

**SUPPLEMENT ANALYSIS  
TO THE ENVIRONMENTAL ASSESSMENT FOR  
CHROMIUM PLUME CONTROL INTERIM MEASURE AND  
PLUME-CENTER CHARACTERIZATION**



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## **Acronym List**

CFR	Code of Federal Regulations
DP	Discharge Permit
EIS	environmental impact statement
EM-LA	Environmental Management, Los Alamos Field Office
gpm	gallons per minute
LANL	Los Alamos National Laboratory
NEPA	National Environmental Policy Act
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
OSE	New Mexico Office of the State Engineer
ppb	parts per billion
SWEIS	Site-Wide Environmental Impact Statement

## INTRODUCTION

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This supplement analysis to the 2015 *Environmental Assessment for Chromium Plume Control Interim Measure and Plume-Center Characterization* (DOE/EA-2005, DOE 2015a & b) (hereafter “2015 Environmental Assessment”) is being completed because the U.S. Department of Energy (DOE), Environmental Management, Los Alamos Field Office (EM-LA) proposes to drill additional wells and continue aquifer testing within Mortandad Canyon, Technical Area 05 at Los Alamos National Laboratory (LANL). These actions support an interim measure being conducted to control the migration of a chromium plume in the regional aquifer.

DOE has determined that installation of additional extraction wells and associated infrastructure will improve the effectiveness of the system to control chromium plume migration until DOE and the New Mexico Environment Department (NMED) select a final remedy in compliance with the 2016 Compliance Order on Consent. Injection of treated water is the principle mechanism for controlling plume migration. Therefore, maximizing the amount of water available for injection will help meet the interim measure objective more efficiently. The current water volume that can be pumped (from three existing extraction wells) and used for injection is about 210 gallons per minute.

Pursuant to DOE National Environmental Policy Act (NEPA) implementing procedures in 10 Code of Federal Regulations (CFR) 1021.314(c), DOE must evaluate these proposed actions to determine whether (a) the 2015 Environmental Assessment should be supplemented, (b) a new environmental assessment should be prepared, or (c) that no further NEPA documentation is required.<sup>1</sup> In preparation of this supplement analysis, DOE reviewed relevant regulatory, technical, and prior NEPA documents. Based on these reviews and additional analyses, DOE has determined that the 2015 Environmental Assessment sufficiently bounds the potential environmental impacts from the proposed action and no further NEPA documentation is required.

## BACKGROUND

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LANL is a multidisciplinary, multipurpose research institution owned and managed by the DOE in north-central New Mexico about 60 miles north-northeast of Albuquerque and about 25 miles northwest of Santa Fe. LANL extends over approximately 40 square miles of DOE-owned property (Figure 1). There are about 2,000 structures totaling approximately eight million square feet that house LANL operations and activities; about half the square footage is used as laboratory or production space and the

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<sup>1</sup> In addition, 10 CFR 1021.314(c) explicitly references the Council on Environmental Quality NEPA regulations (40 CFR 1502.9(c)) which require Federal agencies to prepare supplements to appropriate NEPA documents if “(i) the agency makes substantial changes in the proposed action that are relevant to environmental concerns” or “(ii) there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.”

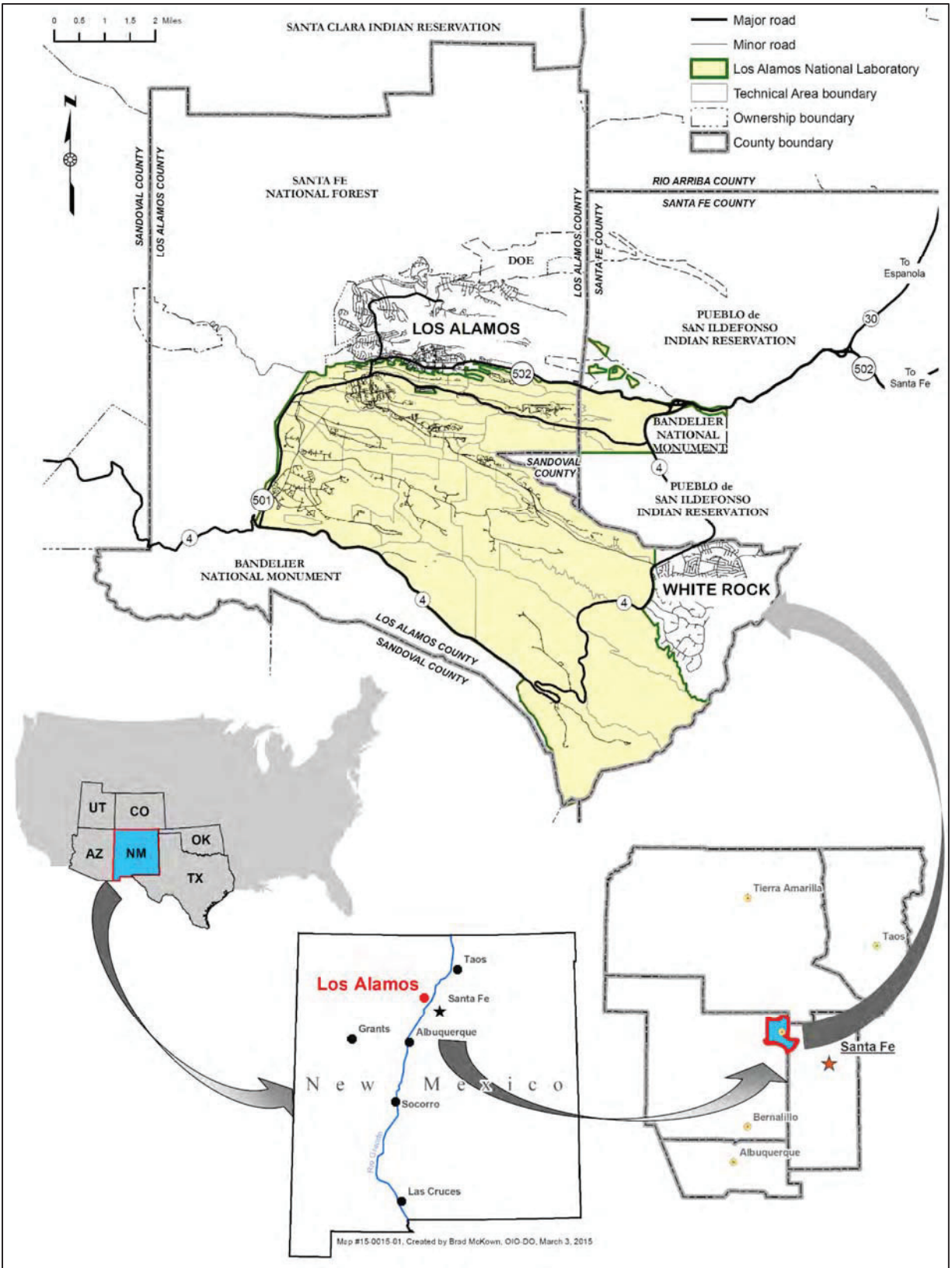


Figure 1. Location of Los Alamos National Laboratory

remainder for administration and offices, storage, service, and other purposes. DOE EM-LA is responsible for the cleanup of legacy contamination at LANL.

As stated in the 2015 Environmental Assessment, DOE has been working since 2006 to characterize the nature and extent of hexavalent chromium contamination in the regional aquifer that resulted from historical use of potassium dichromate as a corrosion inhibitor at LANL between 1956 and 1972. Hexavalent chromium was present in the cooling-tower water that was discharged to an outfall in Technical Area 03 as part of operational maintenance activities (Figure 2). Concentrations of hexavalent chromium within the groundwater plume beneath Mortandad Canyon exceed the New Mexico groundwater standard of 50 parts per billion (ppb) near the property boundary between LANL and the Pueblo de San Ildefonso and have been as high as approximately 1,000 ppb in the plume center in the vicinity of groundwater monitoring well R-42 (Figure 3). Groundwater monitoring well sampling data collected to date have shown increasing chromium concentrations on the plume edges (sidegradient and downgradient), which is indicative of plume migration.

The activities analyzed in the 2015 Environmental Assessment were intended to control the migration of the plume until a final remedy is selected. EM-LA has completed the following activities since the issuance of the 2015 Environmental Assessment:

- Received Discharge Permit (DP) 1835, allowing injection of treated groundwater into the regional aquifer as described and analyzed in the 2015 Environmental Assessment;
- Land applied treated water in accordance with Discharge Permit<sup>2</sup> (DP-1793) awaiting approved injection well permits as described and analyzed in the 2015 Environmental Assessment;
- Received Emergency Authorization to add groundwater Points of Diversion for the diversion of up to 679 acre feet of water per year from the New Mexico Office of the State Engineer (OSE)<sup>3</sup>
- Installed five (5) injection wells as described and analyzed in the 2015 Environmental Assessment;
- Installed two (2) extraction wells as described and analyzed in the 2015 Environmental Assessment;

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<sup>2</sup> Discharges greater than 5,000 gallons require the submittal of a Notice of Intent to the New Mexico Environment Department, pursuant to 20.6.2.1201 of the New Mexico Administrative Code. The New Mexico Water Quality Control Commission regulations control liquid discharges onto or below the ground surface to protect all groundwater in New Mexico. Under the regulations, a facility must submit a discharge plan and obtain a permit from the New Mexico Environment Department. Subsequent discharges must be consistent with the terms and conditions of the discharge permit.

<sup>3</sup> Under Section 72-5-25 NMSA, the State Engineer has the authority to issue emergency authorization to change the place of diversion, storage or use of water. This authorization allows for the extraction of groundwater from the OSE permitted wells.

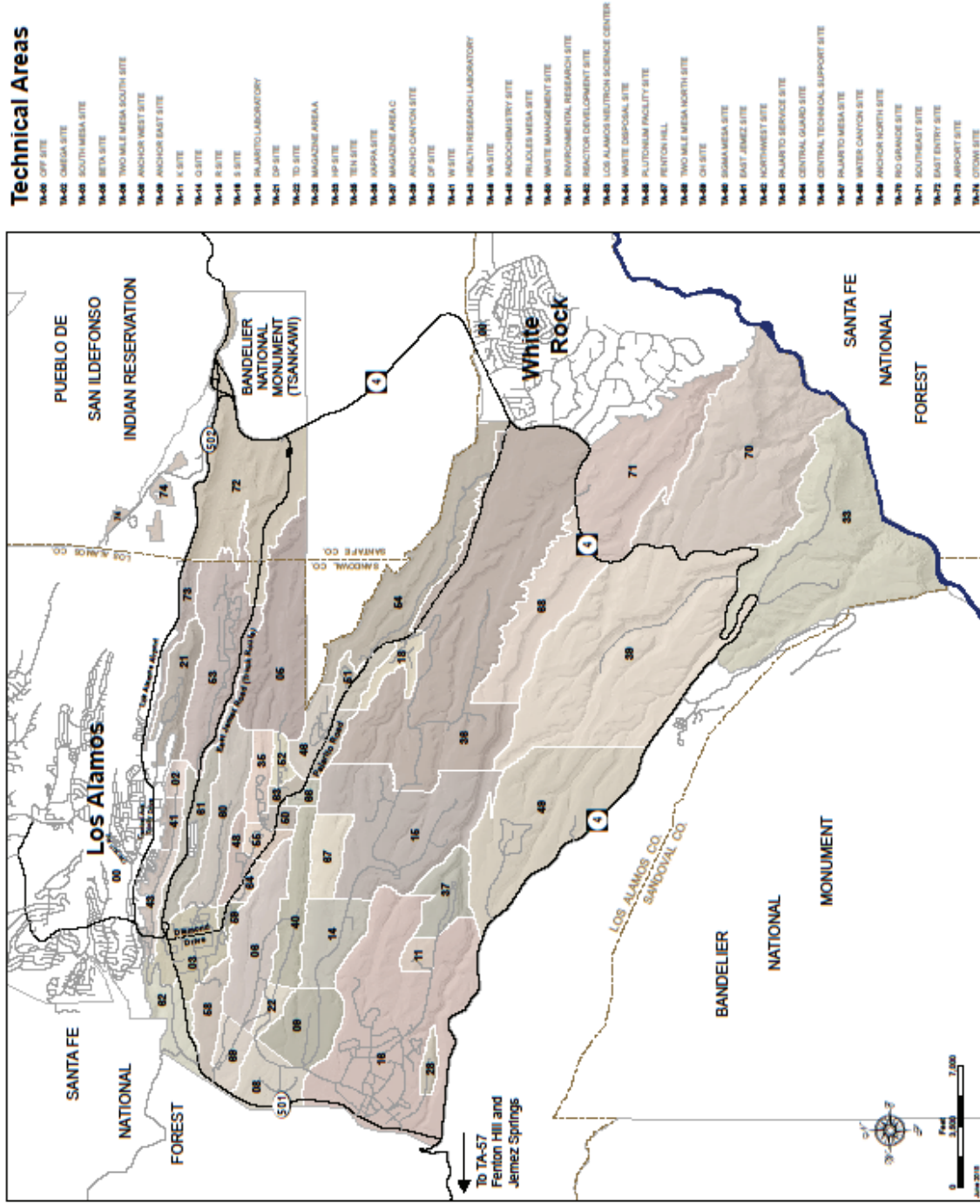


Figure 2. Technical Areas at Los Alamos National Laboratory



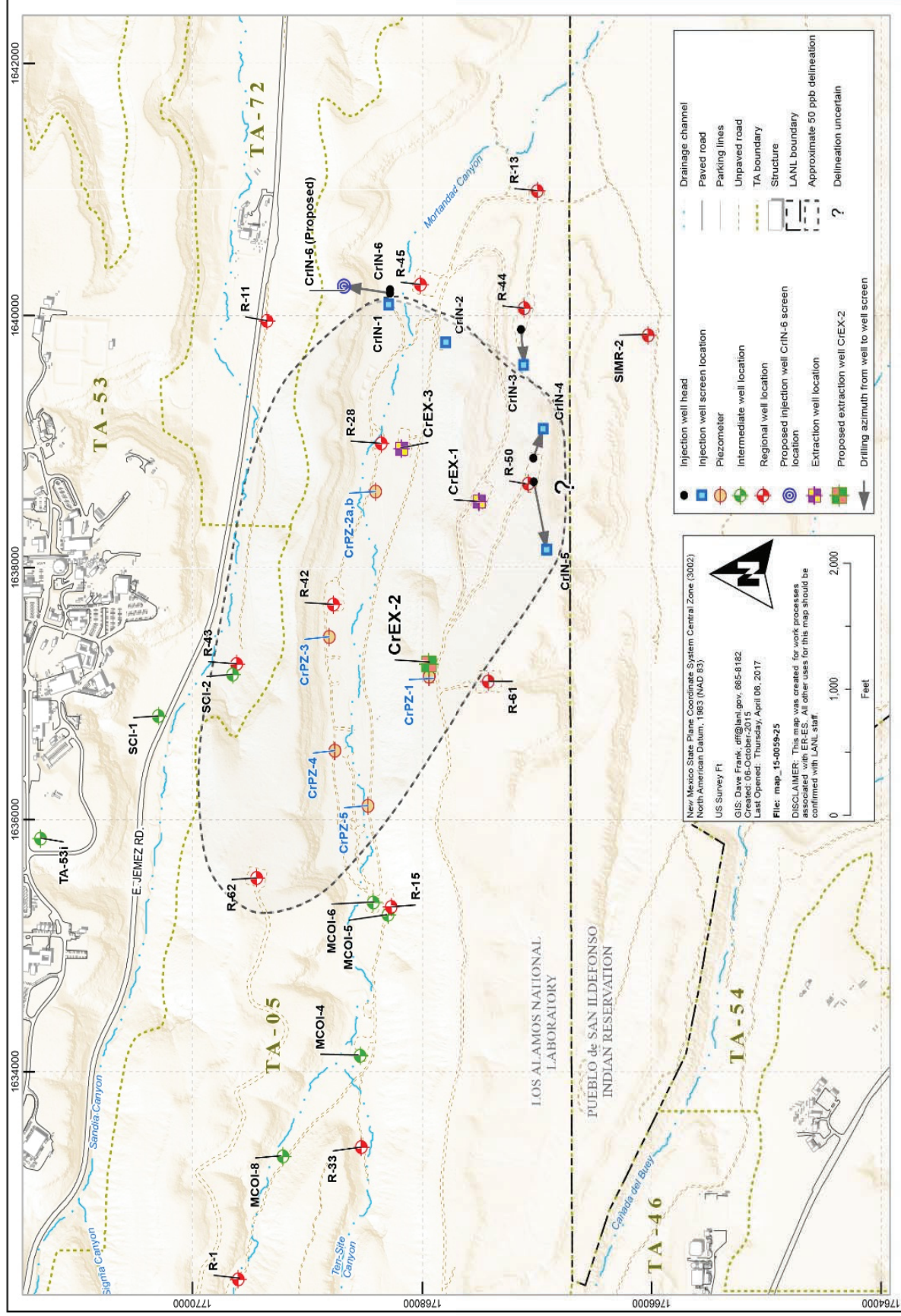


Figure 3. Chromium plume (>50-ppb concentration) area with existing extraction, injection, and monitoring wells

- Installed pipelines, powerlines, and other infrastructure as described and analyzed in the 2015 Environmental Assessment;
- Began operating the groundwater extraction, treatment, and injection system described and analyzed in the 2015 Environmental Assessment; and
- Deployed tracers into monitoring wells as described and analyzed in the 2015 Environmental Assessment.

## **PURPOSE AND NEED FOR ACTION**

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The purpose and need for the DOE actions described in the 2015 Environmental Assessment and in this supplement analysis is to control migration of the chromium plume in the regional aquifer. Data collected for the 2015 Environmental Assessment and from the work that has been initiated since the issuance of the 2015 Environmental Assessment indicate that, in the absence of any action, plume migration will continue toward the boundary LANL shares with the Pueblo de San Ildefonso. DOE therefore needs to continue to implement the interim measures that can have a rapid effect on plume migration. DOE must also continue to evaluate the effectiveness and feasibility of a final remedy in accordance with the 2016 Compliance Order on Consent between DOE and the New Mexico Environment Department for the chromium plume. Field-scale studies analyzed and described in the 2015 Environmental Assessment to characterize the plume center would continue for eight years and data collected will inform decisions regarding a final remedy. The 2015 Environmental Assessment stated that these field-scale tests would only be conducted for two years, however, the data that these tests have provided to date are beneficial and under the proposed action, these studies would continue for up to eight years.

The actions being evaluated in this supplement analysis include installation of additional wells and associated infrastructure to maximize the volume of treated groundwater to more efficiently meet the interim measure objective and to continue plume-center characterization studies for eight years.

## **DESCRIPTION OF PROPOSED ACTION**

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DOE proposes to drill additional wells in Mortandad Canyon as needed to support more efficient and effective control of the migration of the chromium plume. DOE also proposes to extend the period of time that field tests would be conducted from 2 years to the entire eight year period analyzed for the entire project in the 2015 Environmental Assessment. Additional extraction wells, depending on the rate at which they can extract water, and associated infrastructure (e.g., powerlines, dirt roads, and pipelines) are needed to achieve the goals of the interim measure because the total groundwater volume that can be pumped from the three existing extraction wells is limited to 210 – 240 gpm by natural hydraulic properties. Additional volume obtained from new wells

would provide operational flexibility by providing more treatment of water in areas of the plume where rapid migration may be the most likely. Pumping contaminated groundwater from extraction wells allows for treatment to remove chromium from the aquifer and establishes a capture zone, which is the portion of the plume that is drawn into an extraction well. The observed hydraulic properties that are present at existing extraction wells constrain the amount of water that can be extracted and, therefore, the overall portion of the plume that is within capture zones. Equally important is the injection of treated groundwater into existing injection wells. The 210 – 240 gpm pumped from extraction wells distributed across six injection wells equates to approximately 35 – 40 gallons into each injection well. DOE did not obtain DP 1835, which allows for injection of the treated water, until 2017; therefore, the extracted water was land applied in compliance with DP 1793. Because of the limited amount of water that can be pumped from extraction wells, a correspondingly limited amount is available for injection. These factors impact the confidence and desired timeframe for achieving the interim measure goal of controlling plume migration near the LANL site boundary. The additional water generated by additional extraction wells will not exceed the volume analyzed in the 2015 Environmental Assessment.

Since the issuance of the 2015 Environmental Assessment, plume center characterization has provided important information to identify potential long-term remedies. For this reason, plume center characterization studies would continue for up to eight years under this proposed action extending the two-year period evaluated in the 2015 Environmental Assessment. Data from this testing provide additional insight into the feasibility and design of a potential chromium removal pump-and-treat system or in situ remedial alternatives. Field tests that would continue under the proposed action involve continued pumping from CrEX-3 (characterization extraction well), the use of existing shallow piezometers to monitor water levels in the shallow Sandia Canyon alluvial system and use of data from deep piezometers and wells. Deep piezometers are used for water-level monitoring and water-quality sampling from the regional aquifer. Field tests also involve injection of tracers and/or amendments at the deep piezometers and/or wells and monitoring the performance of these at nearby monitoring wells. These studies, using tracers and/or chemicals or biostimulants, evaluate the feasibility of in situ remedies to convert hexavalent chromium to the stable, nonmobile, nontoxic trivalent form and would be conducted under NMED and the OSE permits.

## **EVALUATION OF IMPACTS**

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This supplement analysis relies upon the impacts analysis in the 2015 Environmental Assessment. The approach used in this supplement analysis eliminates or minimizes the discussion of resources not affected and focuses on resources where changes or potential impacts are anticipated. The Mitigation Action Plan for the 2015

Environmental Assessment, discusses specific mitigations associated with cultural and biological resources and potential impacts to the floodplain (DOE 2016). For this supplement analysis, DOE compared changes associated with the proposed action to those analyzed in the 2015 environmental assessment (Table 1).

There are no substantive changes associated with any of the resources described in Table 1. While additional wells are proposed in this supplement analysis, impacts associated with water resources will remain consistent, because water volumes will remain within in the 230 million gallons (707 acre-feet) annually over the approximately eight-year duration of the project analyzed in the 2015 Environmental Assessment. All environmental impacts associated with the proposed action are bounded by the analysis in the 2015 Environmental Assessment and will be temporary for the life of the project.

## **CONCLUSION**

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In this supplement analysis, DOE considered potential environmental impacts associated with the proposed action. DOE has determined there would be no substantial changes in the proposed action relevant to environmental concerns or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Although the 2015 Environmental Assessment does not explicitly analyze more than two extraction wells and six injection wells, potential environmental impacts associated with the proposed action are bounded by existing NEPA analyses in the 2015 Environmental Assessment.

## **DETERMINATION**

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Based upon the analysis in this supplement analysis, DOE has determined the proposed action would make no substantial change to the proposed action relevant to environmental concerns, and there are no significant new circumstances or information relevant to environmental concerns and bearing upon operational activities or their impacts.

Accordingly, DOE determines environmental impacts of the proposed action have been sufficiently considered and are bounded by existing NEPA analyses and there is no need to prepare a supplemental environmental assessment pursuant to 40 CFR 1502.9. Based upon the analysis in this supplement analysis and review of the references, per 10 CFR 1021.314 (c) (iii), DOE determines no further NEPA documentation is required to implement the proposed action.

**Table 1. Proposed Action Impact Comparison**

<b>Resource</b>	<b>Impact statement from the 2015 Environmental Assessment</b>	<b>Changes associated with the proposed action discussed in this supplement analysis</b>	<b>Subject to the 2015 Mitigation Action Plan</b>
<b>Land Use</b>	Activities would take place within the LANL boundary in an area of active groundwater investigation; activities would be compatible with existing land uses.	No substantive change to land use impacts, however some additional wells and infrastructure will be installed.	Yes
<b>Geology and Soils</b>	Installation and operation of extraction and injection wells would have minimal to negligible effects to geology. Small effects to soil profiles would occur from soil disturbance associated with grading.	No substantive change to geology and soils impacts, however some additional wells and infrastructure will be installed.	Yes
<b>Groundwater</b>	Nearby Los Alamos County water-supply wells draw water from the regional aquifer. Pumping from proposed extraction wells would result in temporary increases in drawdown of up to 6.4 feet at County wells in the Pajarito Mesa wellfield. This drawdown would likely not affect the economic or physical characteristics of the wells. Water injected into the aquifer through injection wells, land-applied, or evaporated would meet NMED Ground Water Quality Bureau permit standards; activities under the proposed action would not increase the flow of contaminants into groundwater.	No change, pumping rates will be within the bounding condition analyzed in the 2015 Environmental Assessment. Potential drawdown impacts to nearby Los Alamos County wells continues to be an estimated 6.4 feet.	Yes

<b>Resource</b>	<b>Impact statement from the 2015 Environmental Assessment</b>	<b>Changes associated with the proposed action discussed in this supplement analysis</b>	<b>Subject to the 2015 Mitigation Action Plan</b>
<b>Surface water</b>	Stormwater runoff from activities would be controlled through best management practices; effects on surface-water quality or quantity would be minimal.	No change to surface water impacts.	Yes
<b>Air Quality</b>	Activities would produce criteria-pollutant, hazardous air-pollutant, and/or greenhouse-gas emissions from earth-moving activities (dust), use of equipment (exhaust), and operation of mechanical evaporators (particulate matter). Effects on air quality would be small to negligible. A portion of the activity area lies within buffer habitat for the Mexican spotted owl. Potential effects to the Mexican spotted owl from direct disturbance, noise, or treated-water disposition would be avoided through annual biological surveys to ensure the project area is not occupied or nest locations are farther than 1,300 feet from project activities and restricting activities, such as land application within the buffer area, from March 1 to August 31. Activities under the proposed action are not likely to affect the Mexican spotted owl, migratory birds, other sensitive species, or floodplain/riparian habitat.	No change to air quality impacts.	Yes
<b>Ecological Resources</b>	A portion of the activity area lies within buffer habitat for the Mexican spotted owl. Potential effects to the Mexican spotted owl from direct disturbance, noise, or treated-water disposition would be avoided through annual biological surveys to ensure the project area is not occupied or nest locations are farther than 1,300 feet from project activities and restricting activities, such as land application within the buffer area, from March 1 to August 31. Activities under the proposed action are not likely to affect the Mexican spotted owl, migratory birds, other sensitive species, or floodplain/riparian habitat.	No change to ecological resources impacts.	Yes. Threatened and Endangered species habitat will not be impacted by the proposed action.
<b>Cultural Resources</b>	Historic properties would be avoided during proposed action activities, including construction, maintenance, and land application of treated water. Road improvements would be used to minimize the risk of impacts to archaeological sites from road use and maintenance. Stormwater runoff control measures would be employed to minimize erosion.	No change to cultural resources impacts.	Yes. All archaeological sites will be avoided, No affect through avoidance.

<b>Resource</b>	<b>Impact statement from the 2015 Environmental Assessment</b>	<b>Changes associated with the proposed action discussed in this supplement analysis</b>	<b>Subject to the 2015 Mitigation Action Plan</b>
<b>Utilities and Infrastructure</b>	Electricity to operate project infrastructure would be supplied from existing power lines; impacts to electrical infrastructure would be small. The potable water supply and existing water-supply infrastructure would accommodate project use; effects on water infrastructure would be negligible. Unpaved access roads to new well pads would be constructed and measures would be taken to construct and/or maintain roads in a manner protective of archaeological sites; effects on road infrastructure would be small.	No change to utilities and infrastructure impacts.	Yes.
<b>Traffic and Transportation</b>	Only small amounts of traffic would be generated by proposed action activities; effects on traffic would be negligible.	No change to traffic and transportation impacts	Yes.
<b>Hazardous Materials and Waste Generation</b>	Small quantities of construction debris, approximately 30 gallons per year of hazardous waste, and approximately 50,000 gallons of treated water annually from maintenance at each injection well would be generated. All waste would be handled in accordance with LANL's waste management procedures. Impacts to on-site waste operations or off-site disposal facilities would be small.	No change to Hazardous Materials and Waste Generation impacts	N/A
<b>Noise</b>	Heavy equipment would be used during some project activities; noise generated would be confined to locations near the project area and effects would be small.	No change to noise impacts.	Yes.
<b>Visual Resources</b>	There would be no substantial dominant visual change as observed at sensitive viewer locations, no substantial change in visibility caused by predicted air pollutant emissions, no	No change to visual resources impacts.	Yes.

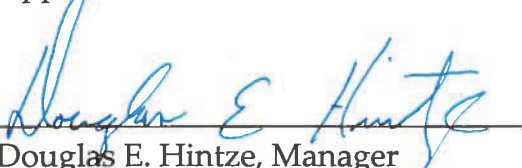
<b>Resource</b>	<b>Impact statement from the 2015 Environmental Assessment</b>	<b>Changes associated with the proposed action discussed in this supplement analysis</b>	<b>Subject to the 2015 Mitigation Action Plan</b>
	<p>conflict with visual standards identified by a Federal land management agency, and no long-term dominant visual interruption of unique viewsheds; impacts to visual resources would be small.</p>		
<p><b>Human Health and Worker Safety</b></p>	<p>Access to the project area is restricted and noise generating activities and air emissions would be unlikely to affect members of the public at the nearest publicly accessible points. Effects on human health would be negligible.                      Applicable safety and health training and monitoring, personal protective equipment, and work-site hazard controls would be required for workers; activities would not be expected to have any adverse health effects on workers.</p>	<p>No change to human health and worker safety impacts.</p>	<p>Yes.</p>
<p><b>Environmental Justice</b></p>	<p>Pueblo de San Ildefonso residents would be considered a minority population for purposes of identifying environmental justice concerns. Because the proposed action would reduce risks to human health and welfare in the region by removing contaminants from the environment and containing the off-site migration of groundwater contamination onto Pueblo de San Ildefonso lands, and the proposed action has no other significant environmental impacts, the proposed action would not result in disproportionately high and adverse effects to residents of the Pueblo.</p>	<p>No change to environmental justice impacts</p>	<p>Yes.</p>



## APPROVAL AND CONCURRENCE

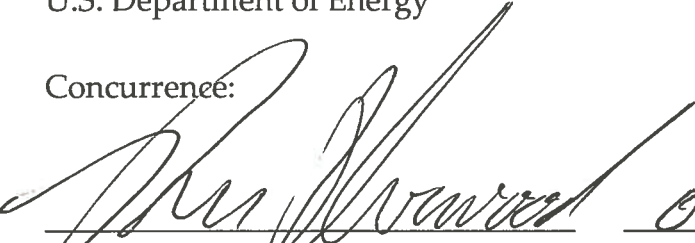
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### Approval

  
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Date  
22 Aug 2017

Douglas E. Hintze, Manager  
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### Concurrence:

  
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Date  
08-22-2017

Ben Underwood, Attorney-Advisor  
Environmental Management Los Alamos Field Office  
U.S. Department of Energy

## REFERENCES

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- DOE (Department of Energy) 2015a. *Environmental Assessment for Chromium Plume Control Interim Measure and Plume-Center Characterization, Los Alamos, New Mexico*. DOE/EA-2005. December 2015.
- DOE (Department of Energy) 2015b. Finding of No Significant Impact for the *Environmental Assessment for Chromium Plume Control Interim Measure and Plume-Center Characterization, Los Alamos, New Mexico*. DOE/EA-2005. December 2015.
- DOE (Department of Energy) 2016. *Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory, Los Alamos, New Mexico Mitigation Action Plan Revised 2016*. DOE/EIS-0380, March 2016.