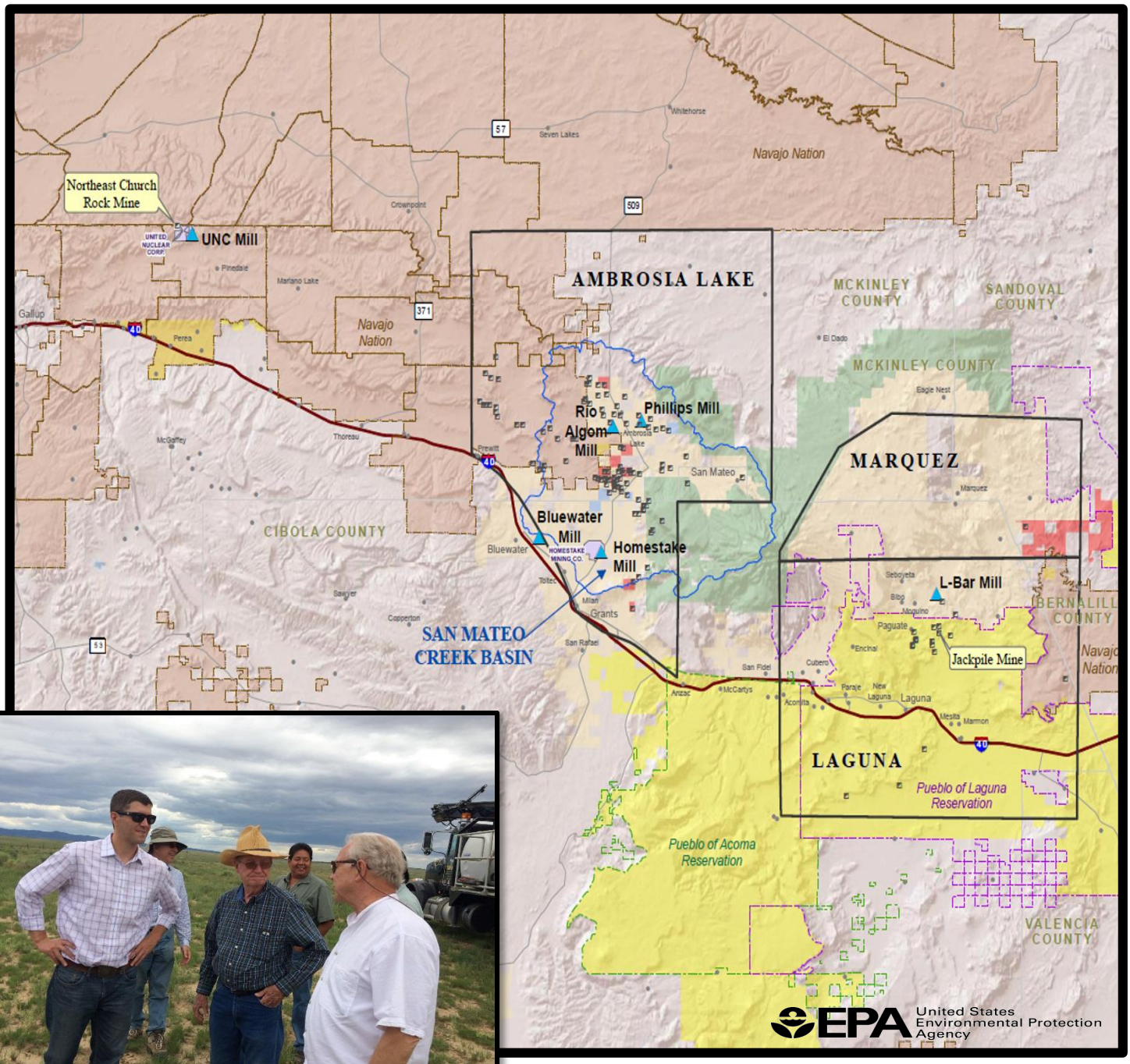
Grants Mining District, New Mexico

2015-2020 Five-Year Plan

To

Assess and Address Health and Environmental Impacts of Uranium Mining and Milling



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Purpose

The purpose of this 2015 – 2020 Five-Year Plan is to report to the public the progress made in implementing the 2010 Five-Year Plan and to memorialize priorities and activities for the next five years in the Grants Mining District. The plan is intended to promote and advance the assessment and cleanup, when warranted, of contamination caused by legacy uranium mining and milling operations.

The five objectives for the 2015 Five-Year Plan are designed to guide the endeavor in the Grants Mining District. Each objective identifies goals with specific actions to be taken by those agencies with the authority and responsibility in the next five years. Although the objectives are presented as standalone subjects in the plan, they are intertwined. The objectives are:

1. Assess water supply sources for contamination
2. Assess and cleanup legacy uranium mines
3. Assess, cleanup, and perform long-term management of former uranium milling sites
4. Assess and clean up contaminated structures and properties
5. Communicate and coordinate with communities

Partners

Federal, state, and tribal governmental agencies are partners to the plan. They are committed to continue to assess and address legacy contamination and to eliminate, reduce or manage risks to human health and the environment.

The Governmental partners participating are:

- U.S. Environmental Protection Agency – Region 6
- U.S. Department of Energy – Office Legacy Management
- U.S. Department of the Interior – Bureau of Land Management
- U.S. Department of Health and Human Services – Agency for Toxic Substances and Disease Registry
- U.S. Nuclear Regulatory Commission
- U.S. Department of Agriculture – Forest Service
- Pueblo of Acoma Environment Department
- Pueblo of Laguna Environmental and Natural Resources Department
- New Mexico Environment Department
- New Mexico Energy, Minerals, and Natural Resources Department – Mining and Minerals Division
- New Mexico Department of Health

Background

The Grants Mining District is an area of significant uranium-bearing rock approximately 100 miles long and 25 miles wide encompassing portions of McKinley, Cibola, Sandoval and Bernalillo counties and organized into three sub-districts (Ambrosia Lake, Laguna, and Marquez – Figure1). These mining sub-districts contain 97 legacy uranium mines and five former uranium mill and tailing disposal sites that were active during the Atomic Energy Commission uranium purchase years (1940's-1970) and beyond until the 1990's. Over 52 million tons of uranium ore were extracted from these mines, constituting approximately 68% of the total uranium ore mined in the United States.

Land ownership within the Grants Mining District consists of public, tribal, and private property. Though surface and underground mining was prolific during the Atomic Energy Commission uranium purchase years (1940's-1970) and beyond until the 1990's, the state of New Mexico has specifically identified 97 uranium mines that require assessment and possible cleanup. The mines had reportable ore production and surface expression post mining (i.e., waste rock piles, vents/shafts, physical remnants, etc.).

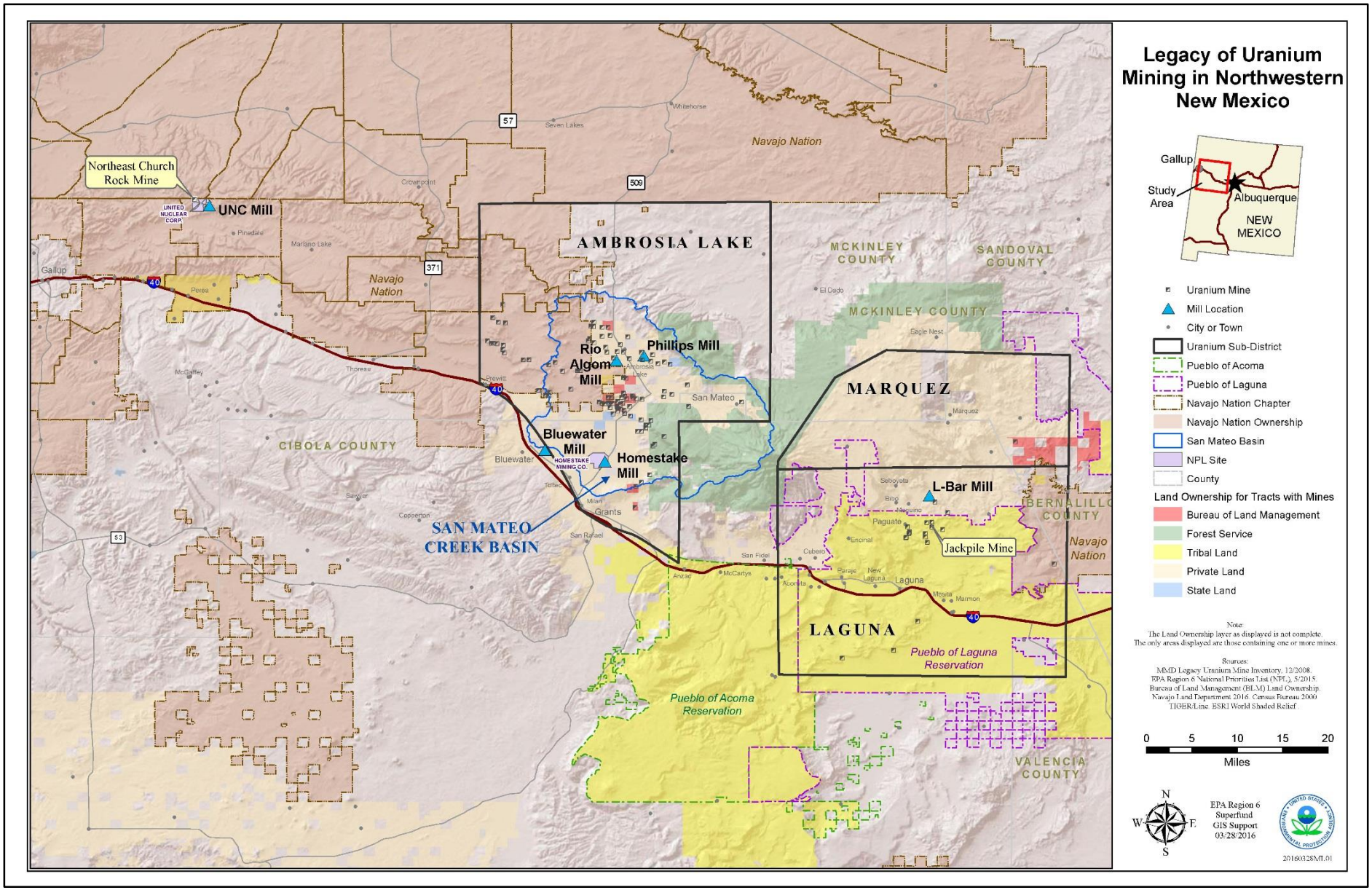
Legacy of Uranium Mining in Northwestern New Mexico
Northeast Church Rock Mine
UNC Mill
UNITED NUCLEAR CORP.
AMBROSIA LAKE
Rio Algom Mill
Phillips Mill
Bluewater Mill
HOMESTAKE MINING CO.
Homestake Mill
SAN MATEO CREEK BASIN
MARQUEZ
L-Bar Mill
Jackpile Mine
LAGUNA
Pueblo of Laguna Reservation
Pueblo of Acoma Reservation
Navajo Nation
CIBOLA COUNTY
MCKINLEY COUNTY
SANDOVAL COUNTY
BERNALILLO COUNTY
VALENCIA COUNTY
Gallup
Grants
Study Area
Albuquerque
NEW MEXICO
Uranium Mine
Mill Location
City or Town
Uranium Sub-District
Pueblo of Acoma
Pueblo of Laguna
Navajo Nation Chapter
Navajo Nation Ownership
San Mateo Basin
NPL Site
County
Land Ownership for Tracts with Mines
Bureau of Land Management
Forest Service
Tribal Land
Private Land
State Land
Note:
The Land Ownership layer as displayed is not complete.
The only areas displayed are those containing one or more mines.
Sources:
MMD Legacy Uranium Mine Inventory, 12/2008.
EPA Region 6 National Priorities List (NPL), 5/2015.
Bureau of Land Management (BLM) Land Ownership.
Navajo Land Department 2016. Census Bureau 2000.
TIGER/Line. ESRI World Shaded Relief.
0 5 10 15 20
Miles
N
W
E
S
EPA Region 6
Superfund
GIS Support
03/28/2016
20160328MT.01

Figure 1

Summary of Work Completed 2010-2015[1] and Planned for 2015-2020

2010 – 2015 Plan		2015 – 2020 Plan
Goals	**Accomplished**	**Goals**
<u>Water Supply Sources</u> – Evaluate private well groundwater quality – Evaluate public water supplies	– 32 private wells sampled (2009 & 2010) • 23 wells exceed drinking water standards for at least one or more constituents – 43 private wells sampled (2014 & 2015) • 26 wells exceed drinking water standards for at least one or more constituents – 3 Milan public water supply wells sampled • all wells meet drinking water standards	– In 2016, issue EPA and NMED Groundwater Assessment Reports – In 2018, issue conceptual site model; a tool to understand impacts of legacy uranium mining and milling on surface water and groundwater systems in San Mateo Creek Basin
<u>Legacy Uranium Mines</u> – Compile existing information – Assess mine impact areas – Evaluate Jackpile for NPL	– 97 mines assessed • aerial gamma survey • screening assessments • 10 investigations – Dysart #2, John Bully, Johnny M, Marquez, Mary #1, Sandstone, Sections 10,12,15,30 • 1 cleanup – San Mateo Mine – Jackpile on National Priorities List December 2013	– In 2016, engage potential responsible parties – In 2016, BLM complete cleanup at four mines (Spencer and Barbara J Complex) – In 2016, USFS complete cleanup at four mines (Old La Jara, Taffy, Vallejo, Zia) – In 2016, EPA complete assessment on two mines and begin cleanup (Sections 35, 36); initiate assessment on four mines (Sections 10, 22, 24, 30W) – In 2017, complete assessment on four mines and begin cleanup (Sections 10, 22, 24, 30W); initiate assessment on four mines (Sections 17, 19, 30, 33) – In 2019, complete cleanup of three mines (Sections 35, 36, Johnny M) – In 2020, begin cleanup of four mines (Sections 17, 19, 30, 33) – Conduct remedial investigation/feasibility study at Jackpile

[1] For a more complete description of history and work accomplished under the 2010 Five-Year Plan, see Appendix A.

Summary of Work Completed 2010-2015[2] and Planned for 2015-2020

2010 – 2015 Plan		2015 – 2020 Plan
Goals	**Accomplished**	**Goals**
Former Uranium Mills – Surveillance and maintenance – Additional groundwater studies	– Inspected and maintained disposal cells (Phillips Mill, Bluewater Mill, L-Bar Mill) – Demolished all remaining structures at the Rio Algom Mill site – Installed 10 new monitoring wells at the Bluewater Mill; additional constituents/more frequently sampling of wells at the Bluewater and Rio Algom Mill sites • better understanding of hydrology	– Maintain disposal cells (Phillips Mill, Bluewater Mill, L-Bar Mill) – In 2017, complete groundwater feasibility study for United Nuclear Corporation – Northeast Church Rock site and update the Record of Decision to account for current site conditions – In 2017, complete investigation at Homestake Mill site and issue final groundwater and tailings pile Record of Decision – 2020 NRC license termination at Rio Algom site; handoff to DOE for surveillance and maintenance – 2020 NRC begins handoff transition to DOE
Residential Areas – Identify contaminated structures – Identify contaminated properties	– Initial mission completed with 900 structures and properties assessed • 772 found below action levels, owners informed • 128 found above action levels and cleaned up	
Public Health Surveillance – Study uranium exposure	– Completed biometric study[3] • six to nine times higher uranium in urine than national average	
Communication	– Four Community meetings held – Five -Year Plan updated twice	– Clearly communicate ongoing and planned actions/activities – Provide information the community needs

[2] For a more complete description of history and work accomplished under the 2010 Five-Year Plan, see Appendix A.
[3] Grants Mineral Belt Uranium Biomonitoring Project Summary, March 2011.

OBJECTIVES

The objectives of the 2015-2020 Five-Year Plan are designed to comprehensively assess and cleanup, when warranted, contamination related to legacy uranium mining and milling activities within the Grants Mining District.

Objective 1: Assess Water Supply Sources for Contamination

Background

Residents within the Ambrosia Lake and Laguna mining sub-districts primarily rely on private and community wells for residential-domestic, stock-watering, and agricultural uses. Legacy uranium mining and milling operations generated liquid wastes (effluent). The effluents included groundwater produced from mine dewatering, process waters from unlined on-site ore leach pads, evaporation and tailing ponds, heap- and isotope-leaching, and uranium milling operations. These effluents were discharged to ground surface or surface drainage features (*e.g.,* arroyos, channels) and allowed to infiltrate and recharge the shallow alluvium directly or via impoundment infiltration and overflow. From 30 years of mining operations alone, approximately 80 billion gallons of mine water was extracted from the subsurface and discharged to surface drainages, the majority being discharged into the San Mateo Creek Basin. The effluent discharges that occurred prior to the establishment of state and federal groundwater regulations had little or no treatment prior to discharge. The effluents discharged during legacy uranium site operations, as well as subsequent runoff from contaminated soil and sediment which continues to the present, may impact regional bedrock drinking water aquifers and shallow alluvial aquifers. These aquifers are accessed by scattered private residences and nearby municipal or community water supply systems. Additionally, extensive dewatering of underground workings during mine operations created a regionally-extensive cone of depression into which oxygenated groundwater currently is flowing. The oxygenated groundwater may dissolve and mobilize unmined uranium and associated constituents within the aquifers.

Current Status

Groundwater quality investigations have been ongoing in the San Mateo Creek Basin by the New Mexico Environment Department (NMED) and the U.S. Environmental Protection Agency (EPA), focusing on private water wells and municipal or community supply wells. Even though these investigations throughout the years have occurred as separate events, all information gathered furthers the understanding of the water systems and the potential impact from uranium mining and milling operations.

New Mexico Environment Department

The New Mexico Environment Department (NMED), under a Cooperative Agreement with the U.S. Environmental Protection Agency (EPA), conducted Phase I and Phase II Site Inspections (SIs) of the San Mateo Creek Basin groundwater from 2009 to 2012 to

determine groundwater quality in private water wells within the basin[4]. There was concern that legacy uranium mines and mills may have contributed to the widespread degradation of groundwater quality within the basin. Additionally, groundwater in the alluvial aquifer upgradient of the Homestake Mining Company Mill Superfund site was found to contain uranium and other contaminants at concentrations above federal and state drinking water standards. The results of the Phase I and Phase II SIs showed elevated concentrations of constituents in 31 of the 32 wells sampled with respect to health-based or aesthetic (color, odor, or taste) drinking water standards. The one well with water quality that did not exceed drinking water standards is not located in an area that was mined or where milling operations were located. All well owners were notified by letter of the analytical results.

In 2014, the NMED collected 26 additional groundwater samples from private and public water supply wells in the Homestake Mining Company Superfund site area at the request of the community. A report summarizing the groundwater quality will be completed in the spring of 2016 documenting the results.

U.S. Environmental Protection Agency

In 2013, the EPA, with assistance from the NMED and the U.S. Geological Survey, initiated a phased groundwater investigation for the San Mateo Creek Basin as part of an Expanded Site Inspection (ESI) to assess the nature and extent of contamination in the alluvial aquifer related to legacy uranium mining and milling. The investigation was to build on the investigative work completed by the NMED for Phase I and Phase II of the SIs. Most importantly, the investigation was crafted to determine background water quality in the alluvial aquifer in the basin, i.e., groundwater that has not been impacted by legacy mining and milling activities. Therefore, beginning in the fall of 2014 and continuing into early 2015, a field team conducted seismic surveys and drilled numerous boreholes. Despite an extensive amount of drilling, background alluvial groundwater was not found within the San Mateo Creek Basin. However, five boreholes were completed as monitoring wells in an attempt to address data gaps within the basin. A total of 20 groundwater samples were collected from the new monitoring wells as well as municipal supply and private wells for analysis. An interim report summarizing the groundwater quality will be completed and shared in the spring of 2016 documenting the results.

Goals for The Next Five Years

U.S. Environmental Protection Agency

The goal is to build a conceptual site model by 2018 that can be used as a tool to understand impacts of legacy uranium mining and milling on the surface and groundwater systems in the San Mateo Creek Basin and to identify the current and potential future risks to human health.

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[4] New Mexico Environment Department. Phase I Site Investigation Report, San Mateo Creek Legacy Uranium Mines, June 2010. New Mexico Environment Department, Site Inspection Report, Phase 2, San Mateo Creek Basin Legacy Uranium Mine and Mill site Area, April 2012.

Communicate with and provide information to residents regarding groundwater quality especially from private wells with detected uranium and other constituents at concentrations that exceed federal and state drinking standards. Information about the risks and potential mitigation practices will be provided.

Specific Actions for The Next Five Years

- Collect and analyze additional groundwater samples from existing and new monitoring wells, private water wells, and water supply wells throughout the San Mateo Creek Basin, if needed, to address data gaps in assessing groundwater quality.
- Collect and analyze additional soil impacted from legacy uranium mine water discharges to determine the potential for ongoing releases to surface water and groundwater.
- Collaborate with the NMED, the U.S. Department of Energy – Office of Legacy Management (DOE) and the Nuclear Regulatory Commission (NRC) to incorporate information from the Bluewater Mill, the Rio Algom Mill and the Homestake Mill sites and collected groundwater quality information into the conceptual site model for the San Mateo Creek Basin.
- Issue the conceptual site model in 2018.

Project plans will be developed to accomplish the specific actions in coordination with all appropriate agency partners.

Potential Challenges

Natural Contamination

Since the San Mateo Creek Basin contains uranium-bearing rock formations from which groundwater is accessed by private water wells, it is challenging to determine if groundwater containing constituents that exceed federal and state water quality standards are due to natural conditions and/or has been impacted by legacy mining and milling operations. Additional analyses will be performed on groundwater samples to attempt to forensically distinguish mining and milling impacts from natural conditions.

Objective 2: Assess and Cleanup of Legacy Uranium Mine Sites

Background

Uranium mining was prolific in the Grants Mining District starting in the 1950's until as late as the mid-1980's. In the Grants Mining District alone, over 300 mining permits were issued by the state of New Mexico for mine exploration and mining operations in McKinley, Cibola, Sandoval and Bernalillo counties. The extraction of uranium-bearing ore occurred through open pits, from underground workings that were extensively connected and solution mining. Of all of the mining operations, 97 legacy uranium mines with surface expression (i.e., open pits, waste rock piles, vents/shafts, etc.) are the focus for reclamation and cleanup.

Current Status

For the 97 uranium mines in the Grants Mining District, the EPA has identified four categories with respect to entities that should be responsible for addressing the legacy mines and operational impacts.

- Mines associated with Jackpile-Paguate
- Mines with Potentially Responsible Parties
- Mines covered by the Tronox Settlement
- Mines without responsible parties (orphans)

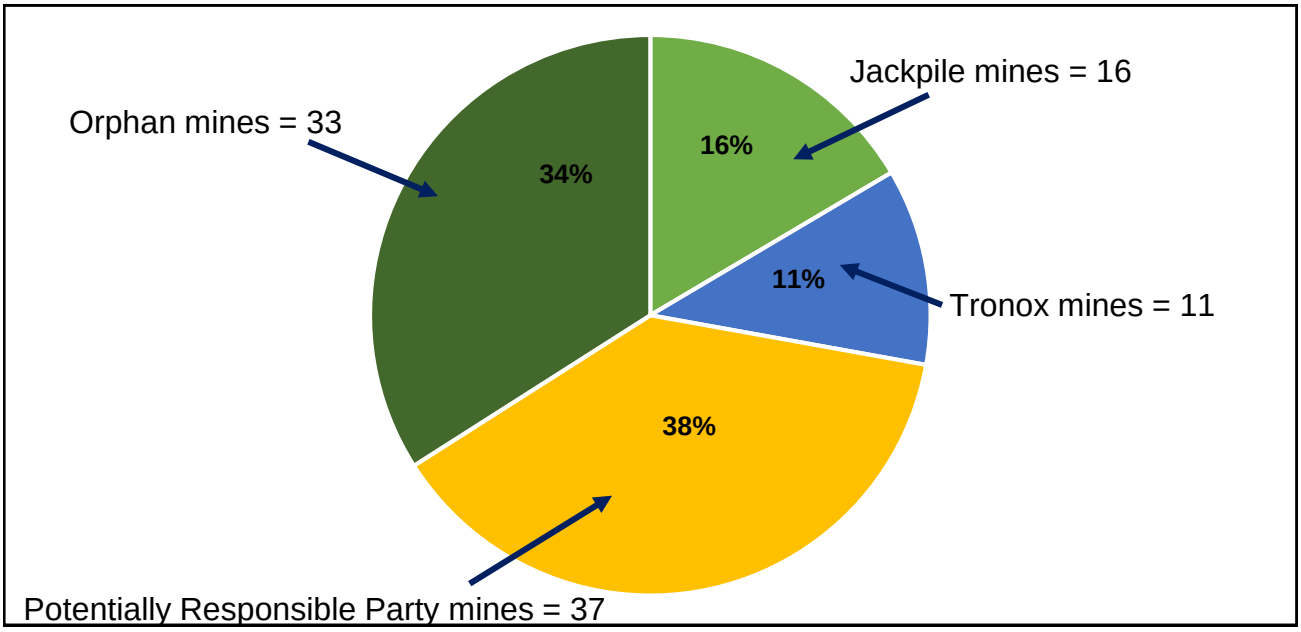

Figure 2

The Jackpile-Paguate mines are located in the Laguna sub-district on the Pueblo of Laguna. The whole mine area was added to the National Priorities List in December 2013 and will be addressed by the EPA's Remedial Program.

For the Tronox mines[5], all of which are located in the Ambrosia Lake sub-district, the mines have been divided into three geographic sub-areas of private or State owned properties (Figure 3): East (Sections 35 and 36 Mines); Central (mines east of State Highway 509, Sections 17, 19, 30, 32, and 33 Mines); and West (Sections 10, 22, and 24, and 30W Mines).

As more information is gathered about mines with potentially responsible parties and the orphan mines, further geographic sub-areas may be identified.

From 2008 through 2014, screening assessments were conducted on the majority of the 97 legacy uranium mines in the Grants Mining District by the various Agencies and some actions were taken. Specifically, the U.S. Forest Service (USFS) completed a removal action which consolidated waste rock and contaminated soils at the San Mateo Mine and assessed the Taffy, Vallejo, Old La Jara and Zia Mines located in the Cibola National Forest. Additionally, the Bureau of Land Management (BLM) completed assessments on several mines located on federally managed lands and developed a removal action plan to address threats to human health or the environment.

In 2010 and 2011, the EPA conducted Airborne Spectral Photometric Environmental Collection Technology (ASPECT) overflights of the Ambrosia Lake mining sub-district to collect gamma radiological measurements. Results from the ASPECT aerial gamma surveys indicated elevated gamma radiation activity at many legacy uranium mine sites (Figure 4). The largest gamma radiation anomalies were identified at mine sites in the Ambrosia Lake area and near the village of San Mateo located near Mount Taylor that operated as wet mines with mine water discharges to ground surface. Using information from assessments and the ASPECT aerial gamma surveys, EPA conducted detailed assessments on nine mine sites likely to pose a threat to human health or the environment.

In 2011, the EPA conducted a Removal Action to relocate a resident and his livestock from property located immediately adjacent to the Johnny M Mine to address an imminent and substantial endangerment from elevated radiation. The EPA signed an Administrative Order on Consent for Removal Action with the operator of the Johnny M Mine in 2012 for performance of a site investigation and engineering evaluation/cost analysis at the mine and adjacent residential property. The site investigation was completed in early 2014 and confirmed the presence elevated gamma radiation in soil. Based on the site investigation report and engineering evaluation/cost analysis, there is an estimated 500,000 cubic yards of contaminated soil that will need to be addressed.

[5] In April, 2014, the United States (U.S.) and the Anadarko Litigation Trust entered into a settlement agreement with Anadarko Petroleum Corporation and some of its affiliates regarding environmental liability associated with former Kerr McGee industrial and mining operations. The settlement approved by the U.S. District Court and the U.S. Environmental Protection Agency provided approximately $984,500,000 for the cleanup of over 50 Tronox Navajo Area Abandoned Uranium Mines (Tronox NAUM) sites. Of the over 50 Tronox NAUM sites listed in the settlement, 22 mine operations on 11 mine sites are located in the Grants Mining District. The other Tronox NAUM are located on the Navajo Nation in the Cove Wash area and Eastern Agency.

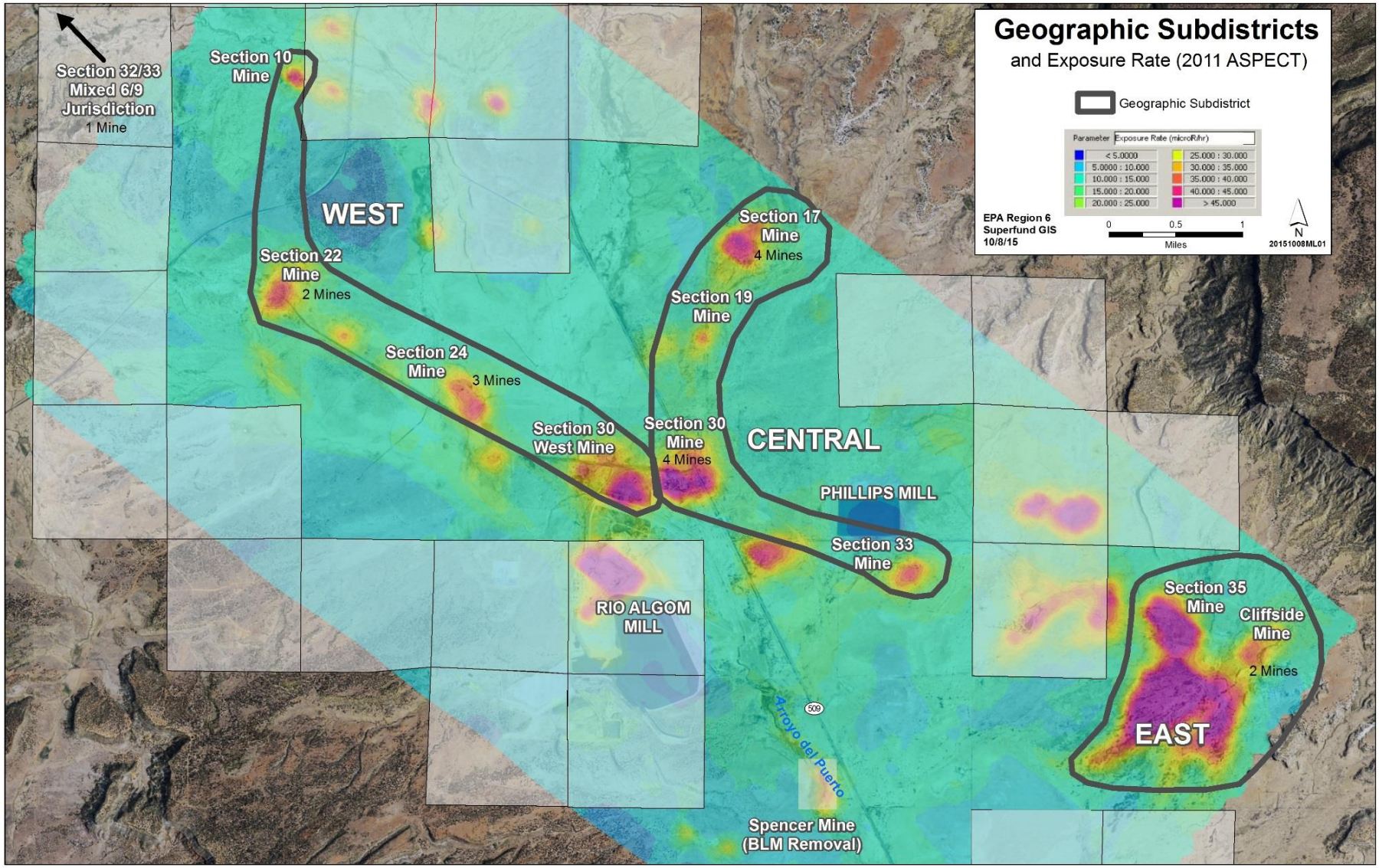
Geographic Subdistricts
and Exposure Rate (2011 ASPECT)
Geographic Subdistrict
Parameter Exposure Rate (microR/hr)
< 5.0000
5.0000 : 10.000
10.000 : 15.000
15.000 : 20.000
20.000 : 25.000
25.000 : 30.000
30.000 : 35.000
35.000 : 40.000
40.000 : 45.000
> 45.000
EPA Region 6
Superfund GIS
10/8/15
0
0.5
1
Miles
N
20151008ML01
Section 32/33
Mixed 6/9
Jurisdiction
1 Mine
Section 10
Mine
WEST
Section 22
Mine
2 Mines
Section 24
Mine
3 Mines
Section 30
West Mine
Section 30
Mine
4 Mines
Section 17
Mine
4 Mines
Section 19
Mine
CENTRAL
PHILLIPS MILL
Section 33
Mine
RIO ALGOM
MILL
Section 35
Mine
Cliffside
Mine
2 Mines
EAST
509
Arroyo del Puerto
Spencer Mine
(BLM Removal)

Figure 3

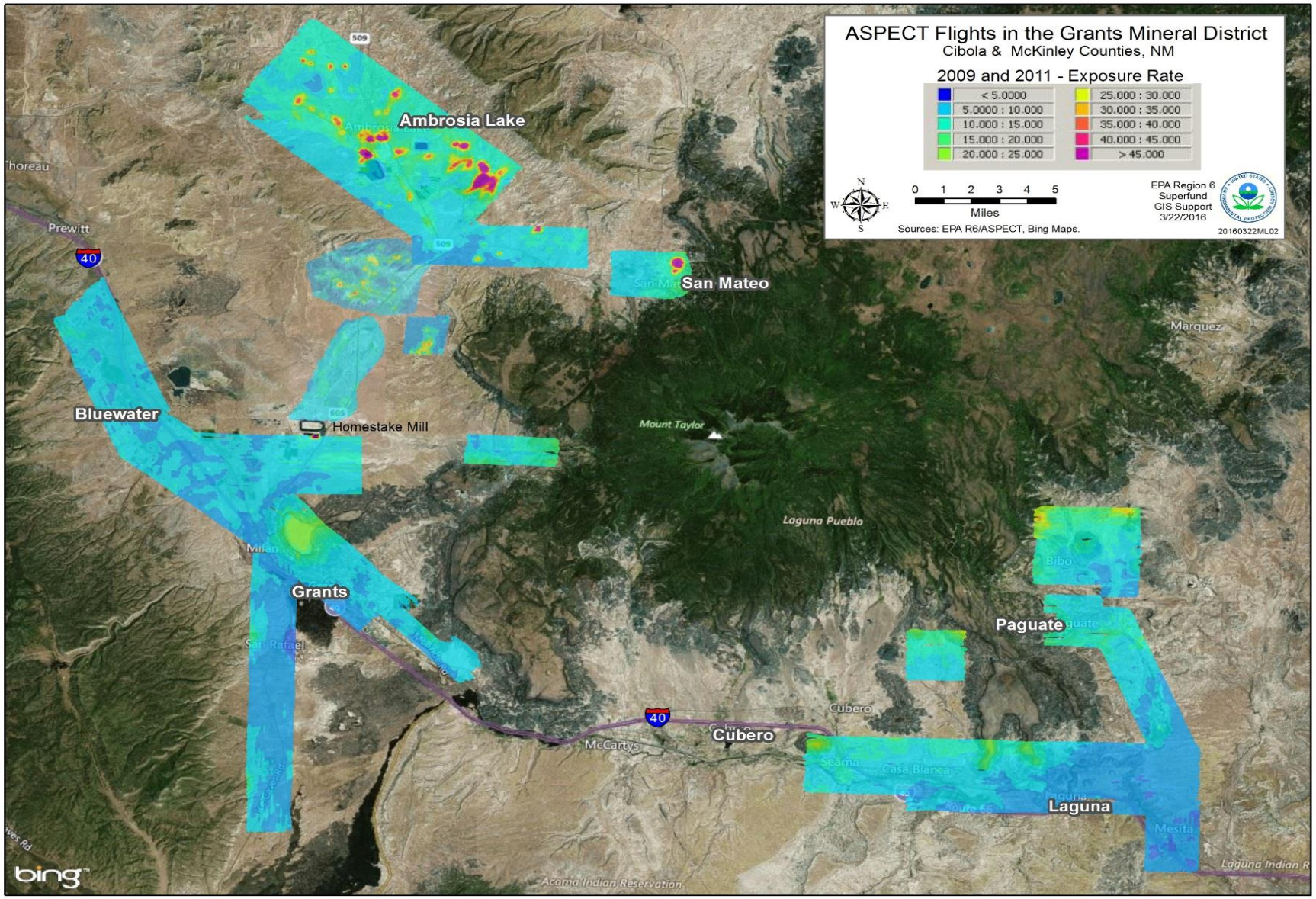
ASPECT Flights in the Grants Mineral District
Cibola & McKinley Counties, NM
2009 and 2011 - Exposure Rate
< 5.0000
5.0000 : 10.000
10.000 : 15.000
15.000 : 20.000
20.000 : 25.000
25.000 : 30.000
30.000 : 35.000
35.000 : 40.000
40.000 : 45.000
> 45.000
0 1 2 3 4 5
Miles
Sources: EPA R6/ASPECT, Bing Maps.
EPA Region 6
Superfund
GIS Support
3/22/2016
20160322ML02
Ambrosia Lake
San Mateo
Bluewater
Homestake Mill
Mount Taylor
Laguna Pueblo
Grants
Paguate
Cubero
McCartys
Laguna
Prewitt
Marquez
Milan
San Rafael
Casa Blanca
Mesita
Acoma Indian Reservation
Laguna Indian R
bing

Figure 4

Goals for the Next Five Years

U.S. Environmental Protection Agency

During the next five years, the EPA will conduct a series of assessments and engineering evaluation/cost analyses at uranium mine sites for the purpose of obtaining necessary information to develop an appropriate number of investigations which will be become the basis for any subsequent actions that may be necessary to abate the threats to human health and the environment posed by these mine sites.

Bureau of Land Management

The goal is to restore watersheds impacted by legacy uranium mines and mitigate hazards to protect public health and safety.

U.S. Forest Service

During the next five years, the USFS will continue to evaluate site conditions at abandoned mines with a record of uranium production on lands they manage in the Grants Mining District.

Specific Actions for Next Five years

U.S. Environmental Protection Agency

Assessments and engineering evaluation/cost analyses and potential non-time critical removal actions will be conducted and completed in the Ambrosia Lake sub-district, East geographic subarea, starting with the Section 35 and 36 mines. The assessment of the East geographic subarea will be completed in the summer of 2016 with actions completed by the end of 2019. Assessments will be completed in the West geographic subarea on all Tronox mines by 2017 with non-time critical removal actions beginning in the Central geographic subarea in 2020. Additionally, will oversee response actions at the Johnny M Mine and initiate a Remedial Investigation/Feasibility Study at the Jackpile-Paguate mines. Other mine assessments may be reprioritized, as warranted.

U.S. Bureau of Land Management

During the next five years, the BLM through the New Mexico Energy, Minerals, and Natural Resources Department's Abandoned Mine Land Program is planning on completing reclamation of the Spencer Mine and the Barbara J Complex Mines (which are comprised of three mine operations). Additionally, the physical hazards will be addressed at the Poison Canyon Mine. At the Rio Puerco Mine, reclamation activities will be conducted by the current mine operator/claimant which will include placement of mine wastes into a lined pit and removal of structures, tanks and other mine-related facilities (Figure 5).

U.S. Forest Service

Removal actions will be performed at the Taffy, Vallejo, Old La Jara and Zia Mines. These sites will be made safe for visitors and wildlife and will be restored to a natural appearance and re-vegetated with native grasses (Figure 6).

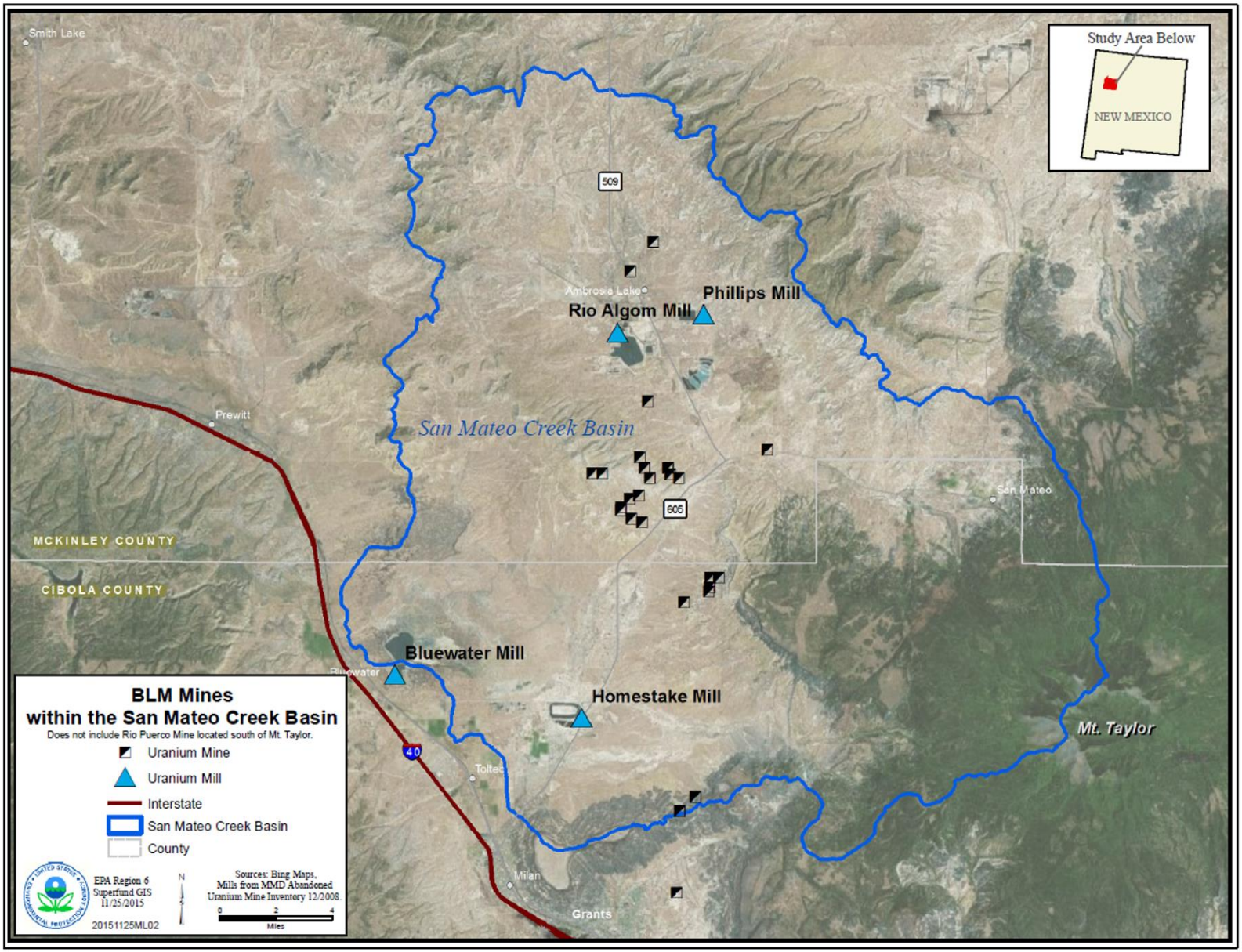
Study Area Below
NEW MEXICO
Smith Lake
509
Ambrosia Lake
Phillips Mill
Rio Algom Mill
Prewitt
San Mateo Creek Basin
San Mateo
605
MCKINLEY COUNTY
CIBOLA COUNTY
Bluewater Mill
Bluewater
Homestake Mill
Mt. Taylor
40
Toltec
Milan
Grants
BLM Mines
within the San Mateo Creek Basin
Does not include Rio Puerco Mine located south of Mt. Taylor.
Uranium Mine
Uranium Mill
Interstate
San Mateo Creek Basin
County
EPA Region 6
Superfund GIS
11/25/2015
20151125ML02
N
Sources: Bing Maps,
Mills from MMD Abandoned
Uranium Mine Inventory 12/2008.
0 2 4
Miles

Figure 5

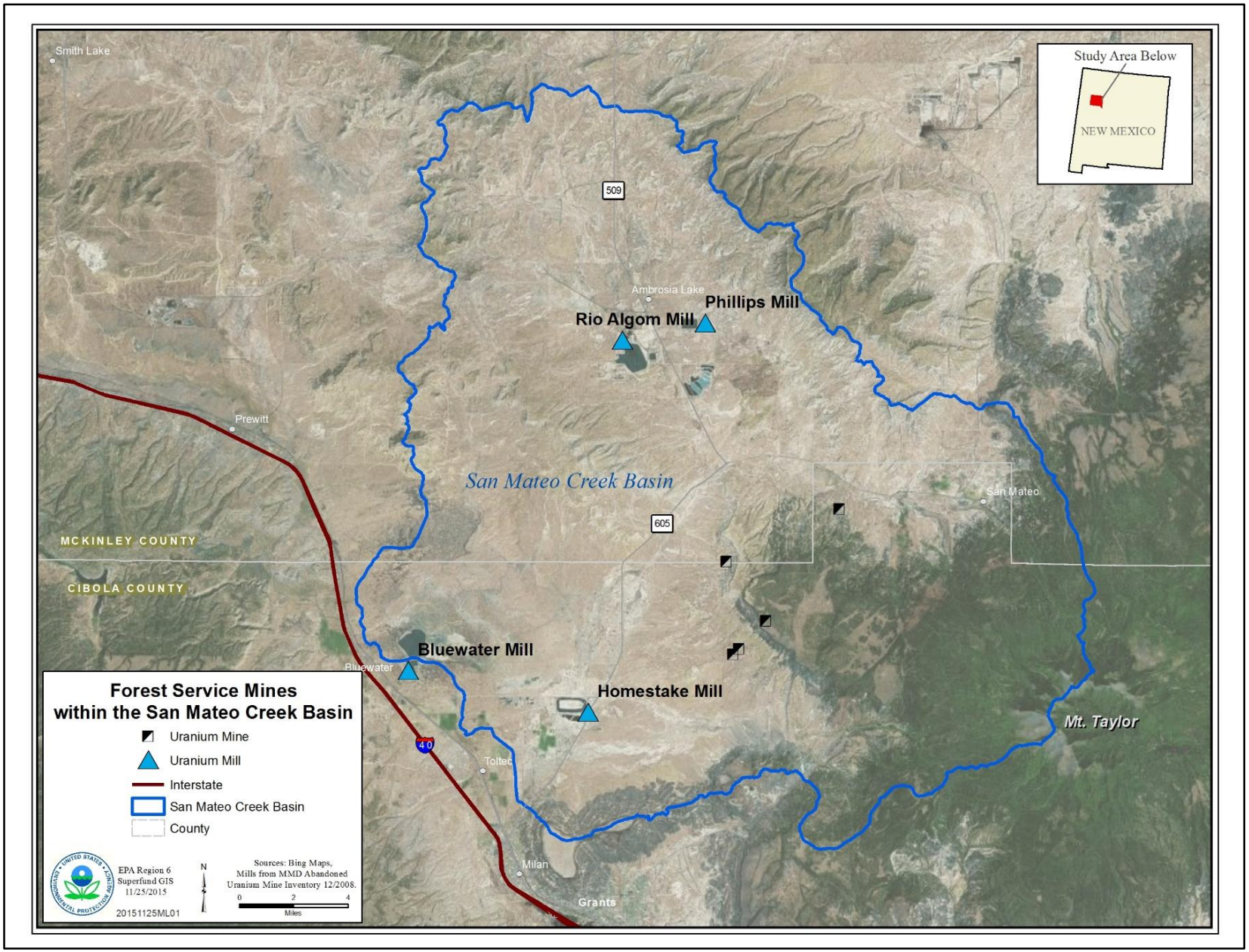
Smith Lake
Study Area Below
NEW MEXICO
509
Ambrosia Lake
Phillips Mill
Rio Algom Mill
Prewitt
San Mateo Creek Basin
San Mateo
605
MCKINLEY COUNTY
CIBOLA COUNTY
Bluewater Mill
Bluewater
Homestake Mill
Mt. Taylor
40
Toltec
Milan
Grants
Forest Service Mines
within the San Mateo Creek Basin
Uranium Mine
Uranium Mill
Interstate
San Mateo Creek Basin
County
EPA Region 6
Superfund GIS
11/25/2015
20151125ML01
N
Sources: Bing Maps,
Mills from MMD Abandoned
Uranium Mine Inventory 12/2008.
0
2
4
Miles

Figure 6

Opportunities for Potentially Responsible Parties

The EPA will continue its efforts to engage and work with potentially responsible parties for the assessment and cleanup of mines or to secure funding through enforcement for this work.

Selection of final cleanup plans for mines is dependent on identification of cost effective and protective solutions for mine operation related materials.

Objective 3: Assess, Cleanup, and Perform Long-Term Management of Former Uranium Milling Sites

Background

Five legacy uranium milling operations are located in the Grants Mining District. Within the San Mateo Creek Basin of the Ambrosia Lake sub-district, milling activities occurred at the Phillips Mill-Ambrosia Lake site from 1958 to 1982; at L-Bar Mill site from 1977 to 1981; at the Homestake site from 1957 to 1990; at the Anaconda-Bluewater site from 1953 to 1982, and at the Rio Algom-Ambrosia Lake site from 1958 to 2002. The Bokum Mill is located within the Marquez sub-district; however, no uranium ore was processed at the site.

The United Nuclear Corporation Mill – Northeast Church Rock Superfund (UNC–NECR) site is located outside of the Grants Mining District near Gallup, New Mexico, but is included for a more comprehensive understanding of legacy uranium operations in northwestern New Mexico.

The DOE, with NRC oversight, is responsible for long-term surveillance and maintenance duties at the Phillips Mill-Ambrosia Lake (Phillips Mill), Anaconda-Bluewater Mill (Bluewater Mill), and L-Bar Mill sites.

The NRC, in coordination with the EPA and the NMED, currently regulates ongoing remedial activities at the both the Homestake Mining Company Uranium Mill Superfund (Homestake) site and the UNC–NECR site.

The NRC also oversees reclamation in coordination with the NMED at the Rio Algom-Ambrosia Lake Mill (Rio Algom Mill) site.

The NRC current and historical licensing documents for the Bluewater, Homestake, Rio Algom, Phillips, and L-Bar Mills can be located at their electronic reading room.[6] Documents related to the DOE's responsibility for Title I and II uranium mills are also in the NRC electronic reading room and DOE webpages.[7]

[6] http://adams.nrc.gov
[7] http://energy.gov/lm/office-legacy-management

Current Status of Work

The DOE reviews groundwater compliance strategies annually for the Phillips Mill, Bluewater Mill, and L-Bar Mill sites to track progress against compliance standards.

The DOE monitors activities at the Homestake and UNC–NECR sites and the Rio Algom Mill in preparation for when the sites transition from the NRC to DOE's stewardship.

Additionally, the DOE and NRC continue to work with NMED under a Cooperative Agreement to provide the resources to review and participate in the DOE's activities during these long-term actions.

For the Rio Algom Mill, reclamation under NRC regulation is largely complete. A radon barrier was constructed over Tailings Impoundment 1 in 1999 and the mill was decommissioned in 2005. Additional reclamation tasks were completed in subsequent years, including the construction of a 1000-year diversion channel for the Arroyo Del Puerto. In 2014 and 2015, RAML demolished all remaining structures at the mill site and consolidated remaining waste material into Tailings Impoundment 2.

The DOE conducted additional hydrogeological work at the Phillips and Bluewater Mill sites. At the Phillips Mill site groundwater monitoring of existing site wells was increased in frequency, and additional constituents were analyzed as recommended by NMED. A new monitoring well was installed in the alluvium immediately down gradient of the uranium mill tailings disposal cell to sample groundwater at the alluvium/bedrock contact. This well has been dry so no groundwater samples have been collected.

The DOE has conducted a considerable amount of work at the Bluewater site. Ten new monitoring wells were added to the original nine wells to better understand the site hydrogeology of the Rio San Jose alluvium and San Andres bedrock aquifers. Groundwater monitoring of the site well network was increased in frequency and additional constituents were analyzed as recommended by NMED. Offsite private wells have also been sampled. Additionally, disposal cell performance and the site and regional hydrogeology were evaluated to determine the extent of contamination originating from the Bluewater site. A report describing this evaluation was submitted to the NRC, NMED, and the EPA in November 2014, and is available to the public.

Goals for the Next Five Years

Legacy sites (Phillips Mill, Bluewater Mill, L-Bar Mill):

- The DOE will review and update the Bluewater Mill Site Status Report as appropriate, and evaluate the impacts of new information on the understanding of the Bluewater Mill site.
- The DOE, where applicable, continue to update sampling information from on-site monitoring wells and evaluate the impacts of new information on the groundwater activity and composition.

- The DOE work with the NMED through the Cooperative Agreement to support NMED's participation in DOE activities to ensure that former uranium mill sites do not pose risks to human health and the environment.

Ongoing remedial activities sites (Rio-Algom, Homestake):

- The DOE monitors activities at the Homestake and Rio Algom Mill sites in preparation for when the sites transition to their stewardship.
- Complete EPA Record of Decision for the groundwater and the tailings pile at Homestake.
- Update the EPA Groundwater Record of Decision at UNC–NECR site to account for current site conditions.
- NRC license termination in 2020 for the Rio Algom Mill.

Specific Actions for Next Five Years

Legacy sites (Phillips Mill, Bluewater Mill, L-Bar Mill):

During the next five years, the DOE plans to continue ongoing monitoring of the milling-activities affected groundwater at the Bluewater Mill site, as follows:

- Continue to monitor and review the condition of existing monitoring wells at Bluewater. Specifically, they will continue to sample the on-site monitoring wells annually for milling-related metals of concern and major ions and cations, and collect water level data at the wells.
- Provide on-site well monitoring data to the EPA for use in developing the conceptual model for the San Mateo Creek Basin.
- Work with the NMED through the Cooperative Agreement to test private wells off of the Bluewater Mill site that have the potential of being impacted by past milling activities at the Bluewater Mill.

Ongoing remedial activities sites (Rio Algom, Homestake):

The DOE will participate in meetings related to the Homestake and Rio Algom Mill sites and review the progress of these ongoing reclamation activities. The final licensing action will be the approval of a redesigned channel by the NRC.

Objective 4: Assess and Clean up Contaminated Structures and Properties

Background

Uranium mining or milling waste was occasionally used as sand for aggregate (in foundations and stucco) and contaminated stones were incorporated into the walls and floors of structures, including homes. Structures may also be contaminated by the presence of mined or naturally-occurring radioactive materials in outside dust and soil brought into homes on shoes and clothing. Flagstones and petrified wood have been used as decorative items in homes and in residential landscaping.

Current Status of Work

U.S. Environmental Protection Agency's Accomplishments

From 2010 through 2015, the EPA's Removal Program assessed over 900 structures and properties for gamma and elemental uranium contamination (Figure 7). All of the villages of the Pueblo of Laguna and communities of the Acoma Pueblo, the villages of Bluewater, San Mateo, and the Cebolleta Land Grant, and the subdivisions south of the Homestake Mill site were assessed. Of the 900, 772 structures were found below action levels and deemed to require no action; however, 128 of the assessed properties had soil radiation above action levels and were cleaned up. One structure was demolished and another was replaced with a modular house. One resident living in close proximity to Johnny M legacy uranium mine was relocated.

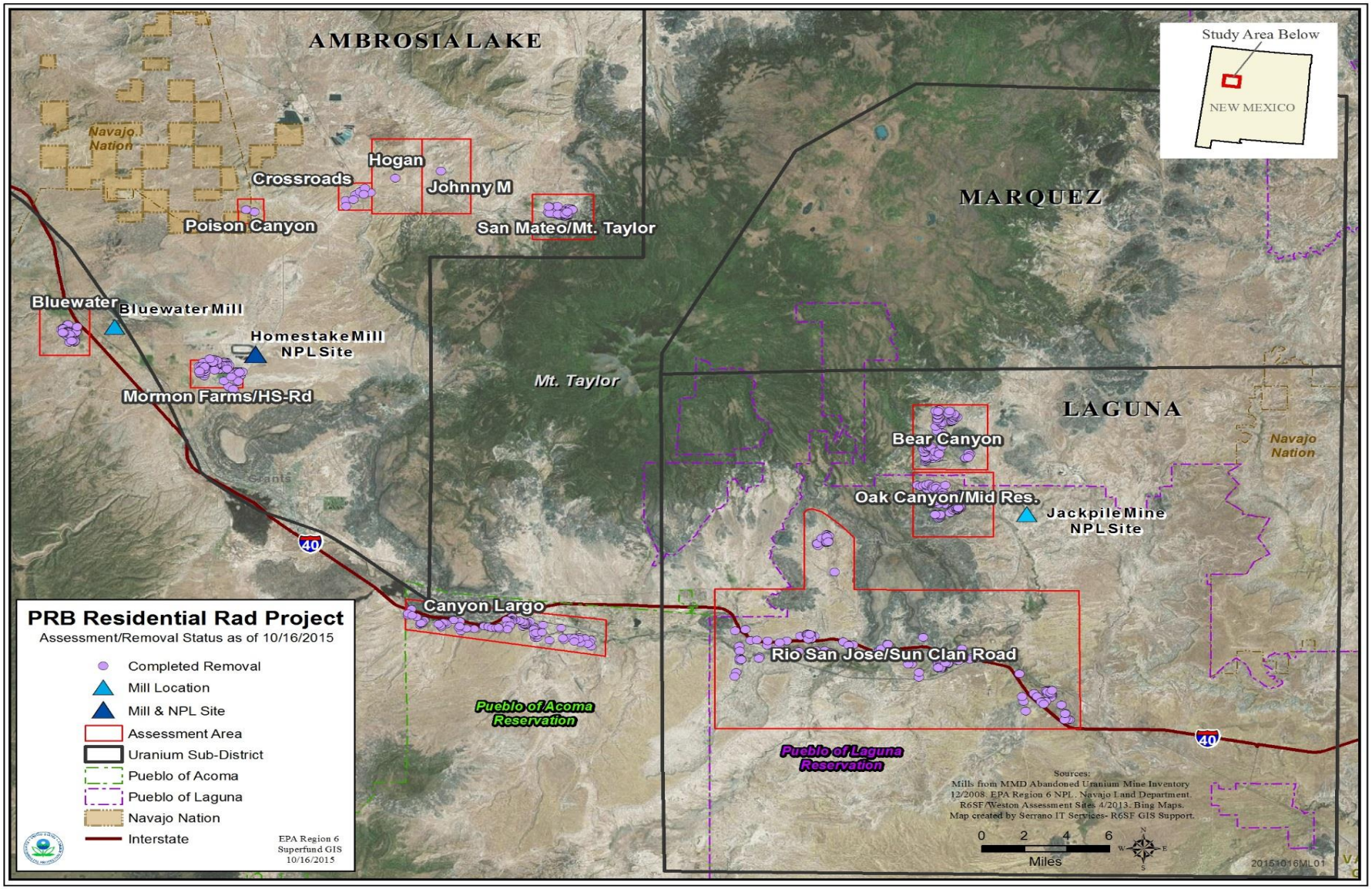
AMBROSIA LAKE
MARQUEZ
LAGUNA
Study Area Below
NEW MEXICO
Navajo Nation
Hogan
Johnny M
Crossroads
Poison Canyon
San Mateo/Mt. Taylor
Bluewater
Bluewater Mill
Homestake Mill
NPL Site
Mormon Farms/HS-Rd
Mt. Taylor
Bear Canyon
Oak Canyon/Mid Res.
Jackpile Mine
NPL Site
Canyon Largo
Rio San Jose/Sun Clan Road
Pueblo of Acoma Reservation
Pueblo of Laguna Reservation
40
PRB Residential Rad Project
Assessment/Removal Status as of 10/16/2015
Completed Removal
Mill Location
Mill & NPL Site
Assessment Area
Uranium Sub-District
Pueblo of Acoma
Pueblo of Laguna
Navajo Nation
Interstate
EPA Region 6
Superfund GIS
10/16/2015
Sources:
Mills from MMD Abandoned Uranium Mine Inventory
12/2008. EPA Region 6 NPL. Navajo Land Department.
R6SF/Weston Assessment Sites 4/2013. Bing Maps.
Map created by Serrano IT Services- R6SF GIS Support.
0 2 4 6
Miles
20151016ML01

Figure 7

Goals for the Next Five Years

U.S. Environmental Protection Agency

While the EPA has completed work on all known residential properties with excess gamma radiation contamination, the EPA is prepared to work with any additional property owners to identify any potential excess gamma radiation contamination issues.

Objective 5: Communicate and Coordinate with Communities

Background

Historical releases to ground and surface water, soil and air have been documented from legacy uranium sites throughout the Grants Mining District. Releases are likely to continue, posing risk to area residents, the public, and the environment.

Current Status

In the 2010 Five-Year Plan, communication with the public, federal and state agencies, and tribes was incorporated into each of the plan objectives. For the 2015 Five-Year Plan, communication and coordination about community issues will be emphasized by separating into its own objective.

For the 2010 Five Year Plan, the EPA in cooperation with federal, state and local partners continued to provide ongoing community engagement with residents and communities. The EPA has provided and/or participated in community meetings, site technical meetings with agencies, and specific meetings with residents regarding the UNC-NECR, Homestake Mill, and the Jackpile-Paguate Mine Superfund sites. For example, EPA staff has met with the Bluewater Valley Downstream Alliance (BVDA) and the Multicultural Alliance for a Safe Environment (MASE) regarding the Homestake Mining Company Mill Superfund site to explain ongoing site remediation, met with Pueblo of Laguna leaders on the Jackpile-Paguate Mine site, and participated with the EPA Region 9 in frequent tribal and village meetings regarding the UNC-NECR site.

The EPA has also provided several community involvement support initiatives to enhance communication and outreach at these sites. Technical Assistance Services for Communities, as well as a Technical Assistance Grant were provided to BVDA and Homestake Mill site communities. A Technical Assistance Services for Communities was also recently approved for the UNC-NECR site to assist the community with a better understand of the science, regulations and policies of environmental issues associated with upcoming site cleanup issues.

Goal for The Next Five Years

The goal for the 2015 Five-Year Plan partners is to provide clear and understandable information about ongoing and planned actions and activities in the Grants Mining District. This will be accomplished through enhanced coordination amongst the partners to provide clear and understandable information that the community members request, want, and/or need.

Specific Actions for Next Five Years

- Conduct strategic outreach to residents that use groundwater exceeding federal and state drinking water standards.
- Implement education plan to increase awareness of studies, processes, regulatory involvement, and the public's right to know.
- Maintain and update the EPA's Grants Mining District website.
- Hold community meetings for Superfund sites in the Grants Mining District.
- Maintain the Field Operations and Outreach Center (FO-OC) located in the Ambrosia Lake sub-district and the Grants Mining District Post located in downtown Grants, New Mexico through this period.
- Make available Technical Assistance Services for Communities and Technical Assistance Grants.
- Annual updates to Community Involvement Plans at each of the Superfund sites in the Grants Mining District.

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