UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 17 2014

OFFICE OF
AIR AND RADIATION

Mr. Jose R. Franco, Manager
Carlsbad Field Office
U.S. Department of Energy
P.O. Box 3090
Carlsbad, New Mexico 88221-3090

Dear Mr. Franco:

The U.S. Environmental Protection Agency is currently conducting a completeness review of the U.S. Department of Energy's (DOE) 2014 Compliance Recertification Application (CRA-2014) for the Waste Isolation Pilot Plant (WIPP). The Agency first needs to determine whether the CRA-2014 is complete before it undertakes a full technical evaluation of the recertification. Based on our initial review, we have determined that the CRA-2014 is not yet complete, and this letter transmits the first set of completeness questions and comments that the Agency has for DOE (see Enclosure).

We request that DOE respond in a timely manner to these and forthcoming completeness questions and comments so that the Agency may proceed with the 2014 CRA technical evaluation. The EPA is aware that there may be several technical exchanges between our respective staff members and contractors before the Agency determines the 2014 CRA as complete. We value and appreciate the information provided during these exchanges. The Agency expects to submit additional completeness questions to the Department in the next few months.

We understand that there are organic components added to Los Alamos nitrate salt waste associated with the February 14, 2014 radiological incident at the WIPP. We need information that accurately represents these additional components and how they may affect long-term performance (e.g. gas generation). We also need you to provide an estimate of the materials you expect to leave in the repository as a result of mitigation measures planned for the contaminated portion of the underground.

We look forward to receiving responses to this first set of completeness questions. If you have any questions concerning this request, please contact Kathleen Economy at (202) 343-9844 or economy.kathleen@epa.gov.

Sincerely,

Jonathan D. Edwards
Director
Radiation Protection Division

Enclosures
1. First Set of CRA 2014 Completeness Questions
2. Map of WIPP Underground

cc: Electronic Distribution
George Basabilvazo, DOE/CBFO
Russ Patterson, DOE/CBFO
Frank Marcinowski, DOE/HQ
Doug Tonkay, DOE/HQ
Alton Harris, DOE/HQ
Ricardo Maestas, NMED
Nick Stone, EPA Region 6
WIPP Team
EPA WIPP Docket

FIRST SET OF EPA COMPLETENESS COMMENTS FOR CRA 2014

40 CFR 194.15(A)(2) MONITORING

1-15-1 Water Level Fluctuations in SNL-13. DOE/WIPP-12-3489 p. 143 states "SNL-13 was also excluded [from the Culebra groundwater analysis] due to a sudden rise and then sudden stabilization following the drilling of a new oil or gas well nearby." Please address the following:

1. Identify and provide the location, depth, and purpose of the 'new' nearby wells.
2. What activities took place at the nearby wells during the time of the changes in SNL-13, such as fluid injection? Provide pressure histories, volumes and fluid types, fluid enhancements (e.g. fracking fluids or proppants).
3. Provide a chronological history of the activities in the nearby wells compared to the "sudden" changes in adjusted freshwater heads recorded in SNL-13.
4. Were water levels in other monitoring wells influenced by activities at nearby wells?

1-15-2 Shaft Extensometers Not Taking Recordings. DOE is not replacing the failed monitoring instruments in the shaft. However, EPA Section 42, Monitoring requirements expects, "*...extent of deformation...*" and "*...brittle deformation...*" to be monitored. Please provide a justification to discontinue measuring these characteristics in the WIPP shafts as these measurements are used to calibrate numerical models and predict closure rates. Additionally, identify how this requested information will be addressed in the future.

1-15-3 Derivation of Annual Culebra Water Level Map. CRA-2014 Section 42.8 *Changes or New Information Since the CRA-2009* discusses changes to the process used to derive the Culebra groundwater flow parameters that is used to prepare the annual water level map. Please address the following:

1. For each yearly calculation (ERMS 558589, Section 2.3.2.2), if the monitored freshwater heads have changed, do the 100 calibrated T-Fields need to be recalculated? If not, why?
2. ERMS 557633 Section 2.1 states, "The PA MODFLOW model T (transmissivity), A (anisotropy) and R (recharge) input fields are appropriately averaged across 100 realizations, producing a single average MODFLOW flow model." Provide information as to how averaging is done with examples.
3. For the averaged MODFLOW model, T (transmissivity), A (anisotropy) and R (recharge) are fixed while a subset of the boundary conditions is modified (ERMS 557633, Section 2.1). Please describe how the new boundary conditions are determined and implemented. If this simply involves raising or lowering the heads along the boundaries to best match the observed water levels within the modeled area, describe how well the assigned boundaries honor the water levels in the nearest monitoring wells both inside and outside the model area.
4. If the step-by-step creation of the annual Culebra water level map is the same as that provided during 2012 and 2013 inspections, please denote as such. If generating the

annual water level map differs from what has been provided during inspections, please provide these steps.

40 CFR 194.23 Models and Computer Codes

1-23-1 Continuing Validity of Kds. CRA-2014 Appendix PA, Table PA-1 states that the Culebra Matrix Partition Coefficients (Kds) are, "*Carried over from CRA-2009 PABC.*" Please provide the rationale for the assumption that the CRA 2014 Kds can be same as those used in the CRA-2009 despite the changes in the organic ligand content and the 2012 inventory since the last PA. Additionally, provide a discussion of the potential impacts of the organic kitty litter added to the LANL waste on the Culebra Kds.

1-23-2 Continuing Validity of T-Fields. CRA-2014 Appendix PA, Table PA-1 states that the Culebra Transmissivity Fields are, "*Carried over from CRA-2009 PABC.*" It appears that the last update to the geologic well data analysis was performed in 2007 (Powers 2007a and Powers 2007b). Specific questions and requests the Agency has related to the T-Fields are listed below.

1. Have changes in the Culebra well data during the past seven years changed the T-Field derivation in any way?
2. Has any additional hydraulic testing been performed that could be used for additional calibration of the T-Fields?
3. Has the saturated thickness of the Culebra remained constant since the original derivation of the T-Fields?
4. Provide justification that new well information and water level changes since the 2009 PABC do not need to be included in the T-Field derivation and that the 2009 T-Fields are still valid for use in the CRA-2014 PA.
5. Provide justification for the continued use of the CRA-2009 T-fields.

1-23-3 Region ROMPCS

The Agency agreed to the adopted parameter values used for the panel closure change request to isolate the effects and facilitate a comparison of the proposed panel closure design on the baseline PA and, at the time of the planned changed request, there was uncertainty in the emplacement technique to be used. The Agency would like DOE to address the following comments on several parameters related to the panel closures:

1. Identify and technically justify that ranges of porosity and permeability for the ROM salt PCS during the time period 0 to 100 years (material PCS_T1) are consistent with initial emplacement of the ROM salt material without wetting or compaction.
2. Provide technical justification for applying a capillary pressure model that assumes zero threshold pressure to region ROMPCS during time periods 100 to 10,000 years (T2 and T3).
3. Provide a technical justification for selecting the ranges for the residual brine and gas saturations (SAT_RBRN and SAT_RGAS) during time periods T2 and T3; the justification should include adopting a zero value as the low end.

4. Provide technical justification for using the same value for the bulk compressibility of ROM salt during the T1, T2 and T3 time periods (from 0 to 100, 100 to 200, and 200 to 10,000 years).

1-23-4 REGION DRZ_PCS

The Agency would like DOE to address the following comments related to the parameter values adopted for the DRZ_PCS:

1. Provide technical justification for assigning the same sampled value of porosity to the material in DRZ_PCS region for both early and late time periods (T2 and T3) when the DRZ is undergoing consolidation and healing.
2. Provide technical justification for the apparent discrepancy created by independently sampling the permeability of material DRZ_PCS, representing a healed DRZ, from a distribution that can provide a sampled permeability as much as seven orders of magnitude higher than the permeability of intact halite.
3. Provide technical justifications for assigning zero values to the residual brine and gas saturations (SAT_RBRN and SAT_RGAS) in CRA-2014 for the region DRZ_PCS during the T3 time period (200 to 10,000 years).
4. Provide technical justification for applying a capillary pressure model that assumes zero threshold pressure in region DRZ_PCS during the T3 time period (200 to 10,000 years).
5. Provide technical justification for the value of the bulk compressibility of the DRZ_PCS region, and applying that same value during both early and late time periods (T2 and T3) when the material in that region is undergoing consolidation.

1-23-5 Waste Shear Strength. Please address the following:

1. Provide horsetail plots of the remaining fraction of uncorroded iron in the repository throughout the 10,000-year regulatory time frame from the CRA-2009 PABC from each of the three replicates and each scenario.
2. Provide horsetail plots of the remaining fraction of undegraded CPR in the repository throughout the 10,000-year regulatory time frame from the CRA-2009 PABC from each of the three replicates and each scenario.
3. Provide and justify the criteria used in advancing the surrogate waste samples during the shear strength tests when the eroded sample face was not smooth but irregular.
4. Identify and justify the consequences of using the proposed uniform distribution rather than the currently approved log-uniform distribution for TAUFAIL.
5. Provide the quality control procedures used during the shear strength tests and provide evidence that the tests were performed consistent with those procedures.

1-23-6 Probability of Encountering a Castile Brine Pocket. Please address the following comments:

1. TDEM results are site specific and indicate the presence of potentially large volumes of brine beneath some waste panels. Explain why TDEM data is not used in DOE's proposed approach for estimating PBRINE.
2. DOE's approach ignored the presence of high electrical conductivity zones identified beneath four of the ten WIPP waste panels. Please explain how this omission affected the comparison of the TDEM approach with DOE's newly derived drilling data approach.

3. ERMS 558724 asserts that brine encounters of sufficient size to impact the repository would be noticed and logged by a driller. The approach does not acknowledge the potential of encountering a low yield and high volume brine pocket which would not be noticed by the driller in calculating PBRINE. Please address the basis for not considering the low yield, high volume brine pockets.
4. DOE reported the same count of 34 brine intrusions out of 678 Castile wells in 2008. It is unclear whether 2008 was the last time a brine intrusion was observed at the time of collecting data for the CRA-2014 or if 2008 was the cut-off date for recoding a brine intrusion. Please clarify.
5. The circular regions in Figure 5 of ERMS 558724 were selected to include a known brine pocket encounter. Please provide information as to whether this radius would bias the results and the sensitivity of the results to the radius size.
6. Provide information as to how the well depths, for each well that did and did not encounter a brine pocket, were incorporated into the drilling data analysis.
7. The ratios in Table 2 of ERMS 558724 include double-counting of many wells. Please provide information as to how this affected the results.
8. ERMS 558724 states that pressurized brine is associated with near-vertical fractures. However, WIPP-12 yielded large volumes of brine that is assumed to have been stored and transmitted through the extensive and primarily interconnected horizontal to sub-horizontal fractures. Please provide an explanation as to how the near-vertical fracture model adopted by DOE's modified PBRINE parameter is consistent with evidence that WIPP-12 releases are attributed to horizontal and sub-horizontal fractures.

1-23-7 Volume of Repository Operations and Experimental Areas. Please address the following:

1. Explain how DOE arrived at a volume of 148,011 m^3 for the underground.
2. In the diagram of repository ventilation during recovery (see attached, labeled *Phase 2B Underground Map*, dated March/17/2014) a large portion of the north experimental area is denoted as 'backfilled'. Please provide information of the material properties of these backfilled areas and how they are modeled during the 10,000 year regulatory period in the CRA-2014 PA.

1-23-8 Fluid Flow in Repository Operations and Experimental Areas. There have been numerous refinements of conceptual and numerical models of repository fluid flow since the 1994-95 time frame as well as changes to the panel closure system that may also change repository fluid flow. Please provide updated technical justifications for the following parameter values adopted for the experimental and operations areas:

1. Setting the permeability of the operations and experimental rooms to a constant value of value 10^{-11} m^2 throughout the modeled period.
2. Setting the porosity of the operations and experimental rooms to a constant 18% throughout the modeled period.
3. Setting the porosity and permeability of the DRZ adjacent to the operations and experimental room to the same sampled value as the DRZ surrounding a waste panel throughout the modeled period.

1-23-11 EQ3/6 and Supporting Files. Please provide the following computer files related to the actinide source term modeling calculations and the determination of the cumulative distribution functions for the actinide solubilities:

1. The EQ3/6 database file DATA0.FM1 used for the CRA-2014 solubility calculations, (also known as DATA0.FMT.R2).
2. EQ3/6 input and output files used for calculating actinide solubilities for the actinide source term at different brine volumes (1x, 2x, 3x, 4x, 5x minimum brine volumes).
3. The Excel macro GetEQData.xls and all Excel spreadsheets that contain the output extracted with GetEQData.xls.
4. EQ3/6 input and output files used for calculating actinide solubilities for the +III and +IV actinide uncertainty analysis calculations.
5. Excel macros GetEQData_v101e.xls and GetEQData_v101f.xls; and
6. Excel files Thorium_Uncertainty_Results_2014_PA.xls and Americium_Uncertainty_Results_2014_PA.xls.

1-23-12 WIPP-Specific Organic Complexation Data. Appendix SOTERM Section 3.8.2 provides a description and four graphs (Figure SOTERM-21) that relate to WIPP-specific experiments designed to evaluate the effects of organic chelating agents on +III and +IV actinide solubility in WIPP brines.

1. Please provide supporting documentation for these data, including a summary of the experimental approach, materials and analytical methods used to produce the data.
2. Please provide any available characterization data for the solid phases present in these experiments.

1-23-13 Missing Reference. Appendix SOTERM, Figure SOTERM-7 caption cites Altmaier (2011) but this reference is missing from the reference list. Please provide this reference.

40 CFR 194.24 Waste Characterization – Performance Assessment Inventory

1-24-1 Shielded Container Lead Inventory

1. Please provide information as to how lead shielding on RH shielded containers is included in the performance assessment.

1-24-2 Inventory Report Text Unclear. Please address the following:

1. Provide information as to how the "projected-to-stored volume ratio" is derived for both RH and CH waste. Please provide an example of this derivation.
2. Provide information of the RH waste volume that has been and will be placed in the leaded containers on the waste panels floors.
3. Provide information that specifies how potential waste inventory listed in the inventory report estimate is used in the CRA-2014 performance assessment.

1-24-3 Emplaced Inventory Chemical Constituents

1. In the ATWIR 2012, Section 2.3, it is stated that, "Chemical constituents are not reported in the emplaced inventory". In the PAIR 2012 report, Section 4.3, it is indicated that "two additional analysis" were performed for chemical and other important constituents. It is unclear how the chemical constituents of emplaced inventory, identified in the PAIR report, are derived and calculated for the CRA-2014 PA, provide clarification.

1-24-4 Missing References. Please provide the following references:

French, D. 2009. *Analysis of Container Material Masses,* INV-SAR-19. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2010. *Analyses*, LCOQP9-Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2011a. *Data Collection, Data Management, and Control for the Comprehensive Inventory,* INV-SP-01. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2011b. *Entry, Verification, and Validation of Inventory Information in the Comprehensive Inventory Database,* INV-SP-02. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2011c. *LANL-CO Software Quality Assurance Plan*, LCO-QPD-02. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2011d. *Software Quality Assurance*, LCO-QP19-1. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2011e. *Comprehensive Inventory Database,* Version 2.0, Schema Version S2.00, Data Version D.10.01. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2012. *Comprehensive Inventory Database,* Version 2.01, Schema Version S2.01, Data Version D.11.00. Los Alamos National Laboratory – Carlsbad Operations, Carlsbad, NM.

Chemical and Cement Components 2011 Inventory Estimates. LANL-CO. INV-SAR-28, Revision 0, November 1, 2012. LANL-CO Record ID# INV-1211-01-01-01.

Estimation of Cellulose, Plastic, and Rubber Emplacement Materials in the Waste Isolation Pilot Plant (WIPP). LANL-CO. INV-SAR-27, Revision 0, November 5, 2012. LANL-CO Record ID# INV-1211-02-01-01.

GENERAL: CRA-2014 DOCUMENTATION

1-G-1 Reference Appendix QAPD-2014 Not Provided. CRA-2014 Section 23, Models and Computer Codes, Section 23.5.7 states, "The DOE's quality assurance program, as applied to the CRA-2014, is contained in Appendix QAPD-2014." The appendix has not been provided. Please provide this document.

1-G-2 Codes IDs Do Not Include Source Code Listing. CRA-2014 Section 23, Models and Computer Codes, Section 23.8.7 states, "The IDs include source-code listings..." EPA examined a number of code Implementation Documents; they include a reference to the location of the source-code listing, but not the actual listing of the code. Please provide the source-code listing for the following CRA-2014 codes: BRAGFLO 6.02, MATSET 9.20, CCDFGF 6.0.

1-G-3 New Codes EQ3/6 and JAS3D Documentation Incomplete. DOE states in CRA-2014 Section 23, 23.7.7, "The documentation for the new codes EQ3/6 and JAS3D may be found in their respective UM, AP, VD, ID, and RD/VVP." It does not appear that this documentation has been included in CRA-2014. Please provide this documentation.

CHEMISTRY COMMENTS

1-C-1 LANL Waste Stream With Added Cellulosic Material

Organic kitty litter was used as an absorbent for nitrate salts for Waste Stream LA-MIN02-V.001 (NMED 2014) and 349 drums of this waste were placed in Panels 6 and 7 (Wallace 2014). Please address the following:

1. Provide a complete waste profile for the kitty litter; including; cellulosic content and other ingredients; emplaced volume and mass.
2. Specify the number of drums with kitty litter placed in either Panel 6 or 7.
3. Identify the type of waste emplaced in the drums with the kitty litter.
4. Indicate whether this cellulosic kitty litter has been used in other waste streams and whether the corresponding waste profile reports adequately describe the waste material parameters.
5. Describe the effects of omitting the organic kitty litter in the waste stream(s) on the CPR inventory and consequent effects on gas generation rates calculated for the CRA-2014 PA.
6. Provide information of the quantities of soluble organics, such as organic ligands or surfactants that could affect actinide solubilities when this material is leached.

REFERENCES

DOE (U.S. Department of Energy). 2012. *Annual Transuranic Waste Inventory Report–2012, Revision 0* (October). DOE/TRU-12-3425. Carlsbad Field Office, Carlsbad, NM.

Gillow, J. and A.J. Francis. 2003. *Microbial Gas Generation Under Expected Waste Isolation Pilot Plant Repository Conditions*. Brookhaven National Laboratory, ERMS 532877.

Kirchner, T., T. Zeitler, and R. Kirkes. 2012. Memorandum to S. Dunagan (Subject: *Evaluating the Data in Order to Derive a Value for GLOBAL:PBRINE*). 11 December 2012. ERMS 558724. Carlsbad, NM: Sandia National Laboratories*Phase 2B Underground Map*, dated March/17/2014

Kuhlman, K.L. 2011. *Analysis Report for Preparation of 2010 Culebra Potentiometric Surface Contour Map*. ERMS 555318. Carlsbad, NM: Sandia National Laboratories.

New Mexico Environment Department. 2014. May 20, 2014 Administrative Order.

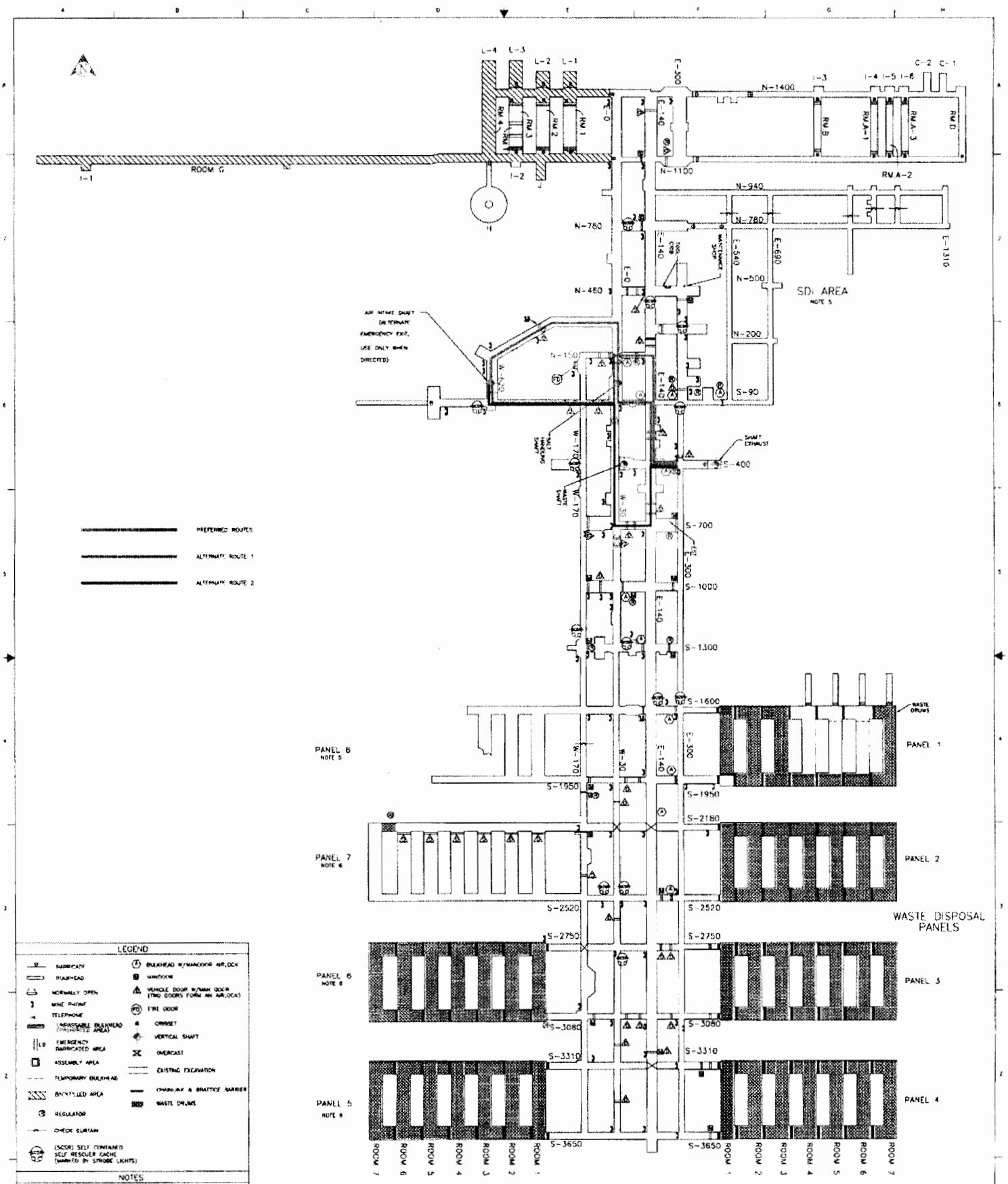
Powers, D.W. 2007a. Analysis Report for Task 1A of AP-114: *Refinement of Rustler Halite Margins Within the Culebra Modeling Domain*. Carlsbad, NM: Sandia National Laboratories. ERMS 547559.

Powers, D.W. 2007b. *Analysis Report for Task 1A of AP-114: Refinement of Rustler Halite Margins Within the Culebra Modeling Domain*. Carlsbad, NM: Sandia National Laboratories. ERMS 547559. *(Unavailable)*

Van Soest, G. 2012. *Performance Assessment Inventory Report-2012.* (Revision 0, November). INV-PA-12, LA-UR-12-26643, INV-1211-05-01-01. Los Alamos National Laboratory, Carlsbad, NM.

Wagner, S.W., Kuhlman K.L., and P.B. Johnson. 2012. *Compliance Monitoring Parameter Assessment for 2012*. Revision 1. ERMS 558589. Carlsbad, NM: Sandia National Laboratories.

Wallace, T.C. 2014. *Understanding the "What" and the "Why" of February 14, 2014*. Los Alamos National Laboratory, LA-UR-14-27201.


L-4
L-3
L-2
L-1
E-300
C-2
C-1
I-3
I-4
I-5
I-6
N-1400
RM 4
RM 3
RM 2
RM 1
E-0
E-140
RM B
RM A-1
RM A-3
RM D
ROOM G
I-1
I-2
N-1100
RM A-2
N-940
N-780
N-780
E-140
100 CFM
MAINTENANCE SHOP
E-540
E-690
E-1310
E-0
N-460
N-500
SDI AREA
NOTE 5
AIR INTAKE SHAFT (ALTERNATE EMERGENCY EXIT, USE ONLY WHEN DIRECTED)
N-200
N-150
W-50
E-140
S-90
W-270
SALT SAMPLING
SHAFT EXHAUST
S-400
WASTE SHAFT
W-170
S-700
E-300
S-1000
E-140
S-1300
S-1600
WASTE DRUMS
PANEL 8
NOTE 5
W-170
W-30
E-140
E-300
PANEL 1
S-1950
S-1950
S-2180
PANEL 7
NOTE 6
PANEL 2
S-2520
S-2520
WASTE DISPOSAL PANELS
S-2750
S-2750
PANEL 6
NOTE 6
PANEL 3
S-3080
S-3080
S-3310
S-3310
PANEL 5
NOTE 6
PANEL 4
S-3650
S-3650
ROOM 7
ROOM 6
ROOM 5
ROOM 4
ROOM 3
ROOM 2
ROOM 1
ROOM 1
ROOM 2
ROOM 3
ROOM 4
ROOM 5
ROOM 6
ROOM 7
PREFERRED ROUTES
ALTERNATE ROUTE 1
ALTERNATE ROUTE 2
LEGEND
BARRICADE
BULKHEAD
NORMALLY OPEN
MINE PHONE
TELEPHONE
(NON-PASSABLE BULKHEAD (CONCRETE AREA))
EMERGENCY BARRICADED AREA
ASSEMBLY AREA
TEMPORARY BULKHEAD
BACKFILLED AREA
REGULATOR
CHECK CURTAIN
(SCSR) SELF CONTAINED SELF RESCUER CACHE (MARKED BY STROBE LIGHTS)
BULKHEAD W/MANDOOR AIR LOCK
MANDOOR
VEHICLE DOOR W/MAN DOOR (TWO DOORS FORM AN AIR LOCK)
FIRE DOOR
CROSSCUT
VERTICAL SHAFT
OVERCAST
EXISTING EXCAVATION
CHAINLINK & BRATTICE BARRIER
WASTE DRUMS
NOTES
1. DRIFT WIDTHS NOT TO SCALE, EXAMPLED 2X FOR CLARITY.
2. EXISTING EXCAVATION REFLECTS STATUS AS OF 1/20/14
3. ALL DESIGNATED ASSEMBLY AREAS ARE EQUIPPED WITH A DIAL PHONE PAGER PHONE, MAY MINER'S AID STATION. EXTENSION NUMBERS FOR DIAL PHONES ARE PROVIDED UNDER HEADING "LOCATION OF ASSEMBLY AREAS".
4. SECONDARY ESCAPEWAY TO WASTE SHAFT STATION THROUGH BULKHEAD 24-B-308.
5. MINE PHONES IN THE CONSTRUCTION AREA ARE MOVED AS NEEDED TO SERVICE THE ACTIVE WORK LOCATIONS.
6. EACH NON-BARRICADED ROOM IN THE ACTIVE WASTE PANEL HAS A MINE PHONE ON A POST, AT THE ENTRY TO THE ROOM.
SCALE: 1"=150'
MARCH 17, 2014
WASTE ISOLATION PILOT PLANT
CARLSBAD, NEW MEXICO
PHASE 2B UNDERGROUND MAP