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NEW MEXICO
ENVIRONMENT DEPARTMENT

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DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

February 6, 2012

Edward Ziemianski, Acting Manager
Carlsbad Field Office
Department of Energy
P. O. Box 3090
Carlsbad, New Mexico 88221-3090

M. Farok Sharif
Washington TRU Solutions LLC
P. O. Box 2078
Carlsbad, New Mexico 88221-5608

**RE: CORRECTION OF TYPOGRAPHIC ERRORS FOR CLASS 2 MODIFICATION REQUEST ISSUED
JANUARY 31, 2012, WIPP HAZARDOUS WASTE FACILITY PERMIT
EPA I.D. NUMBER NM4890139088**

Dear Messrs. Ziemianski and Sharif:

On January 31, 2012 the New Mexico Environment Department (NMED) issued a final decision the Class 2 permit modification. NMED has since been notified and has identified several non-substantive typographical errors to the modified permit.

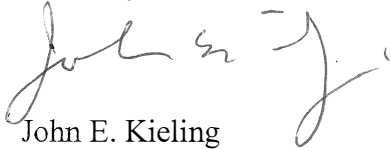
Enclosed are the revised pages of the modified permit in redline-strikeout to help identify the corrections. Enclosed is an electronic version in CD format of the corrected permit. An electronic version of the corrected permit has also been posted for the public on the Department's WIPP Information Page at <http://www.nmenv.state.nm.us/wipp/download.html>

February 6, 2012

Page

Please contact Trais Kliphuis at (505) 476-6051 or via e-mail at trais.kliphuis@state.nm.us if you have questions or need additional information.

Sincerely,

A handwritten signature in cursive script, appearing to read "John E. Kieling".

John E. Kieling
Acting Chief
Hazardous Waste Bureau

Enclosures:

Redline/strikeout pages showing corrections

Electronic version of corrected permit dated January 31, 2012

cc: C. de Saillan, NMED OGC
Trais Kliphuis, HWB
Don Hancock, SRIC

PART 1 - GENERAL PERMIT CONDITIONS

1.1. **AUTHORITY**

This Permit is issued pursuant to the authority of the Secretary of the New Mexico Environment Department (**Secretary**) under the New Mexico Hazardous Waste Act (**HWA**), NMSA 1978, §§74-4-1 through 74-4-14, in accordance with the New Mexico Hazardous Waste Management Regulations (**HWMR**), 20.4.1 NMAC.

Pursuant to the Resource Conservation and Recovery Act (**RCRA**), 42 U.S.C. §§6901 to 6992k, and 40 CFR Part 271 and Part 272 Subpart GG, the State of New Mexico, through the Secretary, is authorized to administer and enforce the state hazardous waste management program under the HWA in lieu of the federal program.

This Permit contains terms and conditions that the Secretary has determined are necessary to protect human health and the environment, pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.32(b)(2)).

Any violation of a condition in this Permit may subject the Permittees or their officers, employees, successors, and assigns to:

- 1) A compliance order under §74-4-10 of the HWA or §3008(a) of RCRA (42 U.S.C. §6928(a));
- 2) An injunction under §74-4-10 of the HWA or §3008(a) of RCRA (42 U.S.C. §6928(a)), or §7002(a) of RCRA (42 U.S.C. §6972(a));
- 3) Civil penalties under §§74-4-10 and 74-4-10.1 of the HWA or §§3008(a) and (g) of RCRA (42 U.S.C. §§6928(a) and (g)), or §7002(a) of RCRA (42 U.S.C. §6972(a));
- 4) Criminal penalties under §74-4-11 of the HWA or §§3008(d), (e), and (f) of RCRA (42 U.S.C. §§6928(d), (e), and (f)); or
- 5) Some combination of the foregoing.

The list of authorities in this paragraph is not exhaustive and the Secretary reserves the right to take any action authorized by law to enforce the requirements of this Permit.

1.2. **EFFECT OF PERMIT**

The Secretary issues this Permit to the United States Department of Energy (**DOE**), the owner and co-operator of the Waste Isolation Pilot Plant (**WIPP**) (EPA I.D. Number NM4890139088), and Washington TRU Solutions LLC, Management and Operating Contractor (**MOC**), the co-operator of WIPP. This Permit authorizes DOE and MOC (**the Permittees**) to manage, store, and dispose contact-handled (**CH**) and remote-handled (**RH**) transuranic (**TRU**) mixed waste at WIPP, and establishes the general and specific standards for these activities, pursuant to the HWA and HWMR.

Prior to disposal of TRU mixed waste in a newly constructed Underground HWDU, the Permittees shall comply with the certification requirements specified in Permit Section 1.5.11.

4.5.3. Repository Operation

4.5.3.1. Underground Traffic Flow

The Permittees shall restrict and separate the ventilation and traffic flow areas in the underground TRU mixed waste handling and disposal areas from the ventilation and traffic flow areas for mining and construction equipment, except that during waste transport in W-30, ventilation need not be separated north of S-1600.

The Permittees shall designate routes for the traffic flow of TRU mixed waste handling equipment and construction equipment as required by Permit Attachment A4 (Traffic Patterns), Section A4-4, "Underground Traffic." These routes will be recorded on a mine map that is posted in a location where persons entering the underground can read it. Whenever the routes are changed, the map will be updated. Maps will be available in facility files until facility closure.

4.5.3.2. Ventilation

The Permittees shall maintain a minimum running annual average mine ventilation exhaust rate of 260,000 standard ft³/min and a minimum active room ventilation rate of 35,000 standard ft³/min in each active room where waste disposal is taking place and workers are present in the room, as specified in Permit Attachment A2, Section A2-2a(3), "Subsurface Structures (Underground Ventilation System Description)" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)).

4.5.3.3. Ventilation Barriers

The Permittees shall construct ventilation barricades in active Underground HWDUs to restrict the flow of mine ventilation air through full disposal rooms, as specified in Permit Attachment A2, Section A2-2a(3), "Subsurface Structures (Underground Ventilation System Description)" and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.601(c)).

4.6. MAINTENANCE AND MONITORING REQUIREMENTS

The Permittees shall maintain and monitor the Underground HWDUs as specified by the following conditions and as required by 20.4.1.500 NMAC (incorporating 40 CFR §§264.601 and 264.602):

4.6.4. Mine Ventilation Rate Monitoring

4.6.4.1. Implementation of Mine Ventilation Rate Monitoring Plan

The Permittees shall implement the Mine Ventilation Rate Monitoring Plan specified in Permit Attachment O (WIPP Mine Ventilation Rate Monitoring Plan) until the certified closure of all Underground HWDUs and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.602 and §264.601(c)).

4.6.4.2. Reporting Requirements

The Permittees shall report to the Secretary annually in October the results of the data and analysis of the Mine Ventilation Rate Monitoring Plan.

4.6.4.3. Notification Requirements

The Permittees shall calculate the running annual average mine ventilation exhaust rate on a monthly basis. In addition, the Permittees shall evaluate compliance with the minimum active room ventilation rate specified in Permit Section 4.5.3.2 on a monthly basis. The Permittees shall report to the Secretary in the annual report specified in Permit Section 4.6.24.2 whenever the evaluation of the mine ventilation monitoring program data identifies that the ventilation rates specified in the Permit Section 4.5.3.2 have not been achieved.

4.6.5. Hydrogen and Methane Monitoring

4.6.5.1. Implementation of Hydrogen and Methane Monitoring

The Permittees shall implement the Hydrogen and Methane Monitoring Plan specified in Permit Attachment N1 (Hydrogen and Methane Monitoring Plan).

4.6.5.2. Reporting Requirements

The Permittees shall report to the Secretary semi-annually in April and October the data and analysis of the Hydrogen and Methane Monitoring Plan.

4.6.5.3. Notification Requirements

The Permittees shall notify the Secretary in writing, within seven calendar days of obtaining validated analytical results, whenever the concentration of hydrogen or methane in a filled panel exceeds the action levels specified in Table 4.6.5.3 below.

quality at each DMW specified in Table 5.3.1 to the background groundwater quality determined pursuant to Permit Section 5.6, in compliance with the statistical procedures specified in Permit Section 5.9.1, and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(f)).

5.9.4. Data Evaluation Timeframe

The Permittees shall perform the data evaluations specified in Permit Section 5.9.3 within 120 calendar days after completion of DMP sampling, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(f)(2)).

5.10. RECORDKEEPING AND REPORTING

5.10.1. Operating Record Requirements

The Permittees shall enter all DMP monitoring, testing, and analytical data in the operating record as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.73(b)(6)). The Permittees shall enter these data, as measured and in a form appropriate for the determination of statistically significant evidence of contamination, into the operating record as specified in Permit Section 5.9.1 and as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(c)).

5.10.2. Submittal of Results

5.10.2.1. Data Evaluation Results

The Permittees shall submit to the Secretary the analytical results required by Permit Sections 5.5.1 and 5.9.2, and the results of the statistical analyses required by Permit Section 5.9.3, in the Annual Culebra Groundwater Report by November 30 of each year as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.97(j)).

Analytical results of a sampling round may be included in the report specified in Permit Section 5.10.2.3 if publication of the report coincides with the 120 calendar day report submittal schedule.

5.10.2.2. Groundwater Surface Elevation Results

The Permittees shall submit to the Secretary groundwater surface elevation data specified in Permit Section 5.7. This submittal shall include both groundwater surface elevations calculated from field measurements and fresh-water head elevations calculated as specified in Permit Attachment L, Section L-4c(1). Water level data shall be ~~submitted~~ reported semiannually by May 31 and November 30 ~~within 30 calendar days after data are collected~~. The November water level data report shall be combined with the Annual Culebra Groundwater Report

~~specified in Permit Part 5.10.2.3. Water level data shall be submitted within 30 calendar days after data are collected.~~

5.10.2.3. Groundwater Flow and Radionuclide Sampling Results

~~The Permittees shall submit to the Secretary an evaluation of the ground-water groundwater flow data (to include annotated hydrographs) specified in Permit Section 5.8 and the results of radionuclide specific analysis of groundwaters sampled from the DMWs in the Annual Culebra Groundwater Site Environmental Report by October 1 by November 30 of each calendar year.~~

The Permittees shall submit to the Secretary an evaluation of the groundwater flow data specified in Permit Section 5.8 and the results of radionuclide specific analysis of groundwaters sampled from the DMWs in the Annual Site Environmental Report by October 1 of each calendar year.

5.10.3. Determination of Contamination

If the Permittees determine, pursuant to Permit Section 5.9 and 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)), that there is statistically significant evidence of contamination for any hazardous constituent specified in Table 5.4.b, the Permittees shall comply with the following:

5.10.3.1. Notification

The Permittees shall notify the Secretary in writing within seven calendar days, indicating what hazardous constituents have shown statistically significant evidence of contamination, as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(1)).

5.10.3.2. Appendix IX Sampling

The Permittees shall immediately, but no later than one month, sample the groundwater in all DMWs specified in Table 5.3.1 for which there was statistically significant evidence of contamination. The remaining DMWs shall be sampled within two months after statistically significant evidence of contamination is found in any DMW. All DMWs shall be sampled to determine the concentration of all substances identified in 20.4.1.500 NMAC (incorporating 40 CFR §264 Appendix IX), as required by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(2)).

5.10.3.3. Verification Sampling

As specified by 20.4.1.500 NMAC (incorporating 40 CFR §264.98(g)(3)), for any substances found in the initial analysis pursuant to

1 power is returned. As specified in Part 2, all waste handling equipment will "fail safe," meaning
2 that it will retain its load during a power outage.

3 Underground Ventilation Normal Mode Redundancy

4 The underground ventilation system has been provided redundancy in normal ventilation mode
5 by the addition of a third main fan. Ductwork leading to that new fan ties into the existing main
6 exhaust duct.

7 Electrical System

8 The WIPP facility uses electrical power (utility power) supplied by the regional electric utility
9 company. If there is a loss of utility power, TRU mixed waste handling and related operations
10 will cease.

11 Backup, alternating current power will be provided on site by two 1,100-kilowatt diesel
12 generators. These units provide 480-volt power with a high degree of reliability. Each of the
13 diesel generators can carry predetermined equipment loads while maintaining additional power
14 reserves. Predetermined loads include lighting and ventilation for underground facilities, lighting
15 and ventilation for the TRU mixed waste handling areas, and the Air Intake Shaft hoist. The
16 diesel generator can be brought on line within 30 minutes either manually or from the control
17 panel in the Central Monitoring Room (CMR).

18 Uninterruptible power supply (**UPS**) units are also on line providing power to predetermined
19 monitoring systems. These systems ensure that the power to the radiation detection system for
20 airborne contamination, the local processing units, the computer room, and the CMR will always
21 be available, even during the interval between the loss of off-site power and initiation of backup
22 diesel generator power.

23 A2-2a(4) RH TRU Mixed Waste Handling Equipment

24 The following are the major pieces of equipment used to manage RH TRU mixed waste in the
25 geologic repository. A summary of equipment capacities is included in Table A2-3.

26 The Facility Cask Transfer Car

27 The Facility Cask Transfer Car is a self-propelled rail car (Figure A2-14) that operates between
28 the Facility Cask Loading Room and the geologic repository. After the Facility Cask is loaded,
29 the Facility Cask Transfer Car moves onto the waste shaft conveyance and is then transported
30 underground. At the underground waste shaft station, the Facility Cask Transfer Car proceeds
31 away from the waste shaft conveyance to provide forklift access to the Facility Cask.

32 Horizontal Emplacement and Retrieval Equipment or Functionally Equivalent Equipment

33 The Horizontal Emplacement and Retrieval Equipment (**HERE**) or functionally equivalent
34 equipment (Figure A2-15) emplaces canisters into a borehole in a room wall of an Underground
35 HWDU. Once the canisters have been emplaced, the HERE then fills the borehole opening with
36 a shield plug.

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1 mudstone, claystone, siltstone, and interbedded sandstone (see Amended Renewal Application
2 Addendum L1, Section L1-1c(6) ~~Application~~ (DOE, 2009)). This formation forms a 500-ft- (152-
3 m) thick barrier of fine-grained sediments that retard the downward percolation of water into the
4 evaporite units below. The Bell Canyon is the first water-bearing unit below the repository (see
5 Amended Renewal Application Addendum L1, Section L1-1c(2) (DOE, 2009)) and is confined
6 above by the thick evaporite deposits of the Castile. It consists of 1,200 ft (366 m) of
7 interbedded sandstone, shale, and siltstone.

8 The Salado was selected to host the WIPP repository for several reasons. First, it is regionally
9 extensive, underlying an area of more than 36,000 square mi (mi²) (93,240 square kilometers
10 [km²]). Second, its permeability is extremely low. Third, salt behaves mechanically in a plastic
11 manner under pressure (the lithostatic pressure at the disposal horizon is approximately 2,200
12 pounds per square inch [lb/in.²] or 14.9 megapascals [MPa]) and eventually deforms to fill any
13 opening (referred to as creep). Fourth, any fluid remaining in small fractures or openings is
14 saturated with salt, is incapable of further salt dissolution, and has probably remained in place
15 since deposition. Finally, the Salado lies between the Rustler and the Castile (Figure L-4), which
16 contain very low permeability layers that help confine and isolate waste within and keep water
17 outside of the WIPP repository (see Amended Renewal Application Addendum L1, Section L1-
18 1c(5) and L1-1c(3) (DOE, 2009)).

19 L-1a(2) Groundwater Hydrology

20 The general hydrogeology of the area surrounding the WIPP facility is described in this section
21 starting with the first geologic unit below the Salado. Addendum L1, Section L1-2a of the
22 Amended Renewal Application (DOE, 2009) provides more detailed discussions of the local and
23 regional hydrogeology. Relevant hydrological parameters for the various rock units above the
24 Salado at WIPP are summarized in Table L-1.

25 L-1a(2)(i) The Castile

26 The Castile is a basin-filling evaporite sequence of sediments surrounded by the Capitan Reef.
27 The Castile represents a major regional groundwater aquitard that effectively prevents upward
28 migration of water from the underlying Bell Canyon. Fluid present in the Castile is very restricted
29 because evaporites do not readily maintain pore space, solution channels, or open fractures at
30 depth. Drill-stem tests conducted in the Castile during construction of the WIPP facility
31 determined its permeability to be lower than detection limits; however, the hydraulic conductivity
32 has been conservatively estimated to be less than 10⁻⁸ ft (3 × 10⁻⁹ m) per day. A description of
33 the Castile brine reservoirs outside the WIPP facility area is provided in Addendum L1, Section
34 L1-2a(2)(b) of the Amended Renewal Application (DOE, 2009).

35 L-1a(2)(ii) The Salado

36 The Salado is an evaporite sequence that filled the remainder of the Delaware Basin and lapped
37 extensively over the Capitan Reef and the back-reef sediments beyond. The Salado consists of
38 approximately 2,000 ft (610 m) of bedded halite, with interbeds or seams of anhydrite, clay, and
39 polyhalite. It acts hydrologically as a regional confining bed. The porosity of the Salado is very
40 low and naturally interconnected pores are probably nonexistent in halite at the depth of the
41 disposal horizon. Fluids associated with the Salado occur mainly as very small fluid inclusions in
42 the halite crystals and also occur between crystal boundaries (interstitial fluid) of the massive
43 crystalline salt formation; fluids also occur in clay seams and anhydrite beds. Permeabilities

1 Potentiometric surfaces and groundwater flow directions defined for the Culebra prior to large-
2 scale pumping in the WIPP facility area and the excavation of WIPP facility shafts suggests that
3 flow was generally to the south-southeast from the waste disposal and shaft areas (Mercer,
4 1983; Davies, 1989). Potentiometric surface maps of the Culebra adjusted for density
5 differences show very similar characteristics. The wells used for measuring the potentiometric
6 surface of the Culebra are measured monthly and listed in Table L-4.

7 L-3b(1) Detection Monitoring Well Construction Specification

8 Diagrams of the six DMP wells are shown in Figures L-7 through L-12. Detailed descriptions of
9 geology and construction methods may be found in DOE 1995.

10 The six DMP Culebra wells were drilled between September 13 and October 16, 1994. The total
11 depth of each well is shown in Table L-5. The wells were drilled through the Culebra ~~and into~~
12 the Los Medaños as shown in Table L-5. The wells were drilled to the top of the Culebra using
13 compressed air as the drilling fluid and a 9 $\frac{7}{8}$ -in. drill bit. The wells were then cored using a 5 $\frac{1}{4}$ -
14 in. core bit to cut 4-in. (0.1-m) diameter core to total depth. See Table L-5 for the drilling and
15 coring intervals for each well. After coring, DMP wells were reamed to 9 $\frac{7}{8}$ -in. (0.3 m) in
16 diameter to total depth. After reaming, wells were cased from the surface to total depth with 5-in.
17 (0.1-m) (0.28-in. [0.7-centimeter (cm)] wall) blank fiberglass casing with in-line 5-in.- (0.1-m)
18 diameter fiberglass 0.02-in. (0.1-cm) slotted screen across the Culebra interval as shown in
19 Table L-5 . The annulus between the borehole wall and the casing/screen is packed with sand
20 and with 8/16 Brady gravel as indicated in Table L-5.

21 L-4 Monitoring Program Description

22 The WIPP DMP has been designed to meet the groundwater monitoring requirements of
23 20.4.1.500 NMAC (incorporating 40 CFR §§264.90 through 264.101). The following sections of
24 the monitoring plan specify the components of the DMP.

25 L-4a Monitoring Frequency

26 Groundwater surface elevations will be monitored in each of the six DMWs on a monthly basis.
27 The groundwater surface elevation in each DMW will also be measured prior to each annual
28 sampling event. The groundwater surface elevation measurements in the WLMP wells will also
29 be monitored on a monthly basis when accessible. The characteristics of the DMW (sampling
30 frequency, location) will be evaluated if significant changes are observed in the groundwater
31 flow direction or gradient.

32 L-4b Analytical Parameters and Hazardous Constituents

33 The parameters listed in Part 5, Table 5.4.a and hazardous constituents listed in Part 5, Table
34 5.4.b are measured as part of the DMP.

35 Additional hazardous constituents may be identified through changes to the list of hazardous
36 waste numbers authorized for disposal at the WIPP facility. If hazardous constituents are
37 identified, these will be added to Part 5, Table 5.4.b, unless the Permittees provide justification
38 for their omission (e.g. hazardous constituent not in 40 CFR §264 Appendix IX), and this
39 omission is approved by NMED.

1 Head distribution in the Culebra (see Amended Renewal Application Addendum L1 (DOE,
2 2009)) is consistent with basin-scale groundwater basin modeling results indicating that the
3 generalized groundwater flow direction in the Culebra is currently north to south. However, the
4 fractured nature of the Culebra, coupled with variable fluid densities, can cause localized flow
5 patterns to differ from general flow patterns.

6 Groundwater levels in the Culebra in the region around the WIPP facility have been measured
7 in numerous wells. Water-level rises have been observed and are attributed to causes
8 discussed in the Renewal Application Addendum L1, Section L1-2a(3)(a)(ii) (DOE, 2009). The
9 extent of water-level rise observed at a particular well depends on several factors, but the
10 proximity of the observation point to the cause of the water-level change appears to be a
11 primary factor.

12 Hydrological investigations conducted from 2003 through 2007 provided new information, some
13 of it confirming long-held assumptions and some offering new insight into the hydrological
14 system around the WIPP site. A Culebra monitoring network optimization study was completed
15 by McKenna (2004) and updated by Kuhlman (2010) to identify locations where new Culebra
16 monitoring wells would be of greatest value and to identify wells that could be removed from the
17 network with little loss of information.

18 As discussed in Amended Renewal Application Addendum L1, Section L1-2a(3)(a)(ii) (DOE,
19 2009), extensive hydrological testing has been performed in the new wells. This testing has
20 involved both single well tests, which provide information on local transmissivity and
21 heterogeneity, and long-term (19 to 32 days) pumping tests that have created observable
22 responses in wells up to 5.9 mi (9.5 km) away.

23 Inferences about vertical flow directions in the Culebra have been made from well data collected
24 by the Permittees. Beauheim (1987) reported flow directions towards the Culebra from both the
25 underlying Los Medaños Member (**Los Medaños**) of the Rustler and the overlying Magenta
26 Member (**Magenta**) of the Rustler across the WIPP site, indicating that the Culebra acts as a
27 drain for the units around it. This is consistent with results of basin-scale groundwater modeling.

28 Use of water from the Culebra in the WIPP facility area is quite limited because of its varying
29 yields and high salinity. The Culebra is not used for water supply in the immediate WIPP facility
30 vicinity. Its nearest use is approximately 7 mi (11 km) southwest of the WIPP facility, where
31 salinity is low enough to allow its use for livestock watering.

32 L-2 General Regulatory Requirements

33 Because geologic repositories such as the WIPP facility are defined under the Resource
34 Conservation and Recovery Act (**RCRA**) as land disposal facilities and as miscellaneous units,
35 the groundwater monitoring requirements of 20.4.1.500 NMAC (incorporating 40 CFR
36 §§264.600 through 264.603) shall be addressed. The requirements of 20.4.1.500 NMAC
37 (incorporating 40 CFR §§264.90 through 264.101) apply to miscellaneous unit treatment,
38 storage, and disposal facilities (**TSDF**) only if groundwater monitoring is needed to satisfy
39 20.4.1.500 NMAC (incorporating 40 CFR §§264.601 through 264.603) environmental
40 performance standards.

41 The New Mexico Environment Department (**NMED**) has concluded that groundwater monitoring
42 in accordance with 20.4.1.500 NMAC (incorporating 40 CFR §264 Subpart F) at the WIPP

1 Potentiometric surfaces and groundwater flow directions defined for the Culebra prior to large-
2 scale pumping in the WIPP facility area and the excavation of WIPP facility shafts suggests that
3 flow was generally to the south-southeast from the waste disposal and shaft areas (Mercer,
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36 waste numbers authorized for disposal at the WIPP facility. If hazardous constituents are
37 identified, these will be added to Part 5, Table 5.4.b, unless the Permittees provide justification
38 for their omission (e.g. hazardous constituent not in 40 CFR §264 Appendix IX), and this
39 omission is approved by NMED.

1 Prior to collecting the final samples, the collection team shall consider the analyses to be
2 performed so that proper shipping or storage containers can be assembled. Table L-6 presents
3 the sample containers, volumes, and holding times for laboratory samples collected as part of
4 the DMP.

5 The monitoring system will use dedicated pumping systems and sample collection lines from the
6 sampled formation to the well head.

7 Sample integrity will be ensured through appropriate decontamination procedures. Laboratory
8 glassware will be washed after each use with a solution of nonphosphorus detergent and
9 deionized (DI) water and rinsed in DI water. Sample containers will be new, certified clean
10 containers that will be discarded after one use. Groundwater surface elevation measurement
11 devices will be rinsed with fresh water after each use. Non-dedicated sample collection manifold
12 assemblies will be rinsed in accordance with SOPs after each use. The exposed ends will be
13 capped off during storage. Prior to the next use of the sampling manifold, it will be rinsed a
14 second time with DI water and a rinsate blank sample will be collected to verify cleanliness.

15 Water samples will be collected at atmospheric pressure using either the filtered or unfiltered
16 sampling lines. Detailed protocols, in the form of SOPs (see Table L-3) define how final samples
17 will be collected in a consistent and repeatable fashion for analyses.

18 Final samples will be collected in the appropriate type of container for the specific analysis to be
19 performed. The samples will be collected in new and unused glass and plastic containers (refer
20 to Table L-6). For each parameter analyzed, a sufficient volume of sample will be collected to
21 satisfy the volume requirements of the analytical laboratory (as specified by laboratory SOPs).
22 This includes an additional volume of sample water necessary for maintaining quality control
23 standards. All final samples will be treated, handled, and preserved as required for the specific
24 type of analysis to be performed. Details about sample containers, preservation, and volumes
25 required for individual types of analyses are found in the applicable SOPs generated, approved,
26 and maintained by the contract analytical laboratory.

27 Final samples will be sent to the analytical laboratories and analyzed for parameters and
28 hazardous constituents specified in Part 5, ~~table~~ Tables 5.4a and 5.4b.

29 Duplicates of the final sample will be provided to WIPP Project oversight agencies when
30 requested.

31 Wastes resulting from the sampling and field analysis of groundwater are disposed of in
32 accordance with the WIPP SOPs (see Table L-3).

33 L-4c(2)(iv) Sample Preservation, Tracking, Packaging, and Transportation

34 Many of the chemical constituents measured by the DMP are not chemically stable and require
35 preservation and special handling techniques. Samples requiring acidification will be treated as
36 requested by the analytical laboratory.

37 The analytical laboratory receiving the samples will prescribe the type and amount of
38 preservative, the container material type, the required sample volumes that shall be collected,
39 and the shipping requirements. This information will be recorded on the Final Sample Checklist
40 for use by field personnel when final samples are being collected. The Permittees will follow the

1 EPA "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document," Table 4-1
2 (EPA, 1986), when laboratory SOPs do not specify sample container, volume, or preservation
3 requirements. WIPP SOPs (see Table L-3) provide instructions to ensure proper sample
4 preservation and shipping.

5 The sample tracking system at the WIPP facility uses uniquely numbered chain of custody/
6 request for analysis (CofC/RFA) forms. The primary consideration for storage or transportation
7 is that samples shall be analyzed within the prescribed holding times for the analytes of interest.
8 WIPP SOPs (see Table L-3) provides instructions to ensure proper sample tracking protocol.

9 L-4c(2)(v) Sample Documentation and Custody

10 To ensure the integrity of samples from the time of collection through reporting date, sample
11 collection, handling, and custody shall be documented. Sample custody and documentation
12 procedures for sampling and analysis activities are detailed in WIPP facility SOPs (see Table L-
13 3).

14 Standardized forms used to document samples will include sample identification numbers,
15 sample labels, custody tape, the sample tracking data, and CofC/RFA form. An example form is
16 shown in Figure L-13.

17 Sample Numbers and Labels

18 A unique sample identification number will be assigned to each sample sent to the laboratory for
19 analysis. The sample identification numbers will be used to track the sample from the time of
20 collection through data reporting. Every sample container sent to the laboratory for analysis will
21 be identified with a label affixed to it. Sample label information will be completed in indelible ink
22 and will contain the following information: sample identification number with sample matrix type;
23 sample location; analysis requested; time and date of collection; preservative(s), if any; and the
24 sampler's name or initials.

25 Custody Seals

26 Custody seals will be used to detect unauthorized sample tampering from collection through
27 analysis. For example, custody seals that are adhesive-backed strips are destroyed when
28 removed or when the container is opened. The seal will be dated, initialed, and affixed to the
29 sample container in such a manner that it is necessary to break the seal to open the container.
30 Seals will be affixed to sample containers in the field immediately after collection. Upon receipt
31 at the laboratory, the laboratory custodian will inspect the seal for integrity; a broken seal will
32 invalidate the sample.

33 Sample Identification and Tracking

34 Sample tracking information will be completed for each sample collected. The sample tracking
35 information includes the following information: CofC/RFA form number; date sample(s) were
36 sent to the lab; laboratory name; acknowledgment of receipt or comments; well name and round
37 number. Sample codes will indicate the well location; the geologic formation where the water
38 was collected from, the sampling round number; and the sample number. The code is broken
39 down as follows:

1 WQ6¹C²R2³N1⁴

2 ¹ Well identification (e.g., WQSP-6 in this case)

3 ² Geologic formation (e.g., the Culebra in this case)

4 ³ Sample round no. (Round 2)

5 ⁴ Sample no. (N1)

6 To distinguish duplicate samples from other samples, a "D" is added as the last digit to signify a
7 duplicate. Sample tracking information will be completed in the field by the sampling team.

8 Sample tracking is monitored and documented with the CofC/RFA form and the shipping airbill.
9 Both of these documents are included in the data packets. Receipt at the analytical laboratory
10 may be monitored, if necessary, via the shipper's website tracking application. Samples are
11 considered complete when a copy of the original CofC/RFA form is merged with the Field Lab
12 copy of the same document.

13 Chain of Custody and Request for Analysis

14 A CofC/RFA form will be completed during or immediately following sample collection and will
15 accompany the sample through analysis and disposal. The CofC/RFA form will be signed and
16 dated each time the sample custody is transferred. A sample will be considered to be in a
17 person's custody if: the sample is in his/her physical possession; the sample is in his/her
18 unobstructed view; and/or the sample is placed, by the last person in possession of it, in a
19 secured area with restricted access. During shipment, the carrier's air bill number serves as
20 custody verification. Upon receipt of the samples at the analytical laboratory, the laboratory
21 sample custodian acknowledges possession of the samples by signing and dating the
22 CofC/RFA form. The completed original (top page) of the CofC/RFA will be returned to the
23 Permittees with the laboratory analytical report and becomes part of the permanent record of
24 the sampling event. The CofC/RFA form also contains specific instructions to the analytical
25 laboratory for sample analysis, potential hazards, and disposal instructions.

26 L-4c(3) Laboratory Analysis

27 Analysis of samples will be performed using methods selected to be consistent with EPA
28 recommended procedures in SW 846 (EPA, 1996). Additional detail on analytical techniques
29 and methods will be given in laboratory SOPs. In Part 5, Tables 5.4.a and 5.4.b presents the
30 analytical parameters and hazardous constituents for the WIPP DMP.

31 The Permittees will establish the criteria for laboratory selection, including the stipulation that
32 the laboratory follow the procedures specified in SW 846 and that the laboratory follow EPA
33 protocols unless alternate methods or protocols are approved by the NMED. The analytical
34 laboratory shall demonstrate, through laboratory SOPs that it will follow appropriate EPA SW
35 846 requirements and the requirements specified by the EPA protocols unless alternate
36 methods or protocols are approved by the NMED. The analytical laboratory shall also provide
37 documentation to the Permittees describing the sensitivity of laboratory instrumentation. This
38 documentation will be retained in the WIPP facility Operating Record. Instrumentation sensitivity
39 needs to be considered because of regulatory requirements governing constituent
40 concentrations in groundwater and the complexity of brines associated with the Culebra
41 groundwater.

1 L-7a(2)(i) Accuracy

2 Accuracy is the closeness of agreement between a measurement and an accepted reference
3 value. When applied to a set of observed values, accuracy is a combination of a random
4 component and a common systematic error (bias) component. Measurements for accuracy will
5 include analysis of calibration standards, laboratory control samples, matrix spike samples, and
6 surrogate spike recoveries. The bias component of accuracy is expressed as percent recovery
7 (%R). Percent recovery is expressed as follows:

8
$$\%R = \frac{(\text{measured sample concentration})}{\text{true concentration}} \times 100$$

9 L-7a(2)(i)(A) Accuracy Objectives for Field Measurements

10 Field measurements will include pH, Specific Conductance (SC), temperature, specific gravity
11 and static groundwater surface elevation. Field measurement accuracy will be determined using
12 calibration check standards. Thermometers used for field measurements will be calibrated to the
13 National Institute for Standards and Technology (**NIST**) traceable standard on an annual basis
14 to ensure accuracy. Accuracy of groundwater surface elevation measurements will be checked
15 before each measurement period by verifying calibration of the device within the specified
16 schedule. WIPP document WP 13-1 outlines the basic requirements for field equipment use and
17 calibration. WIPP facility SOPs contains instructions that outline protocols for maintaining
18 current calibration of groundwater surface elevation measurement instrumentation.

19 L-7a(2)(i)(B) Accuracy Objectives for Laboratory Measurements

20 Analytical system accuracy will be quantified using the following laboratory accuracy QC
21 checks: calibration standards, laboratory control samples (**LCS**), laboratory blanks, matrix and
22 surrogate spike recoveries. Single LCSs and matrix spike and surrogate spike sample analyses
23 will be expressed as %R. Laboratory analytical accuracy is parameter dependent and will be
24 prescribed in the laboratory SOP.

25 L-7a(2)(ii) Precision

26 Precision is the agreement among a set of replicate measurements without assumption or
27 knowledge of the true value. Precision data will be derived from duplicate field and laboratory
28 measurements. Precision will be expressed as relative percent difference (**RPD**), which is
29 calculated as follows:

30
$$RPD = \frac{(\text{measured value sample 1} - \text{measured value sample 2})}{\text{average of measured samples 1 + 2}} \times 100$$

31 L-7a(2)(ii)(A) Precision Objectives for Field Measurements

32 Specific conductance, pH, and temperature will be measured during well purging and after
33 sampling. SC measurements will be precise to $\pm 10\%$ pH to 0.10 standard unit, specific gravity to
34 0.01 by hydrometer and temperature to 0.10 degrees Celsius ($^{\circ}\text{C}$). Water-level measurements
35 will be precise to ± 0.01 ft. The precision of water density measurements, when measured in the

1 The use of an average value of 730 hours per month in the monthly average calculation is
2 reasonable, given that all the numbers involved are very large and that the final use of the
3 monthly average flow is in an annual calculation.

4 O-3c Active Disposal Room Minimum Airflow

5 O-3c(1) Verification of Active Room Minimum Airflow

6 Whenever workers are present, the Permittees shall verify the minimum airflow through active
7 room(s) where waste disposal is taking place of 35,000 scfm at the start of each shift, any time
8 there is an operational mode change, or if there is a change in the ventilation system
9 configuration.

10 O-3c(2) Measurement and Calculation of the Active Room Airflow

11 The Permittees shall measure the airflow rate and use the room cross-sectional area to
12 calculate the volume of air flowing through a disposal room. The measurement of airflow shall
13 use a calibrated anemometer and a moving traverse (McPherson, 1993). Airflow measurements
14 shall be collected at an appropriate location, chosen by the operator to minimize airflow
15 disturbances, near the entrance of each active room. The excavation dimensions at the
16 measurement location are taken and the cross-sectional area is calculated. The flow rate is the
17 product of the air velocity and the cross-section area. The value shall be entered on a log sheet
18 (see Table O-3) and compared to the required minimum. The format and content of the log
19 sheet may vary, but will always contain the data and information shown on Table O-3. Working
20 values are in acfm and the conversion to scfm is described in section O-1 above.
21 Measurements shall be collected, recorded, and verified by qualified operators.

22 The operator shall compare the recorded acfm value with the minimum acfm value provided at
23 the top of the log sheet. The airflow shall be re-checked and recorded whenever there is an
24 operational mode change or a change in ventilation system configuration. Once the ventilation
25 rate has been recorded and verified to be at least the required minimum, personnel access to
26 the room is unrestricted in accordance with normal underground operating procedures. If the
27 required ventilation rate cannot be achieved, or cannot be supported due to operational needs,
28 access to the room shall be restricted. Those periods when active disposal room access is
29 restricted shall be documented on the log sheet for that active disposal room. Entry to restricted
30 access active rooms for the purpose of establishing normal ventilation is allowed. Such entry
31 shall be documented on the log sheet including a reference to the SOP used for reentry,

32 O-3d Quarterly Verification of Total Mine Airflow

33 The Permittees shall perform a quarterly verification of the total mine airflow to ensure that rates
34 established by the Test and Balance for various operational modes are reasonably maintained.
35 These checks are identified in Permit Attachment E, Table E-1, and are performed as indicated
36 in Table E-1.

37 O-4 Equipment Calibration and Maintenance

38 Equipment used for the periodic Test and Balance, quarterly flow verification checks, and daily
39 verification of active disposal room flow rate shall be calibrated in accordance with appropriate
40 WIPP calibration and data collection procedures. Work performed by subcontractors shall also