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Name:	U1200321
Title:	Notice of Disapproval - Investigation Report for Water Canon/Canon De Valle
Date Received:	2/14/2012
Addressee Name:	Michael J. Graham, ADEP
Originator:	John E. Kieling, NMED
Action Item Description:	Permittees must address all commets and submit IR
Action Due Date:	3/15/2012
Responsible for Action:	Search Graham, Michael J
Responsible Office:	PADCAP
Distribution:	Michael Graham Deborah K. Woitte Charles McMillan William Alexander Elizabeth Sellers Phoebe K. Suina Richard Marquez Anthony R. Grieggs Paul Henry Tina Sandoval Michael Brandt Scotty Jones

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DAVE MARTIN
Cabinet Secretary

BUTCH TONGATE
Deputy Secretary

EP2012-5035

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 14, 2012

George J. Rael, Manager
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U.S. Department of Energy/National
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Michael J. Graham, Associate Director
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RE: NOTICE OF DISAPPROVAL
INVESTIGATION REPORT FOR WATER CANYON/CAÑON DE VALLE
LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-11-080

Dear Messrs. Rael and Graham:

The New Mexico Environment Department (NMED) has received the United States Department of Energy (DOE) and the Los Alamos National Security L.L.C.'s (LANS) (collectively, the Permittees) *Investigation Report for Water Canyon/Cañon de Valle* (IR), dated September, 2011, received September 30, 2011, and referenced by LA-UR-11-5478 and EP2011-0227. NMED has completed review of the IR and hereby issues this Notice of Disapproval (NOD).

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General Comments:

1. As discussed in the IR, the data presented represent environmental conditions in the Water Canyon and Cañon de Valle watersheds as they existed before the Las Conchas fire in 2011. Subsequent floods in the area resulted in erosion of sediments that were sampled during fieldwork for the IR and the creation of new depositional areas within the Water Canyon and Cañon de Valle watersheds. Accordingly, much of the information presented in the IR is no longer valid due to the changed field conditions. As pointed out in the IR, "...thunderstorms over the burned area in the upper watershed generated large floods that destroyed the [permeable reactive barrier] PRB and two alluvial wells in Cañon de Valle. These floods resulted in both erosion of previously characterized deposits and creation of new deposits along the length of Cañon de Valle and Water Canyons. The potential for additional large floods remains high over the next 1-2 yr." (*IR, page 157*).

   The Permittees must conduct a reconnaissance survey of the Water Canyon and Cañon de Valle watersheds to identify reaches and specific sample locations where sample data discussed in the IR is no longer valid due to the effects of the August 2011 flooding. The survey must include identification and documentation of canyon reaches that experienced stream bank and channel erosion, channel scour or undercutting, newly created flow paths and areas of added or new sediment accumulation. Identification and documentation must be of sufficient detail for the Permittees to provide recommendations for future placement of appropriate sediment control structures including structures to significantly reduce stream velocities during future storm events and mitigate contaminated sediment transport. Recommendations must also be provided concerning the need for, and placement of, dedicated stormwater monitoring and gauging stations within both watersheds.

   Dioxins/furans were not included in the analytical suites for sediment samples collected at Water Canyon/Cañon de Valle, as indicated in Tables C-2.0-4 and C-6.0-1. Due to the nature of activities (i.e., the detonation of open-air explosives) conducted at solid waste management units (SWMUs) and areas of concern (AOCs) within the Water Canyon and Cañon de Valle watershed and due to the effects of the Las Conchas fire, chemical releases of dioxins/furans are expected to have occurred. As such, one of the objectives of this investigation must be to determine if dioxins/furans are present in Water Canyon/Cañon de Valle. Although dioxins/furans were analyzed for water samples (surface water and groundwater), the lack of dioxin/furan data in sediment constitutes a data gap for the nature and extent of contamination investigation, and for the human health and ecological risk assessments.

   The Permittees must submit a report which summarizes the results of the survey and includes recommendations concerning erosion control measures needed in specific reaches and identifying sample locations that must be re-sampled to allow evaluation of current site conditions. The reconnaissance survey results must be submitted on or before

May 31, 2012. The survey report must include a schedule for submittal of a Phase 2 Water Canyon/Cañon de Valle Investigation Work Plan (IWP) including a proposed schedule for submittal of the Phase 2 Water Canyon/Cañon de Valle Investigation Report. At least 10 percent (%) of sediment sample locations that were not affected by erosion or deposition caused by flooding in August 2011 must be re-sampled and tested for dioxins/furans. All sediment sample locations that require re-sampling must include dioxin/furan analyses in addition to the analytes included in the analytical suites needed for the Phase 2 IR. Although re-sampling of surface water and groundwater is not necessary, the previous surface and groundwater data must be included as part of the revised canyons contamination and human health and ecological risk evaluations. The Permittees may include updated stormwater sample data or may evaluate the data from previously collected samples.

2. While the supplemental human health risk assessment conducted for the Water Canyon and Cañon de Valle watershed included an evaluation of residential exposure to sediment at each reach, the supplemental human health risk assessment did not include an evaluation of exposure to groundwater. Residential receptors are expected to be exposed to groundwater that is used for domestic purposes. Although concentrations of constituents of potential concern (COPCs) in groundwater were evaluated by comparing against background values and applicable water quality standards, the comparisons do not provide cumulative risk and hazard estimates from exposure to groundwater for a resident. This is especially a concern given that alluvial and perched groundwater at Water Canyon and Cañon de Valle is contains explosives compounds. In addition, risk and hazard estimates from exposure to groundwater must be combined with risk and hazard estimates from exposure to canyon sediments. Although residential land-use is unlikely in the Water Canyon and Cañon de Valle watershed, the supplemental human health risk assessment must provide risk and hazard estimates from all potentially completed exposure pathways. Modify the supplemental human health risk assessment to include exposure to groundwater used for domestic purposes.

3. The human health risk assessment did not include the evaluation of industrial workers at Water Canyon/Cañon de Valle. The current designated land use is industrial, and access to these canyons is restricted to industrial workers that may currently be exposed to COPCs in sediment and surface water at Water Canyon/Cañon de Valle. Revise the human health risk assessment to include evaluation of industrial worker receptors at the Water Canyon and Cañon de Valle watersheds.

4. Recent research provides evidence that hexavalent chromium is carcinogenic by a mutagenic mode of action via ingestion. The New Jersey Department of Environmental Protection (NJDEP) released a publication entitled *Derivation of Ingestion-Based Soil Remediation Criterion for [Hexavalent Chromium]* Cr^{+6} *Based on the [National Toxicology Program] NTP Chronic Bioassay Data for Sodium Dichromate Dihydrate* (April 8, 2009) which presents cancer potency

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values derived from a two-year dose-response study conducted by the National Toxicology Program (2008). NJDEP derived an oral cancer potency value of 0.5 mg/kg-day for hexavalent chromium. Based on this information, the risk-based human health screening levels would be lower than the screening levels presented and utilized in the human health risk assessments in this IR. US EPA's (2011) Regional Screening Levels (RSLs) also include screening levels for hexavalent chromium in soil and tap water utilizing the NJDEP updated oral cancer slope factor of 0.5 mg/kg-day and age-adjustment calculations for exposure to mutagenic constituents. Modify the human health risk assessments to utilize updated soil and tap water screening levels for hexavalent chromium and the oral cancer slope factor of 0.5 mg/kg-day.

Specific Comments:

5. **Section 2.1.3, TA-49 Sources, second paragraph, page 10:**

   This section describes various source areas identified within Technical Area (TA) 49. The numbering sequence assigned to the source areas includes Areas 1 through 12. Descriptions of source areas 8 and 9 are not provided in the IR. Provide descriptions of Areas 8 and 9 in the revised IR.

6. **Section 2.3.1.4, MDA R, last sentence, page 21:**

   Permittees' Statement: "In September 2000, SWMU 16-019 was sampled to determine the nature and extent of potential contamination at [material disposal area] MDA R after the area had been excavated (LANL 2001, 069971)."

   NMED Comment: Provide information on the results of the sampling conducted at MDA R.

7. **Section 2.3.1.5, Silver Outfall, last sentence, page 22:**

   Permittees' Statement: "Verification samples were collected following the [interim action] IA; moderate levels of contamination remained."

   NMED Comment: Indicate what "moderate levels of contamination" means relative to NMED Soil Screening Levels (SSLs) and provide the technical justification for leaving the contaminants in place after the IA was completed.

8. **Section 5.4, Water-Quality Standards and Comparison Values, third paragraph, page 30:**

   Permittees' Statement: "The numeric [water quality criteria] WQC for livestock watering (20.6.4.900[F] and 20.6.4.900[J] NMAC); wildlife habitat (20.6.4.900[G] and

20.6.4.900[J] NMAC); acute aquatic life (20.6.4.900[H], 20.6.4.900[I], and 20.6.4.900[J] NMAC); and secondary contact (20.6.4.900[E] NMAC) apply to nonstorm-related surface water for all of the watercourse classifications. For classified ephemeral or intermittent segments, the WQC for acute total ammonia (20.6.4.900[K] NMAC) also applies. The New Mexico Environment Improvement Board (NMEIB) Standards for Protection Against Radiation (20.3.4.461 [D], 20.3.4.461 [E] NMAC) are applicable to nonstorm-related surface water."

NMED Comment: Water quality standards (and the criteria in those standards) apply to all surface waters of the state. This includes stormwater. Section 20.6.4.126 NMAC applies specifically to the perennial reaches of Water and Cañon de Valle canyons. The Chronic Aquatic Life criteria is a sub-set of the Coldwater Aquatic Life designated use and all surface water data (including stormwater data) must also be compared to these standards along with the livestock watering, wildlife habitat, acute aquatic life, and secondary contact standards (20.6.4.126 NMAC).

Subsection K of 20.6.4.900 includes criteria for ammonia. Ammonia criteria apply to all aquatic life uses except limited aquatic life. However, 20.6.4.128 specifically indicates that the ammonia criteria apply to both watersheds. Table 20.6.4.900(2) includes criteria for adjusted gross alpha, radium, strontium and tritium as radioactive materials.

20.6.4.13.G, General Criteria states "The radioactivity of surface waters of the state shall be maintained at the lowest practical level and shall in no case exceed the criteria set forth in the New Mexico Radiation Protection Regulations, 20.3.1 and 20.3.4 NMAC." See Table 2, column 2 for appropriate concentration limits for radionuclides in water.

Eliminate any references in the IR referring to separate criteria or comparison values for storm or non-storm-related surface water. Evaluate all stormwater and non-stormwater data against applicable water quality standards and criteria (including radioactivity) equally to determine surface water contaminants of potential concern (COPCs).

9. **Section 5.5, Stormwater Comparison Values, page 31:**

Permittees' Statement: "Stormwater discharges are regulated under the [clean water act] CWA, and no applicable standards for stormwater are available. The [individual permit] IP contains target action levels for specific contaminants in stormwater, but these action levels apply only at the monitoring locations specified in the permit. For purposes of assessing the relative quality of stormwater discharges, stormwater monitoring data obtained from the Water Canyon and Cañon de Valle watershed downgradient of SWMUs and AOCs are compared with the following values from the State of New Mexico Standards for Interstate and Intrastate Surface Waters (Section 20.6.4 NMAC):

- livestock watering (20.6.4.900[F] and 20.6.4.900[J] NMAC)

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- wildlife habitat (20.6.4.900[G] and 20.6.4.900[J] NMAC)
- acute aquatic life (20.6.4.900[H], 20.6.4.900[I], and 20.6.4.900[J] NMAC)
- human health (persistent) (20.6.4.11[G] NMAC)

Stormwater concentrations are compared with these values in [IR] section 6."

NMED Comment: While the IP sets target action levels for stormwater discharges from SWMUs and AOCs, these target levels only apply up to the boundary of the Stormwater Monitoring Area (SMA). The applicable water quality standards and criteria apply to any water (baseflow or stormwater) collected in the Water Canyon and Cañon de Valle watersheds outside of the designated SMA boundaries.

Include chronic aquatic life criteria for all samples collected in the designated reaches in accordance with 20.6.4.126 NMAC.

Eliminate the statement "no applicable standards for stormwater are available" and evaluate all stormwater and non-stormwater data against applicable water quality standards and criteria equally to determine surface water and stormwater COPCs.

10. Section 6.4..2.1, Acute Ecological Comparisons, page 35:

Permittees' Statement: "The maximum detected concentrations of three analytes (aluminum, copper, and zinc) exceeded stormwater comparison values based on acute aquatic life criteria. Because the stormwater comparison values are based on an acute exposure, the acute aquatic life standards are also used as the benchmarks for acute ecological exposures. Table 6.4-4 summarizes the maximum detected concentrations exceeding the acute benchmarks, and these exceedences are discussed in [IR] section 8.1.

NMED Comment: There is no table 6.4-4 in the IR hard copy or CDs provided. Provide the table in the revised IR or change the table number designation as appropriate.

11. Section 7.2.1.1, Surface Water, first paragraph, last sentence, page 53:

Permittees' Statement: "One large spring, Water Canyon Gallery, in a tributary of the headwaters of Water Canyon, provides a perennial reach that extends downstream for about 3 [kilometers] km (1.9 mi), extending into TA-16 and TA-28, but most of the perennial stream infiltrates the subsurface in the vicinity of the Pajarito fault zone."

NMED Comment: The statement above is not entirely accurate in that the bulk of the surface water flow from the Water Canyon Gallery spring and other groundwater sources (i.e., Armstead Spring) does not infiltrate to the subsurface at the Pajarito fault zone. Multiple field observations during the past 15 years indicate that perennial flow from groundwater sources west of the Pajarito fault zone is captured by the large volume of fill material (i.e., permeable structure) at the NM 501 and Water Canyon confluence.

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Groundwater captured by the fill is released approximately 50 meters (m) downstream (east of NM 501) along exposed bedrock within the active stream channel. Estimates of stream flow above and below NM 501 during times of drought indicate that most (80 – 90%) of the water passes across the Pajarito fault zone and flows eastward onto Laboratory property for approximately four kilometers (km). Field observations of surface-water flow in Water Canyon from NM 501 to the Cañon de Valle confluence suggest that the abrupt and rapid infiltration of surface flow into the alluvium just upstream of Cañon de Valle may coincide with a zone of enhanced recharge to underlying Bandelier Tuff units. Evaluate whether these characteristics have an impact on water-balance calculations included in IR Appendix F.

12. **Section 7.2.1.3.1, Shallow Perched-Intermediate Groundwater, second paragraph, second and third sentences, page 56:**

    Permittees' Statement: "Surface flow from Water Canyon Gallery extends to the Pajarito fault zone, where the water apparently seeps into subsurface units. The rate of stream loss across the Pajarito fault zone in Water Canyon is usually sufficient such that the streams are dry downstream of the fault at NM 501 (see section 7.2.1.1)."

    NMED Comment: *See* NMED comment #11.

13. **Section 7.2.1.4.2, Stratigraphy, Regional Aquifer East of R-27, second paragraph, penultimate sentence, page 62**

    Permittees' Statement: "Along the walls of White Rock Canyon, spring discharges such as spring 5AA have possible but uncertain connections to the regional system (Figure 7.2-1)."

    NMED Comment: The above statement is not accurate with respect to the position of Spring 5AA. Spring 5AA, which discharges from canyon-bottom alluvium and has been dry for approximately 20 years, is actually located in Water Canyon approximately 1,000 m upstream of the Rio Grande and White Rock Canyon. Revise the text to reflect actual site conditions.

14. **Section 7.2.1.5.1, Groundwater Responses to Seasonal Runoff, first paragraph, penultimate sentence, page 63:**

    Permittees' Statement: "As discussed in section 7.2.1.1, a significant portion of stream flow and runoff in Water Canyon and Cañon de Valle upstream of NM 501 infiltrates the subsurface in the area of the Pajarito fault zone."

    NMED Comment: *See* NMED comment #11 as it relates to infiltration of surface flow in Water Canyon at the Pajarito fault zone. In reference to Cañon de Valle, field observations during times of drought indicate perennial surface-water flow west of the

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Pajarito fault zone is restricted to the upper portion(s) of the watershed. Specifically, perennial flow extends to a position located approximately 2000 meters west of the Pajarito fault zone. The zone of infiltration may be related to smaller faults or zones of enhanced infiltration located within the mountain-block area of the watershed (i.e., near CDV-5.0 Spring). Multiple field observations in Cañon de Valle during large snowmelt runoff events where flows extend towards and/or past NM 501 indicate that a significant amount of this added flow infiltrates to the subsurface along the Pajarito fault zone. These recharge events would be more transient versus that of steady state recharge from baseflow infiltration as found further upstream. Revise the statement to reflect site conditions as appropriate.

15. Section 7.2.2.1.2, RDX, first full paragraph, page 76:

NMED Comment: Correct the typographical error (see bold italics) in second sentence "...systematics, although the concentration ***of*** has been decreasing..."

16. Section 7.2.2.1.6, Other HE, Alluvial Groundwater, first full paragraph, page 91:

Permittees' Statement: "The highest values for other [high explosives] HE in alluvial groundwater in the 2003 to 2011 data set all occur in alluvial well CdV-16-02657 with [octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine] HMX at 364 µg/L, [triaminotrinitrobenzene] TATB at 0.873 µg/L, and [2,4,6-trinitrotoluene] TNT at 0.107 mg/L (Table 7.2-2; Figure 3.2-2)."

NMED Comment: Table 7.2-2 indicates the constituent concentration units for TNT (and other listed compounds) are micrograms per liter (µg/L). Revise the table or the text for consistency in the concentration units.

17. Section 7.2.2.1.7, HE-Degradation Products and Impurities, Fate and Transport, page 92 and Section 7.2.2.1.9, Other Organic Chemicals, Fate and Transport, fourth paragraph, first and second sentences, page 104:

Permittees' Statement: "The HE-degradation products and impurities tend to be more soluble than the principal explosives (LANL 1993, 039440, Appendix D). Thus, the HE-degradation products and impurities tend to collocate with the principal explosives in the environment; however, because they are less conservative than [hexahydro-1,3,5-trinitro-1,3,5-triazine] RDX, they may not be transported as far along a pathway as RDX." and, "Water solubility may be the most important chemical characteristic used to assess mobility of organic chemicals. The higher the water solubility of a chemical, the more likely it is to be mobile in a hydrogeologic system."

NMED Comment: These statements seem to contradict each other. If HE-degradation products and impurities are generally more soluble than the principal

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explosives, it would follow that they would migrate t to farther from the source areas distances than the principal explosives. Provide additional discussion to support the statement(s) or revise the statement(s) appropriately.

18. Section 7.2.2.2, Geochemical Evidence for Connections between Water-Bearing Zones, pages 112 through 120:

NMED Comment: A discussion concerning the findings of the bromide tracer applied in the 260 Outfall settling pond in 1997 was not presented in the IR. A basic review of bromide data collected at many of the new intermediate wells installed near the 260 Outfall suggests that the tracer may have migrated downward to perched groundwater and potentially the regional aquifer. For example, bromide data for intermediate well 16-2664, intermediate zones at R-25 screens 1 through 4, and the regional aquifer at R-25 screen 5 appear to indicate increases and/or the presence of elevated bromide concentrations. A thorough analysis and evaluation of bromide data obtained at intermediate and regional wells in the vicinity of the 260 Outfall area must be made to help refine the current hydrogeochemical and groundwater flow conceptual models for the area. Revise the IR accordingly.

19. Section 7.2.2.2.2, Major-Element Constraints on Hydrologic Conceptual Model, second paragraph, page 112,:

NMED Comment: Correct the typographical error (see bold italics) in last sentence "Possible sources of these…used in process buildings ***and*** (at?) TA-16, waters with a…"

20. Section 7.2.2.2.3.1, RDX versus [octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine] **HMX, third paragraph, page 114:**

NMED Comment: There is a typographical error (see bold italics) in the third sentence, "Wells CdV-16-02657... plot at the lowest RDX/***R***MX with ratios ranging from 1 to less than 0.1." The ratio should be expressed as RDX/HMX.

21. Section 7.3, Summary of Physical System Conceptual Model, fifteenth paragraph, fourth sentence, page 125:

NMED Comment: Correct the typographical error (see bold italics) in second sentence "This locally derived...and alluvial groundwater that infiltrated (***in?***) Cañon de Valle…in the upper Bandelier Tuff."

22. Section 7.3, Summary of Physical System Conceptual Model, fifteenth paragraph, fifth sentence, page 125:

Permittees' Statement: "The deep perched zone is significantly less contaminated than the upper perched zone (section 7.2.2.1.2)."

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NMED Comment: With respect to the lower deep perched zone, the above statement is based solely on data collected at two locations, screen 4 at R-25 and CdV-16-4ip screen 2. The potential for higher levels of contamination in the lower deep perched zone does exist, especially considering the uncertainties with respect to the nature and extent of saturation and contamination in the lower deep perched zone. Revise the statement to reflect this uncertainty.

23. Section 8.1.2 Ecological Screening Approach for the Water Canyon and Cañon de Valle Watershed, fifth paragraph, pages 128 and 129:

Permittees' Statement: "Surface-water occurs within the Water Canyon and Cañon de Valle watershed as the result of runoff from rainfall and snowmelt in some reaches, combined with discharge from springs. Also, after runoff events, persistent pools of water can be locally present for some time. Surface-water sampling stations from which nonstorm-related surface water samples have been collected are shown in Figure 3.2-1. Stations from which stormwater has been collected are also shown in Figure 3.2-1. Water-sampling results from all nonstorm-related surface-water locations in the Water Canyon and Cañon de Valle watershed are compared with the minimum water [ecological screening level] ESLs and lowest effect ESLs (L-ESLs) that are protective of both aquatic receptors and drinking water by terrestrial wildlife. The HQs associated with these surface-water COPCs and contaminants of potential ecological concern (COPECs) are presented in section 8.1.5. The COPCs for ecologically relevant nonstorm-related surface water are identified in Tables 6.3-2 through 6.3-6."

NMED Comment: Stormwater must be evaluated the same way as non-stormwater by comparing all results to minimum water ESLs and L-ESLs and aquatic life criteria (chronic and acute where applicable) which are protective of aquatic receptors.

Stormwater data is available from the 2011 monsoon season and it must be evaluated in this IR. The Permittees must develop a total polychlorinated biphenyl ecological screening level (PCB ESL) to evaluate PCB stormwater and baseflow data. PCB ESLs in water only exist for Aroclor mixtures. An alternative approach would be to apply the following algorithms to the PCB congener data to generate Aroclor equivalents that could then be compared to the Aroclor ESLs in the Permittees' EcoRisk database. These algorithms were developed by AXYS Analytical Services who use the same chromatographic column as the Permittees' PCB analytical laboratory, Cape Fear. This assures that the co-elutions are the same between the two labs and the resulting Aroclor equivalents are comparable.

Aroclor equivalent concentrations may be calculated by converting the summed concentrations of a suite of characteristic PCB congeners to concentrations using empirical factors determined from the analysis of Aroclor mixtures. Include data values for coelutions only once since the coelution is all encompassing and includes a total for all the congeners that coelute.

- Aroclor 1016 = the sum of PCBs [BZ congener number] 8, 18/30, 31, 28/20 concentrations multiplied by 2.7;
- Aroclor 1221 = the sum of PCBs 1, 3, 8 concentrations multiplied by 1.4;
- Aroclor 1232 = the sum of PCBs 1, 3, 18/30 concentrations multiplied by 3.4;
- Aroclor 1242 = the sum of PCBs 8, 18/30, 31, 28/20 concentrations multiplied by 3.0;
- Aroclor 1248 = the sum of PCBs 44/47/65, 49/69, 66 concentrations multiplied by 6.1;
- Aroclor 1254 = the sum of PCBs 86/87/97/108/119/125, 99 concentrations multiplied by 8.0; and,
- Aroclor 1260 = the sum of PCBs 183/185, 180/193, 170 concentrations multiplied by 5.0.

Environmental samples with no clearly identified Aroclor signature are quantified as 1242/1254/1260 mixtures. Results may be reported as Aroclor 1248 instead of Aroclor 1242 and 1254 where the congener pattern clearly indicates this formulation. Other Aroclor formulations may be reported by calibration against the specific Aroclor solutions.

24. Section 8.1.5, Risk Characterization for Nonstorm-Related Surface Water, last paragraph, page 131:

NMED Comment: Assess all stormwater data collected in the reaches of Water and Cañon de Valle watersheds that are designated in 20.6.4.126 NMAC against the chronic surface water quality criteria.

25. Section 9.0, Conclusions and Recommendations, first paragraph, last sentence, page 154:

Permittees' Statement: "The nature and extent of these COPCs are defined in sediment, surface water, the vadose zone and the regional aquifer".

NMED Comment: The extent of RDX, and other co-contaminants such as PCE, in the upper and lower deep perched zones beneath the 260 Outfall area has not be determined. Groundwater flow directions for the upper and lower deep perched zones are not known. With respect to extent of saturation and flow paths of the deep perched zones, it is assumed that Tschicoma lava, breccias, and dacite units located south of the 260 Outfall area and Cañon de Valle likely impede either function as no- or low-flow boundaries to groundwater flow. That is, the potential for contaminant transport via the deep perched zones to the south is minimal.

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For the upper deep zone, the eastern and western extents of contamination have been determined; however, the extent of contamination to the north in the direction of regional well R-18 has not been delineated. As noted below, RDX contamination at R-18 is increasing.

The north and east extents of contamination in the lower deep perched zone have not been determined. Only two locations capture the lower deep perched zone: R-25 screen 4 and CdV-16-4ip screen 2. Due to an incident with the inflatable packer between screens 1 and 2, CdV-16-4ip, screen 2 is likely not usable.

The nature and extent of RDX contamination in the regional aquifer in the direction of contaminated well R-18 has not been determined. Since 2006, RDX concentrations at R-18 have increased from 0.1 µg/L to over 1 µg/L, indicating that RDX contamination exists upgradient of R-18. Revise the text to reflect this uncertainty.

26. Section 9.0, Conclusions and Recommendations, second paragraph, page 154:

Permittees' Statement: "The outfall from the TA-16-260 HE-machining facility was the most significant source for contamination within the Water Canyon and Cañon de Valle watershed, and barium, cobalt, [octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine] HMX, and RDX have their highest concentrations in sediment near this outfall. Other HE-processing facility outfalls and associated ponding areas represent subsidiary sources for HE and other constituents. Other notable sources for contaminants in sediment in TA-16 include the 300s Line Complex (e.g., cadmium, copper, mercury, Aroclor-1260, [2,4,6-trinitrotoluene] TNT, and [polycyclic aromatic hydrocarbons] PAHs); the 90s Line Complex (e.g., chromium and nickel); the silver outfall (SWMU 16-020); P-Site; or the 340 Complex (e.g., arsenic, vanadium, bis[2-ethylhexylphathalate], and [triaminotrinitrobenzene] TATB)."

NMED Comment: The IR does not include discussions concerning how or whether interim measures (IM) such as contaminated soil/sediment removal or capping to eliminate or reduce infiltration at one or more of these source areas would likely result in future significant reduction of contaminants in groundwater systems present within the Water Canyon/Cañon de Valle watersheds. Include discussion in the revised IR concerning how and whether selected IM(s) of one or more of these source areas would or could significantly reduce contaminant concentrations in area groundwater.

27. Section 9.0 Conclusions and Recommendations, sixth paragraph, third sentence, page 155:

Action Required

Permittees' Statement: "The deeper perched zone is significantly less contaminated than the upper perched zone."

NMED Comment: *See* NMED comment #22.

28. Section 9.0, Conclusions and Recommendations, eighth paragraph, penultimate and last sentences, page 156:

Permittees' Statement: 'However, there were exceptions for barium with regard to potential impacts on plants and for RDX with regard to potential impacts on terrestrial invertebrates such that additional biota investigations are warranted. In addition, there is potential impact to the aquatic invertebrate community in S-Site Canyon from lead in water. Preparation of a biota investigation work plan is proposed to address these potential impacts."

NMED Comment: NMED agrees with the need for additional biota investigations. Provide a proposed date for submittal of a biota investigation work plan in the revised IR.

29. Section 9.0, Conclusions and Recommendations, eleventh paragraph, last sentence, page 157:

Permittees' Statement: "Wells to the north (R-18) and south (R-48) of this zone did not encounter perched groundwater, and well R-47i to the east encountered perched water, but it is not contaminated; thus, the extent of contaminated perched groundwater is effectively bounded."

NMED Comment: NMED agrees that perched groundwater is not present at R-18 and R-48; however, the extent of contaminated perched groundwater (lower and/or upper zones) in the direction of R-18 (north) or R-63 (east) has not been delineated. In addition, perched groundwater at R-47i may or may not be the same perched zone observed in CdV-16-2(i)r or CdV-16-4ip. There is an approximate 90 feet elevation difference in depth to groundwater between R-47i and CdV-2(i)r, suggesting that the two zones may not be connected. Revise the text to accurately reflect site conditions.

30. Table 6.2-2, Inorganic Chemicals above BVs in Water Canyon and Cañon de Valle Sediment Samples, pages 295 through 314:

NMED Comment: Detections that were greater than background values (BVs) were presented in Table 6.2-2. For reach WA-0, it appears that detections less than BVs are also shown. Modify Table 6.2-2 to only show detections above BVs for reach WA-0.

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31. Table 6.4.1, Samples Collected and Analyses Performed for Stormwater from Water Canyon and Cañon de Valle Watershed, pages 441 through 458:

NMED Comment: Stormwater was analyzed for dioxin/furan at the following locations in 2000 but are not assessed against the surface water quality criteria in Table 6.5-1. The locations where dioxin/furan data is available for assessment are: Cañon de Valle above SR-501, Indio at SR-4, Water above SR-501, Water at SR-4, and Water below SR-4. The applicable dioxin criteria is 5.1 E-8 ug/L and the dioxin TCDD-equivalent concentration (TEC) must be compared to that criteria (20.6.4.900 J [g] NMAC).

32. Table 6.4-2, Stormwater Comparison Values, pages 460 through 461:

NMED Comment: Change the title of the table to Stormwater Standards and Comparison Values.

Include all criteria for the Coldwater Aquatic Life use, which includes the Chronic Aquatic Life criteria, as comparison values for all samples (including stormwater) collected within the perennial reach of Cañon de Valle from E256 upstream to Burning Ground Spring and Water Canyon from Area-A Canyon upstream to State Route 501. The appropriate designated uses and criteria are specified in WQCC 20.6.4.126.

33. Table 6.5-1, COPC and Stormwater Summary Samples from the Water Canyon and Cañon de Valle Watershed, pages 464 through 469:

NMED Comment: Dioxin is not included as an analyte in the table for any of the sampled media. The surface water quality criteria (HH Persistent) applies to the TEC of the unfiltered dioxin/furan concentration in water (20.6.4.900 J [g] NMAC). Revise the table to include dioxin as appropriate.

34. Tables 8.1-1, 8.1-6, and 8.1-10, HQs Based on Maximum Concentrations of Inorganic COPCs in Sediment Samples from the Water Canyon and Cañon de Valle Watershed and Soil ESLs, HQs Based on Maximum Detected Concentrations of Inorganic COPCs in Sediment Samples from the Water Canyon and Cañon de Valle Watershed and Minimum Sediment ESLs, and HQs Based on Maximum Detected Concentrations of Inorganic COPCs in Nonstorm-Related Surface-Water Samples from the Water Canyon and Cañon de Valle Watershed and Minimum Water ESLs, pages 483, 484, 498 and 503 through 506:

NMED Comment: The ESLs for total chromium were used in the hazard quotient (HQ) calculations for soil, sediment, and surface water. The ratio of hexavalent chromium to trivalent chromium is not specified for the samples collected at Water Canyon and Cañon de Valle. Since industrial processes included the use of hexavalent chromium at TAs within the Water Canyon/Cañon

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de Valle watershed, the ESLs for hexavalent chromium must be applied in the HQ calculations. It is noted that concentrations of chromium detected in canyon sediments (i.e., soil) were compared with the lowest observed adverse effect level (LOAEL)-based soil ESL that is based on hexavalent chromium. However, determine whether concentrations of chromium exceed the sediment and surface water ESLs for hexavalent chromium at the Water Canyon and Cañon de Valle watershed.

35. Table 8.1-3, HQs Based on Maximum Concentrations of Organic COPCs in Sediment Samples from the Water Canyon and Cañon de Valle Watershed and Soil ESLs, pages 486 through 490:

NMED Comment: Some of the cells are not shaded that have HQs greater than one. Modify Table 8.1-3 so that all cells are shaded that have HQs greater than one.

36. Table 8.1-3, HQs Based on Maximum Concentrations of Organic COPCs in Sediment Samples from the Water Canyon and Cañon de Valle Watershed and Soil ESLs, pages 486 through 490:

NMED Comment: Some of the calculated HQs at reach SS-1W are lower than expected using maximum detected concentrations and minimum ESLs. It appears that maximum detected concentrations at SS-1W were not included in the HQ calculations for acenaphthene, benzo(a)anthracene, naphthalene, phenanthrene, and pyrene. The maximum detected concentrations of these constituents compared with their corresponding ESLs would result in HQs greater than one. Table 8.1-3 presents HQs that are less than one for these constituents at reach SS-1W. Modify Table 8.1-3 to list HQs that are based on maximum detected concentrations for acenaphthene, benzo(a)anthracene, naphthalene, phenanthrene, and pyrene at reach SS-1W.

37. Table 8.2-1, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Noncarcinogens, pages 535 through 538:

NMED Comment: A surrogate toxicity value was used for 4-methylphenol. Table 8.2-1 does not specify which surrogate chemical was used. Add an explanation to the footnotes to specify which chemical was used for surrogate toxicity information for 4-methylphenol on Table 8.2-1.

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38. Table 8.2-1, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Noncarcinogens, pages 535 through 538:

NMED Comment: The residential soil screening level (SSL) listed for TATB is associated with footnote "j". Add footnote "j" to the bottom of Table 8.2.1 to indicate which surrogate toxicity value was utilized for TATB.

39. Table 8.2-1, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Noncarcinogens, pages 535 through 538:

NMED Comment: The residential SSL listed for beryllium (62.1 mg/kg) is inconsistent with the NMED SSL of 156 mg/kg. It is noted that beryllium was not detected above BVs and did not contribute to the sum of fractions. However, modify Table 8.2-1 to display the correct SSL for beryllium.

40. Table 8.2-1, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Noncarcinogens, pages 535 through 538:

NMED Comment: The residential risk ratios for antimony at reach WAN-1 (0.04) and reach WAN-2 (0.04) are inconsistent with the residential risk ratios that are expected using maximum detected concentrations and the residential SSL of 31.3 mg/kg. The maximum detected concentration of antimony at reach WAN-1 was 6.17 mg/kg, resulting in a risk ratio of 0.2. The maximum detected concentration of antimony at reach WAN-2 was 5.87 mg/kg, resulting in a risk ratio of 0.2. It is noted that antimony was not detected at these reaches and that risk ratios are based on detection limits. However, footnote "e" on Table 8.2-1 explains that risk ratios are based on the maximum detection limit for COPCs that had detection limits greater than the residential SSLs. Modify Table 8.2-1 to present the correct risk ratios for antimony at reaches WAN-1 and WAN-2. Determine whether this inconsistency affects the sum of fraction calculations at WAN-1 and WAN-2. In addition, update the residential risk and hazard estimates (Table E-2.3-2), if warranted.

41. Table 8.2-2, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Carcinogens, pages 539 through 541:

NMED Comment: The residential risk ratio for benzo(a)anthracene at reach SS-1W (0.27) is inconsistent with the residential risk ratio of 0.82 that is expected. The maximum detected concentration of benzo(a)anthracene at reach SS-1W is 5.09 mg/kg, as shown on Table 6.2-3. Using the residential SSL of 6.21 mg/kg, a risk ratio of 0.82 is calculated. Modify table 8.2-2 to correct the residential risk ratio for benzo(a)anthracene at reach SS-1W.

Additionally, according to the provided ProUCL files, it does not appear that the maximum detected concentration of benzo(a)anthracene (5.09 mg/kg) was included in the exposure-point concentration (EPC) calculations at reach SS-1W. Modify the EPC calculation for benzo(a)anthracene to also include the maximum detected concentration. Recalculate the recreational and supplemental residential risks at SS-1W to utilize the updated EPC.

42. Table 8.2-2, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Carcinogens, pages 539 through 541:

NMED Comment: The residential risk ratios for benzo(a)pyrene at the following reaches are inconsistent with the residential risk ratios that are expected using maximum detected concentrations within each reach (shown on Table 6.2-3) and the residential SSL of 0.621 mg/kg: CDV-2E, CDV-3, CDV-4, CDVS-1, FL-1, MS-1, SS-1E, SS-1W, SS-2, SS-3, WA-3, and WA-4W. It appears that some of these inconsistencies may have resulted in an underestimation of the sum of fractions calculations. Modify Table 8.2-2 to correct the residential risk ratios for benzo(a)pyrene at reaches CDV-2E, CDV-3, CDV-4, CDVS-1, FL-1, MS-1, SS-1E, SS-1W, SS-2, SS-3, WA-3, and WA-4W. Determine if the recreational and supplemental human health risk assessments would be affected and revise the IR accordingly.

Additionally, according to the provided ProUCL files, it does not appear that the maximum detected concentration for benzo(a)pyrene (4.63 mg/kg) was included in the EPC calculation at reach SS-1W. Modify the EPC calculation for benzo(a)pyrene to include the maximum detected concentration. Recalculate the recreational and supplemental residential risks at reach SS-1W to utilize the updated EPC.

43. Table 8.2-2, Residential Risk Ratios Used to Identify Sediment COPCs for Human Health Risk Assessment, Carcinogens, pages 539 through 541:

NMED Comment: The residential risk ratios for indeno(1,2,3-cd)pyrene and naphthalene at reach SS-1W are inconsistent with the expected residential risk ratios using maximum detected concentrations and residential SSLs. The maximum detected concentration of indeno(1,2,3-cd)pyrene at reach SS-1W (3.06 mg/kg) and a residential SSL of 6.21 mg/kg results in a risk ratio of 0.49. The maximum detected concentration of naphthalene at reach SS-1W was 4.78 mg/kg and a residential SSL of 45 mg/kg results in a risk ratio of 0.11. Modify Table 8.2-2 to utilize the correct maximum detected concentrations for indeno(1,2,3-cd)pyrene and naphthalene at reach SS-1W. Since this results in risk ratios greater than 0.1, update the list of COPCs at SS-1W to include indeno(1,2,3-cd)pyrene and naphthalene. In addition, update any subsequent tables and calculations that would be affected.

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44. Table 8.2-4, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Noncarcinogen, pages 543 through 548:

NMED Comment: Footnote "b" indicates that the tap water screening level for hexavalent chromium was used for chromium. The listed value of 54,800 µg/L is inconsistent with the NMED (2009) tap water screening level of 110 µg/L. It appears that the sum of fractions calculations have been underestimated for chromium and that chromium should be considered a surface water COPC in some of the reaches for the recreational scenario. In addition, as explained in General Comment Number 4 above, given that hexavalent chromium is carcinogenic by a mutagenic mode of action and has an updated cancer slope factor, the resulting tap-water screening level would be much lower than 110 µg/L. Modify the risk assessments to utilize updated tap-water screening levels and the oral cancer slope factor of 0.5 mg/kg-day.

45. Table 8.2-4, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Noncarcinogen, pages 543 through 548:

NMED Comment: The tap water screening level of 2,920 µg/L listed for diethyl phthalate is inconsistent with the NMED (2009) value of 29,200 µg/L. The value listed in Table 8.2-1 is an order of magnitude lower than the NMED (2009) value and is more conservative and would not affect the results of the risk assessment. However, modify Table 8.2-1 to utilize the correct tap water screening level of 29,200 µg/L.

46. Table 8.2-4, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Noncarcinogen, pages 543 through 548:

NMED Comment:. The tap water screening level of 220 µg/L listed for 2,4,6-trinitrotoluene is inconsistent with the NMED (2009) tap water screening level of 18.3 µg/L. It appears that the sum of fractions have been underestimated and that 2,4,6-trinitrotoluene should have been included as a surface water COPC at Burning Ground Spring (reach CDV-2W). Modify Table 8.2-1 to utilize the NMED (2009) tap water screening level of 18.3 µg/L and update the sum of fraction calculations. Include 2,4,6-trinitrotoluene as a surface water COPC at Burning Ground Spring.

47. Table 8.2-4, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Noncarcinogen, pages 543 through 548:

NMED Comment: Some of the risk ratios greater than 0.1 are not shaded for reaches that had a sum of fractions greater than 1 (e.g., lead, manganese, and uranium). It is noted that these constituents were still considered as COPCs in the recreational risk assessments and the results are not affected. However, modify Table 8.2-10 so that all cells are shaded with risk ratios greater than 0.1 for reaches that had a sum of fractions greater than 1.

48. Tables 8.2-7 and 8.2-10, Reaches and Analyte Classes Evaluated for Sediment, Surface Water, and Multimedia Exposure and Summary of Recreational Risk Assessment Results, pages 553 and 556:

NMED Comment: One row in each of the tables is labeled "none", indicating that the water sample collected was not within any of the defined reaches at Water Canyon/Cañon de Valle. However, it is not clear which sample locations the records are associated with. Add a description or footnote to Tables 8.2-7 and 8.2-10 to indicate which sample locations correspond to the records with for the rows that are labeled as "none".

49. Table 8.2-9, Risk-Based Screening Values, pages 554 and 555:

NMED Comment: The recreational sediment SSL listed for 2,4,6-trinitrotoluene (30.1 mg/kg) is inconsistent with the SSL of 301 mg/kg presented in previous documents (LA-UR-09-07510, LANL 2010). Since the presented SSL is more conservative, this inconsistency would not affect the results of the recreational risk assessment. However, modify Table 8.2-9 to include the correct recreational SSL of 301 mg/kg for 2,4,6-trinitrotoluene.

50. Table E-2.2-1, EPCs for Sediment COPCs, pages E-11 through E-17:

NMED Comment: A 95% upper confidence limit (UCL) EPC was calculated for arsenic in reach SS-1E using only five samples. A minimum of eight samples is required in order to calculate an EPC. Modify Table E-2.2-1 to show the maximum detected concentration as the EPC for arsenic in reach SS-1E, and any subsequent risk calculations that may be affected. The minimum requirements for calculating 95% UCLs are: 1) a minimum of eight samples collected for analysis for each analyte; and 2) of those eight samples, there must be at least six detections for each analyte.

51. Table E-2.2-1, EPCs for Sediment COPCs, pages E-11 through E-17:

NMED Comment: A 95% UCL EPC was calculated for arsenic in reach WA-2W using only seven samples. A minimum of eight samples is required in order to calculate an EPC. Modify Table E-2.2-1 to show the maximum detected concentration as the EPC for arsenic in reach WA-2W, and any subsequent risk calculations that may be affected. The minimum requirements for calculating 95% UCLs are: 1) a minimum of eight samples collected for analysis for each analyte; and 2) of those eight samples, there must be at least six detections for each analyte."

52. Table E-2.2-1, EPCs for Sediment COPCs, pages E-11 through E-17:

NMED Comment:. 95% UCLs were calculated for many data sets with low frequencies of detections. The ProUCL (2010) Version 4.1 User's Guide states, "Statistics (e.g., UCL95) computed based upon only a few detected values (e.g., less than four to six) cannot be considered reliable enough to estimate the EPC in terms having potential impact on the human health and the environment."

Therefore, 95% UCLs should not be calculated at Water Canyon/Cañon de Valle with data sets containing fewer than six detections. Revise Table E-2.2-1 to display the maximum detected concentration for the EPC for data sets with fewer than six detections. Additionally, modify risk assessment calculations that would be affected by the use of maximum detected concentrations on data sets with fewer than six detections. The minimum requirements for calculating 95% UCLs are: 1) a minimum of eight samples collected for analysis for each analyte; and 2) of those eight samples, there must be at least six detections for each analyte.

53. Table E-2.1-2, Parameters Used to Calculate Chemical Surface-Water SLs, page E-8:

NMED Comment: The table displays input parameters used to estimate screening levels that include exposure via inhalation (i.e. inhalation slope factor and inhalation reference dose). As shown in the surface water screening level equation in Section E.2-4, the inhalation pathway is not included in the surface water screening level equation. Delete the input parameters on Table E-2.1-2 that have to do with inhalation (i.e., inhalation slope factor and inhalation reference dose).

It is not clear what input parameters were applied to calculate the absorbed dose (DAevent) used in the surface water screening level calculations, such as Kp (dermal permeability coefficient), FA (fraction absorbed), t* (time to reach steady state), *T* (lag time), and the values for B (ratio of permeability coefficient through stratum corneum to the permeability coefficient across the viable epidermis). In addition, it is not clear which chemical-specific values were used for the gastrointestinal (GI) absorption factors. Provide GI absporption factors and input values employed for calculating DAevent and/or the calculation spreadsheets that were used to calculate the surface water screening level calculations.

Action Required

54. Table E-2.1-2, Parameters Used to Calculate Chemical Surface-Water SLs, page E-8:

NMED Comment: The units listed for the surface water ingestion rate for a recreational receptor is liters per event (L/event). The units should be in L/day. If 0.2 L/event is indeed correct, then also specify the number of events per day assumed for a recreational scenario. Modify Table E-2.1-2 to list 0.2 L/day for the surface water ingestion rate, or add a parameter value for the number of events/day for surface water ingestion.

55. Table E-2.1-2, Parameters Used to Calculate Chemical Surface-Water SLs, page E-8:

NMED Comment:. The table does not list the values utilized for the number of dermal events per day (EV) and the exposure time for a dermal event (ET_{derm}; hours per event) for the surface water screening level calculations. Clarify the values used for EV and ET_{derm} and add this information to Table E-2.1-2.

56. Table E-2.1-3, Toxicity Values for Surface-Water Screening Values, page E-9:

NMED Comment: The table lists an oral cancer slope factor (SFO) for antimony (1.5 mg/kg-day) and references US EPA's Integrated Risk Information System (IRIS). There is no SFO available from IRIS because antimony is not considered to be carcinogenic. Remove this SFO from Table E-2.1-3. Determine whether the calculation of surface water screening levels would be affected and revise the IR accordingly.

57. Table E-2.1-3, Toxicity Values for Surface-Water Screening Values, page E-9:

NMED Comment: The table does not list an SFO for arsenic. Arsenic is considered to be carcinogenic, and IRIS lists an SFO for arsenic of 1.5 mg/kg/day. Modify Table E-2.1-3 to display the SFO for arsenic. Determine whether the calculation of surface water screening levels would be affected and revise the IR accordingly.

58. Appendix F, Surface Water and Vadose Zone Hydrology, F.1.1 Watershed Characteristics, Page F-1:

NMED Comment: *See* NMED Comment #11 with respect to baseflow and perennial surface-water conditions in Water Canyon near NM 501 and downstream onto Laboratory property, and its influence on water-balance calculations.

Action Required

59. Appendix G, Occurrence of Springs in the Upper Water Canyon and Cañon de Valle Watershed, Page G-1, paragraph 3:

Permittees' Statement: "The rate of stream loss across the Pajarito Fault zone in Water Canyon is usually sufficient such that the streams have minimal flow downstream of the fault at NM 501."

NMED Comment: See NMED Comment #11 with respect to baseflow and perennial surface-water conditions in Water Canyon near NM 501.

The Permittees must address all comments and submit a revised IR by **March 15, 2012**. As part of the response letter that accompanies the revised IR, the Permittees shall include a table that details where all revisions have been made to the IR and that cross-references NMED's numbered comments. All submittals (including maps) must be in the form of two paper copies and one electronic copy in accordance with Section XI.A of the Order. The Permittees must also submit a redline-strikeout version that includes all changes and edits to the IR (electronic copy) with the response to this NOD.

If you have any questions regarding this letter, please contact Daniel Comeau at (505) 476-6043.

Sincerely,

John E. Kieling
Acting Chief
Hazardous Waste Bureau

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