



**116th WIPP QUARTERLY MEETING
October 20, 2011**

Sandia Conference Room, NMED District 1 Office
5500 San Antonio Drive, NE, Albuquerque, New Mexico
Front Desk, 505-222-9500

Morning (AM)

10:00	Introduction	Tom Skibitski
10:05	NMED Hazardous Waste Bureau Update	Tim Hall
10:35	NMED DOE Oversight Bureau Update	Tom Skibitski
10:55	Governor's Task Force Update	Anne de Laine Clark
11:30	DOE CBFO WIPP Update	George Basabilvazo
12:00 PM	Lunch	

Afternoon (PM)

1:15	DOE CBFO WIPP Update	(Continued)	George Basabilvazo
3:00	Action Items		
	Schedule Next Meeting		
	Adjourn		

Discussion Topics:

1. Is there a protocol for WIPP workers to be referred to CEMRC for bioassay assessments? What is selection criterion for these referrals?
2. More than \$955,000 in compensation has been paid to WIPP workers under the Energy Employees Occupational Illness Compensation Program - http://www.dol.gov/owcp/energy/regs/compliance/statistics/WebPages/WASTE_ISO_PILOT.htm.
 - a. Please discuss which DOE and WTS officials are responsible for addressing EEOICP issues, the jobs that compensated workers hold, whether compensation was for exposure to radiation, toxic substances or both, what measures are being taken to reduce worker exposures and provide information to workers about the program and how to reduce exposures.



3. Provide a list of Incident Reports since the last WIPP Quarterly Meeting that do not involve counterfeit parts.
4. Discuss the situation when, in mid-September, a TRUPACT III was returned to SRS for not meeting the NCR standards.
5. What organizations have submitted bids for the M&O WIPP contract? What is the status of and the schedule to put the new contract in place?
6. What organization or company will actually manufacture the shielded RH container?
7. What is the status of Panel 5 closure? Please provide pictures.
8. How did isolating Panel 5 from the ventilation system impact Carbon Tetrachloride levels in the repository?
9. What is the status of waste stream SR-RL-BCLDP.001 at Hanford? This is the waste stream identified in the Permittees' June 22, 2011, Annual Proposed AKSD List as a potential candidate waste stream for an AKSD.
10. What is the status of Magnum Minerals LLC's contract to purchase 300,000 tons of excavated salt from WIPP? Are there any other plans at this time for the salt?
11. What is the current route for shipments coming to WIPP from the east? (specifically from Interstate 20 in Texas to the WIPP site.)
12. What is the anticipated outage schedule and activities to be performed during the annual shutdown?
13. Describe recent and anticipated changes to CBFO staff.
14. What is the status of waste emplacement in Panel 6?
15. How are volumes of contact-handled and remote-handled waste measured at the generator sites and at WIPP? What is the amount of CH and RH waste in each WIPP underground panel?
16. What is the status of the Salt Disposal Investigations (SDI)?
17. Matters of interest include: when will mining begin, what is the budget for the program in FY2012, what approvals have been received, and what additional approvals are necessary?
18. What are the performance measures for disposal of CH and RH TRU waste at WIPP in Fiscal Year 2012?

19. What were the results at WIPP from the American Recovery and Reinvestment Act? Specifically address the numbers of jobs created or saved and how many of those jobs are continuing in FY 2012, the performance measure targets and actual results, and amount spent on various activities.
20. What are the amounts of waste classified as TRU waste that have been dispositioned as TRU waste and as other than TRU waste in FY 2008, FY 2009, FY 2010, and FY 2011?
21. There was a recent post by Frank Munger about ORNL discontinuing use of the CCP in 2012. Where will that equipment be used next?
22. What is the status of shipments from LANL to WIPP? How many drums or drum equivalents are stored at LANL and destined for disposal at WIPP? What is the current schedule for removing the drums stored in the fabric tents?



U.S. DEPARTMENT OF
ENERGY



116th WIPP Quarterly Meeting

Albuquerque, New Mexico
October 20, 2011



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Incidence Reports

**There were no WIPP
Occurrence Reporting
Processing System (ORPS)
reports for this period**



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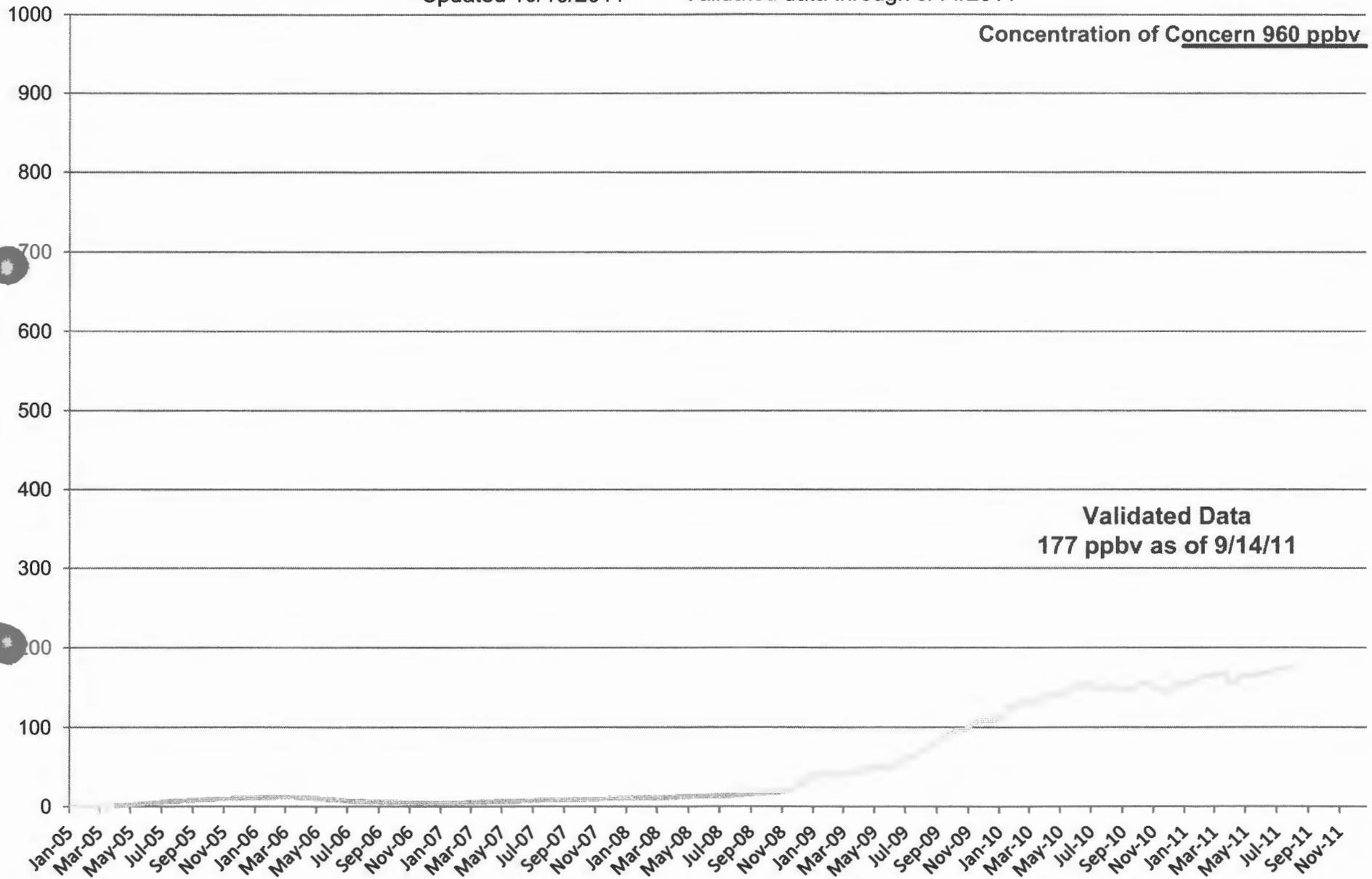
Proposed Permit Notifications and PMRs

- Proposed Permit Modification Requests
 - Class 3 Permit Modification Request
 - Panel Closure Redesign
 - Class 2 Permit Modification Request
 - Repository Reconfiguration

Running Annual Average for Carbon Tetrachloride (ppbv)

Updated 10/10/2011

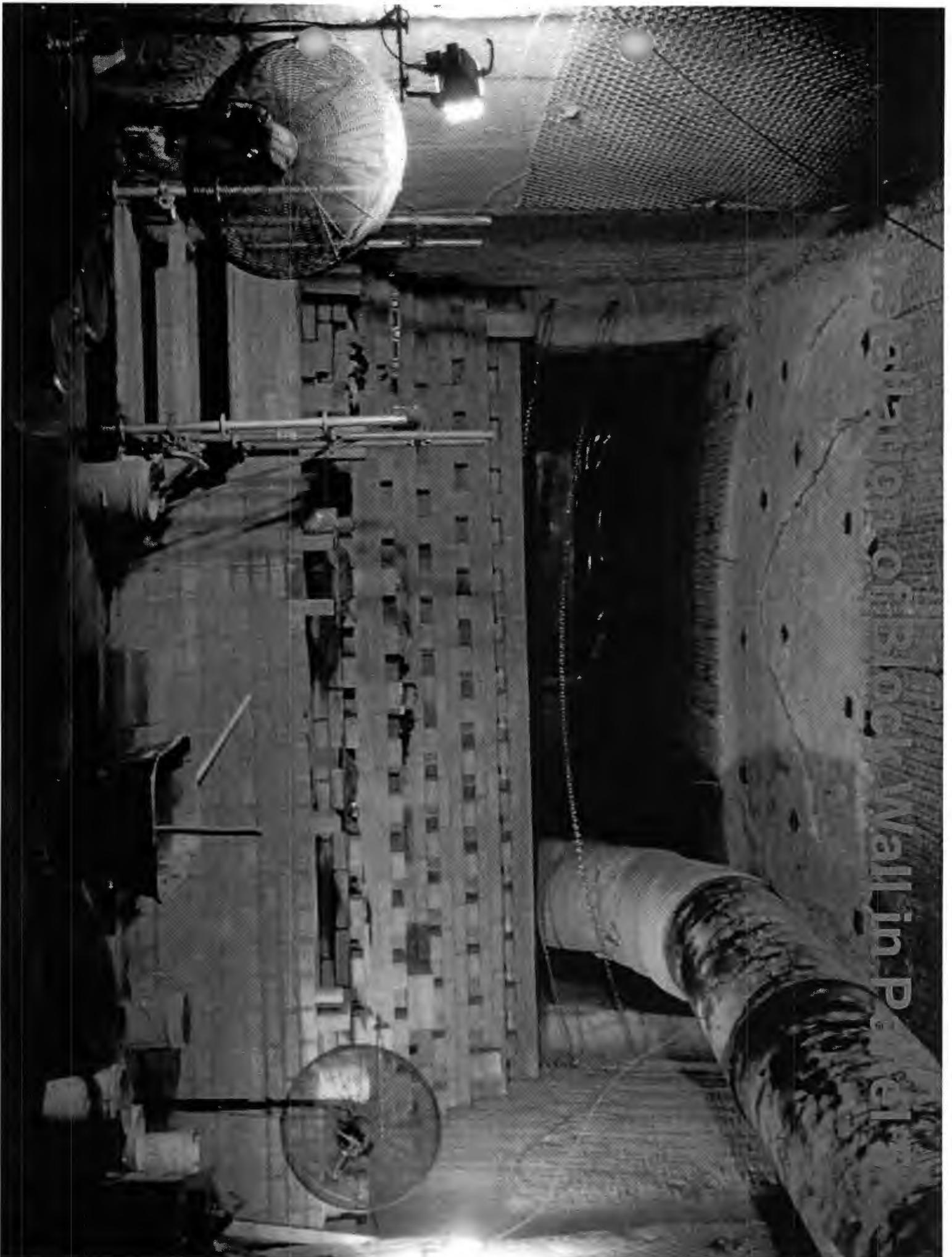
Validated data through 9/14/2011



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Journal of the Society of Wall in P. 61

Shipments Received & Volume Emplaced

Shipments Received at the WIPP facility through 9/30/2011:

Fiscal Year	ANL-E	BAPL	Hanford	INL	LANL	ORNL	SRS	VNC	Total
2010	22		52	701	157	88	82	26	1,128
2011	47	5	88	584	172	17	127		1,040

Volume Emplaced at the WIPP facility through 9/30/2011 (cubic meters):

Fiscal Year	ANL-E	BAPL	Hanford	INL	LANL	ORNL	SRS	VNC	Total
2010	7.30		475.24	5,132.74	1,062.64	262.69	862.32	19.11	7,822.04
2011	17.47	1.89	824.98	4,227.98	1,013.74	83.79	1,143.97		7,313.82



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WIPP Accomplishments

- **August 25, 2011**

- First shipment of waste in a TRUPACT-III arrives at the WIPP facility

- **September 8, 2011**

- WTS honored with Mine Operator of the Year by the New Mexico Mining Association and the New Mexico State Bureau of Mine Safety

- **September 23, 2011**

- DOE completes cleanup of legacy waste at Bettis Atomic Power Laboratory (Pennsylvania)



WIPP Accomplishments

- **September 24, 2011**
 - WIPP receives 10,000th shipment of TRU waste
- **September 29, 2011**
 - WIPP Blue Mine Rescue Team wins the 2011 Missouri Mine Rescue Competition in Rolla, Missouri
- **September 30, 2011**
 - DOE completes cleanup of legacy waste at Argonne National Laboratory (Illinois)



What is the Criteria for Selection to Receive a Whole Body Count?

- For WIPP workers, selection to receive a Whole Body Count is based upon the work they perform
- The following job categories receive Whole Body Counts:
 - Radiological Control Technicians
 - Waste Handlers

American Recovery and Reinvestment Act



Jobs created or retained
WIPP Target: 400
End of September 2011:
696
Some jobs were not
permanent and went away
when ARRA activities
completed



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American Recovery and Reinvestment Act

- Accelerated cleanup of two more Small Quantity Sites in September 2011 (BAPL and ANL)
- WTS began construction of the solid block explosion-isolation wall in underground Panel 5. ARRA funds are being used to construct the 12-foot thick isolation wall. The first Panel 5 Isolation Wall block was emplaced on September 16, 2011

Additional Questions

- **How are volumes of contact-handled and remote-handled waste measured at the generator sites?**
 - For the purpose of DOE-EM metrics and goals
 - Generator site estimates volume
 - Based on the quantity of the radioactive material
 - Material has not been put into approved containers
 - Material has not been treated

Additional Questions

- **How are volumes of contact-handled and remote-handled waste measured at the generator sites?** (continued)
 - After initial characterization, waste is separated into
 - TRU waste
 - Low-level waste (removed from population)
 - Containers with prohibited items (removed from population)
 - Final characterization determines the population of containers that qualify for disposal at the WIPP
 - If any containers are confirmed as LLW, the LLW volume gets credited as removed from TRU, but is categorically counted as LLW



Additional Questions

- **How are volumes of contact-handled and remote-handled waste measured at WIPP?**
 - Emplaced Volume Basis for WIPP
 - CH volume – counted based on the outer-most container capacity
 - RH volume – counted based on the capacity of the inner containers

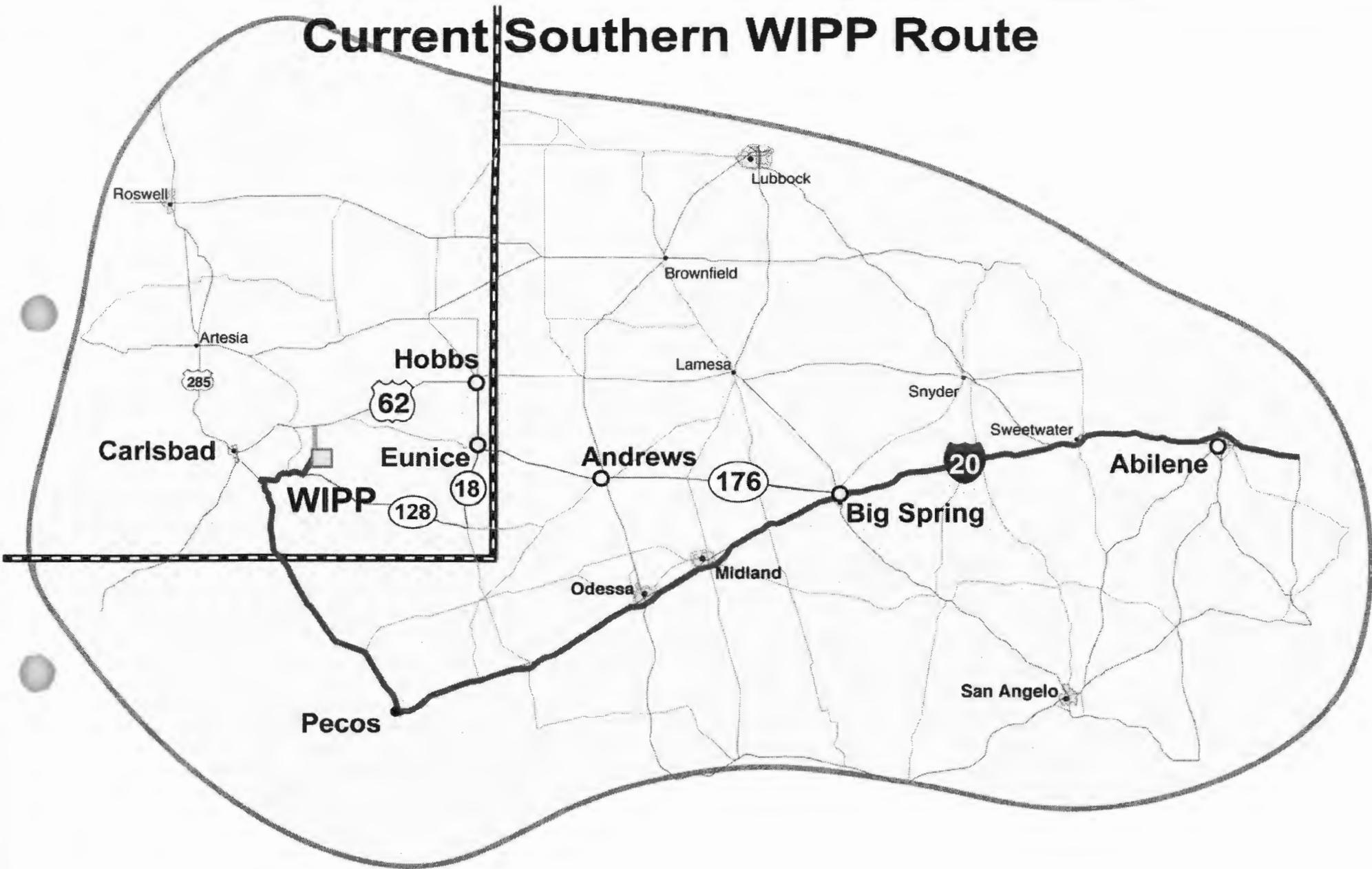


Additional Questions

- Energy Employees Occupational Illness Compensation Program
 - Mr. Gregory Lewis, EEOICPA Program Manager
 - Phone: 202-586-2407
 - Email: Gregory.lewis@hq.doe.gov

- WIPP M&O Contract Primary Point of Contact
 - Mr. Bill Hensley, Contracting Officer
 - Email: bill.hensley@emcbc.doe.gov

Current Southern WIPP Route



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116TH WIPP QUARTERLY MEETING

New Mexico Environment Department
Hazardous Waste Bureau WIPP Group

Albuquerque, New Mexico
October 20, 2011

Hazardous Waste Bureau Changes

- August 8
 - HWB moved back into Resource Protection Division from Environmental Protection Division
- John Kieling is still Acting Bureau Chief and Acting WIPP Group Supervisor

Permit Activities

- Class 1 Permit Modification
 - August 8 – Revise Tables 4.1.1 and G-1 to update volumes and dates for Panel 5
- Class 2 Permit Modification
 - October 3 – Mine Ventilation, Shielded Containers, Groundwater Detection Monitoring Program Plan
- Temporary Authorization Request
 - October 3 – Mine Ventilation (allow entry into RH rooms without required minimum airflow)
 - October 6 – NMED Approval

Audit and Surveillance Activities

- August 2-4 – Argonne National Laboratory/Centralized Characterization Project (ANL/CCP) Audit A-11-20
- September 20-22 – CCP Acceptable Knowledge (AK) Records Surveillance S-11-25

Audit Reports

- Bettis Atomic Power Laboratory/CCP Audit Report A-11-12
 - NMED approval letter sent August 23
- Los Alamos National Laboratory/CCP Audit Report A-11-11
 - NMED approval letter sent September 23
- INL Analytical Laboratories/CCP Audit Report A-11-13
 - NMED approval letter sent September 29
- Sandia National Laboratory/CCP Audit Report A-11-23
 - NMED received September 30; currently under review

Upcoming Audit Activities

- Advanced Mixed Waste Treatment Project (AMWTP) Audit A-11-21 to be conducted in Idaho Falls, ID, November 1-3, 2011
- Savannah River Site/CCP (SRS/CCP) Audit A-11-25 and A-12-02 to be conducted in Aiken, SC, November 14-17, 2011

Notifications

- July 20 – Last waste was emplaced in Panel 5 on July 7
- July 28 and August 11 –Notifications of Exceedance of Disposal Room VOC Monitoring Action Level for Carbon Tetrachloride
- August 5 – Notification that workers entered an active disposal room that did not have 35,000 standard ft³ per minute as required by Attachment O

Other Activities

- August 17 – EPA Tier 2 Evaluation of High Energy RTR Unit at LANL
- August 18 – EPA/NMED/CBFO/CCP “Summit” in Albuquerque
- August 30 – Class 2 PMR Pre-submittal meeting with stakeholders in Albuquerque
- September 21 – Carlsbad Brine Well presentation by Jim Griswold at EMNRD

Other Activities

- October 4 – GET refresher for NMED staff in Carlsbad
- October 5 – WQSP-6 split groundwater sample at WIPP
- October 19 – EPA stakeholder meeting in Santa Fe

WAD70 General Administration

Washington Tru Solutions (WTS) announced that as many as 65 employees will be affected by a reduction-in-force beginning in October 2011. Affected employees include WTS personnel, temporary employees and subcontract personnel. Thirty-five employees had been laid off by the time of this meeting. This is the second phase of a workforce restructuring by WTS, which manages the plant for the DOE.

Senators Bingaman and Udall sent a letter to the chairman and ranking member of the Senate Subcommittee on Energy and Water urging an increase of \$30 million over the FY 2011 amount to maintain a stable workforce at the facility.

Staff met to discuss the floor plan for the Carlsbad area office consolidation project. The NMED maintains two offices for field staff in Carlsbad and the initiative will combine those resources into one office for improved efficiency and to lowered operating costs.

Staff finished WOS inputs for the FFY 2011 Q-3 report

WPO71 Public Outreach

The Bureau Chief presented an update of the WIPP Oversight Section (WOS) activities at the 115th WIPP Quarterly meeting in Santa Fe. Carlsbad staff attended the quarterly meeting by telephone.

Division Director Jim Davis and Bureau Chief Tom Skibitski attended a presentation by Jim Griswold, hydrologist with the Oil Conservation Division of the Energy, Minerals, and Natural Resources Department, detailing brine wells and brine well collapses in southeastern New Mexico. Much of the presentation focused on the geophysical investigations and early warning system of the I&W brine wells Eugenie 1 and Eugenie 2, located at the Y-Intersection of US 285 and US 180/62 in Carlsbad. Most of the infrastructure for Carlsbad, including the Carlsbad Irrigation District canal, Union Pacific Railroad, WIPP transport routes and Carlsbad/Eddy County fiber optic line are located within a half-mile of the two wells and would be catastrophically affected by any well collapse. Division Director Davis requested that Cabinet Secretary Martin be briefed on this issue.

A similar presentation by Mr. Griswold was made to the Radioactive and Hazardous Materials Committee in Carlsbad on October 13, 2011.

Bureau staff scientist Tom Kesterson was asked to present Secretary Martin's position statement on Greater Than Class C (GTCC) radioactive waste to the Radioactive and Hazardous Materials Committee on October 13, 2011. It is the official position of the Environment Department that the Department of Energy considers the WIPP site as the preferred alternative for the disposal of GTCC waste.

WEA72 Exhaust Air Monitoring

Bureau staff continues to collect air filters for NESHAP contaminants at WIPP Station A, the EPA compliance point, as well as from Station B. Skid A-3 is the primary skid of reference, with Skid A-2 serving as back-up. Skid A-1 is secured.

Station A filters for CY2011 Q-2 have been shipped to an independent contract laboratory for analysis.

Occlusion measurements for preventative maintenance probe pulls are presented in a separate document.

Staff reviewed Station A air flow data for June, July, and August and found no concerns.

Staff observed and followed up on Surveillance S-11-22, WTS NESHAP Reporting. The purpose of this surveillance was to verify the adequacy and implementation of the WTS Quality Assurance Program with respect to sampling, data compilation, and reporting to ensure compliance with CBFO and federal requirements for National Emissions Standards for Hazardous Air Pollutants (NESHAP) reporting activities. No conditions adverse to quality were identified and no recommendations were submitted to WTS for management considerations.

Staff submitted a draft report titled, "Station A Exhaust Air Monitoring at the Waste Isolation Pilot Plant Conducted by the New Mexico Environment Department, DOE Oversight Bureau, January - March, 2011" to the DOE for review. There were no detections of activity exceeding the sample method detection concentration (MDC) for Sr⁹⁰, Pu²³⁸, Pu^{239/240}, U²³⁵, or U²³⁸. Uranium²³⁴ was detected with activities exceeding the sample MDC in January. Cesium¹³⁷ was detected with activity exceeding the sample MDC for March, which agrees with results reported by the Permittee for Station A. Americium²⁴¹ was also detected in March with activity exceeding the sample MDC, however this analyte was also detected in the Bureau's matrix blank and the accuracy of the result is questionable.

Reported results for all analytes were qualified (flagged) by the laboratory as either "U" (result is less than the sample specific MDC), or "LT" (result is less than the requested MDC, greater than the sample specific MDC), and are estimated values.

Staff submitted final report to the DOE titled, "Station A Exhaust Air Monitoring at the Waste Isolation Pilot Plant, July - December 2010."

There were no detections of Sr⁹⁰, Cs¹³⁷, or U²³⁵ during this reporting period. Uranium²³⁴ was detected in the filters collected for the months of September, November, and December while U²³⁸ was detected in those filters collected during December. Plutonium²³⁸ was detected in those filters collected during both July and November, while Pu^{239/240} was detected in August. Americium²⁴¹ was detected in August and September. Both Pu²³⁸ and Am²⁴¹ were detected in sample blanks as well for the same period suggesting the results for the months showing detections are questionable.

Reported results for all analytes were qualified (flagged) by the laboratory as either "U" (result is less than the sample specific MDC), or "LT" (result is less than the requested MDC, greater than the sample specific MDC), and are estimated values.

Staff is re-formatting the Excel database and adding temperature and pressure correction factors in results calculations and is transitioning to the Bureau Access database for the upcoming quarter.

WPD73 Direct Penetrating Radiation (DPR) Monitoring

WIPP Oversight staff traveled to Los Alamos to participate in an air and direct penetrating radiation meeting with Los Alamos Oversight staff. Issues discussed include the eventual transfer of Oversight data into a common cloud-based database; resolving contract lab electronic data deliverable (EDD) compatibility issues with the current Access-based data system; and the procurement and construction of PVC pipe housings for the DPR monitors at WOS.

Bureau staff is working in conjunction with the other Oversight sections to implement changes necessitated by procedural updates recommended by Rad-Elec, the manufacturer of the passive gamma detectors used by the Bureau. The developer of the electret ion chamber system of gamma monitoring, Dr. Paul Kotrappa, reviewed Bureau calculations, clarified the significance of specific correction factors, and suggested applying a new factor discovered since the Bureau's DPR program began. The updated Rad-Elec Electret Ionization Chamber manual incorporates modifications to data collection and dose calculations and will be implemented Bureau wide. Minor effects to calculated dose are anticipated.

Staff is also populating the newly developed DPR Access database. In addition to quarterly voltage readings that form the basis for the DPR measurements new information includes mean temperature and pressure corrections to the results calculations. Additional measurements are obtained using the new HOBO data loggers.

Staff is also preparing a sole source determination required by the state procurement process to enter into a Rad-Elec price agreement.

Staff submitted a final report to DOE entitled, "Direct Penetrating Radiation Monitoring at the Waste Isolation Pilot Plant Conducted by NMED/DOE OB for the CY 2010 Q-4."

Staff also completed data collection for CY 2011 Q-2 and forwarded a report entitled, "Direct Penetrating Radiation Monitoring at the Waste Isolation Pilot Plant Conducted by NMED/DOE OB for the CY 2011 Q-2" to DOE for review.

WPL74 Particulates Low-Volume Air Monitoring

Staff is preparing project cost estimates and updated sampling analysis plans (SAPs) for FY 2012.

Staff closed out sampling from the third quarter (Q3) and began the fourth quarter (Q4) sampling period.

Staff continues to collect filters from the six (6) low-volume air stations maintained by the Bureau in the vicinity of the WIPP. Filters are changed more frequently when dusty conditions warrant.

Staff shipped calendar year (CY) 2010 Q4 and CY 2011 Q-1 filters to an independent contract lab for analysis.

Staff shipped one air flow calibrator to the vendor for annual recalibration and took delivery of tools necessary for program maintenance.

Staff revised the field data sheets used in sample collection, organized a filing system for newly implemented HOBO Data Loggers, and entered a backlog of data into Excel spreadsheets.

Two air pumps and one panel were returned to the office for maintenance. Spare sampling equipment was deployed to replace the inoperative units minimizing down time.

WGE75 General ER/EM Projects

Bureau staff continued collaboration with other Oversight Bureau sections and organizations on improving sampling practices, incorporating new equipment and technology, and implementing consistent data formatting and reporting within the Bureau.

Sampling Events

Staff drafted a sampling analysis plan (SAP) for underground volatile organic compound (VOC) sampling and submitted it to WRES for review prior to implementation.

The first Oversight Bureau volatile organic compound (VOC) co-sampling event was held with WTS staff. Sampling canisters have been shipped to a contract lab for analysis.

Staff completed this year's vegetation sampling project, with samples gathered from Mills Ranch, WIPP East, WIPP South, and the South East Control.

Staff met with the Permittees to develop a sampling plan for collecting sediments from evaporation pond H-19 (Discharge Permit DP-831) where the Permittees dispose water originating from the exhaust shaft. Staff then met with the Permittees to schedule and collect sediment samples from evaporation pond H-19 for lead analysis. The samples have been shipped to a contract laboratory and data results are pending.

Reports

Staff submitted the final report on this year's sediment sampling project: "Analytical Results of Sediments Collected From Selected Water Bodies Near the WIPP, New Mexico, 2011."

Strontium⁹⁰ was detected in activities greater than the sample method detection concentration (MDC) in sediments collected from Hill Tank, Noya Tank, and Under-the-Hill Tank. Historically, Sr⁹⁰ has not been detected around the WIPP site. This analyte was neither detected in previous sediment activities, nor was it detected by the Permittee's laboratory this year and the result may not be reliable.

Plutonium²³⁸ was detected in sediments collected from Hill Tank, Indian Tank, Noya Tank, and Red Tank. However, it was not detected in the field duplicate. This analyte was not detected in the previous sampling activities, nor did the Permittee's laboratory detect it this year and the result may not be reliable.

Plutonium^{239/240} was detected this year in activities greater than the sample MDC in sediments collected from Indian Tank. This analyte was detected in samples collected by the DOE OB from this tank in 2009 and are within the average range of plutonium levels in surface soil.

Americium²⁴¹ was detected in activities greater than the sample MDC in samples collected from Hill Tank, Indian Tank, Lost Tank, Noya Tank, Pierce Canyon, and Red Tank. However, this analyte was not detected in the field duplicate. In 2010, Am²⁴¹ was detected in each of these tanks, with the exception of Indian Tank. This analyte was not detected in any of the Permittee's samples this year.

Cesium¹³⁷ was not detected in any Bureau collected sediment samples this year although it had been detected in previous sampling activities.

The analytes U²³⁴ and U²³⁸ were detected in activities exceeding the sample MDC in all sediment samples this year, as was the case in previous sampling activities. Uranium²³⁵ was also detected at Indian Tank, Poker Tank, and the field duplicate from Red Tank this year, and has been detected in these tanks during previous sampling activities. All Uranium results were within the historical range of reported results around the WIPP site prior to any waste emplacement.

In all cases except for uranium^{234, 238} detections and strontium⁹⁰ detections at Hill Tank, and Noya Tank, the results were qualified (flagged) by the laboratory as either "U" (result is less than the sample specific MDC), "LT" (result is less than the requested MDC, greater than the sample specific MDC), or M3 (the requested MDC was not met but the reported activity is greater than the reported MDC) and are estimated values. All values were measured at less than 1.0 pCi/g.

Staff submitted its draft report to the DOE on this year's soil sampling project entitled, "Soil Sampling in the Vicinity of the Waste Isolation Pilot Plant Conducted by NMED/DOE OB, 2011."

Plutonium²³⁸ was detected in concentrations above the sample MDC in soils collected at Mills Ranch (2- 5 cm and 5-10 cm), WIPP South (2-5 cm) and at WIPP North (0-2 cm), but not in the corresponding field duplicate. Plutonium²³⁸ was also detected above the MDC in the laboratory method blank. It should be noted that Pu²³⁸ has not been previously detected by the Oversight Bureau at any of these locations.

All results for plutonium were either below or within the range of previously measured values and can be attributed to deposition from atmospheric fallout related to past above ground weapons testing.

Cesium¹³⁷ was detected in concentrations above the sample MDC at Mills Ranch (0-2 cm and 2-5 cm). In previous sampling programs, this analyte was detected at WIPP South (0-2 cm) in 2009, and at Mills Ranch (0-2 cm) in 2010. All results for Cs¹³⁷ were below the average concentration found in surface soil from atmospheric fallout due to weapons testing.

Americium²⁴¹ was detected in concentrations above the sample MDC in soils collected from Mills Ranch (all three sampling depths), WIPP North (2-5 cm and 5-10 cm), WIPP North East (0-2 cm and 2-5 cm), WIPP South (0-2 cm and 5-10 cm), as well as in the corresponding field duplicates. Americium²⁴¹ was also detected above the MDC in the laboratory method blank. This analyte was previously found in the 2010 soil sampling project by the Oversight Bureau at Mills Ranch (2-5 cm) and at WIPP South (2-5 cm).

Analytes detected in the laboratory method blanks suggest deficiencies in laboratory quality assurance and quality control for the sample run and the results should not be relied upon. In all cases except for uranium^{234, 238} detections and one plutonium^{239/240} detection at WIPP North (5-10 cm) the results were qualified (flagged) by the laboratory as either "U" (result is less than the sample specific MDC) or "LT" (result is less than the requested MDC, greater than the sample specific MDC) and are estimated values.

Staff observed drilling operations at Groundwater Monitoring pad H-11, where a new well is being installed in the Culebra Dolomite Member of the Rustler Formation.

According to a US Department of Energy press release (August 15, 2011) disposal operations in Panel 5 were completed in just over two years. Operations personnel will install a brick and mortar isolation wall to separate this area from the rest of the underground.

Staff accompanied the Permittee's Site Regulatory Specialist in September to observe the preliminary construction work completed for Panel 5. Work included the placement of pallets of bricks along a drift, equipment mobilization, placing a back pile of salt in front of the panel (behind the wall), and mining out a keyway around the perimeter for the wall.

The Permittee will cast leveling mortar on the floor base in preparation for wall construction.



Keyway cut in floor, walls (ribs) and ceiling (Back).



Salt pile in front of panel in preparation of panel closure construction.



Blast wall construction sealing Panel 5.



The first waste shipment using the new TRUPACT-III arrived from the Savannah River Site. The container is scheduled to remain at WIPP for programming the bolting robot.

Staff attended Audit A-11-16, WTS Waste Handling Operations. The audit evaluated the adequacy of WTS procedures with respect to CBFO and WTS quality assurance requirements. Evaluation criteria include waste receipt, container loading and unloading, container movement, container lid handling, container inspection and emplacement for both loaded and empty containers.

A site-wide, scheduled electrical power and domestic water outage occurred on Monday, September 5, 2011 between 0600 and 1600 hours to perform maintenance on the plant substation (25P-SWG15/1).

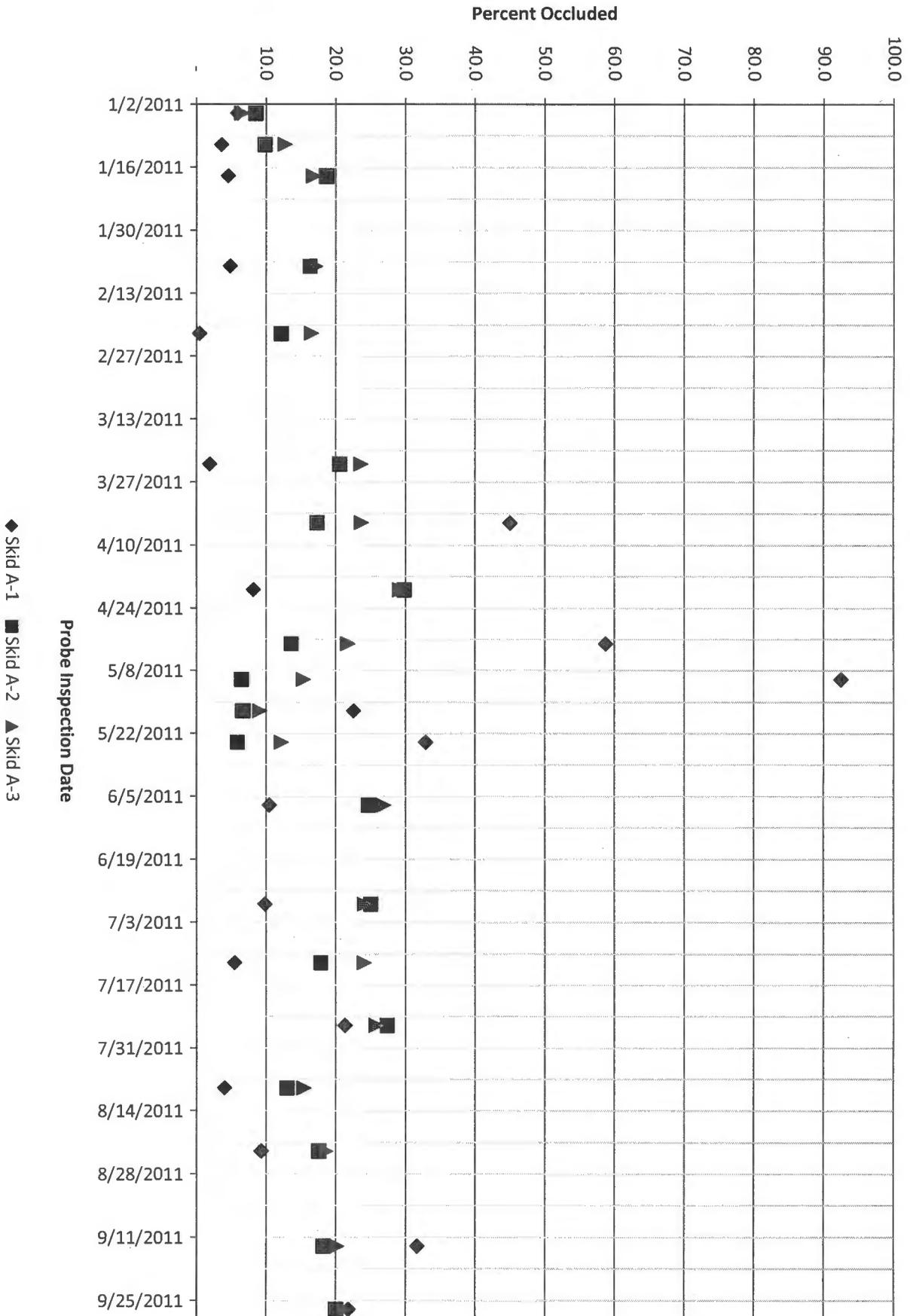
Staff Scientist Thomas Kesterson participated in Safety 502, Mine Safety Experienced Miner Refresher class at WIPP. The training fulfills all requirements of 30 CFR Part 48 for annual miner refresher training and allows continued unescorted access in the mine.

Julia Marple has been added to the New Mexico Community Foundation RACER project management and collaboration system "Basecamp." This will facilitate the eventual inclusion of the WIPP environmental monitoring and sampling data into the new cloud-based RACER database.

Waste processing was temporarily suspended for the replacement of the 2,300 feet long Head Rope #1, a steel rope used to suspend the waste hoist. While the waste hoist was out-of-service waste shipments to WIPP were halted. Crews worked through the weekend to complete the repairs and waste shipments to WIPP resumed.

Staff monitored the suspension and eventual resumption of waste shipments from Idaho National Laboratory.

Salt Build-up on Probes, 2011

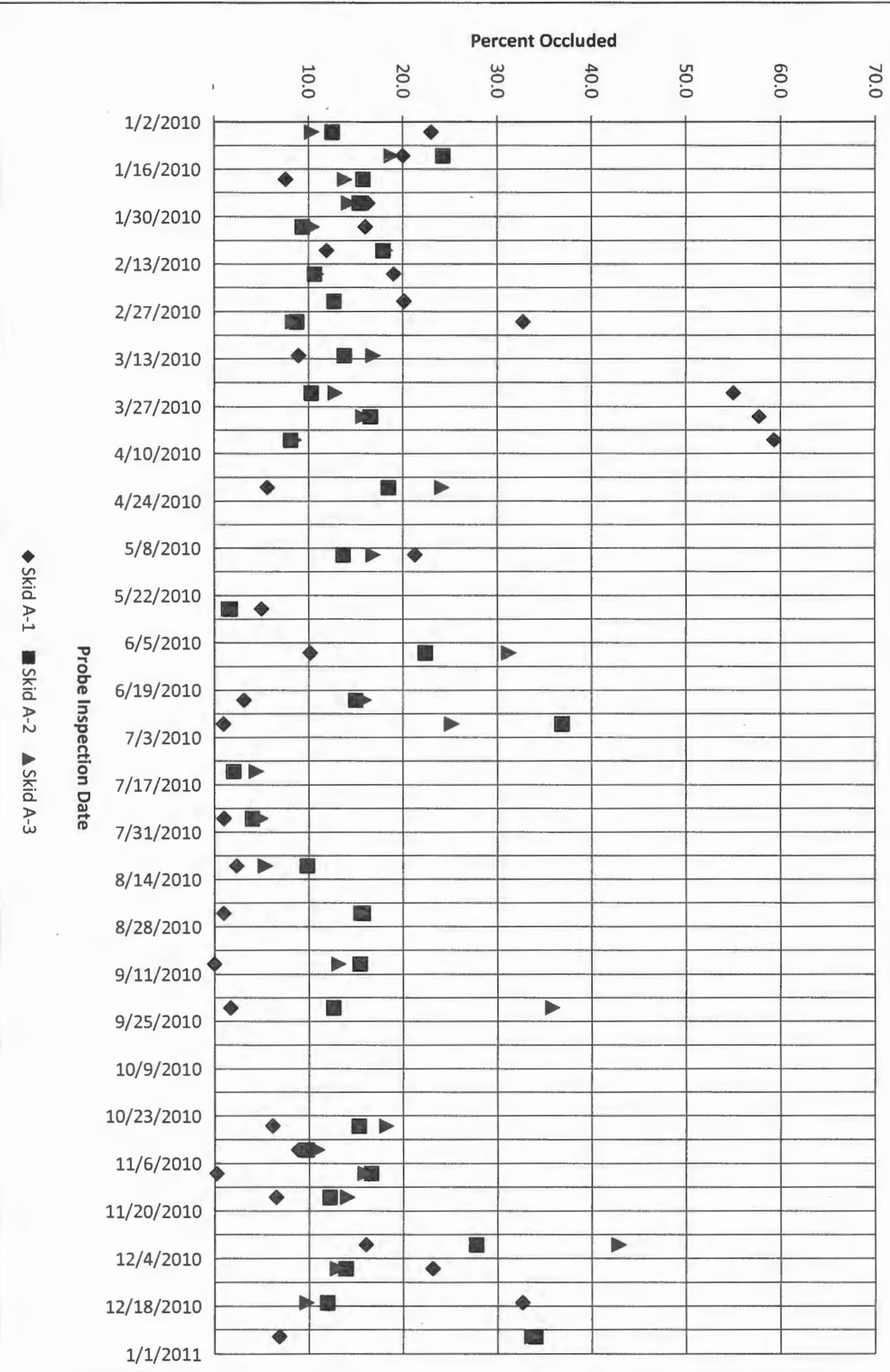


Calendar Year 2011

Date	% Occlusion			Comment
	Skid A-1	Skid A-2	Skid A-3	
1/4/2011	5.9	8.5	6.5	Shroud on A-1 failed, skid was not in service
1/11/2011	3.6	9.8	12.8	
1/18/2011	4.6	18.7	16.8	
2/7/2011	4.9	16.3	17.1	Shroud on A-1 failed, skid was not in service
2/22/2011	0.5	12.2	16.5	
3/23/2011	1.9	20.6	23.6	
4/5/2011	45.0	17.3	23.7	Shroud on A-1 failed, skid was not in service
4/20/2011	8.2	29.8	29.2	Shroud on A-1 failed, skid was not in service
5/2/2011	58.8	13.6	21.7	Shroud on A-1 failed, skid in-service as back-up
5/10/2011	92.5	6.5	15.4	Nozzle and shroud on A-1 failed. Skid in-service as back-up
5/17/2011	22.6	6.7	9.1	
5/24/2011	33.0	5.9	12.2	Shroud on A-1 failed, skid in service as back-up
6/7/2011	10.5	24.7	26.9	
6/29/2011	9.8	25.0	24.1	Shroud on A-1 failed, skid was not in service
7/12/2011	5.5	17.9	24.1	
7/26/2011	21.4	27.4	25.8	
8/9/2011	4.0	13.0	15.4	
8/23/2011	9.3	17.6	18.6	
9/13/2011	31.7	18.2	20.2	Shroud on A-1 failed
9/27/2011	21.8	20.0	21.2	Shroud on A-1 failed
10/11/2011	0.9	21.7	23.9	

Numbers in red indicate the occlusion rate exceeded 66.6%, or failure of the nozzle.

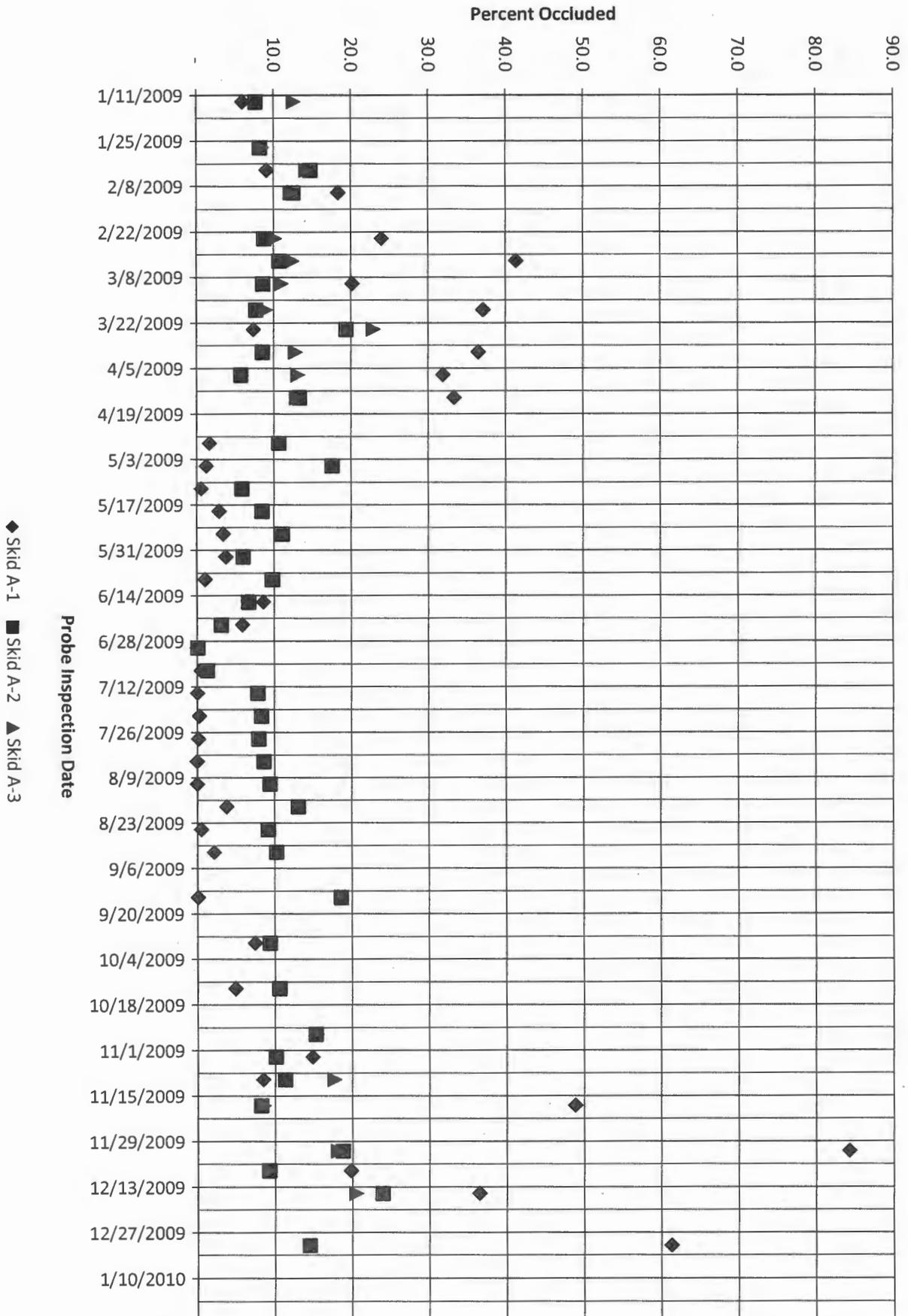
Salt Build-up on Probes, 2010



% Occlusion

Date	Skid A-1	Skid A-2	Skid A-3	Comment
1/5/2010	23.0	12.6	10.4	
1/12/2010	20.0	24.3	18.8	Shroud on A-1 failed; skid not in service
1/19/2010	7.6	15.8	13.9	
1/26/2010	16.3	15.4	14.3	Shroud on A-1 failed; skid not in service
2/2/2010	16.1	9.4	10.4	
2/9/2010	12.0	17.9	18.2	
2/16/2010	19.1	10.7	10.9	
2/24/2010	20.2	12.7	12.8	Shroud on A-1 failed; skid not in service
3/2/2010	32.8	8.8	8.3	
3/12/2010	9.0	13.8	16.9	
3/23/2010	55.0	10.3	12.8	Shroud on A-1 failed; skid not in service
3/30/2010	57.8	16.6	15.8	Shroud on A-1 failed; skid was in service as secondary for one day, when A-3 was secured for maintenance and A-2 was switched to primary
4/6/2010	59.3	8.1	8.5	
4/20/2010	5.6	18.5	24.1	
5/10/2010	21.3	13.7	16.9	
5/26/2010	5.0	1.7	1.5	
6/8/2010	10.2	22.4	31.2	
6/22/2010	3.2	15.0	15.9	
6/29/2010	1.0	36.9	25.2	
7/13/2010	2.0	2.1	4.5	
7/27/2010	1.0	4.1	4.9	
8/10/2010	2.4	9.9	5.4	
8/24/2010	1.0	15.8	15.5	
9/8/2010	-	15.4	13.2	
9/21/2010	1.7	12.6	35.8	
10/26/2010	6.2	15.3	18.2	
11/2/2010	8.9	9.8	10.9	
11/9/2010	0.2	16.6	16.0	
11/16/2010	6.5	12.2	14.1	
11/30/2010	16.1	27.8	42.9	Shroud on A-1 failed; skid not in service
12/7/2010	23.1	13.9	13.0	Shroud on A-1 failed; skid not in service
12/17/2010	32.7	12.0	9.8	
12/27/2010	6.9	34.0	33.6	Shroud on A-1 failed; skid was in-service as secondary from 12/17 until 12/21

Salt Build-up on Probes, 2009



Calendar Year 2009

Date	% Occlusion			Comment
	Skid A-1	Skid A-2	Skid A-3	
1/13/2009	6.0	7.7	12.6	
1/27/2009	8.5	8.3	8.5	
2/3/2009	9.1	14.8	14.2	A1 shroud failed, skid not in service. Served as primary for 12 hours when A3 was secured for maintenance.
2/10/2009	18.4	12.6	12.2	
2/24/2009	24.0	8.8	10.2	A1 shroud failed, skid not in service
3/3/2009	41.4	10.7	12.4	A1 shroud failed, skid not in service
3/10/2009	20.2	8.6	11.0	
3/18/2009	37.1	7.7	8.9	A1 shroud failed, skid not in service
3/24/2009	7.4	19.4	22.9	
3/31/2009	36.5	8.5	12.8	A1 shroud failed, skid not in service
4/7/2009	31.9	5.7	13.1	
4/14/2009	33.4	13.3	12.9	
4/28/2009	1.7	10.7		
5/5/2009	1.3	17.6		
5/12/2009	0.6	5.9		
5/19/2009	2.9	8.5		
5/26/2009	3.4	11.1		
6/2/2009	3.8	6.0		
6/9/2009	1.1	9.8		
6/16/2009	8.6	6.7		
6/23/2009	5.9	3.2		
6/30/2009	-	0.1		
7/7/2009	0.6	1.4		
7/14/2009	0.1	7.9		
7/21/2009	0.3	8.3		
7/28/2009	0.2	8.0		
8/4/2009	-	8.6		
8/11/2009	-	9.4		
8/18/2009	3.8	13.1		
8/25/2009	0.5	9.2		
9/1/2009	2.2	10.3		
9/15/2009	0.1	18.6		
9/29/2009	7.5	9.4		

Calendar Year 2009

10/13/2009	4.9	10.6	
10/27/2009	15.4	15.3	
11/3/2009	14.9	10.1	A1 shroud failed, skid not in service
11/10/2009	8.5	11.3	17.7
11/18/2009	48.9	8.2	8.5 A1 shroud failed, skid not in service
12/2/2009	84.3	18.8	18.2 A1 shroud failed, skid not in service
12/8/2009	19.8	9.3	9.2 A1 shroud failed, skid not in service
12/15/2009	36.5	23.9	20.5 A1 shroud failed, skid not in service
12/31/2009	61.3	14.5	14.6

Numbers in red indicate the occlusion rate exceeded 66.6%, or failure of the nozzle.

116th WIPP QUARTERLY MEETING
Held on October 20, 2011

*At the Sandia Conference Room, NMED District 1 Office
5500 San Antonio Drive, NE, Albuquerque, New Mexico*

Action Items

1. Tom Skibitski to send electronic copy of Jim Griswold (Hydrologist, Oil Conservation Division, Energy, Minerals and Natural Resources Department) brine well report to attendees.
2. Tom Skibitski to send data validation protocol for entries into RACER database to CBFO for review.
3. CBFO to provide updated organization chart to HWB. WTS to provide update on current organization hierarchy down to the site project management level to HWB and to inform HWB of significant changes in personnel or job assignments.
4. Current waste placement map to be provided by CBFO for distribution to the group.
5. Regarding "whole body counts" and bioassay for workers at WIPP; WTS to provide information on:
 - a. When is whole body count or bioassay performed on an individual, staff, workers, contractors, and subcontractors? (This question refers to mandatory or non-voluntary procedures.)
 - b. With what frequency is the whole body count or bioassay performed on staff, workers, contractors, and subcontractors?
 - c. Who gets the results of these tests, measurements, or bioassay procedures?
 - d. What information is provided to employees regarding these tests, measurements, and procedures? (Provide copies).
6. How is remote handled (RH) waste volume computed or determined? (Ref. 3.3.1)
7. Provide answer to question (#20) reprinted below:
 - a. What are the amounts of waste classified as TRU waste that have been dispositioned as TRU waste and as other than TRU waste in FY 2008, FY 2009, FY 2010, and FY 2011?
8. Can some (coded or unobtrusive) method be employed to visually notify first responders that waste contained in shielded containers is remote handled (RH) waste and not contact handled (CH) waste?

Next Quarterly Meeting (#117) is scheduled for **January 12, 2012**, hosted by Hazardous Waste Bureau.

WIPP Quarterly Meeting Sign-In Sheet

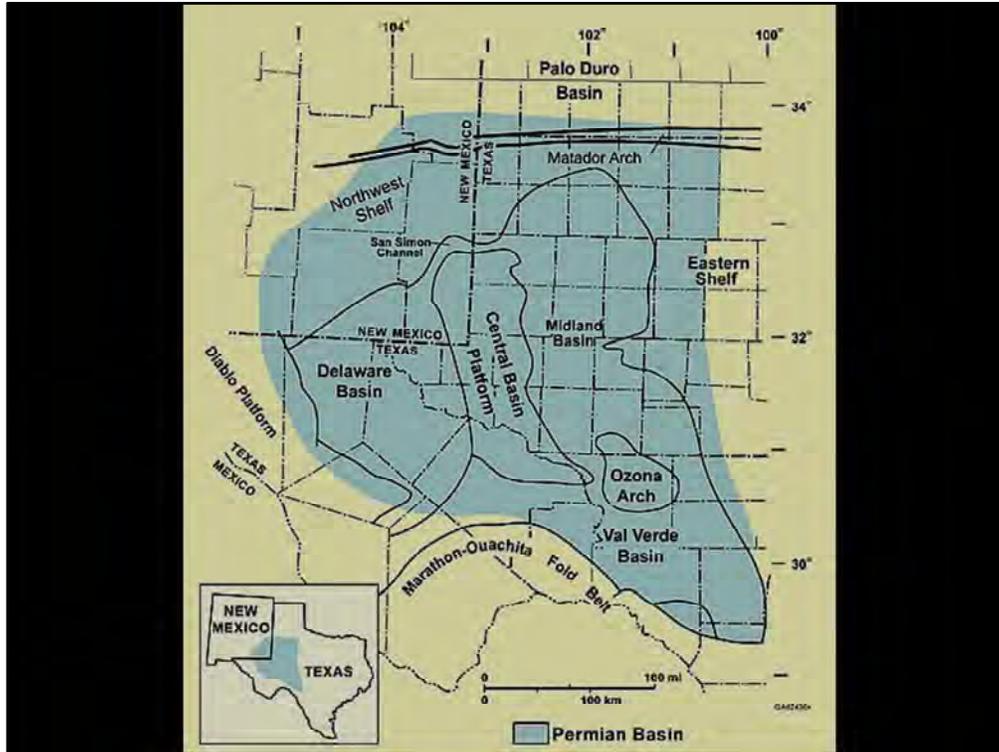
Present Name	Organization	E-mail address	Phone #	Corrections	
X	Anne deLain W. Clark	EMNRD/Radioactive. Waste Consultation Task Force	anne.clark@state.nm.us	505-476-3224	
	Anthony Stone	DOE-CBFO	anthony.stone@wipp.ws	575-234-7475	
X	Bob Kehrman	WRES/WIPP	bob.kehrman@wipp.ws	575-234-7210	
X	Bobby Lopez	NMED/ RCB	bobby.lopez@state.nm.us	505-476-3219	
	Christopher M. Timm	PECOS Management Services	ctimm@pecosmanagement.com	505-323-8355	
	Connie Walker	Trinity/NMED	conniewalker@aol.com	303-526-0954	
	Dennis M. Cook	WTS	dennis.cook@wipp.ws	575-234-7116	
X	Dolores Baca	PRC.Fire Marshall	dolores.baca@state.nm.us	505-476-0175	
X	Don Hancock	SRIC	sricon@earthlink.net	505-262-1862	
X	Don Shainin	DHSEM	don.shainin@state.nm.us	505-476-9628	
X	Geno (Henry) Trujillo	NMSP	geno.trujillo@state.nm.us	505-670-0423	
	George Basabilvazo	DOE-CBFO	george.basabilvazo@wipp.ws	575-234-7488	
X	George Hellstrom	DOE-CBFO	george.hellstrom@wipp.ws	575-234-7010	
	Janet Greenwald	CARD	contactus@cardnm.org	505-242-5511	
X	Jerry Fox	PECOS Management Services	jfox@pecosmanagement.com		
	Jodi Porter	EMNRD/Radioactive. Waste Consultation Task Force	jodi.porter@state.nm.us	505-476-3226	
X	John Kieling	NMED/HWB	john.kieling@state.nm.us	505-476-6035	
X	Joni Arends	CCNS	jarends@nuclearactive.org	505-986-1973	
	Mike Usher	WRES/WIPP	mike.usher@wipp.ws		
X	Ricardo Maestas	NMED/HWB	ricardo.maestas@state.nm.us	505-476-6050	
	Rick Chavez	WRES/WIPP	rick.chavez@wipp.ws	575-234-7405	
	Roseanne Madrid	DPS/MTD	roseanne.madrid@state.nm.us		
X	Scott Kovac	Nuclear Watch NM	scott@nukewatch.org	505-989-7342	
X	Steve Holmes	NMED/HWB	steve.holmes@state.nm.us	505-476-6047	



Carlsbad Brine Well Update

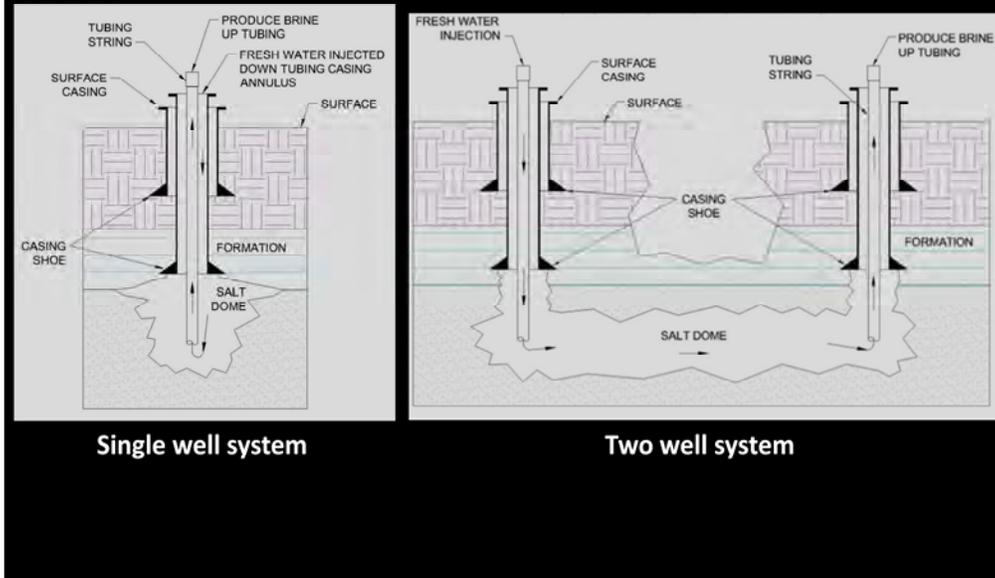
October 13, 2011



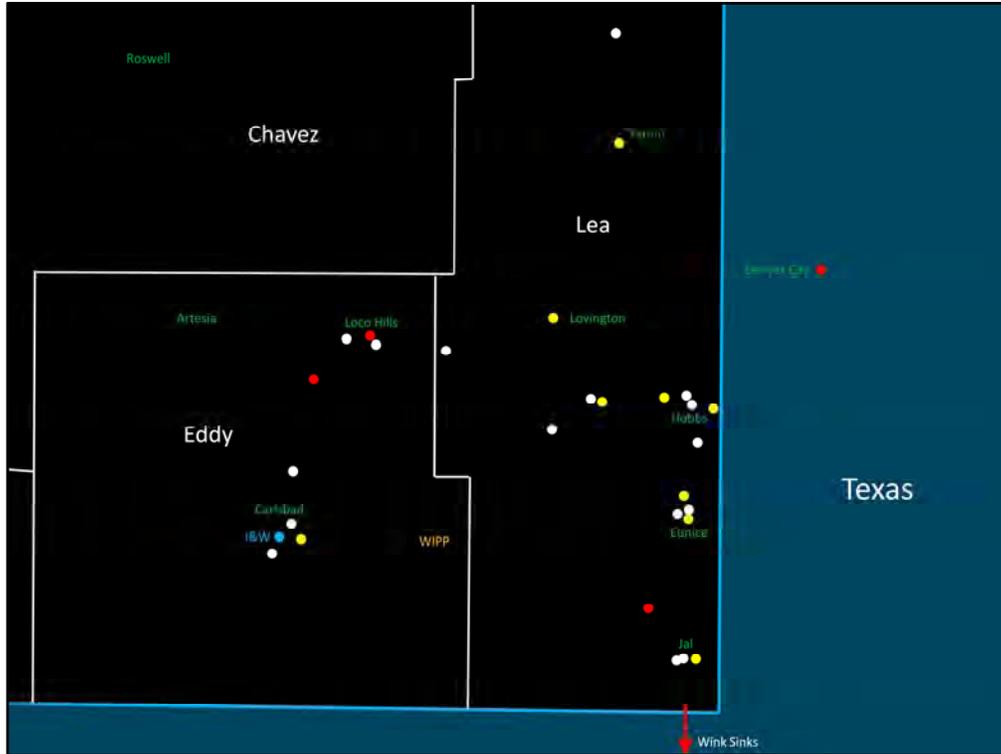


The Permian Basin (the area shaded in blue) spans southeast New Mexico into west Texas and is internationally known for its reserves of crude oil and natural gas. Overlying these valuable reserves are significant layers of salt left behind millions of years ago as an ancient ocean receded. That salt benefits us not only via potash mining, but is also the material providing for the safe disposal of the nation's defense-related transuranic waste at the Waste Isolation Pilot Plant. As one proceeds west-to-east across the basin, not only do the salt layers become thicker, the top of the salt is also deeper (shallowest and thinnest near Carlsbad, thicker and deeper near Hobbs). When drilling through the salt layers to extract the underlying oil and gas, drilling fluids need to be pre-saturated with salt to prevent washouts and ensure borehole integrity. As such, a source of brine (salt-laden water) is required. Brine is also used to mitigate existing downhole pressures during well workover operations due to its higher density.

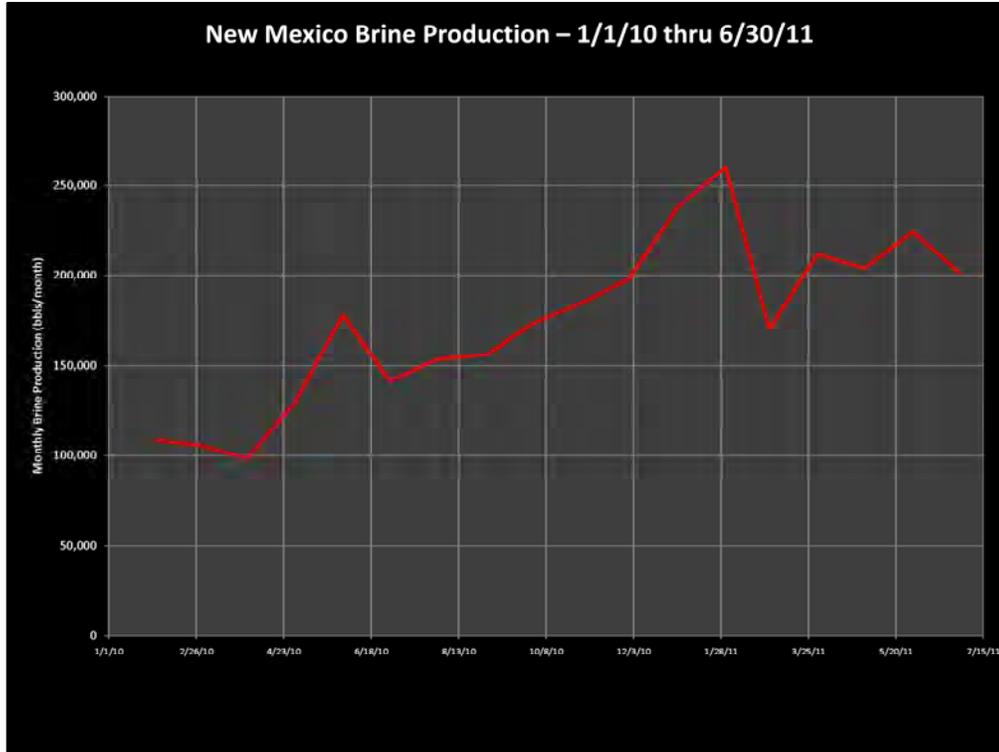
Brine well configurations



A “brine well” is a solution mining operation. Fresh water is introduced into the subsurface through a well casing or tubing, thereby dissolving the salt. The brine is then pumped out and trucked to wellsites for use.



There are a total of 32 historically permitted brine well operations in New Mexico associated with oil and gas development. The oldest of these wells date back to 1963. At present, there remain nine active brine facilities.



The market value of brine is relatively low (less than two dollars per barrel) and brine operations have almost exclusively been owned by trucking companies. Monthly statewide brine production for 2011 is exceeding 200,000 barrels per month.

Oversight of brine wells by the Oil Conservation Division is accomplished under provisions of the federal Underground Injection Control program and the New Mexico Water Quality Control Commission regulations. Both these enforcement mechanisms are primarily concerned with the protection of groundwater.

Factors Affecting Stability

Depth to Cavern

Width of Cavern

Strength of Roof Material

Percentage of Liquid in Cavern

Depth into Salt of Casing Shoe

Use of a "Blanket" Liquid

Production Flow Pattern

The solution mining of the salt results in an underground cavern. The stability of these caverns is dependent upon their depth, their width, the strength of the materials above the cavern, and the liquid within.

Since July of 2008, three large sinkholes associated with brine wells in the Permian Basin have catastrophically developed; two in New Mexico, and one in Texas. Both the sinkholes in New Mexico are at locations where the depth to the salt-bearing formation is less than 500 feet and more than five million barrels of brine were historically produced.



Jim's Water Service Brine Well Collapse

On July 16, 2008 the OCD received a phone call from a representative of Jim's Water Service of New Mexico (JWS) asking about the permitting process for a new brine well. During that conversation the OCD inquired as to the need for a new well as JWS already had an active brine well in Eddy County approximately 17 miles southeast of Artesia. Their initial response was to say they had "lost the well". After several more minutes of discussion, the OCD was informed that at approximately 8:15 that morning during a routine inspection an employee was approaching the well when he observed a significant amount of dust. He stopped, got out of his truck, and immediately noticed severe ground movement and a crack propagating toward him. Within minutes he observed a sinkhole centered on the former location of the wellhead.



Jim's Water Service Brine Well Collapse - July 16, 2008. The sinkhole contains brine that migrated upward from the cavern as the roof and overburden moved down. There is no significant groundwater in this area.



Jim's Water Service Brine Well - July 25, 2008; nine days after collapse. Brine has begun to drain into the surrounding soil and the sidewalls are eroding to a natural angle of repose.



Jim's Water Service Brine Well Collapse -This sinkhole has since grown to a diameter of about 400 feet with a depth greater than 100 feet. Numerous concentric surface cracks appeared immediately after the collapse and identified as far as 300 feet away from the sinkhole's edges.



Jim's Water Service Brine Well Collapse –These cracks can be more than 80 feet in length, more than one foot in width, and of an unverified depth.



Jim's Water Service Brine Well Collapse – Cracks nine months after collapse. This picture was taken on the northeast side of the sinkhole approximately 60 feet from the edge. The central block has fallen about two feet vertically.

The site is located on State Trust land otherwise used for grazing. The area was fenced by JWS and is monitored to see if subsidence is adversely affecting the adjacent roadway (NM 217). This brine well first came into production in March 1979 under the ownership of Permian Brine Sales. The well was constructed by re-entering a former oil well. Depth to salt in the area is 397 feet below surface. Production records are incomplete, but an estimate of total brine production is in excess of 5 million barrels resulting in a mined cavern greater than 750,000 barrels in volume.

On July 23rd, 2008, then EMNRD Cabinet Secretary Joanna Prukop requested a state-wide review of all brine wells including an internal OCD audit and daily well inspections by all operators of active facilities. What precipitated the cavern collapse at the JWS facility is not definitively known. Based on the diameter of the surface hole, the subsurface cavern was at least 300 feet across. Thus, the ratio of cavern diameter to overburden thickness is $300/397$ or 0.76. A general "rule of thumb" in rock mechanics and solution mining says that caverns appear to be stable if this ratio is less than 0.67 (two-thirds).



Loco Hills Water Disposal Co. Brine Well Collapse

In June of 2008, a brine well failed a casing integrity test located at the Loco Hills Water Disposal facility immediately north of the town of Loco Hills, in Eddy County east of Artesia (also on State Trust land). The well was thereafter plugged. This brine well had been in operation since late-1985, depth to salt in the area is 470 feet, and produced approximately 8 million barrels of brine throughout its lifetime. This would have resulted in a cavern nearly 1.2 million barrels in volume.

On November 3rd, 2008 as one of the owners of the Loco Hills facility was returning from lunch, he saw what he thought was a dust devil in the vicinity of the plugged brine well. As he got closer he noticed the dust particles were not swirling, but rather traveling vertically. The brine cavern was collapsing.



Loco Hills Water Disposal Co. Brine Well Collapse

This picture was taken during the evening of November 3rd, 2008.

On November 14th, 2008 the Cabinet Secretary placed a six month moratorium on new brine well permits in geologically sensitive areas and tasked the OCD with continuing its investigation of the brine well collapses and providing recommendations for the future. As part of that effort, a working group was established with members of state regulatory agencies beyond New Mexico, the EPA, the DOE, Sandia Labs, WIPP, the solution mining industry, and oil & gas service companies.



Loco Hills Water Disposal Co. Brine Well Collapse – 15 days after collapse, and still growing eventually to over 300 feet in diameter.



Loco Hills Water Disposal Co. Brine Well Collapse – Cracks formed in outlying areas as also occurred at the JWS sinkhole. These cracks immediately decimated the adjacent public roadway and eventually placed future operation of the disposal facility at risk.



Loco Hills Water Disposal Co. Brine Well Collapse – This crack broke a 4-inch thick reinforced concrete slab.



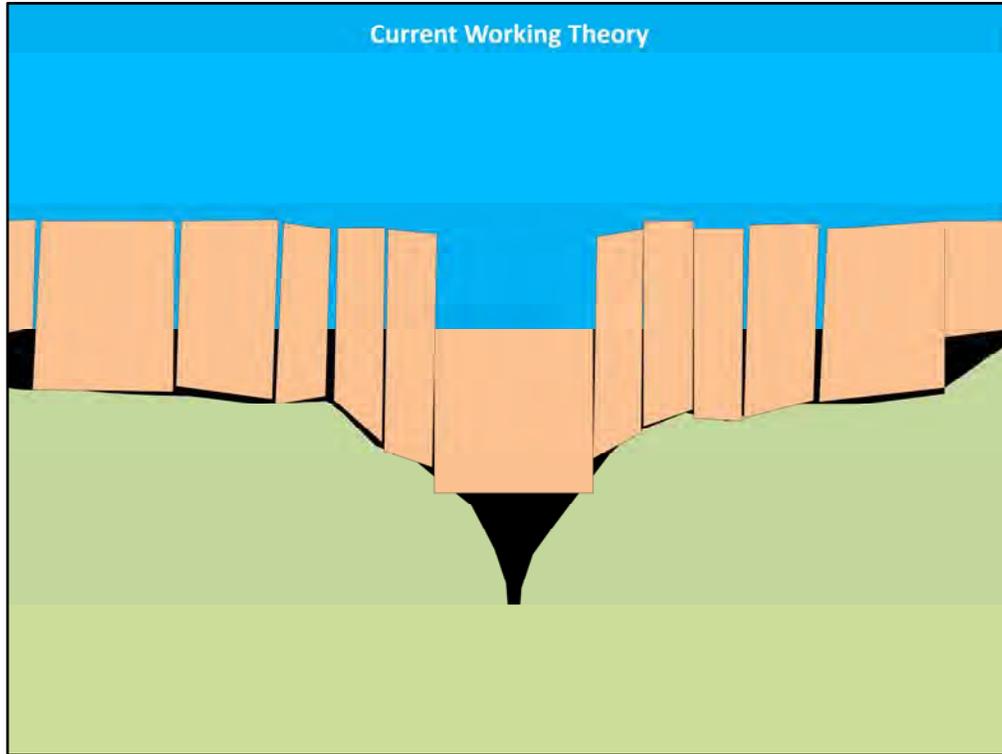
Loco Hills Water Disposal Co. Brine Well Collapse – Due to the continued risk to operations at the water disposal facility in Loco Hills, the operator decided to backfill the sinkhole. This endeavor took several months to complete and cost approximately \$1.3 million. Based on sonar logging of the brine cavern undertaken in February of 2001, the maximum cavern diameter was 310 feet. This placed the ratio of diameter to overburden thickness at $310/470$ or 0.66, right at the “rule of thumb” limit discussed previously.



Denver City, Texas Brine Well Collapse

On July 27th, 2009 just over one year after the JWS brine well collapse, another sinkhole associated with brine production appeared overnight in the Permian Basin. This time just east of Denver City, Texas in Yoakum County about 15 miles from the Texas/New Mexico border.

This brine well came into production in 1974 but was completed as a re-entry into an oil and gas well originally drilled in 1958 and mined salt from the same geologic salt formation (Salado) as all brine wells in New Mexico. The depth to this formation in that area is approximately 2,150 feet. Complete information on the well and associated activities is not yet available but the well did experience a casing failure at a depth of 700 feet in 1997 and began venting an estimated 25,000 cubic feet per day of natural gas. The gas was allowed to vent and was flared in hopes of depleting the gas zone, which never occurred. Solution mining of salt continued in the immediate area via adjacent brine wells. An estimate of cavern volume by the Texas Railroad Commission is approximately 885,000 barrels.



Consequently, when catastrophic failure occurs a deep sinkhole is formed in the immediate area of the well where the cavern height is greater, but the observed concentric fractures are indicative of broader roof collapse in those areas where the cavern height is substantially less.

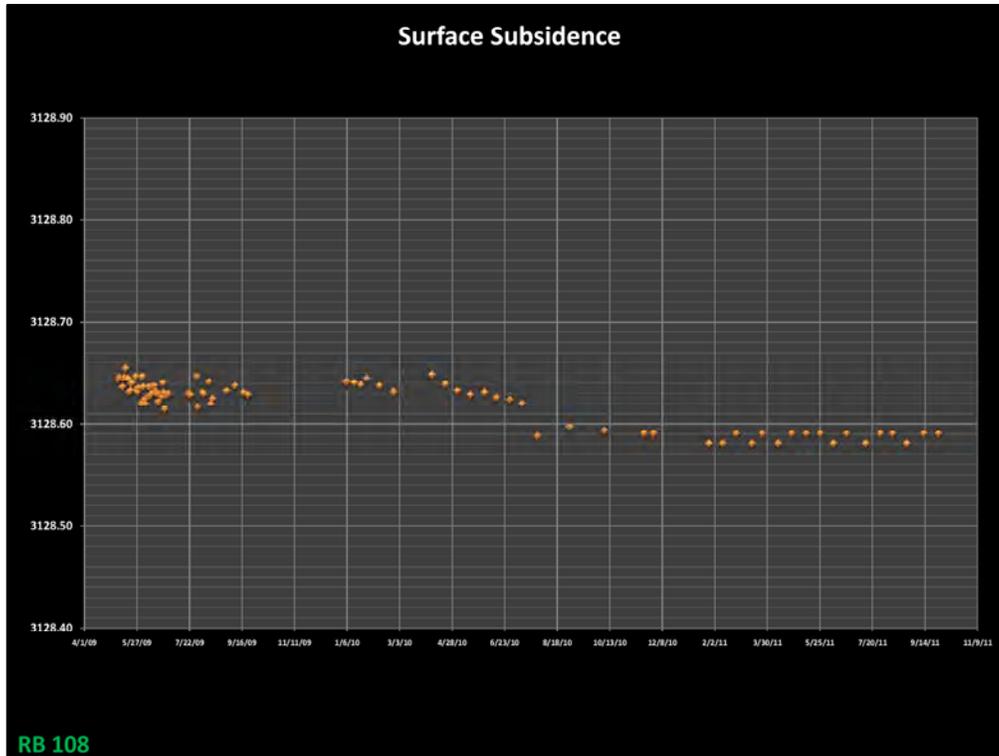


I&W, Inc. Brine Well in Carlsbad

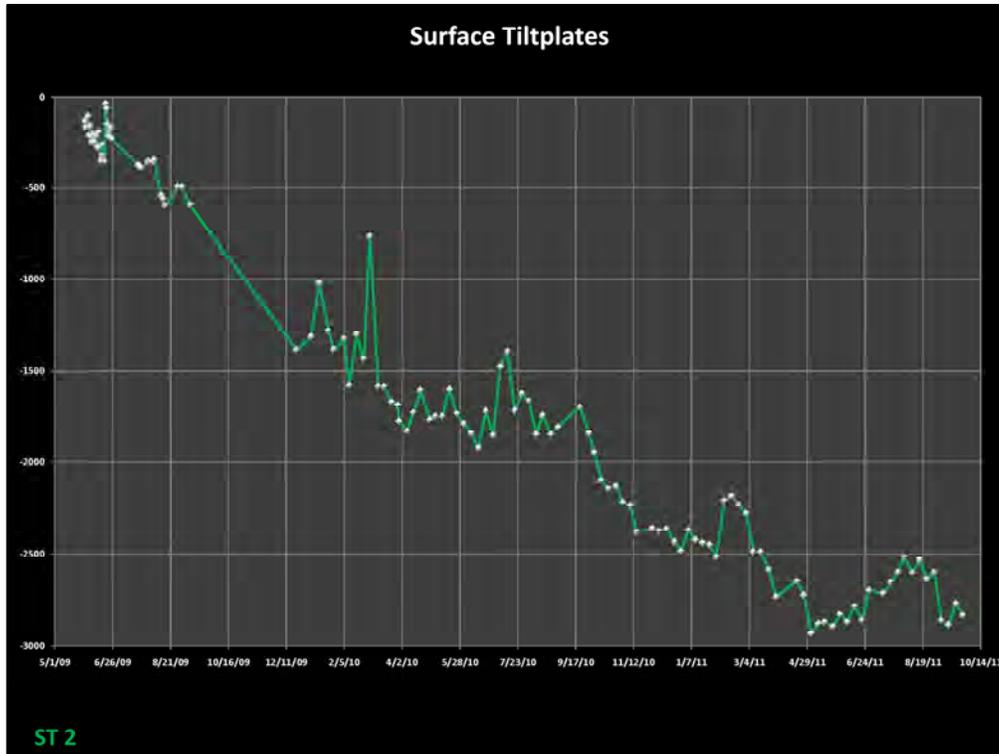
Within days of the first brine well collapse at the JWS facility southeast of Artesia in July 2008 division personnel became concerned about an oilfield trucking operation in Carlsbad owned by I&W, Inc. which included an active brine well of similar depth and production history. This facility is located amidst two major roadways, a vital irrigation canal, a trailer park, a church, a feed store, an agricultural dry goods facility, a truck stop, and a railway servicing the potash industry.

On July 22, 2008 brine production from the remaining operational well was terminated at OCD's direction and the well was plugged in October of that year. On March 11, 2009 OCD recommended the operator consider shutting down remaining operations and submit contingency planning for a possible collapse including discussions with their neighbors. On March 26th and 27th of 2009, a gathering of the brine well working group was held in Santa Fe to discuss overall brine well safety during which a consensus developed that the brine cavern in Carlsbad had a high probability for collapse.

Beginning in April of 2009, the division briefed emergency response organizations, local government, the Departments of Transportation, Public Safety, and the Environment, along with the public about the situation on numerous occasions.



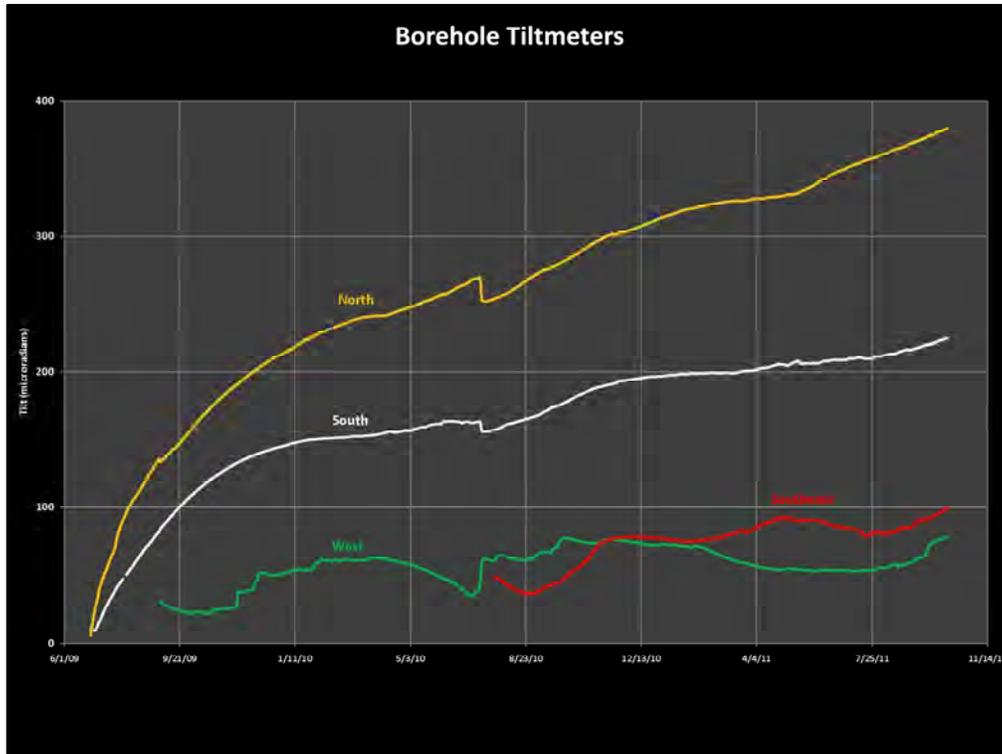
OCD also contracted with a knowledgeable engineering firm to undertake characterization of the brine cavern and install an automated system to detect ground movement. The graph above provides historic surface survey data for one of 71 benchmarks established atop the presumed brine cavern and surveyed on a regular basis. This particular location is above the center of the cavern and has subsided about three-quarters of an inch over the past two years. Approximately half that subsidence occurred during July of 2010 when less than one percent of the brine was allowed to flow from the cavern during a re-entry procedure.



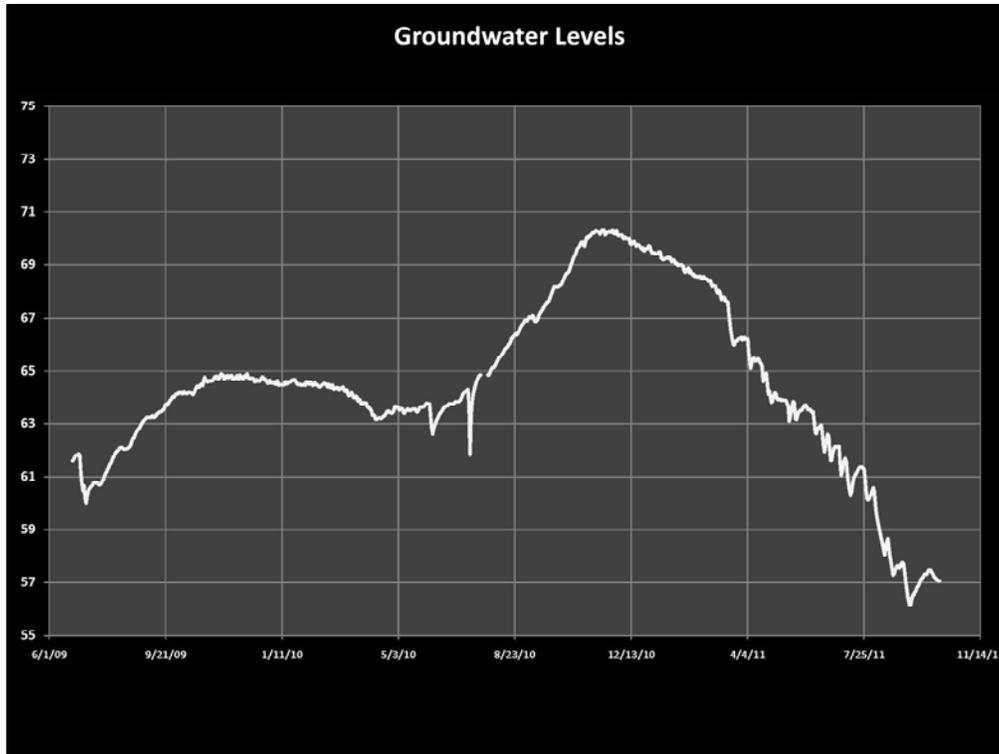
A group of X surface tiltplates were also installed in the area. The graph above presents data from one such plate located within a highway median along US 285 northeast of the I&W facility. The measured displacement indicates a change in tilt of not quite one-quarter of one degree.



The early warning system became operational on June 23, 2009 and consists of four borehole tiltmeters, two pressure transducers monitoring groundwater levels, and two pressure transducers monitoring brine cavern pressure. Data is logged from all sensors every minute, uploaded to an offsite server every five minutes, and automatically checked against preset alarm levels. If an alarm condition is observed, the system digitally alerts the Eddy County Emergency Response infrastructure and the OCD.



Data from the borehole tiltmeters has shown almost continual ground movement since July of 2009. The rate of movement accelerates during the irrigation season due to losses of water from the unlined canal. The distinct movement recorded in July of 2010 on 3 of the four meters is associated with brine flow from the cavern during re-entry for sonar logging.



Groundwater levels in the aquifer situated several hundred feet above the brine cavern vary based on precipitation, regional pumping, and canal losses. If the brine cavern were to fail, upward movement of brine into this freshwater aquifer would render a large amount of the groundwater unusable.



In August of 2009, a two-dimensional seismic reflection survey was completed to determine the lateral extents of the cavern.



The area shaded in yellow represents an interpretation of the seismic data which likely indicates brine cavern heights in excess of 25 feet. The area shaded in red is indicative of the salt being completely removed.

In September 2009 as part of the legislature's efforts to close the State's budget gap, the unencumbered balance of OCD's Reclamation Fund was swept. Thereafter, a local technical committee was established in November of 2009 by the City of Carlsbad and Eddy County tasked with developing a means of mitigating a cavern collapse. Funding for this effort relied on local monies.

In December of 2009 the owners of the neighboring feedstore filed a civil suit against I&W for loss of property and business value. In January 2010 the OCD issued a Compliance Order to I&W seeking reimbursement of State expenses and a fine for violations of their operating permit and the Water Quality Act. At the same time the City of Carlsbad filed suit against I&W to compel the firm to pay for ongoing and future characterization, monitoring, and reclamation efforts. On March 9th, 2010 Governor Richardson signed legislation to enact an additional conditional severance on crude oil to enhance the OCD's ability to properly deal with such matters. On May 9th, 2010 I&W filed for bankruptcy protection.



Re-entry of one of the brine wells for purposes of sonar logging was attempted by contractors for the city during July and September of 2010. This is a photo of the Eugenie #1 well with the P&A marker removed and a small pit excavated around the wellhead.



A bradenhead flange was then welded to the casing.



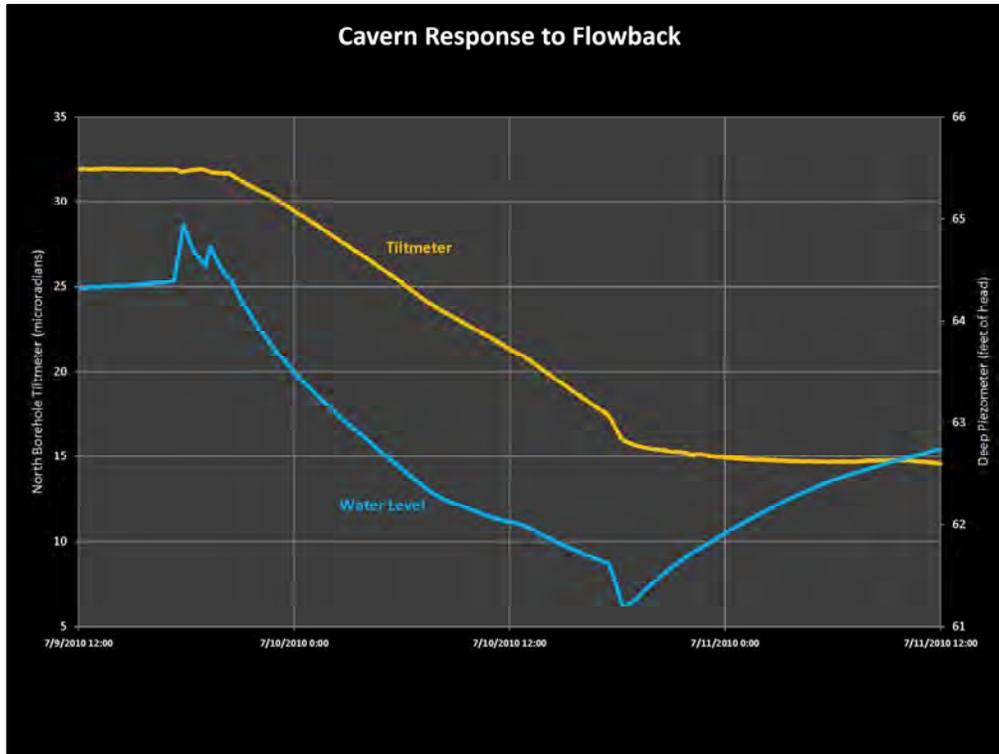
A blowout preventer was fastened to the bradenhead flange.



The previously cemented well casing was then drilled out using a coiled tubing system to prevent excessive weight being placed on the potentially fragile wellbore. Drilling thru the cement and cast iron bridge plug only took a few hours.



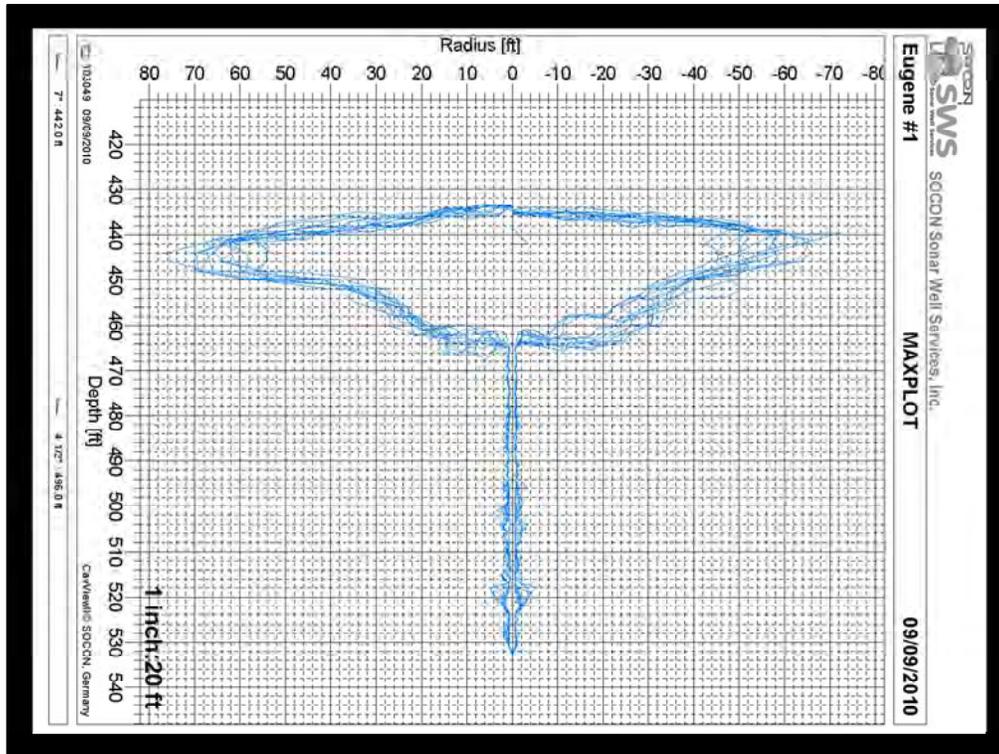
Once the cement and plug had been drilled out, the well was allowed to flow back brine thru the bradenhead and choke lines into on-site tanks while the upper cavern was logged using a sonar tool. This photograph shows the logging crew assembling a lubricator and the downhole sonar equipment prior to logging.



During the period in which brine was allowed to leave the cavern the borehole tiltmeters indicated ground movement and even the deeper water levels showed a response presumably due to an elastoporosity response in the overburden above the brine cavern. When the rate of flowback was temporarily increased, the earth movement and groundwater decline increased as well. When flow from the cavern was terminated, the ground immediately ceased moving and the water level began to return to its original state. This data is strongly indicative of an unstable cavern roof and the presence of brine within the cavern is likely the only remaining support.



With a desire to still sonar log the cavern, the effort was put off until September of 2010 when a snubbing unit could be deployed to prevent loss of brine.



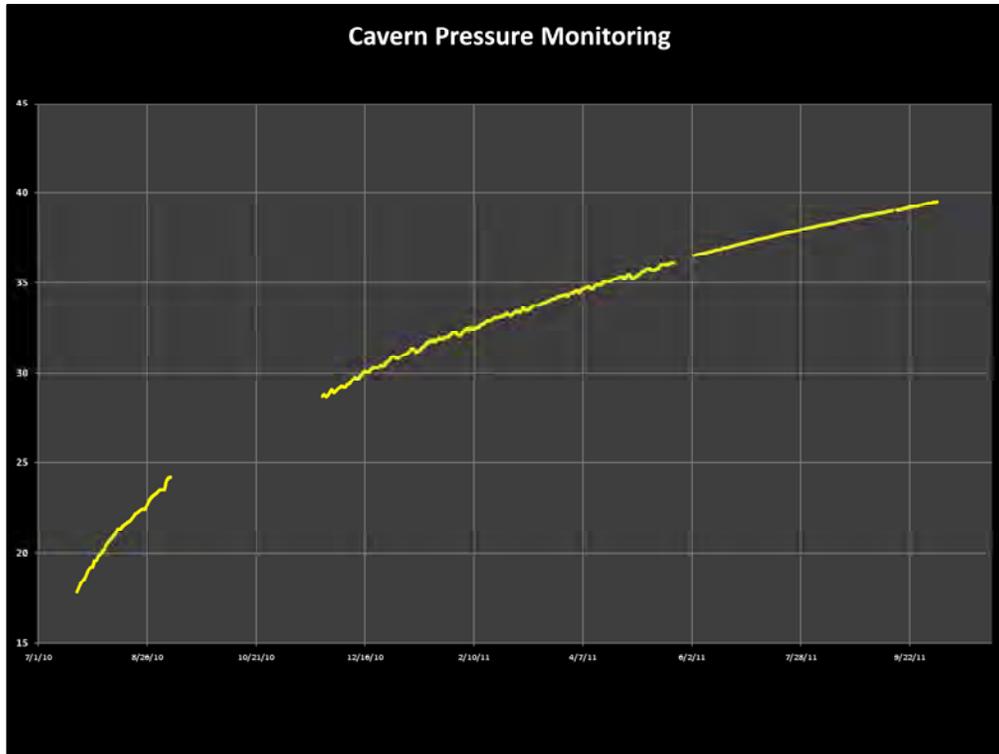
Those efforts did not yield a sonar picture of the larger cavern as had been hoped. A relatively small upper cavern was imaged, but what is most likely a rubble pile of broken material was observed at greater depth. Furthermore, those efforts in large part depleted available funding from the City of Carlsbad.



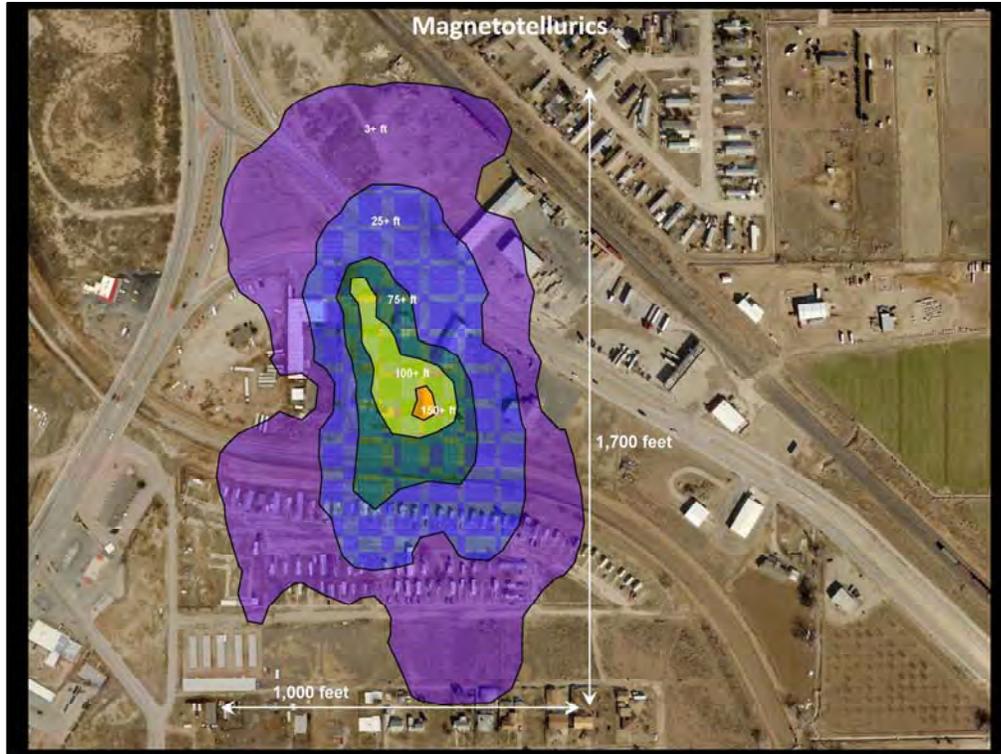
The image above provides the sonar footprint of the upper cavern (in white) overlain upon the seismic interpretation previously presented.



A master valve was fitted to the wellhead and integrated with pressure transducers to gauge the cavern pressure as part of the early warning system.



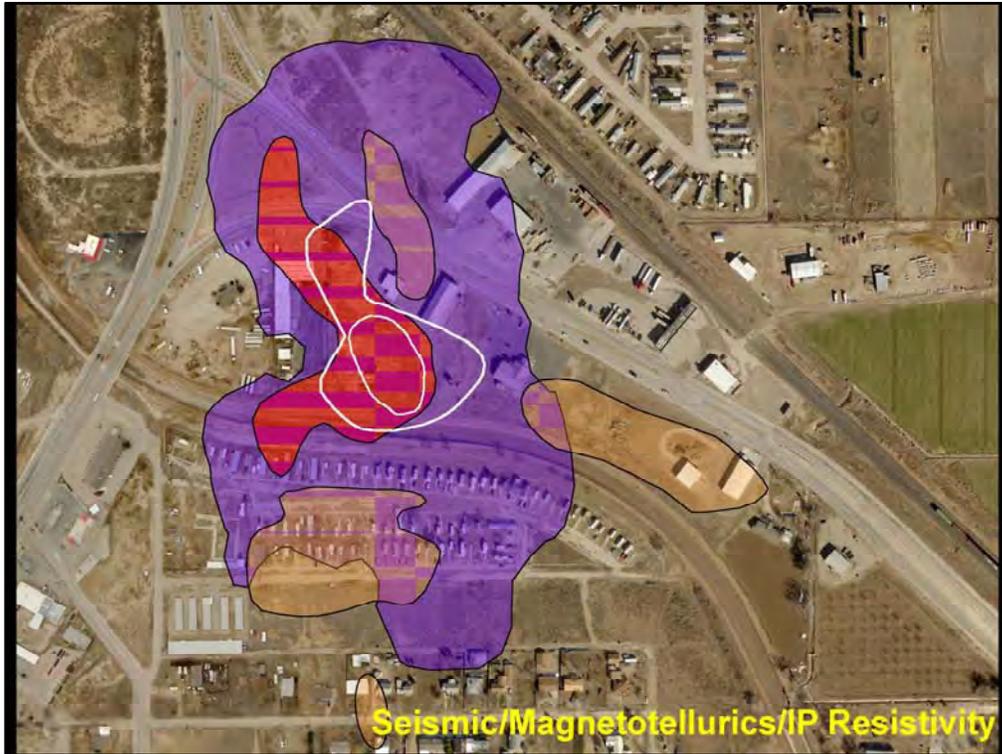
That pressure data shows a continuous climb in cavern pressure which indicates the cavern is hydraulically “tight” at present, but the observed increase could also be indicative of thermal instability, salt creep, and downward overburden movement.



The OCD resumed fiscal and technical oversight of the characterization and early warning efforts in the winter of 2010 supported by the Reclamation Fund. Additional geophysical techniques have been used including digital magnetotelluric imaging. The image presented provides an overlay of the inferred cavern footprint atop an aerial photograph of the area. The area in purple defines disturbed salt and overburden thickness of at least three feet. The area in blue 25 feet. The dark green 75 feet. The lime green 100 feet and the orange greater than 150 feet in disturbed thickness. The potentially impacted zone spans about 1,700 feet North to South and 1,000 feet East to West.



The National Cave & Karst Research Institute in Carlsbad was contracted by the OCD to undertake an induced polarization resistivity survey of the subsurface in the area and those results are partially presented above. The area shaded in red indicates low resistivity (brine) which is likely associated with the cavern. The areas shaded in orange represent low resistivity (brine and/or fresh groundwater) within the overburden.



This image provides a combination of the seismic, magnetotelluric, and resistivity profiles. It may not look like it, but there is reasonable agreement between the techniques from a remote geophysical point of view.

Path Forward

Magnetotelluric Survey on Tightened Spacing

Coring Program

Re-interpretation of Existing Seismic Data
(new synthetic)

Continued Monitoring and Upgrade of Early
Warning System

Feasibility Study