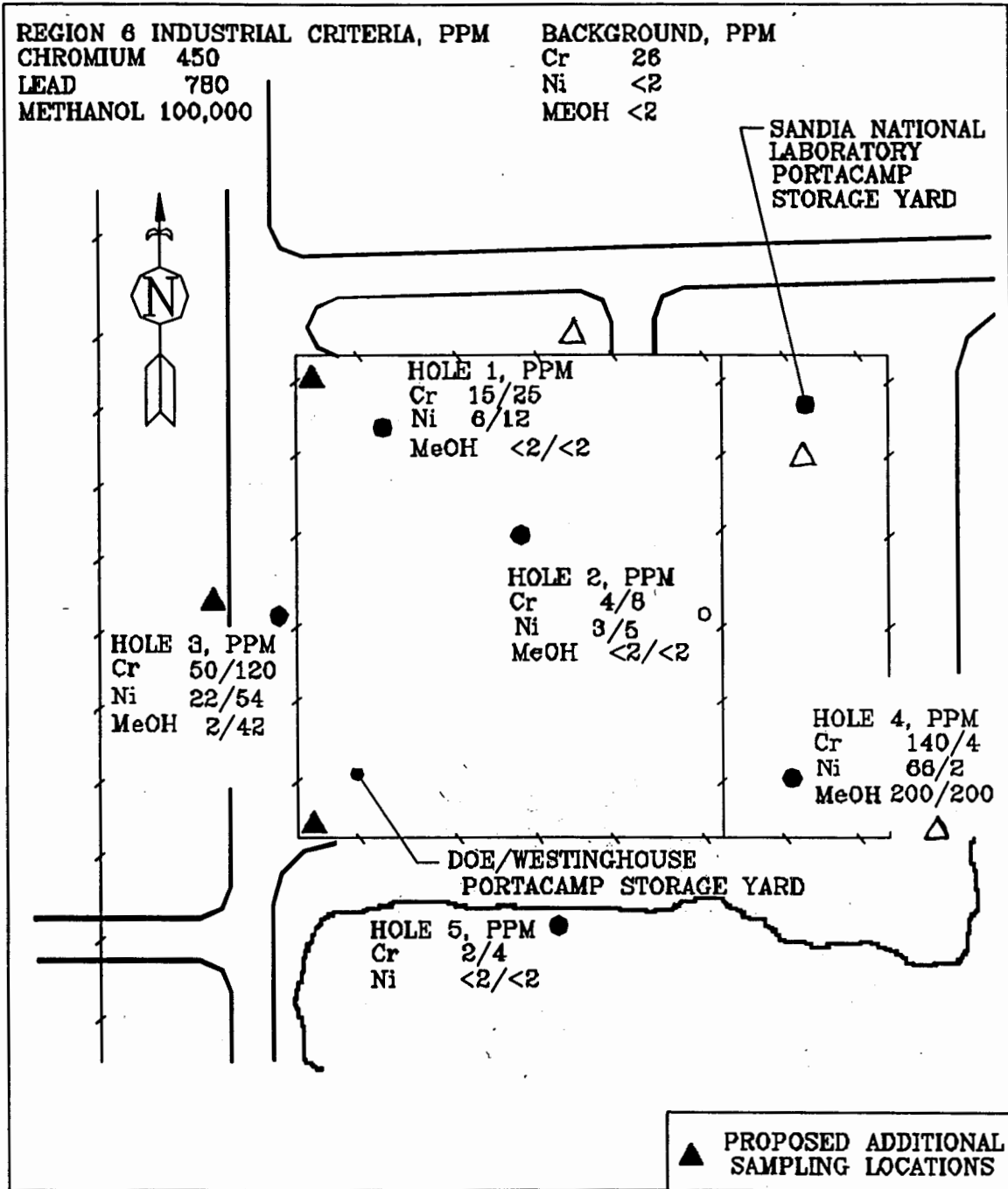


Figure 15.1 - Sample Location Map – SWMU 004a (Portacamp Storage Yard)

△ = ADDITIONAL SAMPLING LOCATIONS PROPOSED BY NMEB w/ 9/12/00

NMEB FIGURE 4

Appendix A

State of New Mexico Soil Screening Levels

Table A-1 provides State of New Mexico Soil Screening Levels (SSLs), as developed by the New Mexico Environment Department (NMED) Hazardous Waste Bureau (HWB) and the Ground Water Quality Bureau Voluntary Remediation Program for 133 chemicals most commonly associated with environmental releases within the state. These NMED SSLs are derived using default exposure parameter values (as presented in Table A-2) and chemical- and State of New Mexico-specific physical parameters (as presented in Table B-1 of Appendix B). These default values are assumed to be appropriately conservative in the face of uncertainty and are likely to be protective for the majority of site conditions relevant to soil exposures within New Mexico.

However, the NMED SSLs are not necessarily protective of all known human exposure pathways, reasonable land uses or ecological threats. Thus, before applying NMED SSLs at a site, it is extremely important to compare the conceptual site model (CSM) with the assumptions upon which the NMED SSLs are predicated to ensure that the site conditions and exposure pathways match those used to develop the NMED SSLs. If this comparison indicates that the site at issue is more complex than the corresponding SSL scenarios, or that there are significant exposure pathways not accounted for by the NMED SSLs, then the NMED SSLs are insufficient for use in a defensible assessment of the site. A more detailed site-specific approach will be necessary to evaluate the additional pathways or site conditions.

TABLE A-1

- Column 1: The first column in Table A-1 presents the names of the 133 chemicals for which NMED has developed SSLs.
- Column 2: The second column presents NMED SSLs predicated on residential soil exposures.
- Column 3: The third column presents indicator categories for the NMED SSL residential basis, whether predicated on carcinogenic effects (ca), noncarcinogenic effects (nc), soil saturation limits (sat) or a non-risk based "max" determination. NMED SSLs predicated on a carcinogenic endpoint reflect age-adjusted child-to-adult exposures. NMED SSLs predicated on a noncarcinogenic endpoint reflect child-only exposures. Detected concentrations above the "sat" value may indicate the presence of nonaqueous phase liquid (NAPL). For certain inorganic and semivolatile organic compounds (SVOCs) that exhibit relatively low toxicity, a non risk-based maximum concentration of 10^5 mg/kg is given when the risk-based SSL exceeds that level. These are noted as "max" in the tables.
- Columns 4 and 6: The fourth and sixth columns present NMED SSLs analogous to Column 1, with the exception that these values correspond to Industrial/Occupational and Construction worker (adult-only) exposures, respectively.
- Columns 5 and 7: The fifth and seventh columns present endpoint bases analogous to Column 3

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for the Industrial/Occupational and Construction worker receptor populations, respectively. Unlike the Residential population, noncarcinogenic endpoint notes for these receptor populations are predicated on adult-only exposures.

- Column 8: The eighth column notes which chemicals are considered VOCs (for inhalation considerations). Those chemicals not considered VOCs are evaluated within the SSLs relative to inhalation of particulate emissions.
- Columns 9 and 10: The ninth column presents NMED SSLs for the migration to groundwater pathway developed using a default dilution attenuation factor (DAF) of 1, which assumes no effective dilution or attenuation. These values can be considered at sites where little or no dilution or attenuation of soil leachate concentrations is expected (e.g., shallow water tables, karst topography). Column 10 presents NMED SSLs for the migration to groundwater pathway developed using a DAF of 20 to account for natural processes that reduce contaminant concentrations in the subsurface.

As noted above, separate NMED SSLs are presented for use in evaluating three discrete potential receptor populations: Residential, Industrial/Occupational, and Construction. Each NMED SSL considers incidental ingestion of soil, inhalation of volatiles (limited to those chemicals noted as volatile organic compounds [VOCs] within Table A-1) or particulate emissions from impacted soil, and dermal contact with soil.

Generally, if a contaminant is detected at a level in soil exceeding the most relevant NMED SSL, and the site-specific CSM is in general agreement with the underlying assumptions upon which the NMED SSLs are predicated, this result indicates the potential for adverse human health effects to occur. Conversely, if no contaminants are detected above the most relevant NMED SSL, this tends to indicate to the user that environmental conditions may not necessitate remedial action of the surface soil or the vadose zone.

A detection above an NMED SSL does not indicate that unacceptable exposures are, in fact, occurring. The NMED SSLs are predicated on relatively conservative exposure assumptions and an exceedance only tends to indicate the potential for adverse effects. The NMED SSLs do not account for additive exposures, whether for carcinogenic or noncarcinogenic endpoints. Section 5 of Part A addresses a methodology by which an environmental manager may determine whether further site-evaluation is warranted, however, this methodology does not replace the need for defensible risk assessment where indicated.

The NMED SSLs address a basic subset of exposures fundamental to the widest array of environmentally-impacted sites within the State of New Mexico. The NMED SSLs cannot address all relevant exposure pathways associated with all sites. The utility of the NMED SSLs depends heavily upon the understanding of site conditions as accurately reflected in the CSM and nature and extent of contamination determinations. Consideration of the NMED SSLs does not preclude the need for site-specific risk assessment in all instances.

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Table A-1

NMED Soil Screening Levels

Chemical	Residential Soil (mg/kg)	Endpoint	Industrial/Occupational Soil (mg/kg)	Endpoint	Construction Worker Soil (mg/kg)	Endpoint	VOC	DAF 1 (mg/kg)	DAF 20 (mg/kg)
Acenaphthene	2.1E+01	sat	2.1E+01	sat	2.1E+01	sat	X	3.E+03	6.E+04
Acrolein	9.9E-02	nc	7.7E-02	nc	4.1E-01	nc	X	8.E-06	2.E-04
Acrylonitrile	1.9E+00	ca	4.6E+00	ca	2.8E+01	nc	X	7.E-05	1.E-03
Aldrin	2.9E-01	ca	1.2E+00	ca	1.6E-02	nc		6.E-03	1.E-01
Aluminum	7.4E+04	nc	1.0E+05	max	7.5E-01	nc		8.E-01	2.E+01
Anthracene	9.9E-01	sat	9.9E-01	sat	9.9E-01	sat	X	6.E+01	1.E+03
Antimony	3.0E+01	nc	9.2E+01	nc	1.1E+02	nc		3.E-03	5.E-02
Arsenic	3.9E+00	ca	1.7E+01	ca	1.9E-02	ca		3.E+00	6.E+00
Barium	5.2E+03	nc	1.5E+04	nc	7.7E-02	nc		4.E+01	8.E+02
Benzene	6.4E+00	ca	5.6E+00	nc	2.9E+01	nc	X	3.E-03	6.E-02
Benzidine	2.1E-02	ca	8.9E-02	ca	1.3E-03	ca		5.E-07	1.E-05
Benzo(a)anthracene	6.2E+00	ca	2.6E+01	ca	9.4E-01	ca		2.E+00	4.E+01
Benzo(a)pyrene	6.2E-01	ca	2.6E+00	ca	9.4E-02	ca		6.E+00	1.E+02
Benzo(b)fluoranthene	6.2E+00	ca	2.6E+01	ca	9.4E-01	ca		8.E-01	2.E+01
Benzo(k)fluoranthene	6.2E+01	ca	2.6E+02	ca	9.4E+00	ca		8.E+00	2.E+02
Beryllium	1.5E+02	nc	4.4E+02	nc	3.1E-03	nc		1.E-02	2.E-01
α-BHC	9.0E-01	ca	3.9E+00	ca	4.6E-02	ca		2.E-05	4.E-04
β-BHC	3.2E+00	ca	1.4E+01	ca	1.6E-01	nc		2.E-03	4.E-02
γ-BHC	4.4E+00	ca	1.9E+01	ca	1.6E-01	nc		4.E-04	7.E-03
Bis(2-chloroethyl) ether	4.4E+00	ca	1.9E+01	ca	2.5E-01	ca		2.E-05	3.E-04
Bis(2-chloroisopropyl) ether	6.9E+01	ca	2.9E+02	ca	8.3E+00	ca		5.E-04	9.E-03
Bis(chloromethyl) ether	2.2E-02	ca	9.3E-02	ca	1.3E-03	ca		9.E-08	2.E-06
Boron	5.5E+03	nc	1.3E+04	nc	3.1E+00	nc		1.E-01	3.E+00
Bromodichloromethane	9.6E+00	ca	2.2E+01	ca	4.5E+02	ca	X	3.E-02	7.E-01
Bromomethane	3.7E+00	nc	3.0E+00	nc	1.5E+01	nc	X	2.E-03	4.E-01
2-Butanone	3.7E+04	nc	8.9E+04	nc	1.5E+02	nc		3.E-01	7.E+00
tert-Butyl methyl ether	6.1E+03	nc	1.5E+04	nc	4.5E+02	nc		4.E-03	8.E-02
Cadmium	7.0E+01	nc	1.9E+02	nc	4.7E-02	ca		8.E-01	2.E+01
Carbon tetrachloride	1.6E+00	nc	1.3E+00	nc	6.8E+00	nc	X	5.E-03	1.E-01
Chlordane	1.6E+01	ca	7.0E+01	ca	1.1E-01	nc		4.E-01	8.E+00
Chlorobenzene	1.4E+02	nc	1.2E+02	nc	1.9E+02	sat	X	5.E-02	1.E+00
Chloroform	3.8E-01	nc	3.0E-01	nc	1.6E+00	nc	X	3.E-02	5.E-01
Chloromethane	1.2E+01	ca	2.5E+01	ca	6.0E+02	ca	X	5.E-04	1.E-02
Chromium III	1.0E+05	max	1.0E+05	max	1.0E+05	max		9.E+00	2.E+02
Chromium VI	2.3E+02	nc	6.6E+02	ca	1.0E-03	ca		1.E+00	2.E+01
Chrysene	6.2E-01	sat	6.2E-01	sat	6.2E-01	sat	X	5.E+01	1.E+03
Cobalt	4.5E+03	nc	1.3E+04	nc	1.6E-01	nc		8.E-03	2.E-01

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Table A-1

NMED Soil Screening Levels									
Chemical	Residential Soil (mg/kg)	Endpoint	Industrial/Occupational Soil (mg/kg)	Endpoint	Construction Worker Soil (mg/kg)	Endpoint	VOC	DAF 1 (mg/kg)	DAF 20 (mg/kg)
Copper	2.8E+03	nc	8.5E+03	nc	1.0E+04	nc		4.E+02	7.E+03
Cyanide	1.2E+03	nc	3.0E+03	nc	1.1E+01	nc		5.E-02	1.E+00
DDD	2.4E+01	ca	1.0E+02	nc	2.7E-01	nc		3.E+00	6.E+01
DDE	1.7E+01	ca	7.5E+01	ca	2.7E-01	nc		1.E+01	3.E+02
DDT	1.7E+01	ca	7.5E+01	ca	2.7E-01	nc		7.E-01	1.E+01
Di(2-ethylhexyl) phthalate	3.5E+02	ca	1.5E+03	ca	1.2E+01	nc		4.E-01	9.E+00
Dibenz(a,h)anthracene	6.2E-01	ca	2.6E+00	ca	9.4E-02	ca		5.E-01	9.E-01
1,2-Dibromoethane	5.3E-02	ca	2.1E-01	ca	1.4E+00	ca	X	2.E-05	4.E-01
1,2-Dichlorobenzene	8.5E+01	sat	8.5E+01	sat	8.5E+01	sat	X	4.E-01	9.E+00
1,3-Dichlorobenzene	1.2E+01	nc	1.1E+01	nc	5.0E+01	nc	X	4.E-03	8.E-02
1,4-Dichlorobenzene	3.2E+01	ca	5.7E+01	sat	5.7E+01	sat	X	8.E-02	2.E+00
3,3-Dichlorobenzidine	1.1E+01	ca	4.5E+01	ca	6.5E-01	ca		3.E-04	5.E-03
Dichlorodifluoromethane	9.0E+01	nc	7.1E+01	nc	3.8E+02	nc	X	6.E+00	1.E+02
1,1-Dichloroethane	5.6E+02	nc	4.6E+02	nc	1.2E+03	sat	X	7.E-03	1.E-01
1,2-Dichloroethane	3.3E+00	ca	7.2E+00	ca	4.3E+01	nc	X	1.E-03	2.E-02
cis-1,2-Dichloroethene	4.1E+01	nc	3.3E+01	nc	1.7E+02	nc	X	2.E-02	3.E-01
trans-1,2-Dichloroethene	6.0E+01	nc	4.9E+01	nc	2.5E+02	nc	X	2.E-02	4.E-01
1,1-Dichloroethene	8.1E+00	ca	3.4E+01	ca	1.7E+00	ca		3.E-03	5.E-02
Dichloromethane	6.5E+02	ca	2.7E+03	ca	1.8E+02	ca		2.E-02	4.E-01
2,4-Dichlorophenol	1.8E+02	nc	4.4E+02	nc	1.6E+00	nc		2.E-02	4.E-01
1,3-Dichloropropene	7.8E-01	ca	1.7E+00	ca	3.1E+01	nc	X	2.E-04	5.E-03
Dieldrin	3.0E-01	ca	1.3E+00	ca	1.8E-02	ca		1.E-04	2.E-03
Diethyl phthalate	4.9E+04	nc	1.0E+05	max	4.3E+02	nc		8.E+00	2.E+02
Dimethyl phthalate	1.0E+05	max	1.0E+05	max	5.4E+03	nc		6.E+01	1.E+01
Dibutyl phthalate	6.1E+03	nc	1.5E+04	nc	5.4E+01	nc		9.E+00	2.E+01
2,4-Dinitro-2-methylphenol	1.2E+02	nc	3.0E+02	nc	1.1E+00	nc		1.E-02	2.E-01
2,4-Dinitrophenol	1.2E+02	nc	3.0E+02	nc	1.1E+00	nc		1.E-02	2.E-01
2,4-Dinitrotoluene	1.2E+02	nc	3.0E+02	nc	1.1E+00	nc		1.E-02	2.E-01
1,2-Diphenylhydrazine	6.1E+00	ca	2.6E+01	ca	3.8E-01	ca		1.E-04	3.E-03
Endosulfan	3.7E+02	nc	8.9E+02	nc	3.2E+00	nc		3.E-01	6.E+00
Endrin	1.8E+01	nc	4.4E+01	nc	1.6E-01	nc		3.E-04	7.E-03
Ethylbenzene	6.8E+01	sat	6.8E+01	sat	6.8E+01	sat	X	4.E-01	8.E+00
Flouride	3.7E+03	nc	8.9E+03	nc	1.4E+04	nc		3.E-01	5.E+00
Fluoranthene	2.3E+03	nc	5.3E+03	nc	2.1E+01	nc		9.E+01	2.E+03
Fluorene	1.5E+01	sat	1.5E+01	sat	1.5E+01	sat	X	3.E+00	6.E+01
Fluorotrichloromethane	1.2E+04	nc	3.0E+04	nc	3.1E+01	nc		7.E-02	1.E+00
Heptachlor	1.1E+00	ca	4.5E+00	ca	6.4E-02	ca		4.E-03	8.E-02

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Table A-1

NMED Soil Screening Levels									
Chemical	Residential Soil		Industrial/Occupational		Construction Worker Soil		VOC	DAF 1	DAF 20
	(mg/kg)	Endpoint	(mg/kg)	Endpoint	(mg/kg)	Endpoint			
Hexachlorobenzene	3.0E+00	ca	1.3E+01	ca	1.8E-01	ca		2.E-04	3.E-03
Hexachlorobutadiene	1.2E+01	nc	3.0E+01	nc	1.1E-01	nc		7.E-02	1.E+00
Hexachlorocyclopentadiene	4.2E+02	nc	1.0E+03	nc	1.1E-02	nc		1.E-02	3.E-01
Hexachloroethane	6.1E+01	nc	1.5E+02	nc	5.4E-01	nc		9.E-03	2.E-01
HMX	3.1E+03	nc	7.4E+03	nc	1.1E+04	nc		1.E-03	2.E-02
Indeno(1,2,3-c,d)pyrene	6.2E+00	ca	2.6E+01	ca	9.4E-01	ca		2.E+00	4.E+01
Iron	2.3E+04	nc	6.9E+04	nc	8.0E+04	nc		2.E-01	3.E+00
Isophorone	5.1E+03	ca	2.2E+04	ca	1.1E+02	nc		1.E-01	3.E+00
Lead	4.0E+02	NC	1.0E+03	nc	1.0E+02	nc		8.E-03	2.E-01
Lead (tetraethyl-)	6.1E-03	nc	1.5E-02	nc	2.3E-02	nc		1.E-02	2.E-01
Manganese	7.8E+03	nc	1.4E+04	nc	7.5E-03	nc		3.E-02	7.E-01
Mercury and compounds	2.3E+01	nc	6.9E+01	nc	8.0E+01	nc		1.E-01	2.E+00
Mercury (elemental)	6.5E+00	nc	2.0E+01	nc	4.6E-02	nc		1.E-01	2.E+00
Mercury (methyl)	6.1E+00	nc	1.5E+01	nc	2.3E+01	nc		1.E-03	2.E-02
Molybdenum	3.8E+02	nc	1.2E+03	nc	1.3E+03	nc		2.E-01	3.E+00
Naphthalene	4.1E+01	sat	4.1E+01	sat	4.1E+01	sat	X	1.E-02	2.E-01
Nickel	1.5E+03	nc	4.4E+03	nc	3.1E-02	nc		1.E+01	3.E+02
Nitrate	9.8E+04	nc	1.0E+05	max	8.6E+02	nc		2.E+00	3.E+01
Nitrite	6.1E+03	nc	1.5E+04	nc	5.4E+01	nc		2.E-01	3.E+00
Nitrobenzene	1.7E+01	nc	2.1E+01	nc	6.6E+01	nc	X	9.E-04	2.E-02
Nitroglycerin	3.5E+02	ca	1.5E+03	ca	2.1E+01	ca		3.E-02	6.E-01
N-Nitrosodiethylamine	3.2E-02	ca	1.4E-01	ca	1.9E-03	ca		9.E-07	2.E-05
N-Nitrosodimethylamine	9.5E-02	ca	4.0E-01	ca	6.0E-03	ca		1.E-05	2.E-04
N-Nitrosodi-n-butylamine	2.2E-01	ca	5.4E-01	ca	9.3E+00	ca	X	1.E-05	2.E-04
N-Nitrosodiphenylamine	9.9E+02	ca	4.2E+03	ca	6.0E+01	ca		9.E-02	2.E+00
N-Nitrosopyrrolidine	2.3E+00	ca	9.7E+00	ca	1.4E-01	ca		6.E-06	1.E-04
Aroclor 1016	3.9E+00	nc	8.9E+00	nc	3.8E-02	nc		2.E-04	3.E-03
Aroclor 1221	2.2E+00	ca	9.2E+00	ca	1.5E-01	ca		2.E-04	3.E-03
Aroclor 1232	2.2E+00	ca	9.2E+00	ca	1.5E-01	ca		2.E-04	3.E-03
Aroclor 1242	2.2E+00	ca	9.2E+00	ca	1.5E-01	ca		2.E-04	3.E-03
Aroclor 1248	1.1E+00	nc	2.5E+00	nc	1.1E-02	nc		8.E-01	2.E+01
Aroclor 1254	1.1E+00	nc	2.5E+00	nc	1.1E-02	nc		8.E-01	2.E+01
Aroclor 1260	1.1E+00	nc	2.5E+00	nc	1.1E-02	nc		8.E-01	2.E+01
Pentachlorobenzene	4.9E+01	nc	1.2E+02	nc	4.3E-01	nc		6.E-03	1.E-01
Phenanthrene	1.8E+03	nc	4.4E+03	nc	1.6E+01	nc		4.E+03	8.E+04
Phenol	3.7E+04	nc	8.9E+04	nc	3.2E+02	nc		2.E-03	4.E-02
Pyrene	8.9E+00	sat	8.9E+00	sat	8.9E+00	sat	X	3.E-02	6.E-01

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Table A-1

NMED Soil Screening Levels									
Chemical	Residential Soil (mg/kg)	Endpoint	Industrial/Occupational Soil (mg/kg)	Endpoint	Construction Worker Soil (mg/kg)	Endpoint	VOC	DAF 1 (mg/kg)	DAF 20 (mg/kg)
RDX	4.4E+01	ca	1.9E+02	ca	1.6E+00	nc		2.E-03	4.E-02
Selenium	3.8E+02	nc	1.2E+03	nc	1.3E+03	nc		3.E-01	5.E+00
Silver	3.8E+02	nc	1.2E+03	nc	1.3E+03	nc		4.E-01	8.E+00
Strontium	3.7E+04	nc	8.9E+04	nc	1.0E+05	max		4.E+00	7.E+01
1,2,4,5-Tetrachlorobenzene	1.8E+01	nc	4.4E+01	nc	1.6E-01	nc		2.E-03	4.E-02
1,1,2,2-Tetrachloroethane	3.6E+00	ca	8.2E+00	ca	1.6E+02	ca	X	2.E-03	3.E-02
Tetrachloroethene	4.9E+01	ca	1.0E+02	sat	1.0E+02	sat	X	5.E-03	1.E-02
Thallium	6.1E+00	nc	1.8E+01	nc	2.1E+01	nc		5.E-04	1.E-02
Toluene	1.8E+02	sat	1.8E+02	sat	1.8E+02	sat	X	2.E-01	5.E+00
Toxaphene	4.4E+00	ca	1.9E+01	ca	2.6E-01	ca		5.E-04	1.E-02
Tribromomethane	6.1E+02	ca	2.6E+03	ca	1.1E+01	nc		2.E-02	3.E-01
1,2,4-Trichlorobenzene	5.2E+02	nc	5.3E+02	sat	5.3E+02	sat	X	5.E-01	1.E+01
1,1,1-Trichloroethane	5.1E+02	sat	5.1E+02	sat	5.1E+02	sat	X	3.E-02	5.E-01
1,1,2-Trichloroethane	7.9E+00	ca	1.8E+01	ca	1.6E+02	nc	X	3.E-03	6.E-02
Trichloroethene	1.6E+01	ca	1.8E+01	nc	9.2E+01	nc	X	4.E-02	7.E-01
2,4,5-Trichlorophenol	6.1E+03	nc	1.5E+04	nc	5.4E+01	nc		6.E-01	1.E+01
2,4,6-Trichlorophenol	4.4E+02	ca	1.9E+03	ca	2.7E+01	ca		1.E-02	2.E-01
2,4,6-Trinitrotoluene	3.1E+01	nc	7.4E+01	nc	2.7E-01	nc		4.E+01	7.E+02
Vanadium	5.3E+02	nc	1.6E+03	nc	1.9E+03	nc		4.E-02	9.E-01
Vinyl chloride	2.1E-01	ca	4.5E-01	ca	1.0E+01	ca	X	3.E-04	6.E-03
Xylenes	6.3E+01	sat	6.3E+01	sat	6.3E+01	sat	X	5.E+00	1.E+02
Zinc	2.3E+04	nc	6.9E+04	nc	8.0E+04	nc		6.E+01	1.E+03

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ca – carcinogenic effect basis
nc – noncarcinogenic effect basis
sat – soil saturation limit basis
max – low toxicity maximum, health based SSL exceeds [10⁵] mg/kg

NMED – New Mexico Environment Department
VOC – Volatile organic compound
DAF – Dilution attenuation factor