MDA G Cleanup Overview and Status

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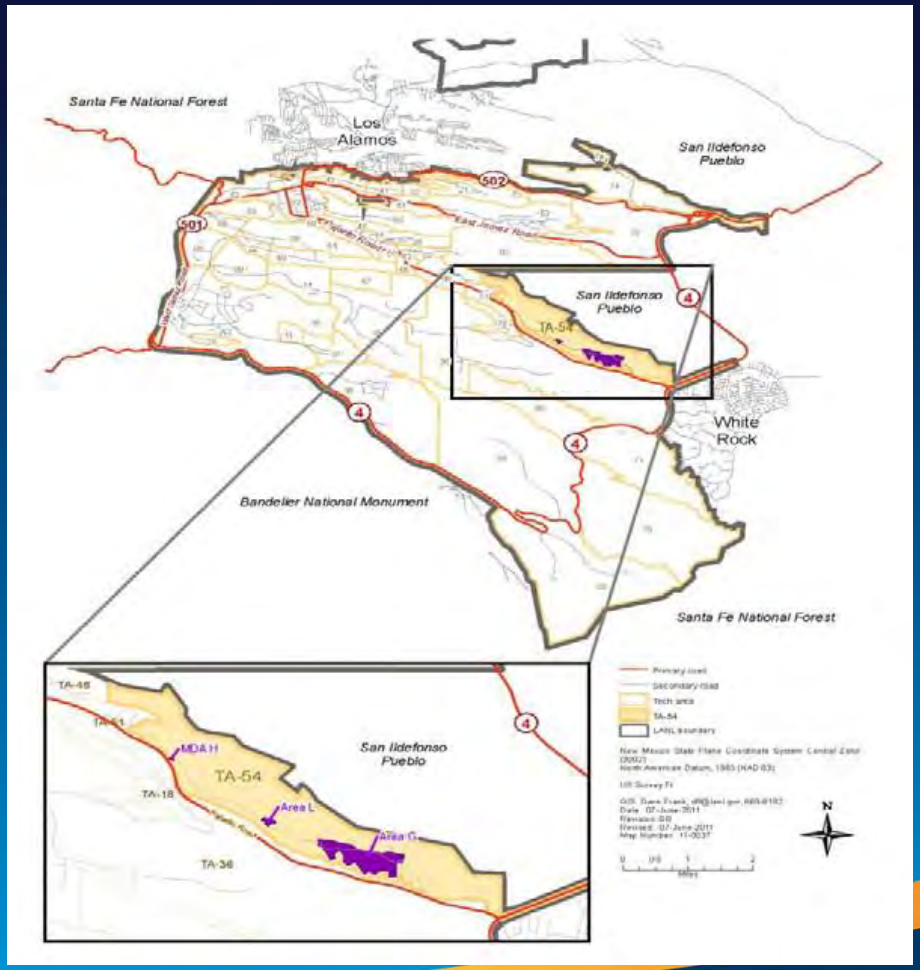
Agenda

- Area G Site Background
- Site Characterization
- Regulatory Process for Remediation and Closure
- Path Forward
- Summary

Site Background and Operational History



- MDA G is 63 acres within Technical Area 54, located adjacent to Pueblo de San Ildefonso property and White Rock
- In operation since 1957
- Subsurface pits/shafts/trenches used for storage and disposal of solid and radioactive contaminated waste
- Low level waste disposal is continuing

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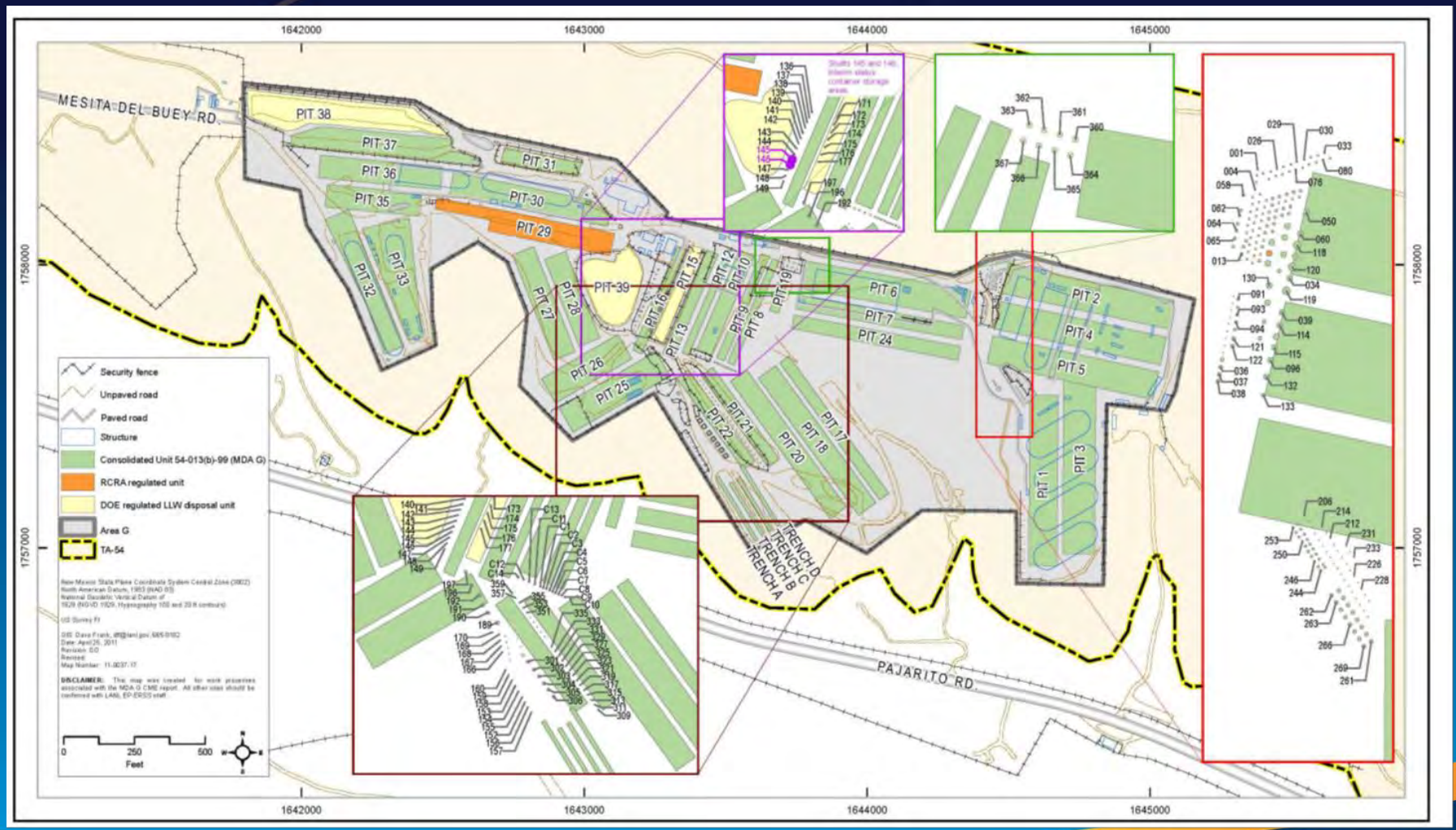
Subsurface Units



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Waste Contents

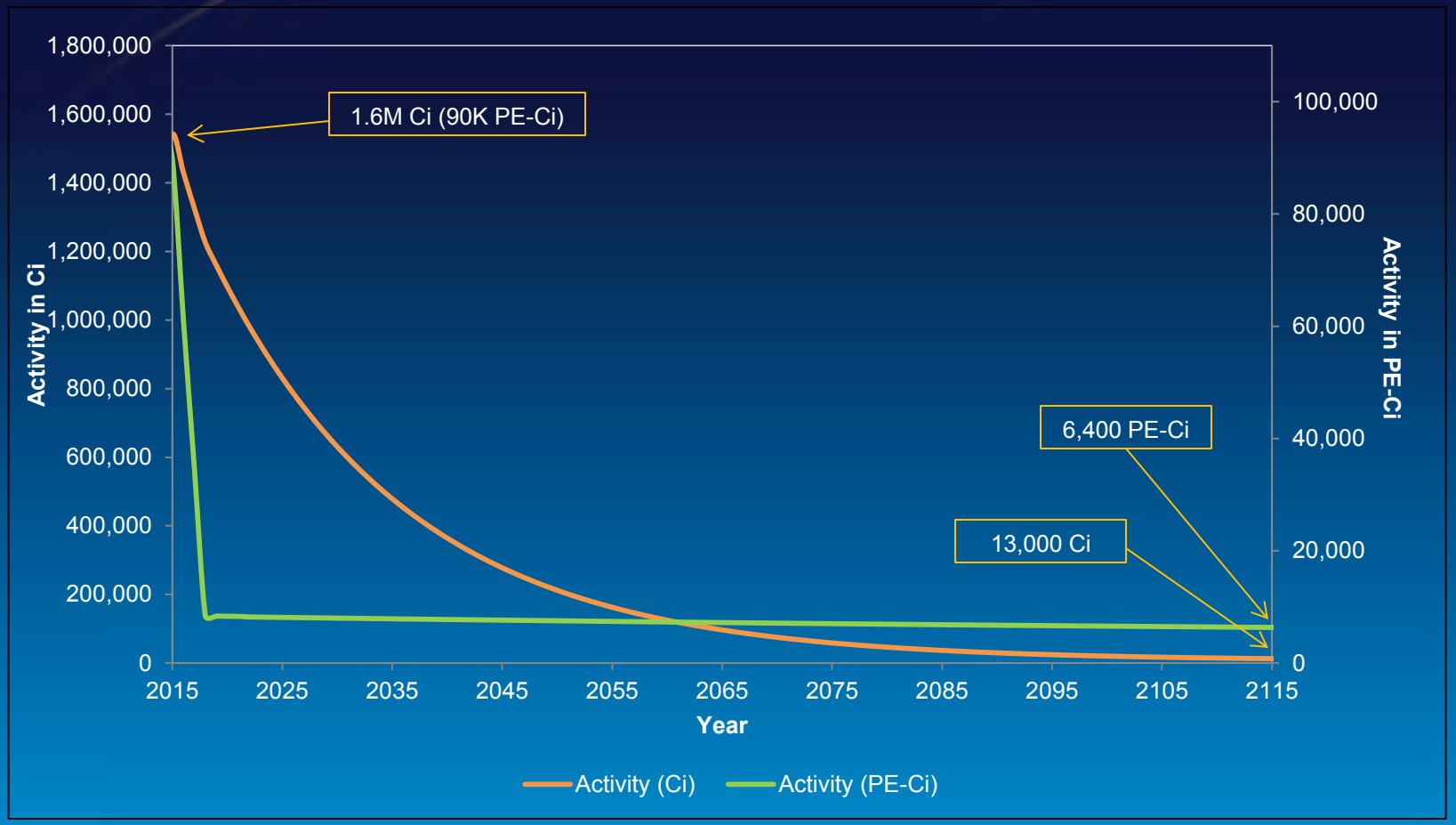
312 Active and Inactive Below-Grade Storage and Disposal Units

- **35 disposal pits; 2 pits also used for below-grade storage of TRU**
  - D&D debris, scrap materials, drummed wastes, contaminated soils, wood, hoppers, lab wastes, sludge, filters, compactable/non-compactable trash, uranium graphite, barium nitrate, pipe, glove boxes, tritium, asbestos, PCB, and unknown chemical wastes, beryllium in stainless steel, reactor control rods, experimental reactor vessel and stack debris
  - TRU wastes in corrugated metal pipes, drums and fiberglass crates
- **229 disposal shafts; 44 additional shafts used for below-grade storage of TRU**
  - Hot cell contaminated materials, metal products, equipment, depleted uranium, fission products, animal tissues, targets, solvents, chemicals, shielding
  - 12 disposal shafts containing PCB-contaminated waste
- **4 trenches used for below-grade storage of TRU**
  - Drums stored inside concrete casks
- **Range from 8 to 65 ft. below ground surface**

Summary of Below-Ground Waste At MDA G

Below-Grade Waste	Number of Disposal Units	Operational Period	Waste Volume (m3)	Inventory (Ci)		Inventory (PE-Ci)	
				As-Disposed	Decayed to 2115	As-Disposed	Decayed to 2115
Buried	35 pits and 229 shafts	1957-2015	292,000	3,870,000	13,000	10,000	6,300
Retrievably Stored	1 dedicated pit (pit 9) A portion of disposal pit 29 Trenches A-D 44 dedicated shafts	1971 - 1985	2,400	150,000	n/a	110,000	n/a

Activity of Below-Ground Waste at MDA G



MDA G Waste Characterization

1957 – 1970: Radioactive Waste

- No distinction made between LLW and TRU
- Radiological constituents characterized to meet existing DOE requirements. Process knowledge was predominant method; however assay and radiochemistry were also used on a limited basis
- No requirement to characterize chemical constituents until 1980, so the only information available for this period is based on process information and limited generator records

1971 – 1979: Radioactive Waste

- Distinguishes between LLW and TRU; LANL begins to limit disposal of TRU
- More extensive use of assay, radiochemistry and calorimetry combined with process information used to characterize to DOE requirements
- No requirement to characterize chemical constituents

1957 – 1979: Chemical Waste

- No radiological constituents
- No requirement to characterize chemical constituents until 1980, so the only information available for this period is based on process information and limited generator records
- Limited disposal at MDA G

1980 – Present: Hazardous Waste

- No radiological constituents
- Chemical constituents characterized to meet existing NMED and treatment facility requirements using laboratory analysis and process information
- Hazardous waste not disposed onsite except for inadvertent in pit 29 and shaft 124

MDA G Waste Characterization (continued)

1980 – Present: TRU Waste

- Assay, radiochemistry and calorimetry combined with process information used to characterize radiological constituents to DOE requirements
- Chemical constituents characterized to meet existing NMED requirements using laboratory analysis and process information
- By 1980, TRU waste no longer disposed onsite (all TRU waste stored)

1980 – 1990: Low-Level Waste

- Assay, radiochemistry and calorimetry combined with process information used to characterize radiological constituents to DOE requirements
- No requirement to characterize chemical constituents in RAD waste until 1991, so the only information for this period is based on process information and generator records

1991 – Present: Low-Level Waste

- Assay, radiochemistry and calorimetry combined with process information used to characterize radiological constituents to DOE requirements
- Chemical constituents characterized to meet existing NMED requirements using laboratory analysis and process information

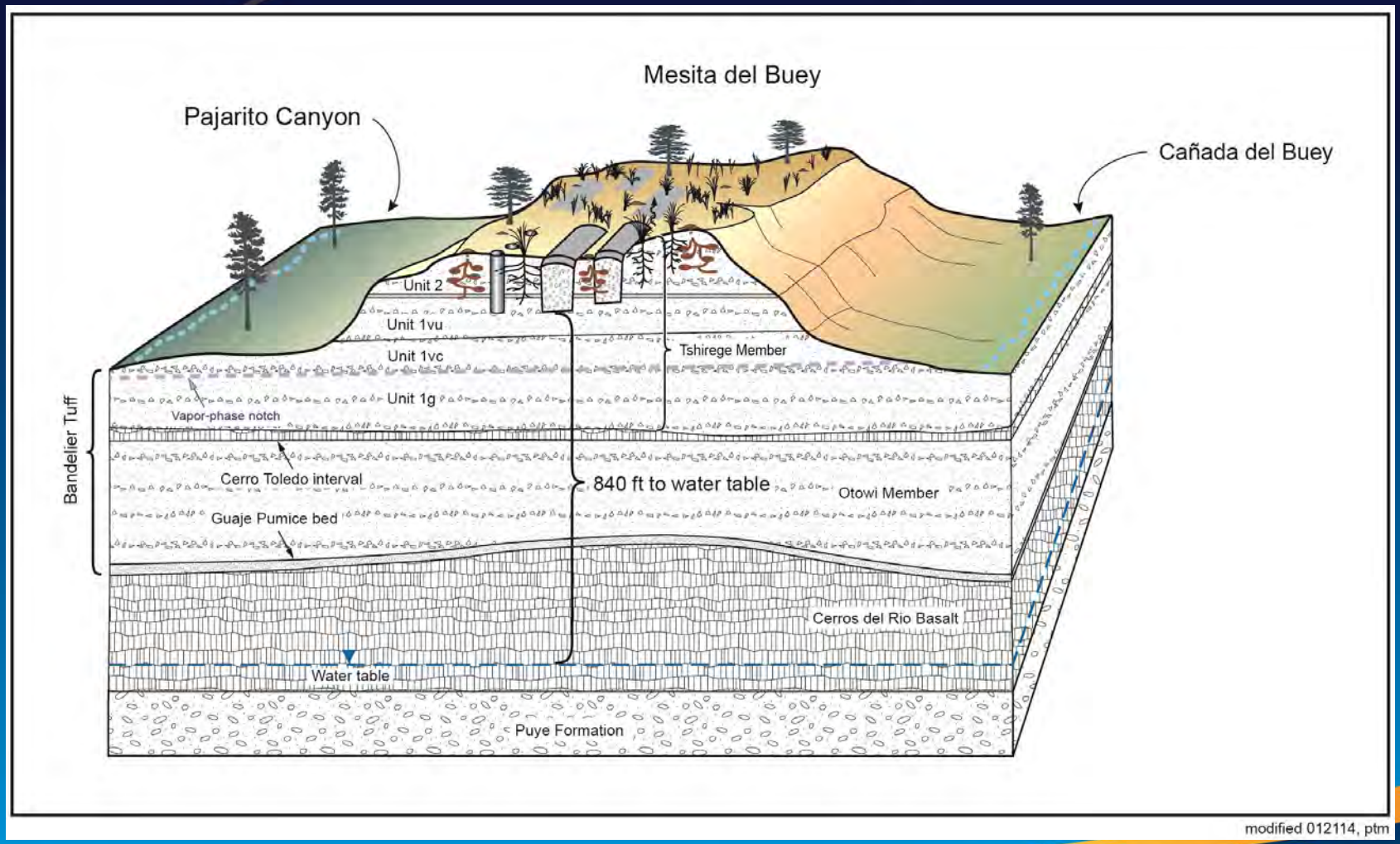
1991 – Present: Mixed Low-Level Waste

- Assay, radiochemistry and calorimetry combined with process information used to characterize radiological constituents to DOE requirements
- Chemical constituents characterized to meet existing NMED and treatment facility requirements using laboratory analysis and process information
- Since 1991, mixed low-level waste no longer disposed onsite

Site Characterization

- Site geology and hydrology
- Boreholes
- Surface soil and storm water analysis
- Pore gas analysis
- Groundwater monitoring
- Moisture monitoring
- Waste disposal records

Well Characterized Geology



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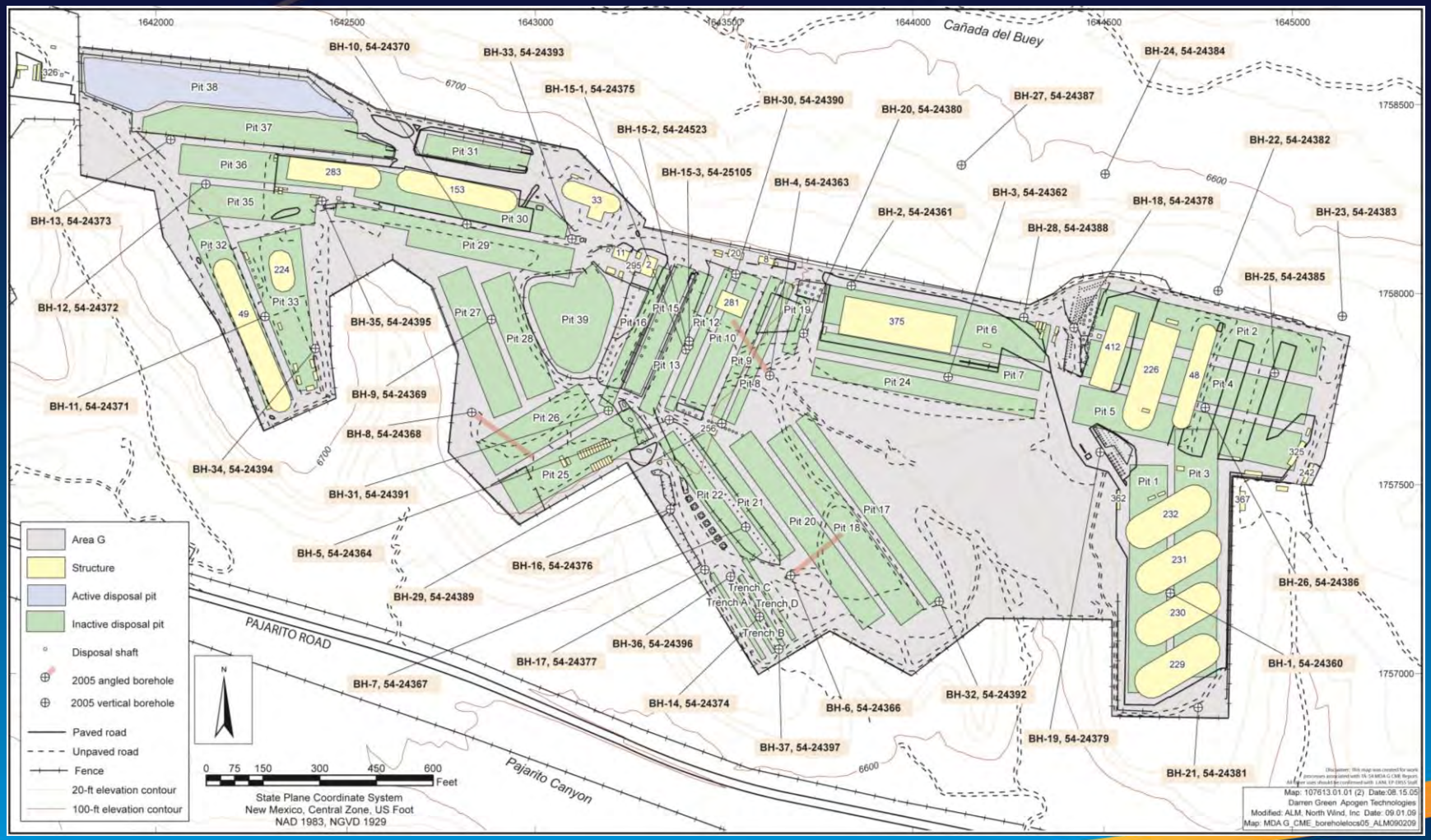
Characterization Boreholes



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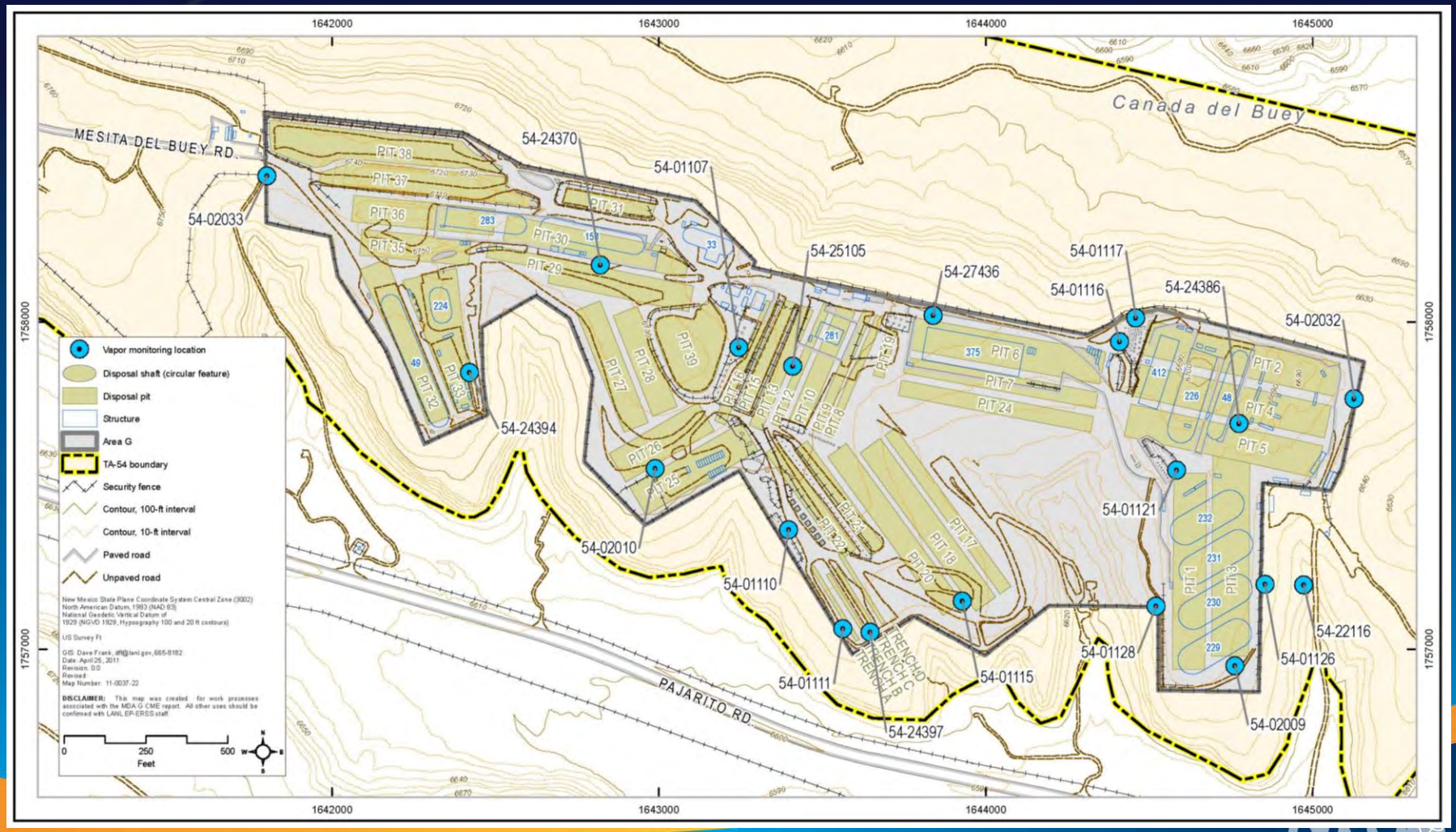
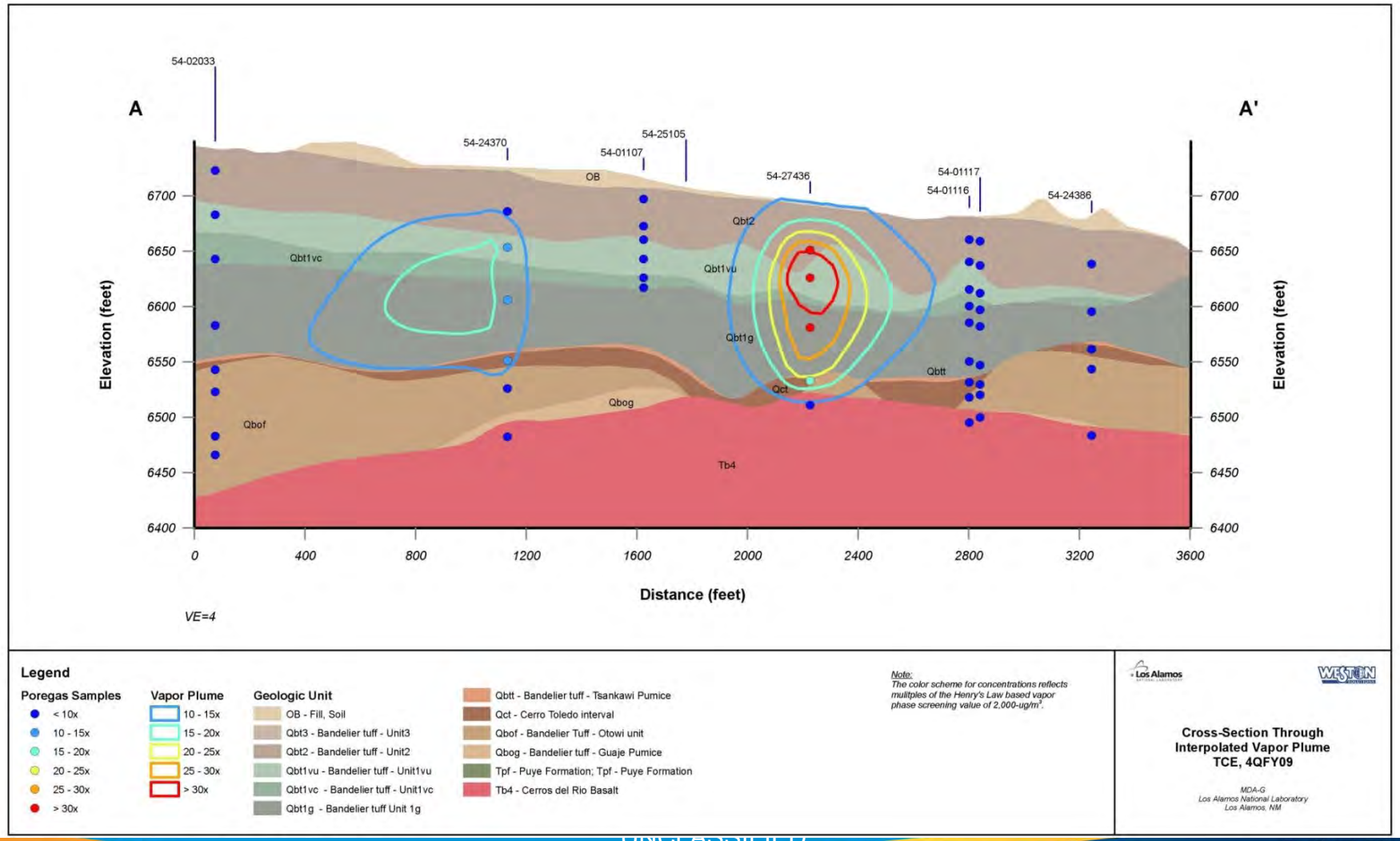
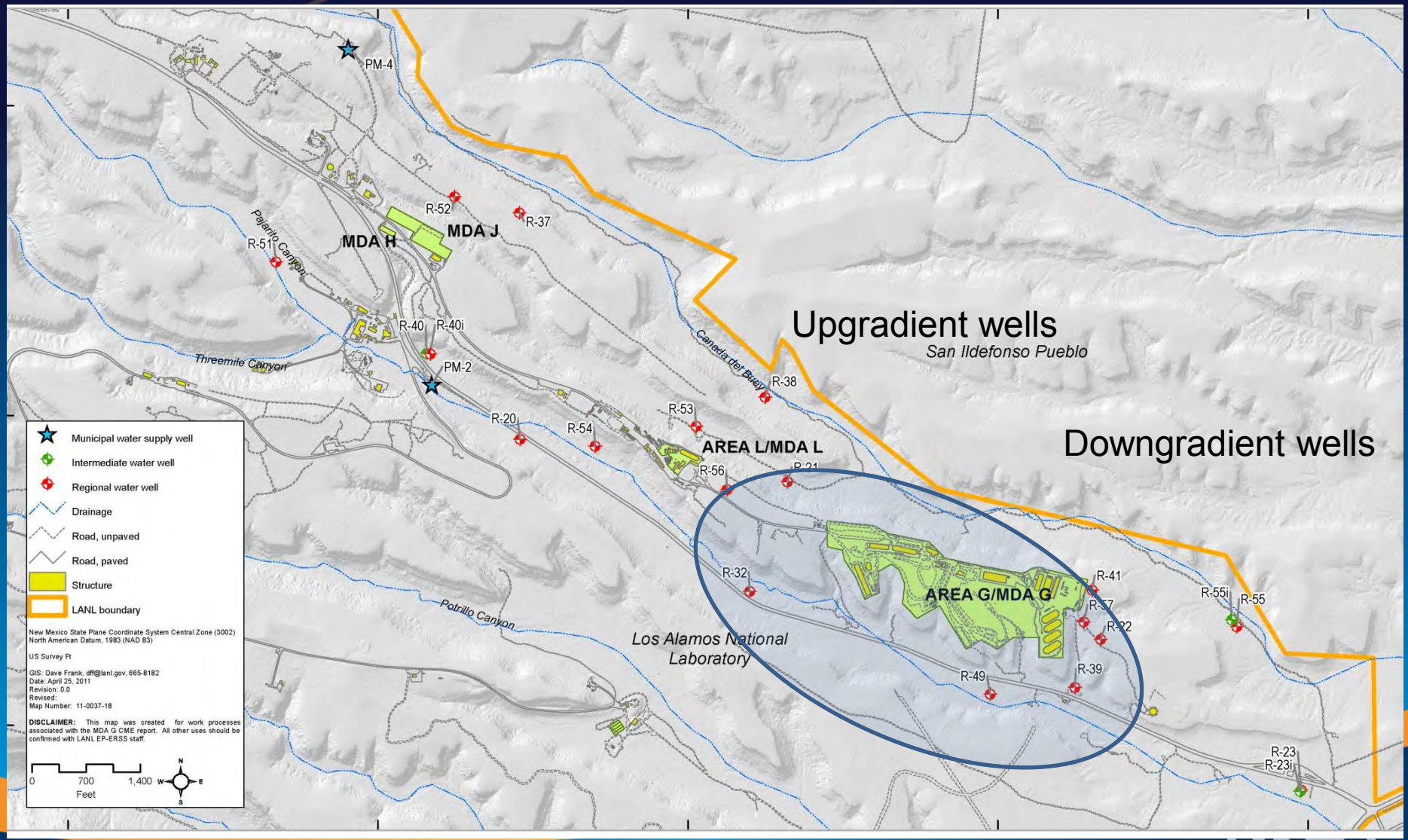
Vadose Zone Pore Gas Monitoring



Cross-Section Showing Vapor-Phase TCE Beneath MDA G – SVE Target



Groundwater Monitoring



Site Characterization

Phase I RCRA Facility Investigation 1993-1995

- Metals in channel sediments above background values
- Radionuclides detected above background values
- Tritium detected in subsurface and subsurface fluxes
- Volatile organic compounds in subsurface and surface fluxes

Consent Order Investigation 2005

- Organics – dioxins and furans at trace levels
- Inorganics – did not indicate release
- Naturally occurring and anthropogenic radionuclides above BV
- Pore-gas VOCs (TCA) and tritium plume in vadose zone
- No perched water zones detected

Supplemental 2007

- Additional pore-gas monitoring in vadose zone – similar

- **No substantive evidence of regional groundwater contamination**
- **Site characterization data is sufficient to provide scientifically credible information to facilitate engineering-driven remediation decisions**

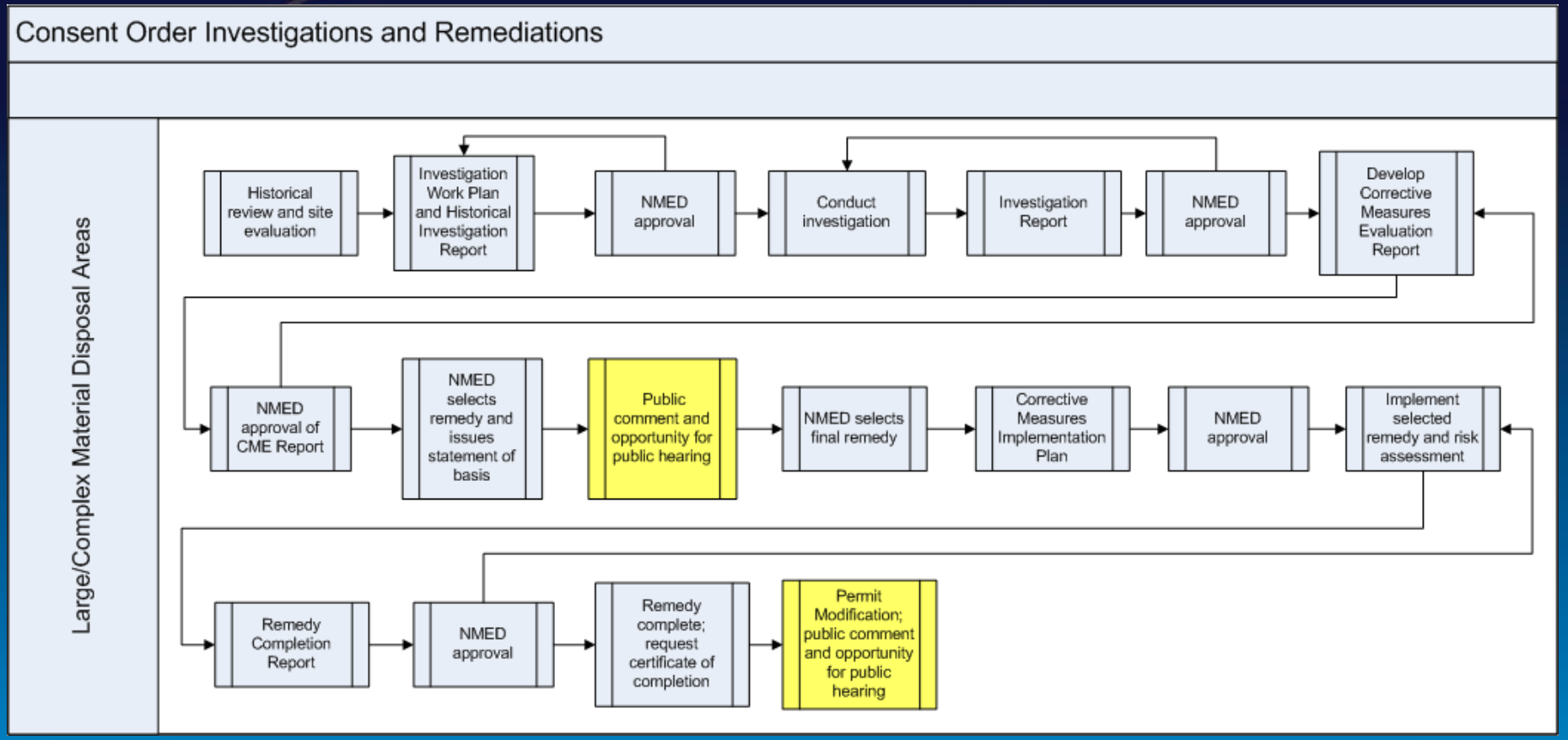
Site Characterization and Continued Monitoring

- **Groundwater beneath TA-54 Area G is protected with Defenses in Depth**
  - Comprehensive and robust vadose zone and groundwater network
  - No evidence that groundwater beneath TA-54 Area G is radioactively or chemically contaminated
- **Cleanup work at Area G is currently focused on above grade and below grade transuranic contaminated waste with long-lived radionuclides per the Framework Agreement**
  - 3,111 m^3 of 3,706 m^3 removed to date
  - Beginning work on below grade TRU removal
  - Accelerating work for removal of all above grade TRU waste

Regulatory Process for Remediation and Closure

- Consent Order investigation and remediation process
- DOE Order 435.1 radioactive waste management process

Corrective Measures Evaluation Process



Note: DOE Radioactive Authority Process not included in Consent Order CME Process outlined above.

Evaluation Criteria

Threshold Criteria – must be met (Consent Order Section VII.D.4.a)

- Protect human health
- Protect the environment
- Achieve media cleanup standards
- Achieve source control to mitigate future releases
- Comply with waste management regulations

Balancing Criteria – used to identify recommended alternative (Consent Order Section VII.D.4.b)

- Long term reliability and effectiveness
- Reduction of toxicity, mobility, and volume
- Short term effectiveness
- Implementability
- Cost

Potential MDA G Remedies

Description of Alternatives	Estimated Cost	Construction Duration
No Action Alternative	$0	0 yrs
One Multi-Layer Cover over 51 acres SVE with 24 boreholes Institutional Controls for 100 years	$213M	2-3 yrs
Recommended Alternative One Engineered Evapotranspiration (ET) Cover over 51 acres SVE with 24 boreholes Institutional Controls for 100 years	$186M	2-3 yrs
Excavation of the Pits and Shafts SVE with 24 boreholes Institutional Controls for 100 years	$29B	30 yrs

LANL Remedy Recommendation

- **Engineered evapotranspiration cap/cover with biointrusion barrier and native vegetation**
- **Targeted soil-vapor extraction to remove VOCs and tritium from vadose zone**
  - 30 SVE wells
  - 8 skid-mounted SVE units
- **Long term monitoring and maintenance to verify continued integrity and long-term performance of the ET cover remedy**

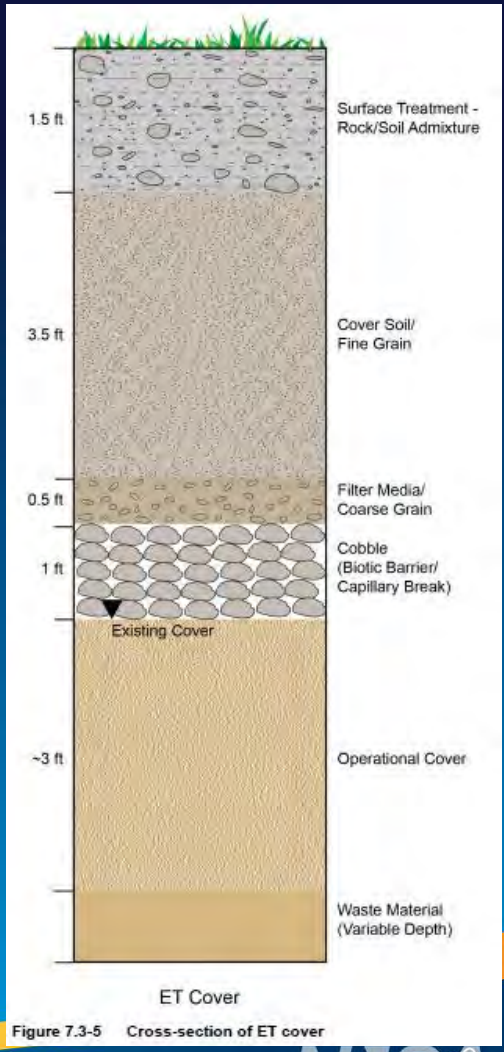


Figure 7.3-5 Cross-section of ET cover

DOE Determination of Radiological Remedy

- Management Procedure 05-17, Regulation and Release of Environmental Sites Containing, or Potentially Containing, Residual Contamination, Revision 3
  - Evaluation of proposed remedy against DOE long-term exposure requirements
  - DOE determination that proposed remedy is protective
  - Execution of remedy
  - Evaluation of remedy implementation
  - DOE determination that remedy was installed as required to be protective

Path Forward

Next Steps

- NMED approves CME and draft Statement of Basis
- Public notice of draft Statement of Basis
- Opportunity for potential public hearing on selected remedy
- DOE determination of whether proposed remedy is protective under radiological regulatory authority
- Close active RCRA units (NNSA)

5-7 Years after NMED issues Statement of Basis

- Completion of TRU campaigns
- Capital project authorization

7-10 Years after NMED issues Statement of Basis

- Remedy project execution
- Obtain certificates of completion (NMED)
- Remove from LANL Hazardous Waste Facility Permit

Summary

- Environmental cleanup at Area G is a “tough problem”
- Many corrective measures exist and many stakeholders are affected and involved
- Cleanup frameworks exist under the NMED Consent Order and DOE radiological closure process
- DOE/LANL communications will be honest, complete and transparent
- Cleanup frameworks involve public comments and hearings
- Through these processes, final decisions will be reached and action-based cleanup initiated
- Current field work in Area G is addressing the highest risks