New Mexico Environment Department

Regulatory Update
White Sands Test Facility (WSTF) Corrective Action

Rick Shean, Division Director, Resource Protection Division

Radioactive and Hazardous Materials Committee of the New Mexico Legislature

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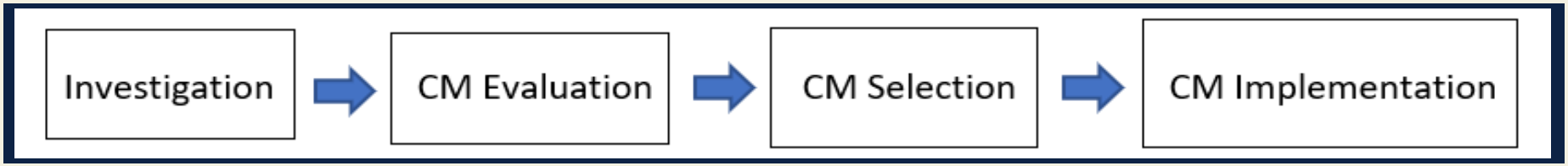
HWB Regulatory Authority

- Regulations
  - Federal Resource Conservation and Recovery Act (RCRA)
  - New Mexico Hazardous Waste Act (HWA)
  - New Mexico Hazardous Waste Permit and Corrective Action Fee Regulations [20.4.1 and 20.4.2 New Mexico Administrative Code (NMAC)]

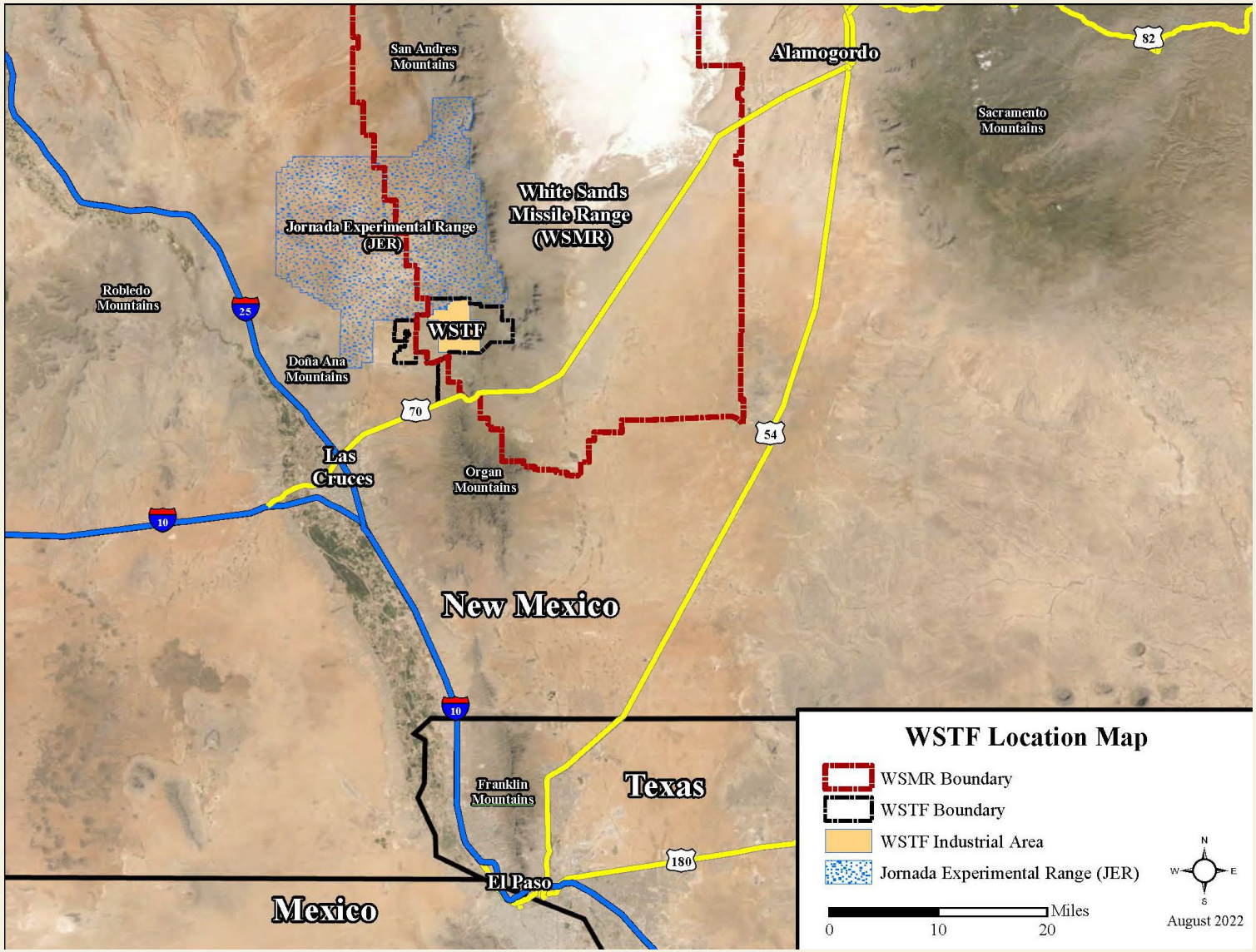
- WSTF Permit (EPA ID# NM08800019434)
  - Governs Corrective Action and Post-Closure Care at the Facility and Contains requirements for Corrective Action Process at WSTF

Corrective Action Process



- Investigation – Determine the nature and extent of the contamination in all media at the site.
- Corrective Measures Evaluation – Evaluate the potential methods to remediate the site.
- Corrective Measures Selection – Cleanup technology is chosen by NMED with input from public, stakeholder, and facility.
- Corrective Measures Implementation – Selected remedy installed, operated and maintained.

National Aeronautics and Space Administration (NASA) White Sands Test Facility (WSTF) Location



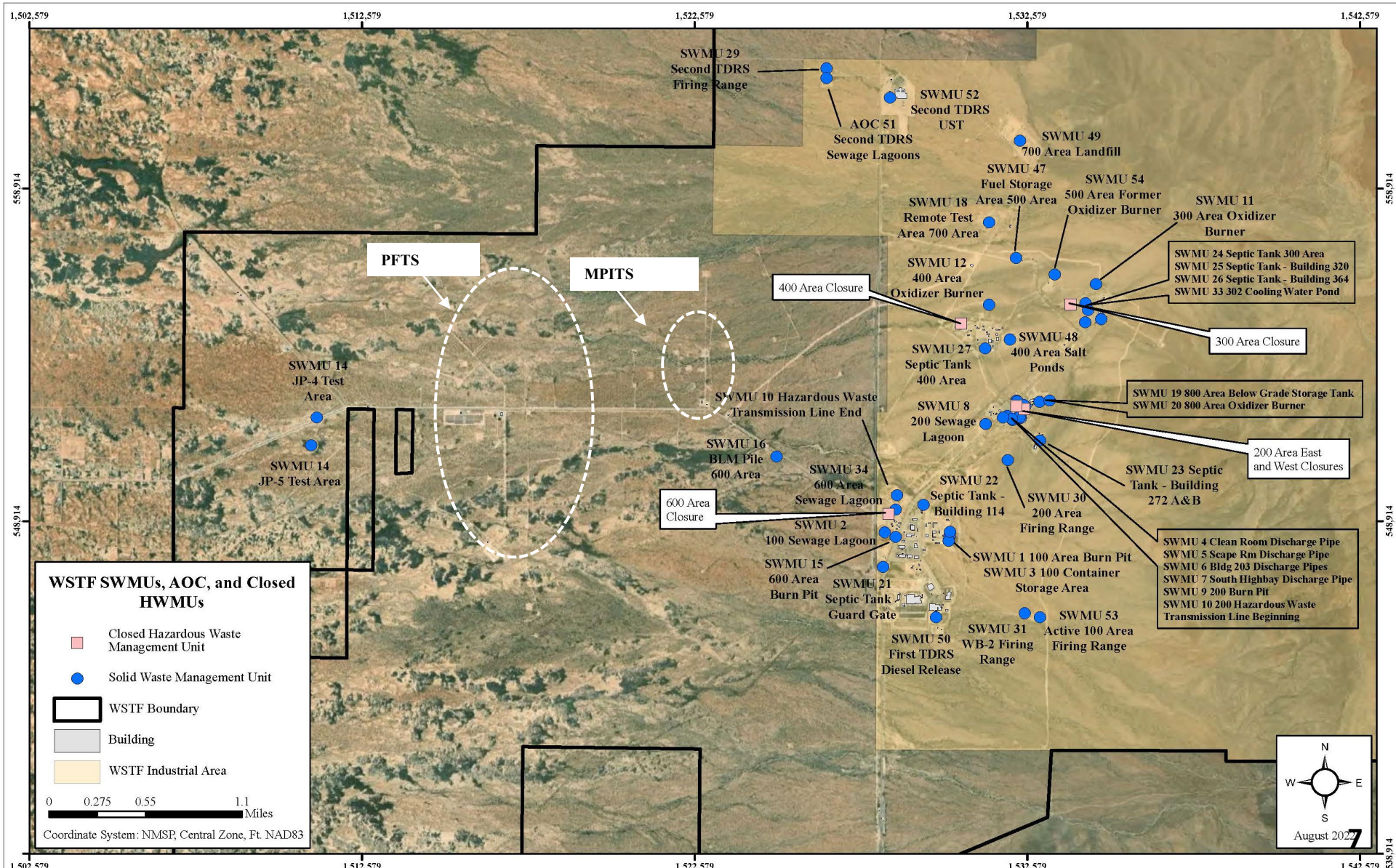
NASA WSTF RCRA Regulatory History

- Initial Resource Conservation and Recovery Act (RCRA) permits issued for WSTF
  - Feb. 1993 - Treatment, Storage, and Disposal Facility (TSDF) Permit
  - Sept. 1994 - Post-closure Permit for five closed hazardous waste management units (HWMUs) located at WSTF 200, 300, 400, and 600 Industrial Areas
  - RCRA Permits are issued for for a period of 10-years but remain in effect until a Permit update is issued by NMED.
- NMED reissued a RCRA Permit in 2009 for:
  - TSDF operations
  - Treatment of hazardous waste at an Evaporation Treatment Unit (ETU) and Fuel Treatment Unit (FTU)
  - Corrective action at facility SWMUs, AOCs, and closed-HWMUs, and post-closure care for HWMUs
- NASA has ceased TSDF operations as documented in NASA's June 2019 RCRA Permit Renewal Application

NASA WSTF RCRA Regulatory History (2)

- Current Permit (March 2023) includes NASA WSTF RCRA Post-Closure Care Permit.
- Requires corrective action at SWMUs, AOCs, and closed-HWMUs and continued post-closure care of the 200, 300, 400, and 600 Industrial Area HWMU Closures.
- NASA WSTF currently manages hazardous waste generated during routine facility operations as a RCRA large quantity generator that does not require a permit.

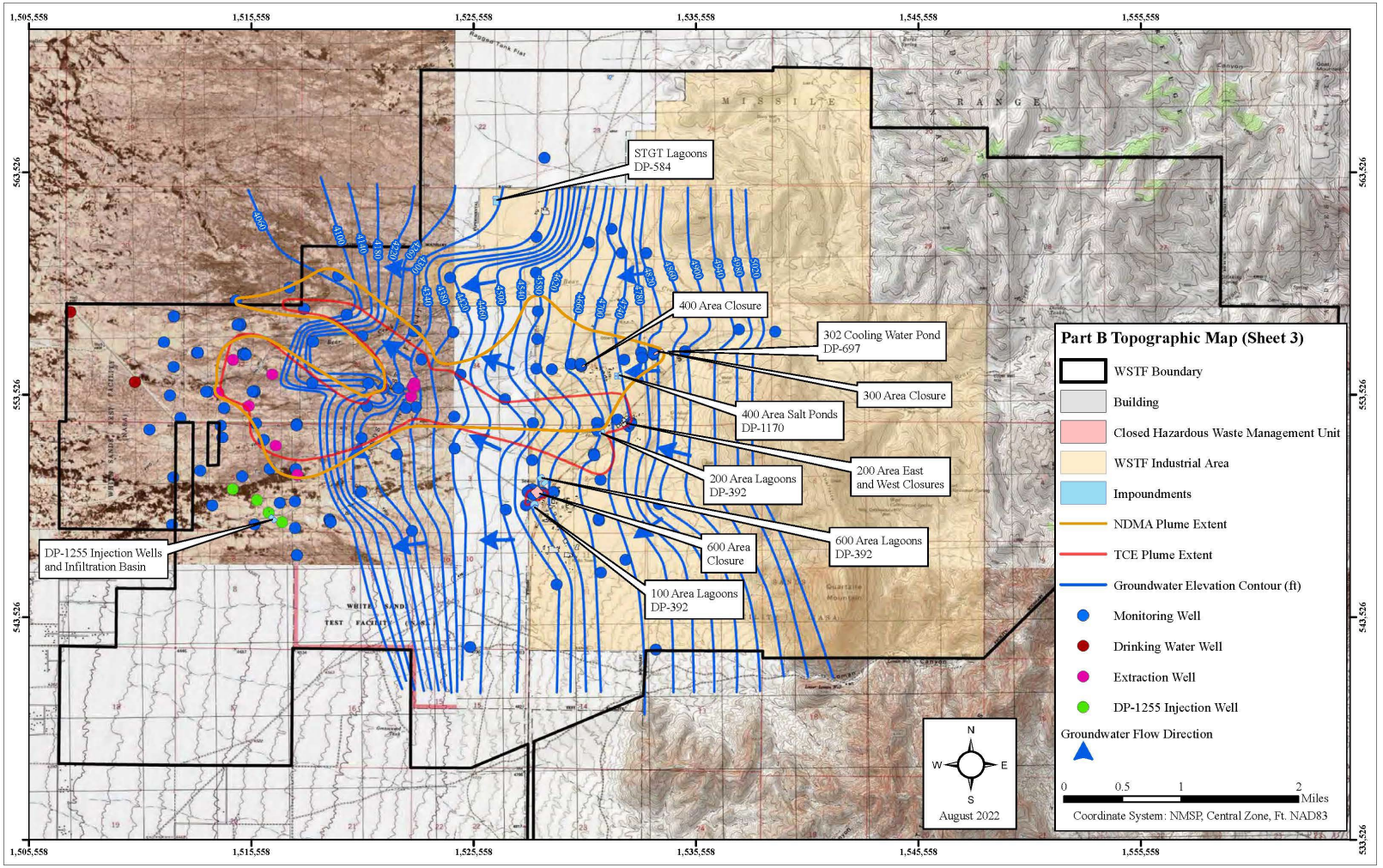
SWMU, AOC, and Closed-HWMU Locations



Source of WSTF Contamination

- Historic release of hazardous waste generated by propulsion and materials testing associated with space exploration projects beginning in 1964.
- Releases of hazardous waste to the environment likely occurred during early 1960's through the mid-1980's.
- Primary contaminants of concern released to the environment at WSTF include N-nitrosodimethylamine (NDMA), trichloroethene (TCE), tetrachloroethene (PCE), trichlorofluoromethane (Freon 11), and 1,1,2-trichloro-1,2,2-trifluoroethene (Freon 113).

WSTF TCE and NDMA Contamination Plumes, Groundwater Flow, and Well Locations



For scale: TCE and NDMA contaminant plumes are approximately four-miles long and one-mile wide at their most extensive point. Groundwater Flow is east to west.

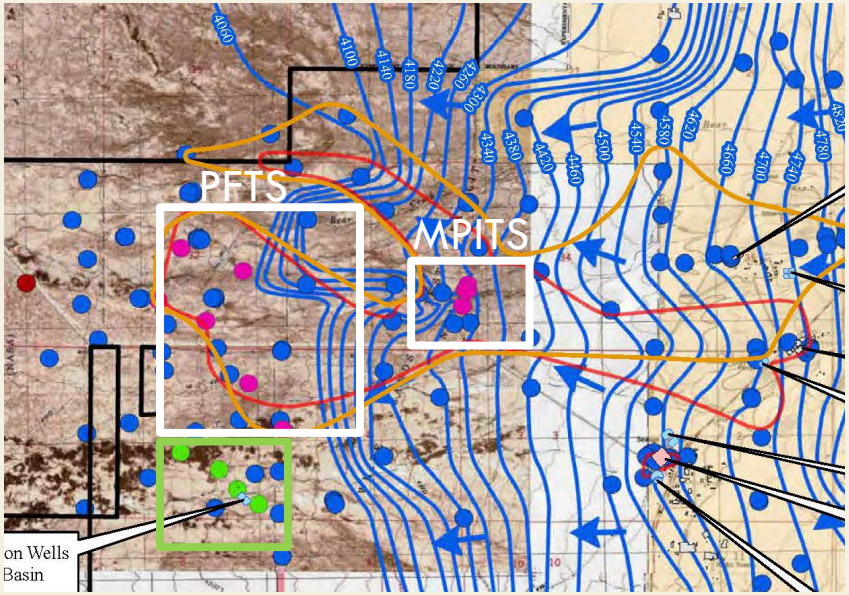
NASA WSTF Corrective Action

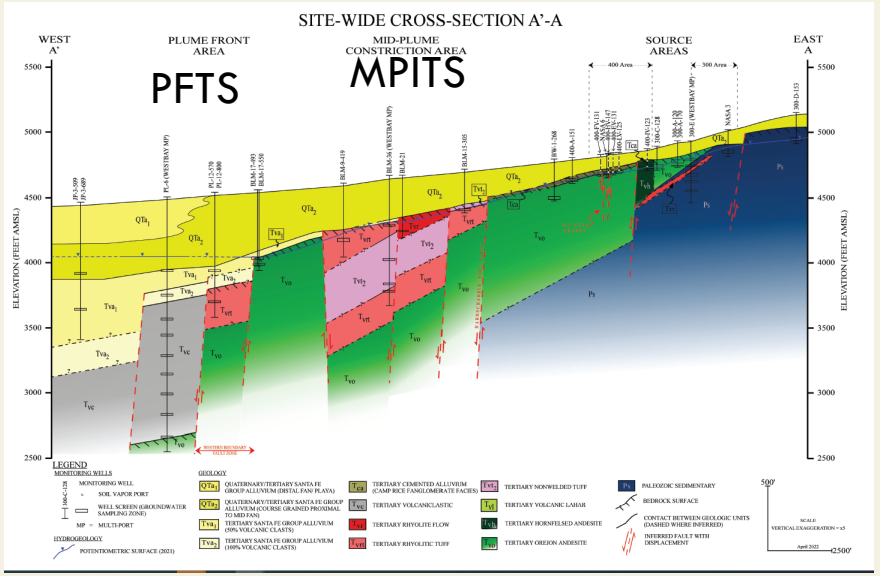
- Investigations since 2012 include:
  - 31 SWMUs, one AOC, and the five closed-HWMUs and groundwater data collection and remediation system monitoring and maintenance.
- Three HWMUs have been subject of investigation and have subsequently been "clean-closed" and do not require post-closure care.

- Ongoing subsurface investigations are characterize the nature and extent of contamination at the various units and identify additional sources.
- About 21 projects have been initiated or are ongoing at Industrial Areas.

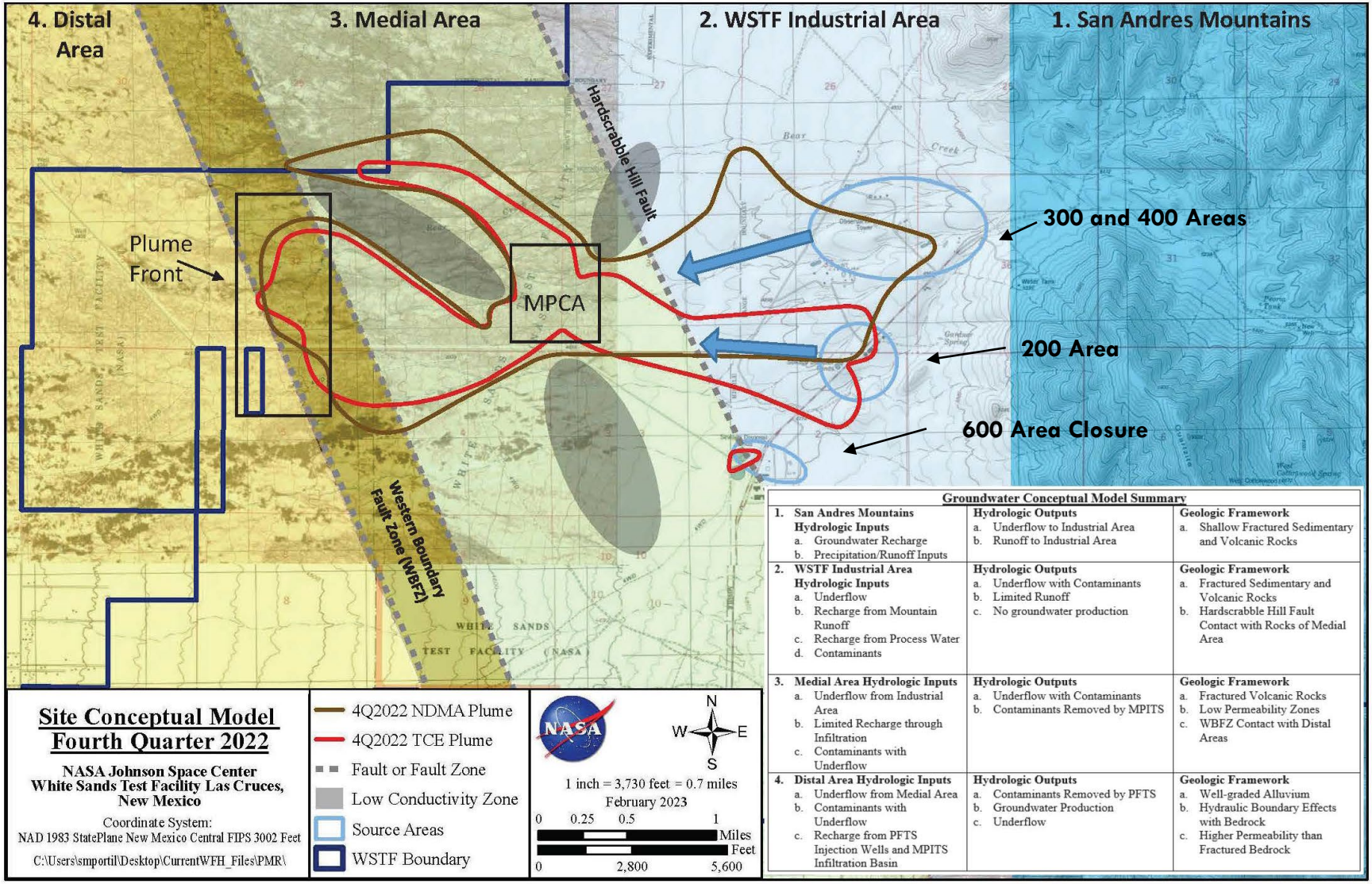
NASA WSTF Corrective Action Cont'd

- Annual groundwater sampling at 215 monitoring locations.
- NASA has two IM pump and treat remediation systems:
  - 2005 - Plume Front Treatment System (PFTS)
  - 2011 - Mid-Plume Interception Treatment System (MPITS)
- 150 million gallons of treated groundwater from the PFTS and MPITS combined annually.
- Reinjection authorized under discharge permit DP 1255, issued May 17, 2023.





WSTF Contamination Plume Conceptual Model



Groundwater Conceptual Model Summary

1. San Andres Mountains **Hydrologic Inputs** a. Groundwater Recharge b. Precipitation/Runoff Inputs	**Hydrologic Outputs** a. Underflow to Industrial Area b. Runoff to Industrial Area	**Geologic Framework** a. Shallow Fractured Sedimentary and Volcanic Rocks
2. WSTF Industrial Area **Hydrologic Inputs** a. Underflow b. Recharge from Mountain Runoff c. Recharge from Process Water d. Contaminants	**Hydrologic Outputs** a. Underflow with Contaminants b. Limited Runoff c. No groundwater production	**Geologic Framework** a. Fractured Sedimentary and Volcanic Rocks b. Hardscrabble Hill Fault Contact with Rocks of Medial Area
3. Medial Area Hydrologic Inputs a. Underflow from Industrial Area b. Limited Recharge through Infiltration c. Contaminants with Underflow	**Hydrologic Outputs** a. Underflow with Contaminants b. Contaminants Removed by MPITS	**Geologic Framework** a. Fractured Volcanic Rocks b. Low Permeability Zones c. WBFZ Contact with Distal Areas
4. Distal Area Hydrologic Inputs a. Underflow from Medial Area b. Contaminants with Underflow c. Recharge from PFTS Injection Wells and MPITS Infiltration Basin	**Hydrologic Outputs** a. Contaminants Removed by PFTS b. Groundwater Production c. Underflow	**Geologic Framework** a. Well-graded Alluvium b. Hydraulic Boundary Effects with Bedrock c. Higher Permeability than Fractured Bedrock

Current Status

- Corrective action at WSTF is still in the investigation phase of the corrective action process at various SWMUs, AOC, and closed-HWMUs.
- NMED will continue to require NASA to submit work plans and investigation reports for SWMUs, AOCs, and closed-HWMUs.
- WSTF groundwater monitoring program will continue for the foreseeable future under the authority of the RCRA Permit.
- Groundwater remediation and post-closure care at five closed-HWMUs will continue as required by the current RCRA Permit for the foreseeable future.

Path Forward

- NASA will continue with subsurface investigations and the delineation of source zone contamination at WSTF.
- Additional site and source zone investigation may result in the need for additional subsurface investigation and site risk assessment.
- If needed, NMED will consider future corrective action status determinations for WSTF contamination sites under their RCRA Permit.
- NASA will continue to operate the PFTS and MPITS to ensure that WSTF contaminant plumes do not migrate further.
- The discovery of emerging contaminants of concern issues at WSTF may require the need for additional investigation.