TRONOX NAVAJO AREA URANIUM MINES FY2011 THROUGH FY2019 FINANCIAL REPORT

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United States Environmental Protection Agency

Tronox Navajo Area Uranium Mines
June 2020

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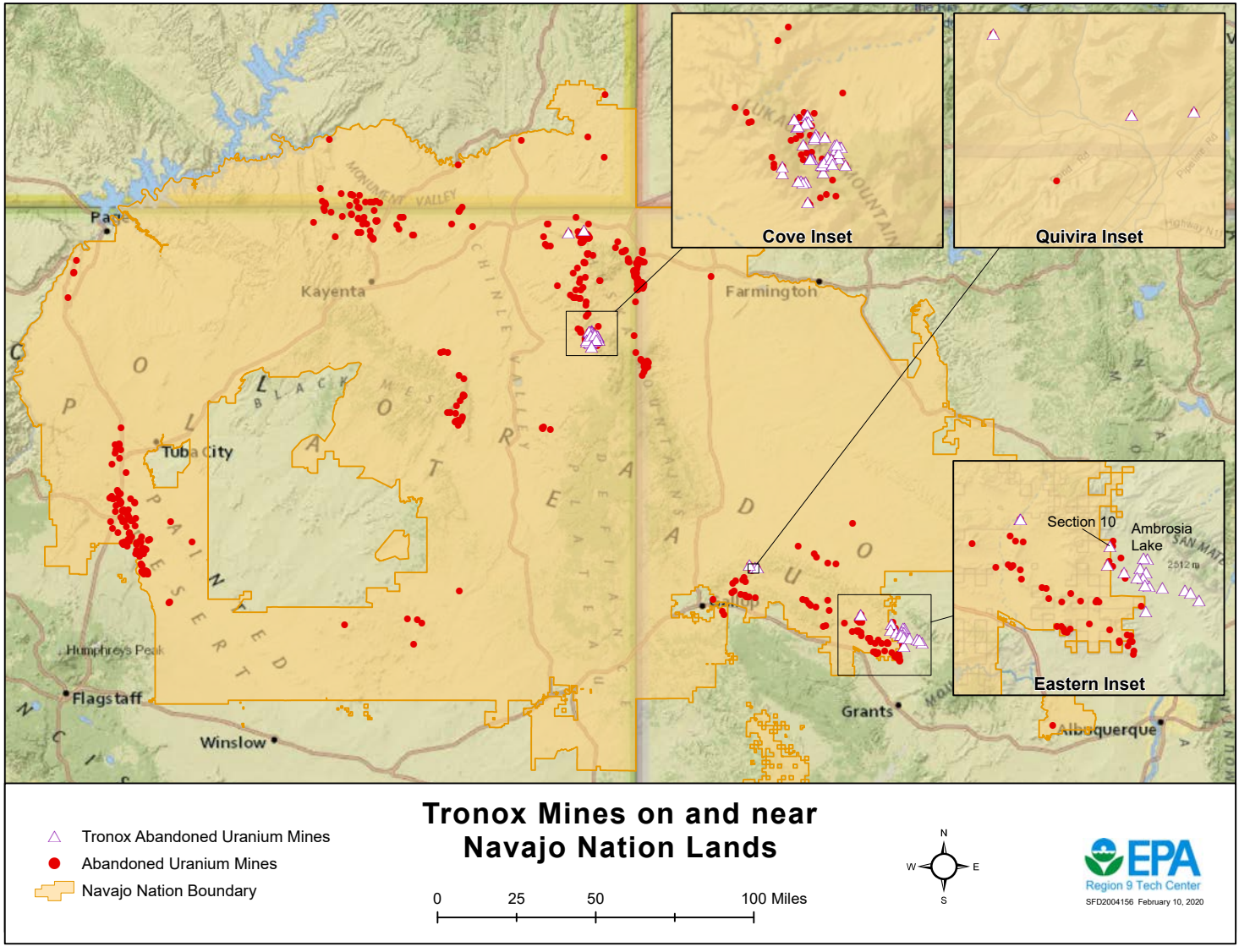
Common Acronyms used in Report

AUM	= Abandoned Uranium Mines	NNAML	= Navajo Nation Abandoned Mine Lands
NAUM	= Navajo Area Uranium Mines	GSA	= Geographic Sub-Area
US EPA	= United States Environmental Protection Agency	RSE	= Removal Site Evaluation
NNEPA	= Navajo Nation Environmental Protection Agency	EE/CA	= Engineering Evaluation / Cost Analysis

Cover Photo of Tronox Mesa V Haul Shaft. See page 22 for photo of shaft post-EPA remediation work.

CLEANUP OF TRONOX NAVAJO AREA URANIUM MINES



EPA updated the Tronox Map in Jan 2020.

1.0 Tronox Settlement Background

Background

On January 21, 2015, the Tronox Settlement agreement resolving fraudulent conveyance claims against Kerr-McGee Corporation and related subsidiaries of Anadarko Petroleum Corporation went into effect. Pursuant to the settlement agreement, Anadarko paid $5.15 billion plus interest to the litigation trust on January 23, 2015.

As a Result of the Tronox Settlement:

- US EPA received a distribution of 20% (~$917 million) for the cleanup of 54 uranium mines that were operated, and subsequently abandoned, by Kerr-McGee in and near the Navajo Nation territory;
- US EPA also received a distribution of 2% (~$92 million) for the cleanup of Quivira Mine Site; and
- Navajo Nation received a distribution of 1% (~$45 million) in connection with the Shiprock Uranium Mill Site.

From the late 1940s to the 1980s, Kerr-McGee Corporation mined more than seven million tons of uranium ore on or near the Navajo Nation. More than 50 mines are being addressed, 31 in the Cove and Lukachai area, other mines are located in the in the Teec Nos Pos, Coyote Canyon, Casamero Lake, and Baca/Prewitt Chapters.

US EPA Tronox funds can be used to support activities related to the assessment and cleanup of the 54 Tronox Settlement mines and contamination caused by the mines. Examples of these activities include:

- Informing and involving the community about cleanup activities
- Investigating radiation levels in water, soil, sediment, and air
- Putting up fences and signs to warn people about dangerous areas
- Protecting cultural and biological resources in the mine areas
- Constructing access roads to the mines for cleanup operations
- Closing mine openings and addressing other physical hazards

2.0 US EPA Tronox Settlement Financial Expenditure Breakout FY2011 through FY2019

The approximately $1 billion in funds that US EPA received for the clean-ups at 54 Tronox Navajo Area Uranium Mines (NAUM) has been deposited into a US EPA Superfund Special Account. In accordance with Section 122(b)(3) of CERCLA, the Agency established a special account to receive funds pursuant to an agreement with a Potentially Responsible Party (PRP). Special accounts are site-specific, interest-bearing sub-accounts housed within US EPA's Hazardous Substances Superfund (Superfund Trust Fund). Charges to a special account must be consistent with the terms ofthe settlement pursuant to which the funds are received.

US EPA, the Navajo Nation, and the state of New Mexico meet several times a year to discuss prioritizing response actions and funding projects at each specific Tronox NAUM site. The agencies strive to develop a coordinated and prioritized project list along with estimated funding requirements for the following calendar year. Information about individual project proposals are presented and discussed and this project list is memorialized in an annual "Approval and Annual Funding Projections for Implementation of Tronox Settlement Memo." The memo is presented to the US EPA Region 6's Branch Chief, Assessment and Enforcement Branch, Superfund and Emergency Management Division, for concurrence and then to the US EPA Region 9's Assistant Director, Superfund Division, for signature. Once projects are approved, a special account name/number is created for that project to track expenditures. Table 2.1 summarizes approved Tronox projects by special account name, budget, expenditures, and balance.

These expenditures are further broken out into the following expenditure categories.

Payroll: EPA costs associated with assessment and cleanup of the mine/mine areas including EPA field staff, administrative, technical support, legal, contracting and management.

Travel: Travel cost associated with the management, assessment, and cleanup of the mine/mine areas specified in the Tronox Settlement.

Contracts: Contracting costs associated with the assessment and cleanup of the mine/mine areas specified in the Tronox Settlement.

Expenses: Expense costs for equipment, property, supplies, and materials associated with the assessment and cleanup of the mine/mine areas specified in the Tronox Settlement.

Grants: Grants associated with the management assessment and cleanup of the mine/mine areas specified in the Tronox Settlement.

Interagency Agreements: US EPA has entered into interagency technical services agreements with US Army Corps of Engineers and US Geological Society.

Figure 2.2 is a graphical representation of Tronox Expenditures by Category FY2011 through FY2019.

US EPA INSPECTOR GENERAL REVIEW UPDATE

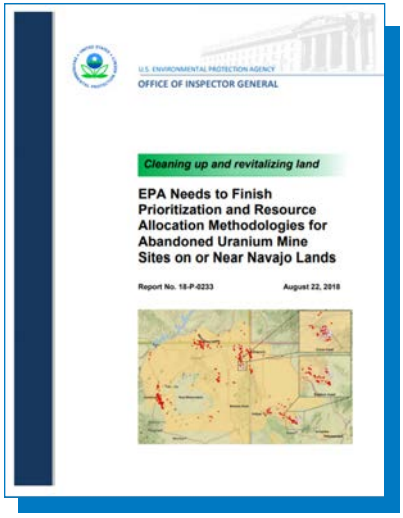
On August 22, 2018, US EPA's Office of Inspector General released a report entitled "EPA Needs to Finish Prioritization and Resource Allocation Methodologies for Abandoned Uranium Mine Sites on or Near Navajo Lands" (Report No. 18-P-0233 August 22, 2018).

On June 2, 2019, US EPA met the first commitment of completing the prioritization methodology for the Tronox NAUMs. The prioritization process is designed to assist US EPA and stakeholders in evaluating mine sites relative human health risks. The process uses data collected during the removal site evaluation phase to score five risk factors:

- Radiation level above background;
- Potential migration to surface water;
- Potential impact to groundwater;
- Land-use scenario; and
- Accessibility.

Once the five factors are scored, the mines will be grouped as "high," "medium," and "low" risk to assist with the decision-making process. The primary ranking categories are intended to provide a relative measure of the severity of the human health risks that exist at a given mine. This prioritization is used to supplement other lines of information to help the delegated officials with decision-making. It is not a substitute for the CERCLA risk assessment process that is performed during the development of the Engineering Evaluation/Cost Analysis (EE/CA) for removal sites or the Remedial Investigation/Feasibility Study for remedial sites. It also is not related to the National Priorities List (NPL) scoring process. It does not substitute for CERCLA or US EPA's regulations, nor is it a regulation itself. This process is simply one aspect of the evaluation of how Tronox settlement funds will be applied to mines identified in the Tronox settlement. Other factors, such as cost and feasibility of cleanup alternatives that are evaluated during the EE/CA phase, will also be included in the decision-making process. The outcome of the risk prioritization factors serves as a guide to decision-makers and stakeholders and may not reflect actual outcomes.

On August 1, 2019, US EPA met the second commitment by releasing the Removal Site Evaluations (RSEs) that cover the Tronox NAUMs. Under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), US EPA can undertake non-time critical removal actions where the planning period exceeds six months before initiation of on-site activities. The RSE is the field work portion of the investigation to determine the nature and extent of contamination and begins the risk assessment process. This information is then used to identify the current or potential threats to public health and/or the environment to meet the NCP criteria for conducting a removal action and justify developing an EE/CA for the site. The RSEs, which were provided to members of the Tronox NAUM Stakeholder Group, and are public documents, will allow the reader to understand the results of field sampling and laboratory analysis and see the current or potential threats to human health and the environment.


U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF INSPECTOR GENERAL

Cleaning up and revitalizing land

EPA Needs to Finish Prioritization and Resource Allocation Methodologies for Abandoned Uranium Mine Sites on or Near Navajo Lands

Report No. 18-P-0233 August 22, 2018

Accounting Line Active Project Names / Descriptions

Names	Descriptions
Tronox NAUM (Region 6)	Overall planning and logistical support for Removal activities and settlement implementation, including salary and travel, Phase II San Mateo Creek Basin groundwater study, and state grants.
Tronox NAUM East GSA	Assessment of Tronox mines in the eastern area of Ambrosia Lake to complete an RSE and EE/CA. Includes contracting, salary, and travel specific to this project.
Tronox NAUM West GSA	Assessment of Tronox mines in the western area of Ambrosia Lake to complete an RSE and EE/CA. Includes contracting, salary, and travel specific to this project.
Tronox NAUM Central GSA	Assessment of Tronox mines in the central area of Ambrosia Lake to complete an RSE and EE/CA. Includes contracting, salary, and travel specific to this project.
Tronox NAUM S18 Mine Residential Removal	A time critical radon abatement project for a residential structure adjacent to the Section 18 Tronox Mine in Ambrosia Lake. Includes contracting, salary, and travel specific to this project. Project was completed in FY18 Quarter 1.
Tronox NAUM Section 10	Assessment of the Section 10 Tronox mine in Ambrosia Lake to complete an RSE and EE/CA. Includes contracting, salary, and travel specific to this project.
Tronox NAUM Section 32 and 33	A joint project with Region 9 to assess the Section 32/33 Tronox mines in the Smith Lake sub-district in the Casamero Lake area to complete an RSE and EE/CA. Includes Region 6 salary, and Region 6 travel specific to this project.
Tronox Abandoned Uranium Mines on the Navajo Nation (bankruptcy settlement)	Tronox NAUM activities (2011 – 2015) prior to the 2015 settlement that included quarterly meetings with Navajo Nation EPA; settlement implementation planning; accounting and contracting strategy; community involvement; Tronox portal development, Northern Agency ACPECT data collection, and grants.
Tronox NAUM Cove Transfer Station	Construction activities to mitigate surface erosion at the former transfer area located in the Cove Chapter of the Navajo Nation, in eastern Arizona.
Tronox NAUM Mesa I Mine	Mesa Mine I Preliminary Site Assessment has been conducted to determine risk to human health and the environment. A RSE was conducted in FY 2018.
Tronox NAUM Cove Wash Regional Assessment	Identify potential areas of concern and sources of contamination, as well as determine the baseline contaminant levels in the Cove Wash.
Tronox NAUM (Region 9)	Activities included quarterly meetings with Navajo Nation; settlement records review; settlement implementation planning; Navajo Nation Mines Portal Database; Northern Agency ASPECT Gamma survey; Annual Quarterly reports; Tronox Northern Agency RSEs; Tronox Northern Agency EE/CAs; Cove Mesa V Main Access Road Improvement/Design; Cove Mine Access Assessment; Northern Agency Cultural Resources Survey; community involvement; and Navajo Nation grants.
Tronox NAUM Cove Sitewide Conceptual Model and Data Gaps	Assimilate information from previous studies and actions of the site; research, gather and analyze other existing data and documents that could be used to develop the conceptual site model; break the site out into investigation areas based on known information; provide pictorial representations of the site; depict exposure pathways and receptors; provide recommendations for paths forward for each of the investigation areas; and, suggest general areas for data gap investigations.
Tronox NAUM Quivira Mines	Activities at the Quivira Mines include: Repair roads and bridges to allow access to removal sites; vent hole removal action; the Engineering Evaluation/Cost Analysis; and discuss the removal options with Navajo Nation, community members, and other stakeholders.

Table 2.1: US EPA Tronox and Quivira Approved Projects, Budgets, and Expenditures: FY2011 through FY2019

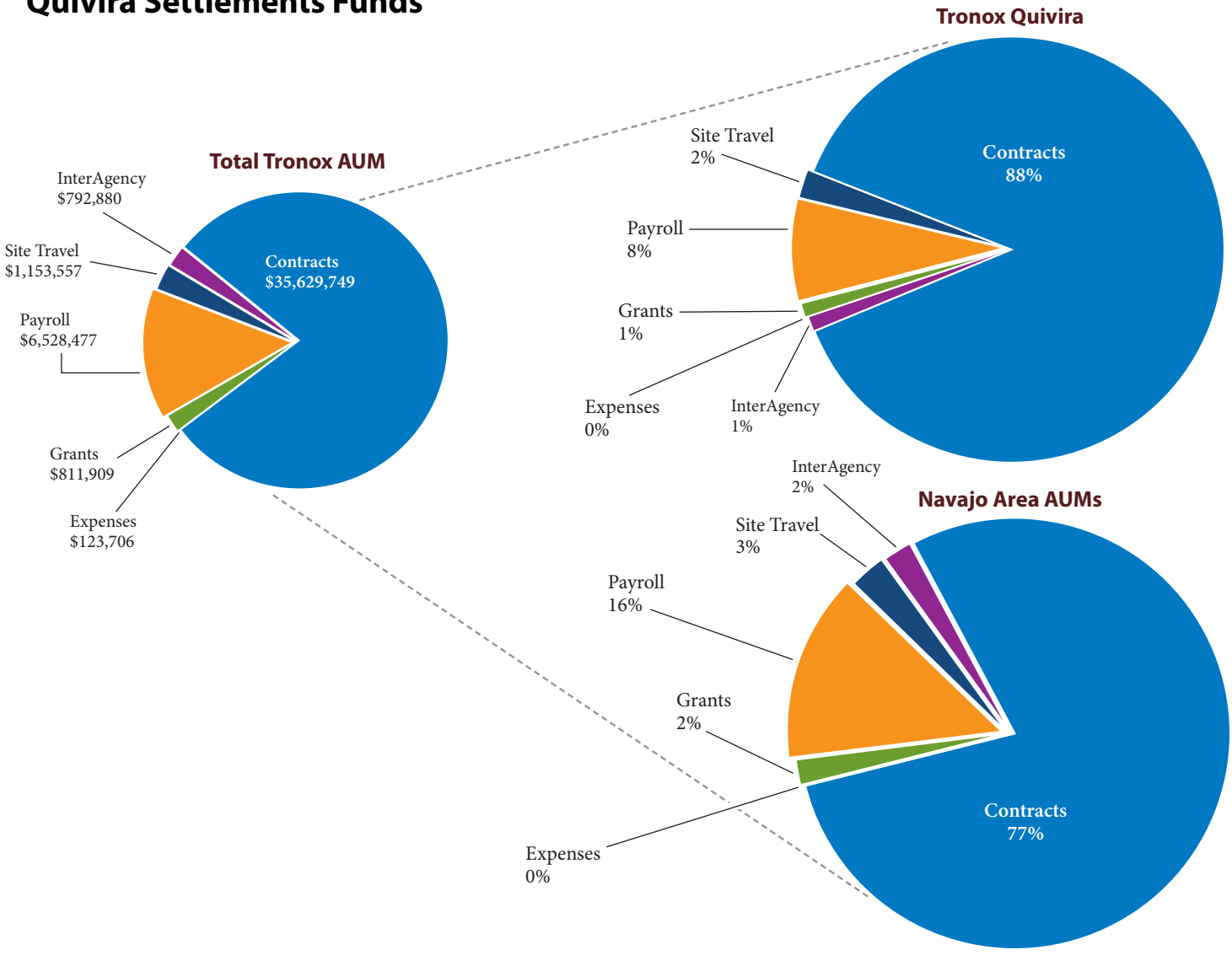
An overview of the approved projects and activities associated with these expenditures is located in Section 3.

Special Account Summary

Special Account Names	Total Budget	Total Expenditures	Remaining Balance
US EPA Region 6			
Tronox NAUM East GSA	$2,325,982	$2,135,142	$190,840
Tronox NAUM West GSA	$1,999,316	$1,596,584	$402,731
Tronox NAUM	$4,693,259	$3,385,811	$1,307,448
Tronox NAUM Central GSA	$2,275,328	$1,640,365	$634,962
Tronox NAUM S18 Mine Residential Removal	$102,529	$22,865	$79,665
Tronox NAUM Section 10	$171,422	$128,923	$42,498
Tronox NAUM Section 33	$810,968	$554,118	$256,850
US EPA Region 9			
Abandoned Uranium Mines on the Navajo Nation	$3,218,714	$3,218,714	$0.0
Tronox Quivira Mines*	$94,887,604*	$8,472,117*	$86,415,487*
Cove Transfer Station - Tronox	$5,252,797	$3,691,046	$1,561,751
Mesa I Mines - Tronox	$9,414	$9,414	$0.0
Section 32 AUM Site - Tronox	$2,076,648	$1,508,059	$568,589
Section 33 AUM Site - Tronox	$70,725	$70,725	$0.0
Tronox NAUM Cove Wash Regional Assessment	$4,156,812	$3,275,497	$881,315
Tronox Navajo Area Uranium Mines	$904,525,615	$20,285,939	$884,239,676
Tronox NAUM Cove Sitewide Conceptual Model and Data Gaps	$3,064,784	$1,834,464	$1,230,320
Tronox NAUM Mesa II	$8,392,792	$2,111,700	$6,281,092
Tronox NAUM Mesa V	$2,181,048	$726,388	$1,454,660
San Mateo Creek Basin	$20,010	$6,525	$13,485
Tronox NAUM Cove Mesa I Mines	$2,162,182	$648,000	$1,514,182
Tronox NAUM Cove Mesa III Mines	$360,364	$108,000	$252,364
Tronox NAUM Cove Mesa IV Mines	$1,441,455	$432,000	$1,009,455
Tronox NAUM Cove Mesa VI Mines	$360,364	$108,000	$252,364
Tronox NAUM Brodie I Mine	$360,364	$108,000	$252,364
Tronox NAUM Block K Mine	$360,364	$108,000	$252,364
Tronox NAUM Step Mesa	$720,727	$216,000	$504,727
Tronox NAUM Flag Mesa	$1,441,455	$432,000	$1,009,455
Tronox NAUM Knife Edge	$360,364	$108,000	$252,364
Total All Special Accounts	**$1,047,803,403**	**$56,942,397**	**$990,861,006**

In Prior Reports referrred to as NECR Quivera Mines.* ***As of September 30, 2019, interest earned on Tronox Accounts $37,952,308.*

Tronox Total Disbursed Breakout by Cost Category for Navajo Area AUMs and Quivira Settlements Funds



Tronox and Quivira Contracting Vehicles

Since the Tronox settlement in 2011, US EPA has been utilizing new and existing contracts to conduct cleanup activities, which allowed the Agency to expeditiously achieve our goal of protecting human health and the environment on the Navajo Nation. These contracts include:

NAVAJO BUSINESS

- **Site Specific Contract:** Arrow Indian Contractors, a Navajo-owned Priority 1 (8A) company was awarded a sole source contract for $4M to excavate and remove contaminated soil related to mining operations. They also repaired access roads and bridges.
- **Site Specific Contract:** Clawson Excavating, a Navajo-Woman owned/Small Business Priority 1 Company was awarded a $1M contract to complete mine access and road upgrades for the approximately 32 mine sites in the Cove Chapter.

OTHER CONTRACTING VEHICLES

- **START Contract:** Superfund Technical Assessment and Response Team – provides scientific/technical support for assessing chemical, biological, and radiological contamination as well as site assessment and remedial support activities.
- **ERRS Contract:** Emergency and Rapid Response Services – provides management, field personnel, and equipment resources to execute decontamination and demolition and removal services.
- **RAC Contract:** Remedial Action Contracts – provides remedial response, enforcement oversight, non-time critical removal activities, engineering support, and assessment services.
- **TASC Contract:** Technical Assistance Services for Communities – to help communities better understand the science, regulations and policies of environmental issues.
- **RAES Contract:** The Response, Assessment and Evaluation Services $85 million capacity contract was awarded on October 11, 2017 to Tetra Tech, and the scope of work includes site assessment of the abandoned uranium mines.

Table 2.2: Breakout of Tronox and Quivira Expenditures Categories for Approved Projects FY2011 through FY2019

Special Account Summary

Special Account Names	Contracts	InterAgency	Expenses	Grants	Payroll	Site Travel	Total Spent
US EPA Region 6							
Tronox NAUM	$2,215,649	$0.00	$0.00	$75,372	$776,394	$164,945	$3,232,359
Tronox NAUM East GSA	$1,709,464	$0.00	$0.00	$0.00	$229,330	$51,588	$1,990,382
Tronox NAUM West GSA	$1,443,488	$0.00	$0.00	$0.00	$116,120	$36,976	$1,596,584
Tronox NAUM Central GSA	$1,571,031	$0.00	$0.00	$0.00	$51,523	$17,812	$1,640,365
Tronox NAUM S18 Mine Residential Removal	$21,352	$0.00	$134	$0.00	$1,378	$0.00	$22,865
Tronox NAUM Section 10	$127,858	$0.00	$0.00	$0.00	$1,065	$0.00	$128,923
Tronox NAUM Section 32/33	$496,332	$0.00	$0.00	$0.00	$44,488	$13,298	$554,118
US EPA Region 9							
Tronox AUM on the Navajo Nation (Bankruptcy)	$1,768,997	$0.00	$5,995	$115,452	$1,213,404	$114,866	$3,218,714
Tronox Quivira Mines	$6,363,659	$112,364	$3,647	$57,840	$562,620	$115,298	$7,215,428
Tronox Cove Transfer Station	$3,445,192	$0.00	$1,049	$2,142	$76,162	$33,056	$3,557,602
Tronox Mesa I Mines	$0.00	$0.00	$0.00	$0.00	$7,376	$2,038	$9,414
Tronox Section 32 AUM Site	$1,432,842	$0.00	$168	$3,737	$33,172	$9,090	$1,479,008
Tronox Section 33 AUM Site	$69,068	$0.00	$0.00	$0.00	$561	$1,097	$70,725
Tronox NAUM Cove Wash Regional Assessment*	$2,010,669*	$0.00*	$3,310*	$227,802*	$649,527*	$121,976*	$3,013,284*
Tronox Navajo Area Uranium Mines	$12,796,323	$80,681	$210,805	$64,739	$2,608,293	$449,070	$16,209,912
Tronox NAUM Cove Sitewide Conceptual Model and Data Gaps	$124,507	$599,835	$0.00	$158,444	$98,117	$14,031	$994,934
Tronox NAUM Mesa II	$29,268	$0.00	$30,543	$0.00	$20,537	$8,418	$88,766
Tronox NAUM Mesa V	$779	$0.00	$5,197	$106,382	$31,886	$0.00	$144,244
Tronox NAUM San Mateo Creek Basin	$0.00	$0.00	$0.00	$0.00	$6,525	$0.00	$6,525
Tronox NAUM Cove Mesa I Mines	$934	$0.00	$5,877	$0.00	$0.00	$0.00	$6,811
Tronox NAUM Cove Mesa III Mines	$156	$0.00	$979	$0.00	$0.00	$0.00	$1,135
Tronox NAUM Cove Mesa IV Mines	$623	$0.00	$3,918	$0.00	$0.00	$0.00	$4,541
Tronox NAUM Cove Mesa VI Mines	$156	$0.00	$979	$0.00	$0.00	$0.00	$1,135
Tronox NAUM Brodie I Mine	$156	$0.00	$979	$0.00	$0.00	$0.00	$1,135
Tronox NAUM Block K Mine	$156	$0.00	$979	$0.00	$0.00	$0.00	$1,135
Tronox NAUM Step Mesa	$311	$0.00	$1,959	$0.00	$0.00	$0.00	$2,270
Tronox NAUM Flag Mesa	$623	$0.00	$3,918	$0.00	$0.00	$0.00	$4,541
Tronox NAUM Knife Edge	$156	$0.00	$979	$0.00	$0.00	$0.00	$1,135
Total	**$35,629,749**	**$792,880**	**$123,706**	**$811,909**	**$6,528,477**	**$1,153,557**	**$45,197,990**

** Beginning with this report, EPA Reporting adjusted to reflect actual expenditures; Unliquidated Obligations (ULOs) or commitments to projects without spending will no longer be reported. Slight discrepancies may be noted between figures above and EPA's Special Account Summary packages due to the posting date of invoices paid.*

Tronox and Quivira Grant Expenditures for FY2011 through FY2019 by US EPA Region, Approved Projects and Grants

US EPA provides grant funding to agencies in support of community interests and to fund partner agencies' activities that support the assessment and cleanup of Tronox NAUMs. Funding has been provided to the Navajo Nation, the State of New Mexico and Dine College. The purposes and levels of the funding are outlined below.

State of NM	$221k was provided to the State of New Mexico to support technical review of workplans, review cleanup options, assist with field oversight and interagency collaboration.
Navajo Nation EPA	Over $4M has been provided to support technical review of remediation plans and final cleanup options, community involvement activities including coordination for community meetings, distribution of information, and collecting environmental samples.
Navajo Nation Abandoned Mines Lands Dept.	$1.7M has been provided for on-site construction activities and technical review of proposed remediation strategies.
Dine College	Funding in the amount of $809,000 is supporting studies of uranium effects on livestock and the Cove watershed; Dine summer interns collected data and helped investigate potential mine impacts in the larger Cove Watershed.

3.0 Tronox and Quivira NAUM Approved Project Descriptions for FY2011 through FY2019

3.1 US EPA Region 6

SAN MATEO CREEK BASIN GROUNDWATER REPORT – PHASE 2

US EPA Region 6 completed work on the multi-phased groundwater investigation for the San Mateo Creek Basin, including the Tronox NAUM Ambrosia Lake Impact Area. The work culminated in the release of the Phase 2 Groundwater Investigation Report in October 2018. The report identified likely alluvial aquifer impacts in the upper and lower parts of the San Mateo Creek Basin and identified likely impacts to the Dakota and Morrison in the vicinity of the NM 509/605 junction, also known as the "Crossroads." A generalized conceptual site groundwater model is shown in Figure 1. Uranium plume maps for the alluvial aquifer of the lower basin are presented on Figure 2 to compare uranium concentrations in groundwater during a peak period of mine water discharge (1976 – 77) to uranium concentrations in a post period of mine water discharge (2015).

CONCEPTUAL SITE GROUND WATER MODEL

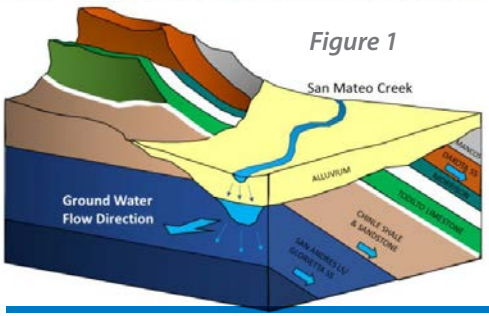
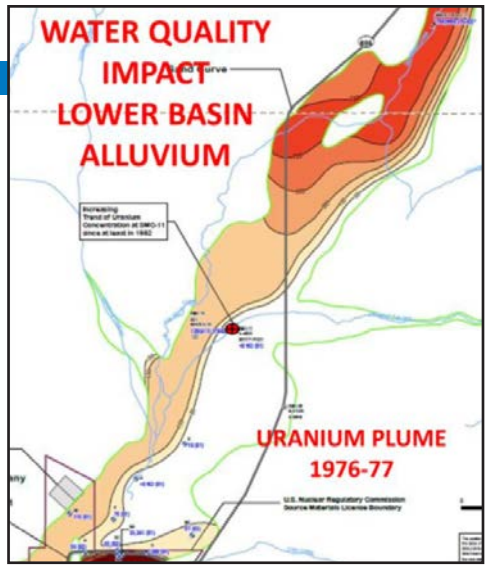


Figure 1

Mark Purcell, Regional Project Manager, presented the findings of the Phase 2 Report during the November 2019 Tronox Stakeholder Meeting. The presentation was used to drive a discussion with Tronox Stakeholder members about the purpose of the study, the approach used to assess mining impacts on the groundwater, comparison of the data to federal and state standards, and the key hydrogeological and geochemical analyses.

The groundwater investigation work completed in 2018 is helping US EPA delineate the extent of the impacts from the Tronox NAUM Ambrosia Lake mines discharge operations to ground water that could present a current or future health threat to the Navajo as well as other local communities that use the ground water as a water supply for drinking and other domestic or agricultural



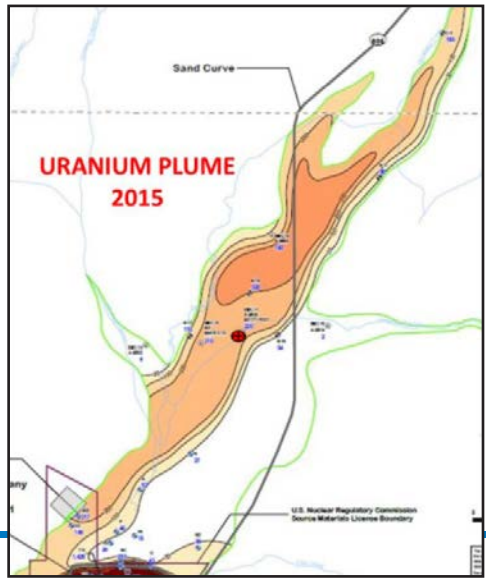


Figure 2 and 3

Sonic Drill Rig used for the Ambrosia Lake Groundwater Investigation.

purposes. Understanding and predicting the future flow path of this impacted groundwater as it continues to move through the shallow alluvium and underlying bedrock formations will be critical to protecting the Navajo Nation and other users from legacy groundwater contamination in the Tronox NAUM Ambrosia Lake area for generations to come. Data gathered and analyzed as part of this groundwater investigation will be useful to the Navajo and other stakeholders that rely on this vital water resource.

The first phase of the investigation (Phase 1), which focused on the alluvial groundwater and was funded by US EPA appropriations, was completed in September 2016 with the release of a groundwater report documenting the findings. Copies of the report were provided to the Navajo and the results presented to the Navajo Nation at the Tronox Quarterly Meeting in Albuquerque in October 2016.

REMOVAL SITE EVALUATIONS COMPLETED

In FY2019, a major milestone was met when US EPA Region 6 released the RSE for mines located on private property in New Mexico in August. The release of this information was followed by a technical workshop for Tronox Stakeholders in which US EPA provided an overview of the findings from the field work and explained how the RSE documents were developed.

In order to more efficiently address these mines, US EPA Region 6 created geographic groupings based upon proximity and current ownership. The groups are as follows, and based upon the original surface expression names:

- East Geographic Sub Area (GSA) – Section 35 and 36 Mines, within Township 14 North, Range 9 West.
- Central GSA – Section 17, 19, 30 East, and 33 Mines, within Township 14 North, Range 9 West.
- West GSA – Section 22 and 24 Mines, within Township 14 North, Range 10 West and Section 30 West Mine, within Township 14 North, Range 9 West.

NAUM Community Meeting.

- Section 10 Mine, within Township 14 North, Range 9 West.
- Section 32 and 33 Mines (joint effort with Region 9), within Township 15 North, Range 11 West.

All of these mining operational areas have undergone some form of closure operations and removal of surface features.

In 2011, prior to the Tronox Settlement, US EPA utilized the ASPECT platform (plane) to conduct an aerial gamma screening survey of the Ambrosia Lake Sub-District. The ASPECT survey indicated high levels of gamma radiation on mines that compose this program and also indicated that wastes from these mines have migrated off-site and onto adjacent properties. US EPA concluded that additional data would be necessary in order to make risk management or cleanup decisions at the Sites. Consequently, several Data Quality Objectives (DQOs) were developed as part of the Programmatic Work Plan. The primary purpose and objectives of each RSE was to investigate surface soil radioactive contamination and determine the exposure risk to human health and the environment. The data generated from the RSEs will be used to assist in cleanup decisions at the Site and indicate whether an EE/CA would be warranted as part of a Non-Time Critical Removal Action.

Despite the diversity in conditions at abandoned uranium mines in the two regions, a high-level objective of the Tronox NAUM program is to maintain the highest possible consistency in planning, documenting, and executing assessment and remediation activities at AUMs in both regions. The technical approach to site activities applied best practices and commonly accepted procedures for measuring and analyzing conditions. A crosswalk was developed to help stakeholders understand key aspects of work performed by both regions.

3.2 US EPA Region 9

QUIVIRA BRIDGE AND MINES

A Navajo-owned company performed a $4 million dollar action to remove contaminated soils from around five ventilation shafts located near the community and repair roads and a bridge.

A second Navajo-owned company performed a $500,000 construction project to complete repairs on the bridge that provides access to the mine site. This bridge also provides access to several homes in the community. The company employed four Navajo construction workers and a Navajo owner/manager during the three-month project.

US EPA participated in 6 meetings with the community during the year and has a conference call every month with the community association executive committee. US EPA staff also spent time individually with multiple community members during the construction mobilization.

Upcoming Work: US EPA is completing the draft EE/CA that describes and compares alternatives to cleanup the site. US EPA plans to share the draft document with the Navajo Nation, community and other stakeholders in 2020.

Deconstruction of old bridge.

The Quivira mine waste pile and the repaired bridge completed in 2018 by Arrow Indian Contractors, a Navajo-owned company.

Cove Chapter, Apache County.

Field crew collecting soil samples in the Cove Chapter wash.

COVE AIR STUDY

Background and Description:

During Region 9's interviews with the Cove Community regarding the surrounding AUMs, residents raised concerns about radionuclides being transported by wind and dust. The goal of the Cove Air Study is to collect air monitoring data, on particulate matter, metals and radionuclides, that will be used to address these concerns. The study includes sampling of airborne particulate matter of diameters of 2.5 microns or less (PM2.5), metals of concern- arsenic (As), barium (Ba), lead (Pb), molybdenum (Mo), selenium (Se), uranium (U), vanadium (V) and airborne radionuclides of concern- isotopes of thorium (Th), U and radium (Ra), specifically Th-230, Th-232, U-234, U-235, U-238, Ra-226, and Ra-228.

Current Status of Monitoring Stations:

Locations for the air monitoring stations, to evaluate potential exposure to residents over the year-long monitoring event, were selected to include the most sensitive populations (children and elders) and in areas downwind of the source AUMs at varying elevations. The five locations selected include four in the Cove Community and one reference location outside of the Cove area. In FY19 access to

all locations were obtained and construction of the air monitoring stations began in mid-October of 2019. Each station will allow for the placement of two air monitors (with the second monitor at these locations allow for quality control checks) on a concrete slab with separate metered electrical service and fencing. The monitoring stations are being constructed by a Navajo Owned Company.

The locations and the status of the air monitoring stations are:

- Cove Chapter House
- Cove Day School
- Cove Water Tower
- Residential Location
- Navajo Tribal Utility Authority (NTUA) Pump House

Air Monitoring Station.

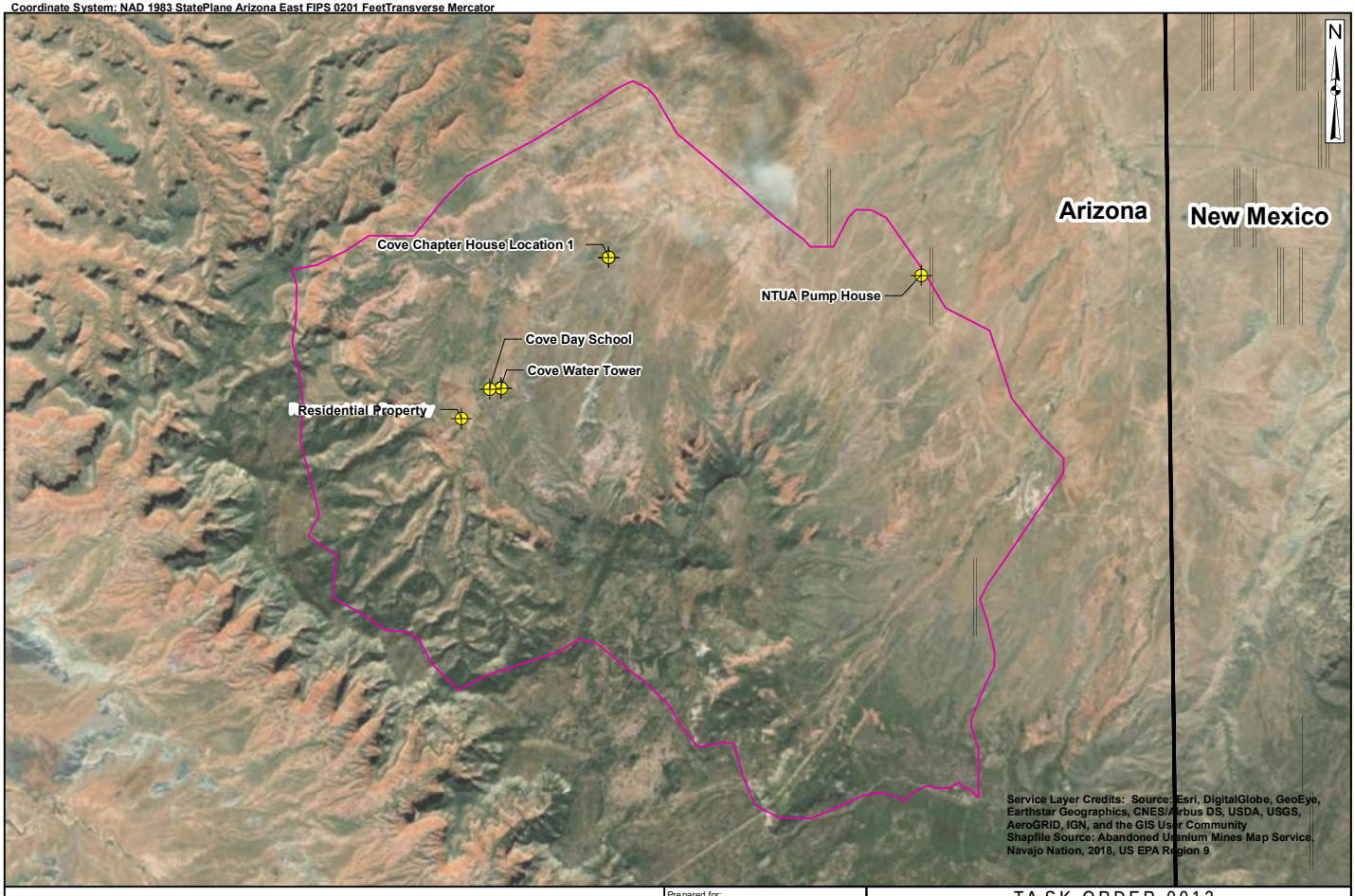
Remaining Work and Target Date:

Once the remaining work at the NTUA pump house and at the residential property are completed the air monitors will be put in place and run for one year. In FY2019, US EPA Region 9 provided a grant to the Navajo Nation Environmental Protection Agency's Air Quality Control Program (AQCP) to purchase and place a meteorological tower at the Chapter House location and to hire an environmental technician who will collect and replace sample filters, weekly, at each location for the duration of the monitoring event. Additionally, NNEPA AQCP will work with community members to assess the monitoring stations and equipment weekly and report back.

Quarterly reports summarizing the data will be provided and shared with the community and Cove Day School for potential use in the School's curriculum. We anticipate the year-long monitoring event to in January 2020 and end in January 2021.

Tronox -Cove Air Study Locations

Coordinate System: NAD 1983 StatePlane Arizona East FIPS 0201 FeetTransverse Mercator



Legend

- Air Sampling Station
- Cove Chapter Boundary

2 1 0 2 Miles

Prepared for:

Prepared By: TETRA TECH, 1999 Harrison Street, Suite 500, Oakland, CA 94612

TASK ORDER 0012
AIR SAMPLING STATION LOCATIONS

Task Order No.: TO 0012	Contract No.: EP-S9-17-03	Figure No.:
Location: NAVAJO NATION	Date: 11/20/2018	

Dennis Tremethick and Autumn Roe presenting and answering questions on the AMRCS RFP.

8TH ANNUAL NAVAJO NATION BUSINESS OPPORTUNITY DAY (WINDOW ROCK, ARIZONA)

In December 2018, Contracting Officers Autumn Roe and Dennis Tremethick and RPM Chip Poalinelli attended and presented at the 8th Annual Navajo Nation Business Opportunity Day. The subject of the presentation was US EPA's work on abandoned uranium mines and procurement opportunities, including the Request for Information (RFI) on the draft Request for Proposals (RFP) for the Navajo Area Abandoned Mines Response and Construction Services (AMRCS) contract.

View of Mesa V Haul Shaft Opening and Waste Pile.

COVE CHAPTER TRONOX MESA V HAUL SHAFT BARRICADE CONSTRUCTION (NAVAJO NATION):

In 2019, the Tronox Cove team and our design engineer contractors conducted an inspection of the Cove Transfer Station. In a previous Time Critical Removal Action, US EPA removed contaminated soils and stabilized a hillside at a residence. The inspection team observed that there was a significant amount of vegetation re-established on the hillside and that the runoff diversion channels were working effectively. The US EPA, NNEPA, and Abandoned Mines Lands Program (NNAML) will conduct a follow-up inspection in the Spring of 2020.

In FY2019 US EPA, in coordination with NN EPA, worked with the NNAML Program, and Clawson Excavating (a Navajo woman owned business) to construct a wire mesh barricade around the opening of the Mesa V Haul Shaft. The Tronox Mesa V Haul Shaft is an opening that was used by the mining company to transport uranium ore from the Tronox Mesa V mine site. The shaft was accessible by the public and livestock (cattle). US EPA and the Navajo Nation were concerned that unrestricted access to the Site posed a risk to public health because of radon gas released into the environment from exposed uranium ore and waste.

USEPA and AML conducting a preconstruction inspection at the Cove Mesa V Haul Shaft.

Cove Mesa V Haul Shaft Post Barricade Construction.

TRONOX NAUM COVE MEXICAN SPOTTED (MSO) OWL SURVEY:

In coordination with U.S. Fish and Wildlife Service (USFWS) and Navajo Nation Department of Fish and Wildlife (NNDFW), US EPA is starting the final season of a two-year MSO survey within the canyons of the Cove Watershed located on the Navajo Nation. The survey is being conducted because the footprint of the Northern Agency Tronox Abandoned Uranium Mine sites falls, or could fall, within the MSO habitat. The MSO is listed as a threatened species by the USFWS and NNDFW and as an Arizona Wildlife Species of Concern by the Arizona Game and Fish Department.

NORTHERN AGENCY NAUM - LIGHT DETECTION AND RANGING (LIDAR) SURVEY (COVE CHAPTER, NAVAJO NATION)

In 2019, the Tronox Cove team conducted a LiDAR survey of the mines, mine areas, washes, and haul roads throughout the Lukachukai mountains using a piloted fixed winged aircraft. Airborne LiDAR can quickly scan large land areas detecting the ground surface contours even in areas with lots of trees and plants, resulting in a three-dimensional image of the land surface. The results of the LiDAR survey will be used

Former Cove Transfer Station Prior to Erosion Repair.

Mexican Spotted Owl (MSO) in Cove.

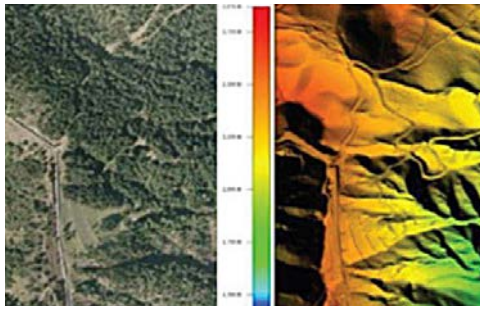
Former Cove Transfer Station After Erosion Repair.

to develop a digital terrain model, contour lines, and refine waste volumes for the former uranium mine site areas that were inaccessible or partially accessible during the RSE field efforts.

LiDAR Plane that Flew the Mission.

OFFICE OF INSPECTOR GENERAL AUDIT REPORT – RSE COMPLETION COMMITMENT

In 2018, the Tronox Northern Agency Project Team completed the Tronox Northern Agency RSEs Report. Completing the Tronox RSEs was a recommendation and US EPA commitment in response to the OIG Audit Report (*see page 7*). The RSE assessed 39 mine sites, 37 mine-related sites, 22 miles of surface water washes, 10 miles of old haul roads, and 32 background study areas located in multiple Navajo Nation chapters, including the Teec Nos Pos, Sweetwater, Cove, Red Valley, and the Lukachukai Chapters.



Example Lidar Images.

Tronox/Cove Project Team.

Tronox NAUM Site that was Evaluated.

4.0 Tronox and Quivira NAUM – Workforce Development Opportunities

Cleaning up abandoned uranium mines on the Navajo Nation creates jobs for Navajo workers and provides opportunities for Navajo businesses. The work is project specific and usually of a short duration. Some positions may be part-time, seasonal and/or limited to a specific project. These opportunities will increase as cleanup work at the mines accelerates. The following provides a summary of workers that have supported Tronox Mine Cleanup work:

Navajo Workers Supporting Tronox Cleanup Work Within the Past Seven Years

57 Professional Service Jobs

- 1 Botanist
- 1 Geologist
- 1 Cultural Resources Consultant
- 1 2nd Community Liaison
- 2 Security Officers
- 2 Sampling Technicians
- 4 local Cove jobs
- 3 Navajo language interpreters
- 9 Removal Site Evaluation Sample Technicians
- 33 Navajo staff on archeological teams

28 Construction Jobs

- 6 Construction Workers for Cove Mesa V Road construction and Mesa V Haul Shaft
- 15 Construction Workers for Quivira time-critical action
- 5 Construction Workers for Quivira bridge construction
- 2 Community Liaisons

62 Internship & Academia

- 42 Diné College interns
- 2 Navajo Technical University interns
- 1 New Mexico State University intern
- 1 Eastern New Mexico University intern
- 3 Diné College faculty members
- 13 Diné College interns

Quivira Bridge repairs, completed in October 2019

DEERE

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