Site Reassessment
Mesa I, Mines 10-15
Abandoned Uranium Mine
Apache County, Arizona

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List of Acronyms

ABGMT	Arizona Bureau of Geology and Mineral Technology
ADWR	Arizona Department of Water Resources
AEC	United States Atomic Energy Commission
AGS	Arizona Geological Survey
AUM	Abandoned Uranium Mine
BIA	Bureau of Indian Affairs
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cpm	Counts Per Minute
DOE	United States Department of Energy
EPA	United States Environmental Protection Agency
GIS	Geographic Information Systems
HRS	Hazard Ranking System
MCL	Federal Maximum Contaminant Level
NAMLRP	Navajo Abandoned Mine Lands Reclamation Program
NDWR	Navajo Department of Water Resources
NMGS	New Mexico Geological Survey
NNEPA	Navajo Nation Environmental Protection Agency
NPL	National Priorities List
NSP	Navajo Nation Environmental Protection Agency – Superfund Program
NTUA	Navajo Tribal Utility Authority
PA	Preliminary Assessment
pCi/L	Picocuries Per Liter
RCRIS	Resource Conservation and Recovery Information System
SARA	Superfund Amendments and Reauthorization Act of 1986
Site	Mesa I, Mines 10-12
µg/L	Micrograms Per Liter
µr/hr	Micro Roentgens Per Hour
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VCA	Vanadium Corporation of America
WESTON	Weston Solutions, Inc.

1.0 INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), Weston Solutions, Inc. (WESTON) has been tasked to conduct a Site Reassessment of the Mesa I, Mines 10-15 site (Site) near Cove, Apache County, Arizona.

The purpose of the Site Reassessment is to review existing information on the Site and its environs to assess the threat(s), if any, posed to public health, welfare, or the environment, and to determine if further investigation under CERCLA/SARA is warranted. The scope of the Site Reassessment includes the review of information available from federal, state, and local agencies and performance of an on-site reconnaissance.

Using these sources of existing information, the Site is evaluated using the U.S. Environmental Protection Agency's (EPA) Hazard Ranking System (HRS) criteria to assess the relative threat associated with actual or potential releases of hazardous substances at the Site. The HRS has been adopted by the EPA to help set priorities for further evaluation and eventual remedial action at hazardous waste sites. The HRS is the primary method of determining a site's eligibility for placement on the National Priorities List (NPL). The NPL identifies sites at which the EPA may conduct remedial response actions. This report summarizes the findings of these preliminary investigative activities.

The Site was identified as a potential hazardous waste site and entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) on September 24, 1990 (NND983466772) (EPA 2013b).

More information about the Superfund program is available on the EPA website at http://www.epa.gov/superfund. The attached fact sheet describes EPA's site assessment process (Appendix E).

1.1 Apparent Problem

The apparent problems at the Site, which contributed to the EPA's determination that a Site Reassessment was necessary, are presented below:

- The Site was mined for uranium ore at several intervals from 1950 until 1967. Low grade uranium ore, rubble, and tailings are present at the Site.
- There are at least four (4) drinking water wells with known uranium contamination within 4 miles of the Site.
- Uranium contamination has been identified in surface water samples collected downstream of the Site.
- Wetlands around found alongside the Site.
- Gamma radiation has been found at the Site at levels significantly above the background.

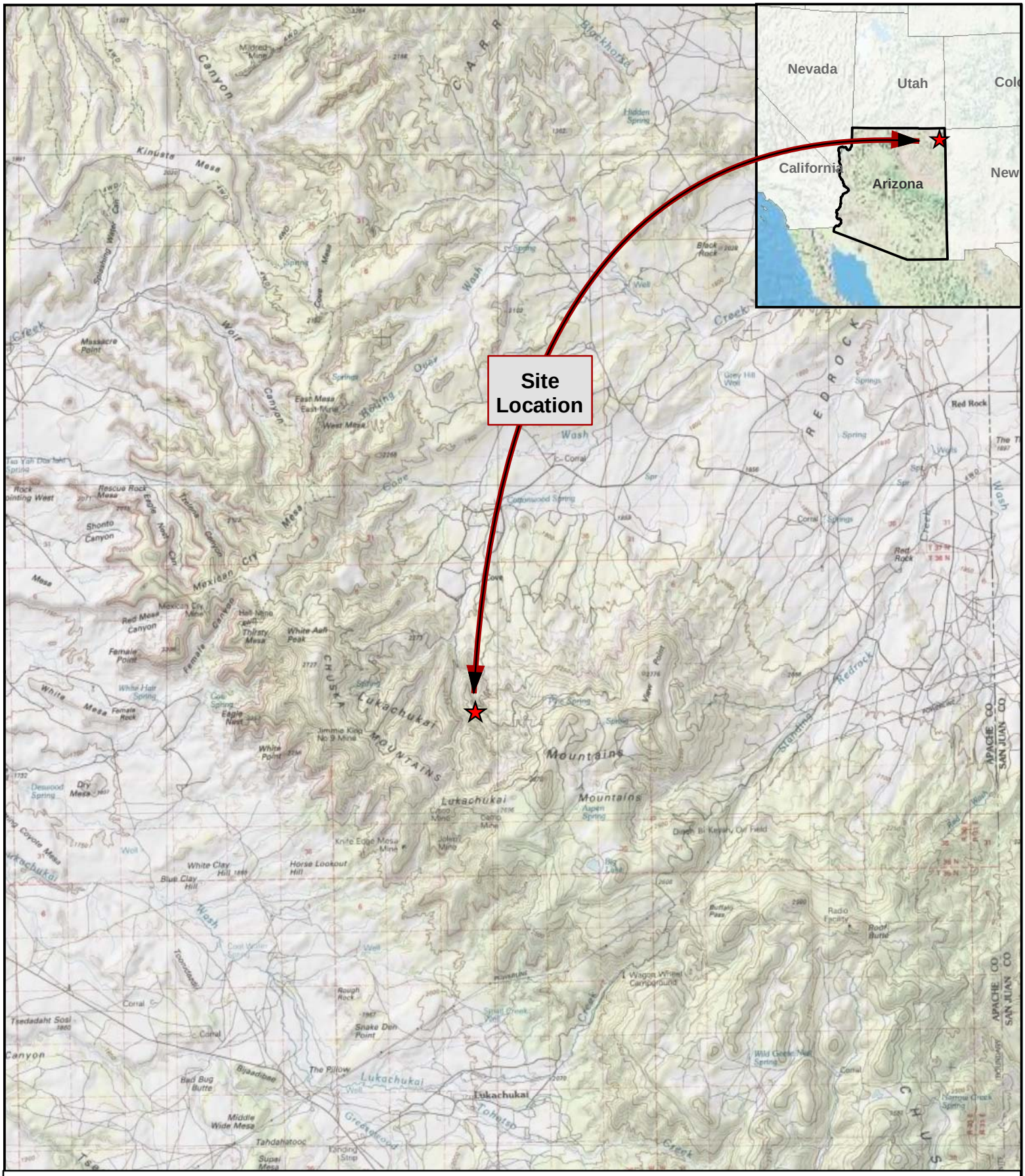


Figure 1 - Site Location
Mesa I Mines 10 - 15
Site Reassessment

2.0 SITE DESCRIPTION

2.1 Site Location

The Site is located in the Lukachukai Mountains, approximately 2 miles south of Cove, Apache County, Arizona on Navajo Nation territory. The geographic coordinates for the Site are 36° 31' 15" North latitude and 109° 13' 14" West longitude (Appendix D). The location of the Site is shown in Figure 1 (ABGMT 1981, AGS 1993).

2.2 Site Description

The Site is an abandoned uranium mine consisting of six mining sites within a single production area, connected by underground and surface workings. The six mining areas constitute a total combined area of approximately 68 acres (ABGMT 1981, AGS 1993, TGS 2007).

The individual mining sites are located near the top of prominent ridges on a mesa, named Mesa I by the United States Atomic Energy Commission (AEC) in 1950, in the Lukachukai Mountains. The Site is no longer being actively mined. Figure 2 shows the site layout, and the six mining sites are detailed in Table 2-1 (ABGMT 1981, AGS 1993, NNEPA 1991, TGS 2007).

Table 2-1. Mesa I, Mines 10-15 Site Summary Table

Description			Reclamation				Production History			Current Status
Name	**ID**	**Area (m^2)**	**Status**	**Agency**	**ID**	**Features**	**Ore (Tons)**	**U3O8 (lbs)**	**Dates**	**General Site Conditions**
Mesa I Mine 10	654	11,629	Unknown	VCA	Mine 10	1 Portal	58,082	382,755	1950 - 1967	No Significant Findings
Mesa I Mine 11	93	37,724	Reclaimed	NAMLRP	NA-0300, 0310B, C, D	5 Portals				Waste Rock Remains On Steep Slopes
Mesa I Mine 12	655	102,879	Reclaimed	NAMLRP	NA-0300, 0310B, C, D	7 Portals				Waste Rock Remains On Steep Slopes
Mesa I Mine 13	94	21,892	Reclaimed	NAMLRP	NA-0310A	1 Portal, 1 Prospect				Soil Cap Partially Eroded In Some Areas
Mesa I Mine 14	656	36,253	Reclaimed	NAMLRP	NA-0300, 0310B, C, D	5 Portals				Waste Rock Remains On Steep Slopes
Mesa I Mine 15	657	29,784	Reclaimed	NAMLRP	NA-0300, 0310B, C, D	3 Portals				Waste Rock Remains On Steep Slopes

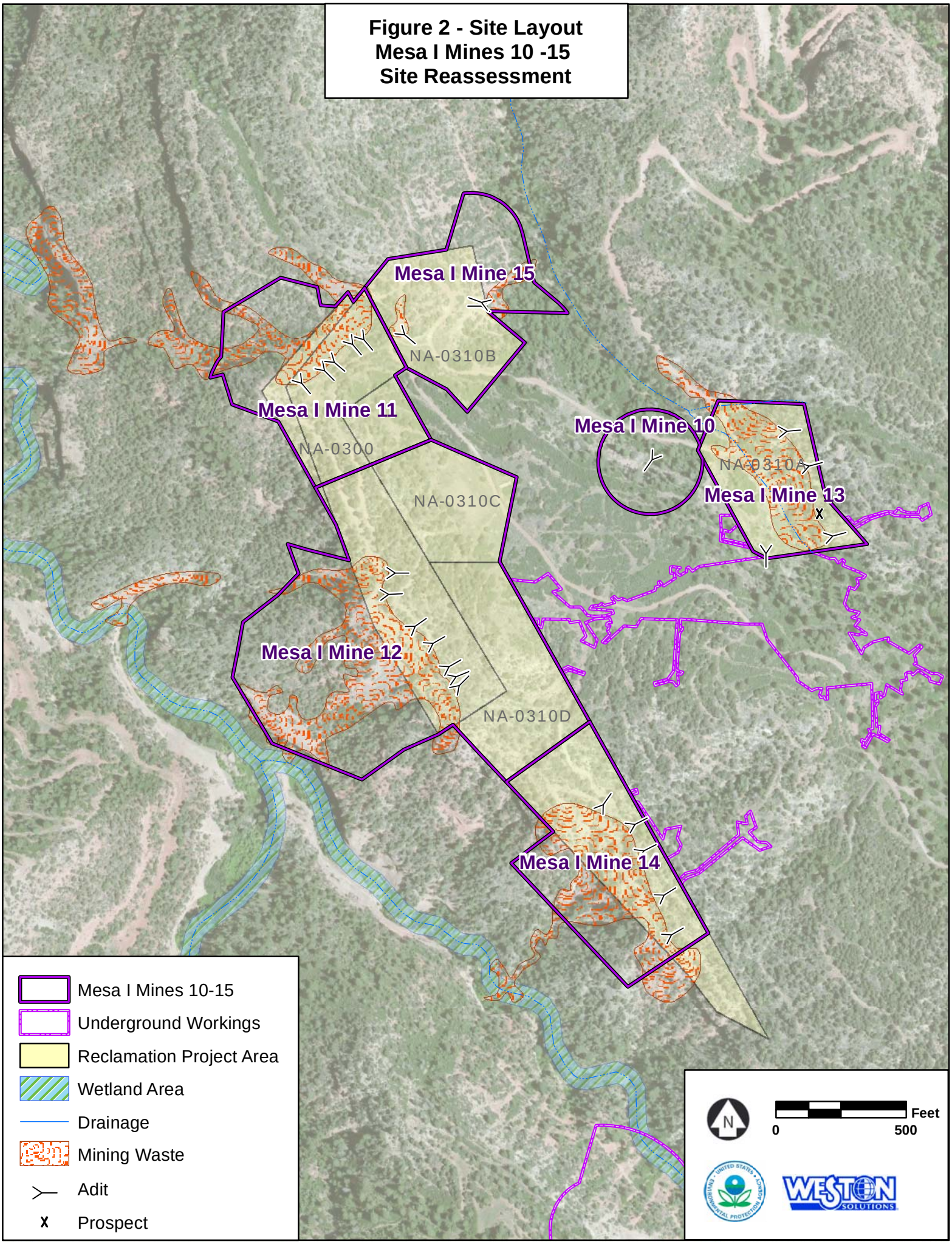


Figure 2 - Site Layout
Mesa I Mines 10 -15
Site Reassessment
Mesa I Mine 15
NA-0310B
Mesa I Mine 11
NA-0300
Mesa I Mine 10
NA-0310A
Mesa I Mine 13
NA-0310C
Mesa I Mine 12
NA-0310D
Mesa I Mine 14
Mesa I Mines 10-15
Underground Workings
Reclamation Project Area
Wetland Area
Drainage
Mining Waste
Adit
Prospect
N
Feet
0
500
WESTON SOLUTIONS

Figure 3 - Water Sources and Sampling Results
Mesa I Mines 10 -15
Site Reassessment

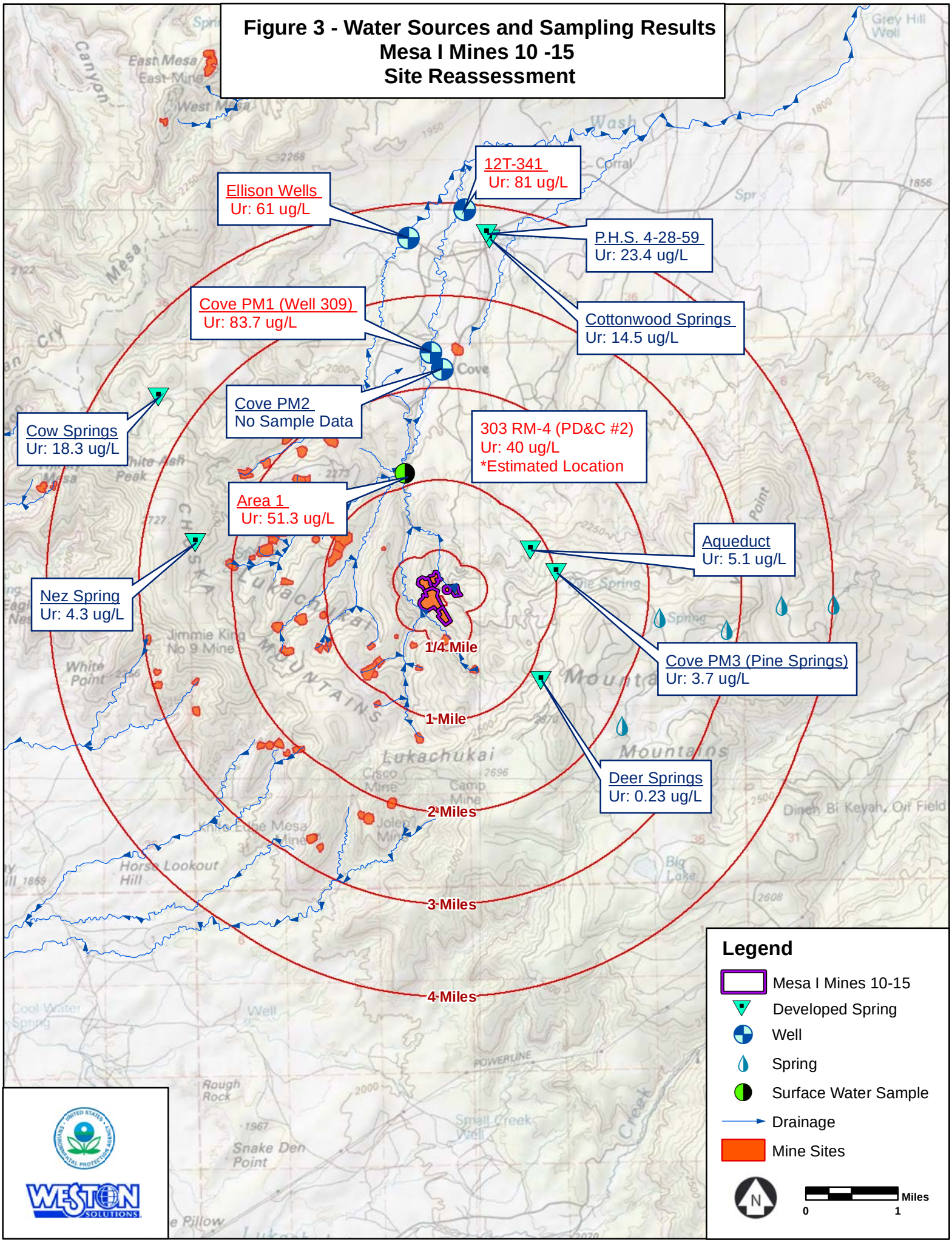
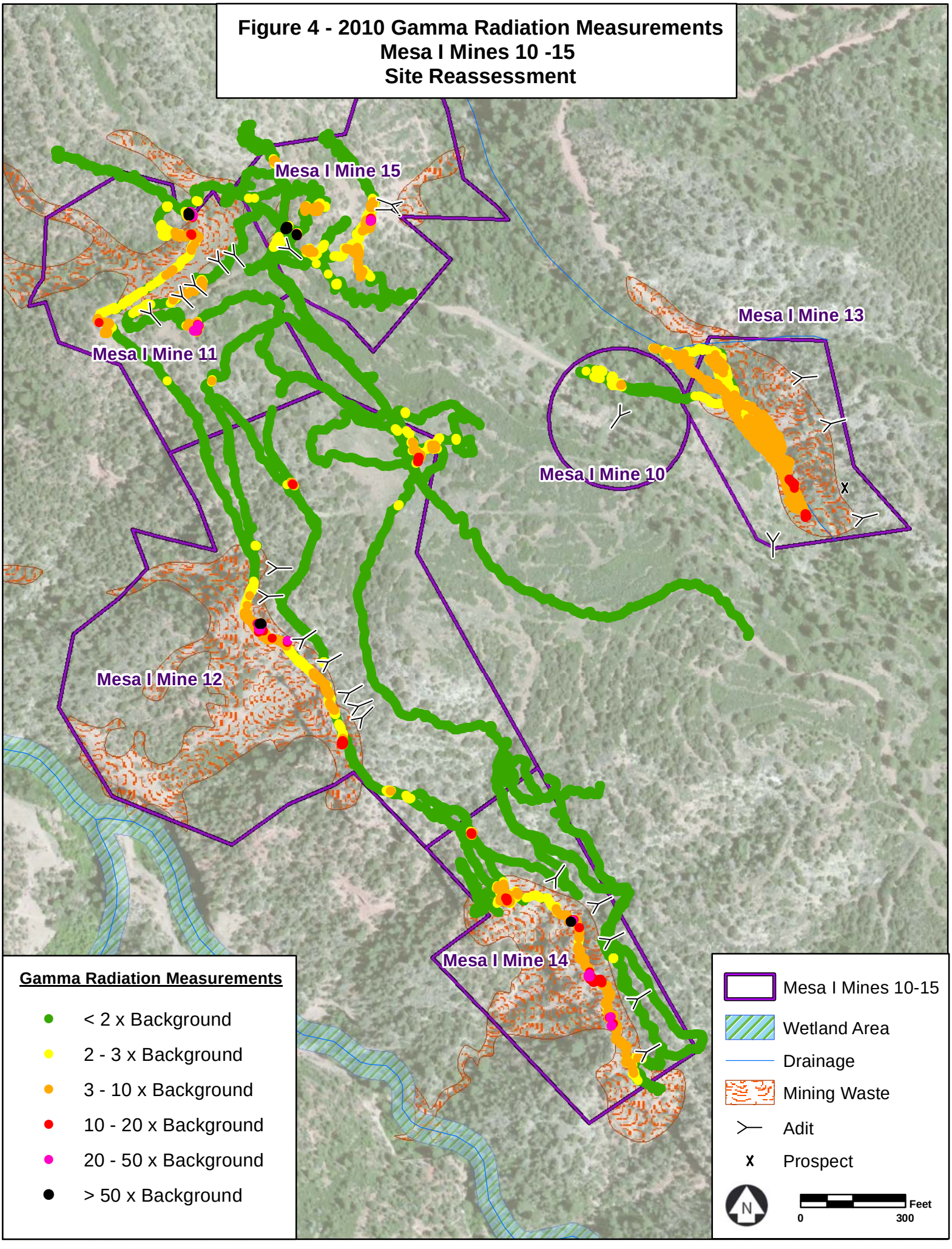


Figure 4 - 2010 Gamma Radiation Measurements
Mesa I Mines 10 -15
Site Reassessment



2.3 Operational History

Uranium ore was mined at the Site intermittently from 1950 to 1967. The following businesses operated uranium mines during those years: F.A. Sutton, Inc. from 1950 to 1951, Navajo Uranium from 1951 to 1952, Kerr-McGee Oil Industries, Inc. from 1953 to 1958 and 1961 to 1963, and Vanadium Corporation of America from 1965 to 1967. During the years the Site was mined, mining activities were conducted year round. In 1967, Vanadium Corporation of America ceased mining operations and abandoned the Site (NNEPA 1991, TGS 2007).

2.4 Regulatory Involvement

2.4.1 United States Environmental Protection Agency

The Site is not listed in the Resource Conservation and Recovery Information System (RCRIS) database as of August 14, 2013 (EPA 2013a).

2.4.2 Navajo Nation Environmental Protection Agency – Superfund Program

A Preliminary Assessment (PA) report was completed by the Navajo Nation Environmental Protection Agency - Navajo Superfund Program (NSP) on April 12, 1991. On September 22, 1992, NSP completed a PA Reassessment report for the Site. The NSP noted in the PA Reassessment that the Site would be referred to the Navajo Nation Division of Natural Resources, Navajo Abandoned Mine Lands Reclamation Program (NAMLRP). NSP worked with US EPA and the USACE to develop a Field Sampling Plan in 1998, which included large scale groundwater, surface water, and sediment sampling throughout the area. Results of the sampling activities within 4 miles of the Site are shown on Figure 3 and Table 3-1. A PA report for the Cove Mesa Aggregated Uranium Mines was completed by NSP in 2004 which included the Mesa I, Mines 10-15 site. The Cove Mesa PA included additional detailed information for the vicinity of the Site, including updated sampling information, sensitive species, and characterization of the general area (NNEPA 1991, NNEPA 1992, NNEPA 1998, NNEPA 2004).

2.4.3 Navajo Nation Division of Natural Resources, Navajo Abandoned Mine Lands Reclamation Program

The NAMLRP received funding from the United States Office of Surface Mining to reclaim part of the Site. The NAMLRP required that sites be reclaimed so that the residual gamma emission from the reclaimed surfaces did not exceed 50 micro roentgens per hour, approximately 50,000 counts per minute. In addition, the NAMLRP required that the residual Radium-226 concentration in the first 6 inches of reclaimed soil did not exceed 25 picocuries per gram in order to be considered reclaimed. Table 2-1 and Figure 2 provide summary information for individual mine sites, including the NAMLRP Identification and the tons of ore and uranium oxide mined. Reclamation activities conducted by the NAMLRP included backfilling adits, portals, highwalls, rimstrips, and pits at the individual mine sites with radioactive mine waste (low-grade uranium ore) left

at the Site, diverting drainage from the backfilled areas, and closing open portals with polyurethane foam. The NAMLRP guidelines called for the creation of drain fields to receive water diverted from portals. Non-contaminated soil may also have been used as cap in some areas. The individual mine sites are considered only partially reclaimed in part because some areas containing low-grade uranium ore were not physically accessible and thus were not reclaimed. (NNEPA 1991, WESTON 2008, WESTON 2010, Appendix B).

2.4.4 United States Army Corps of Engineers and Environmental Protection Agency

In 2007 the United States Army Corps of Engineers (USACE) and EPA, with the assistance of the Navajo Nation Environmental Protection Agency (NNEPA) and the Navajo Abandoned Mine Land Reclamation Program (NAMLRP) issued an AUM Geographic Information System (GIS) Report compiling the findings from earlier investigations of the uranium mining operations throughout the Navajo Nation. Using information from the GIS Report, EPA contractors WESTON visited and screened the six mines at the Mesa I Site in 2008, collected gamma radiation measurements using a combination sodium-iodide scintillation detector and a GPS unit, and characterized general site conditions. WESTON returned to the Site in 2010 to collect more comprehensive gamma measurements. The Site was found to have gamma radiation levels significantly above background, with maximum levels more the 50 times background. WESTON identified an area containing low-grade uranium ore that was physically inaccessible at a mesa ridge within Mines 11, 12, 14, and 15. During the site visits, WESTON collected gamma radiation readings that were greater than three times background levels in sections of all six sites, as shown in Figure 4. The gamma radiation readings collected at Mine 13 were taken on top of a soil cap that was installed by NAMLRP during the reclamation process, and from the waste rock immediately below the adits at all six mines. Sections of the reclaimed area at Mine 13 appeared to have eroded over time. A summary of the gamma radiation measurements and site observations are shown on Figure 4 and in in Appendix B (NNEPA 1991, TGS 2007, WESTON 2008, WESTON 2010, Appendix B).

3.0 HRS FACTORS

3.1 Sources of Contamination

For HRS purposes, a source is defined as an area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that have become contaminated from migration of a hazardous substance.

Potential hazardous substance sources associated with the Site include, but may not be limited to:

- Low-grade uranium waste rock left onsite during previous mining and processing activities is still present at the Site. The six individual mining areas at the Site have not been adequately characterized, but the estimated volume of the waste rock at the Site is approximately 11,616 cubic yards (tons). Gamma radiation readings were measured at levels significantly above the background, with maximum levels more than 50 times the background (NNEPA 1991, WESTON 2010).

3.2 Groundwater Pathway

In determining a score for the groundwater migration pathway, the HRS evaluates the likelihood that sources at a site actually have released, or potentially could release, hazardous substances to groundwater; 2) characteristics of the hazardous substances that are available for a release (i.e., toxicity, mobility, and quantity); and 3) people (targets) who actually have been, or potentially could be, impacted by the release. For the targets component of the evaluation, the HRS focuses on the number of people who regularly obtain their drinking water from wells that are located within four miles of the Site. The HRS emphasizes drinking water usage over other uses of groundwater (e.g., food crop irrigation and livestock watering) because, as a screening tool, it is designed to give the greatest weight to the most direct and extensively studied exposure routes.

3.2.1 Hydrogeological Setting

The Site lies in the Arizona Department of Water Resources Eastern Plateau Planning Area. The Eastern Plateau Planning Area is composed of one groundwater basin, the Little Colorado River Plateau Basin. There are several local aquifers and three regional aquifers that lie in the Eastern Plateau Planning Area. The aquifers consist of sedimentary formations of sandstone and limestone that are stacked on top of one another and generally separated by impermeable shales and siltsones. In descending order, the regional aquifers are the D-, N-, and C- aquifers. Each aquifer has a large areal extent within the basin and with the exception of the D- and N- aquifers; there is little vertical hydrologic connection between them. The water bearing formations gain thickness

towards the center of the basin resulting in artesian conditions. Main recharge areas are along the southern and eastern periphery of the Eastern Plateau Planning Area. The Little Colorado River Plateau aquifers contain an estimated 508 million acre-feet of water (ADWR 2006).

Artesian conditions are known to exist at wells within four miles of the Site. The depth to groundwater at these wells is considered to be at the ground surface (ADWR 2006, Appendix C-1, C-2, C-4).

3.2.2 Groundwater Targets

The United States Bureau of Indian Affairs (BIA) operates five wells within four miles of the Site that serve approximately 100 people. Three of the wells, Cottonwood Springs, Cove PM1 (also known as Water Well 309) and Cove PM 2 are located down-gradient from the Site. Samples collected from the Cove PM1 Well showed uranium contamination at levels of 83.7 µg/L, well above the EPA Maximum Contaminant Level (MCL) of 30 µg/L. Samples collected at the Cottonwood Springs Well showed levels of 14.5 µg/L, below the MCL, but significantly above the background levels collected upstream of the Site, which ranged from 0.23 µg/L to 5.1 µg/L. No samples have been collected from the Cove PM2 Well. Additionally, the Navajo Tribal Utility Authority (NTUA) operated groundwater well 12T-341 until 1985, when it was taken offline due to uranium metal and radiological contamination above the MCL. Samples showed a total uranium concentration of 81 µg/L at well 12T-341. Well 12T-666 was installed to replace well 12T-341. Well 12T-341 was left in place and may still serve as a standby well to 12T-666, although currently it is not online and may have been abandoned. It is estimated that Well 12T-341 may serve as many as 300 residents in Cove while in service. At least three additional wells within 4 miles of the Site have been found to contain elevated levels of uranium contamination above the MCL or significantly above background: the Ellison Wells – a private well with maximum uranium levels of 61 µg/L; P.H.S 4-28-59 – with levels of 23.4 µg/L; and 303 RM-4 / PD&C #2 – two separate wells near the Cove Day School (P&DC #2 was abandoned in 1983), with a composite sample showing levels of 40 µg/L. No information was identified specifying potential populations served by these wells, although an estimated 155 people attended the school at the time of the well closure. The well descriptions and sample results are shown in Figure 3 and Table 3-1 (NNEPA 1991, Appendix C-2, C-4, C-5).

Table 3-1. Groundwater Sample Results within 4 miles of the Mesa I, Mines 10-15 Site

Sample Location	Source Type	Sample Matrix	Distance from Site	Direction from Site	Gradient from Site	Total Uranium (µg/L)	Sample Date
Up-Gradient Groundwater Samples (Background Levels)							
Aqueduct (Cove PM4)	Developed Spring	Groundwater	0.85 mi	East	Up	5.1	1998
Cove PM3 (Pine Water Springs)	Developed Spring	Groundwater	1 mi	East	Up	3.7	1998
Deer Springs	Developed Spring	Groundwater	1.25 mi	Southeast	Up	0.23	1998
Cross-Gradient Groundwater Samples (Not Impacted by Mesa I, Mines 10-15)							
Nez Spring	Developed Spring	Groundwater	2.25 mi	West	Cross	4.3	1998
Cow Springs	Developed Spring	Groundwater	3.25 mi	Northwest	Cross	**18.3**	1998
Down-Gradient Groundwater Samples (Potentially Impacted by Mesa I, Mines 10-15)							
303-RM4 / PD&C #2	Well	Groundwater	1.5 mi	Northeast	Down	**40**	1981
Cove PM2	Well	Groundwater	2.25 mi	North	Down	N/A	N/A
Cottonwood Spring	Developed Spring	Groundwater	3.5 mi	North	Down	**14.5**	1998
Cove PM1 (Water Well 309)	Well	Groundwater	2.5 mi	North	Down	**83.7**	1998
Ellison Wells	Well	Groundwater	3.5 mi	North	Down	**61**	2008
P.H.S. 4-28-59	Developed Spring	Groundwater	3.5 mi	North	Down	**23.4**	1998
12T-341	Well	Groundwater	4 mi	North	Down	**81**	1987

Note: **Bold** indicates ample results greater than the MCL of 30 ug/L, or significantly greater than background (upgradient) results

3.2.3 Groundwater Pathway Conclusions

Uranium contaminated groundwater has been identified significantly above background levels in six wells within 4 miles down-gradient of the Site, contamination at four of the wells was above the MCLs . At least two wells, 12T-341, and 303 RM-4/PD&C #2 were taken offline in due to uranium, metals and radiological contamination which may be in part attributable to the Site. Approximately 100 people are served by the Cottonwood Springs well, and 300 people may still be served by well 12T-341, both located within four miles of the Site. An observed release is documented for the Groundwater Pathway.

3.3 Surface Water Pathway

In determining the score for the surface water pathway, the HRS evaluates: 1) the likelihood that sources at a site actually have released, or potentially could release, hazardous substances to surface water (e.g., streams, rivers, lakes, and oceans); 2) the characteristics of the hazardous substances that are available for a release (i.e., toxicity, persistence, bioaccumulation potential, and quantity); and 3) the people or sensitive environments (targets) who actually have been, or potentially could be, impacted by the release. For the targets component of the evaluation, the HRS focuses on drinking water intakes, fisheries, and sensitive environments associated with surface water bodies within 15 miles downstream of the Site.

3.3.1 Hydrological Setting

Surface water flow runs to drainages below the individual mines that make up the Mesa I Mines 10-15 site. Surface water originating from the Site would then flow to the north toward Cove. Surface water flow from the Site is generated by precipitation only as there are no springs or streams running through the Site. Average precipitation for the area is approximately 10 inches per year. Drainage routes continue to the northeast of the Site for the remainder of the 15-mile target distance limit (ADWR 2006, WESTON 2008).

3.3.2 Surface Water Targets

The 2008 and 2010 EPA screenings documented that possible mining debris, including low-grade uranium ore, had been pushed into drainages below the Site during mining operations, and is still in place. There are no known drinking water intakes and there are no fisheries within the 15-mile target distance limit of the Site (WESTON 2010).

In 2013, EPA identified wetlands immediately west of the Site which continue for approximately 2.5 miles downstream. The spring-fed stream to the west of Mines 11, 12, and 14 was found to have evidence of three-parameter wetlands (i.e. areas with wetland hydrology, hydric soils, and hydrophytic vegetation). The wetlands in this stream would likely extend continuously along one or both banks of the stream (Appendix C-3).

The Site vicinity is known to be a habitat for three federally endangered species including: the Southwestern willow flycatcher (Empidonax traillii extimus), the Loach minnow (Tiaroga cobitis), and the Three Forks Springsnail (Pyrgulopsis trivialis); potential habitat for one federally endangered species: the California condor (Gymnogyps californianus); and a habitat for four federally threatened species including: the Chiricahua leopard frog (Rana chiricahuensis), the Mexican spotted owl (Strix occidentalis lucida), the Apache trout (Oncorhynchus apache), and the Little Colorado spinedace (Lepidomeda vittata) (FWS 2013).

A surface water sample was collected in 1998 from the drainage approximately 1.25 miles north (downstream) of the Site, when a uranium concentration of 51.7 µg/L was identified, well above the MCL of 30 µg/L. The drainage between the Site and sample

location has not been adequately characterized. The surface water sample description and results are shown in Table 3-2 and Figure 3 (TGS 2007).

Table 3-2. Surface Water Sample Results within 4 miles of the Mesa I, Mines 10-15 Site

Sample Location	Source Type	Sample Matrix	Distance from Site	Direction from Site	Gradient from Site	Total Uranium (µg/L)	Sample Date
Down-Gradient Groundwater Samples (Potentially Impacted by Mesa I, Mines 10-15)							
Area 1 (Drainage)	Surface Water	Surface Water	1.25 mi	North	Down	**51.7**	1998

Note: **Bold** indicates ample results greater than the MCL of 30 ug/L

3.3.3 Surface Water Pathway Conclusions

Uranium waste rock generated during mining activities, with gamma radiation measurement significantly greater than background was found throughout the Site. The Site is immediately adjacent to drainage and an associated wetland area, and a surface water sample collected in the drainage confirms uranium contamination, which may be in part attributable to the Site. An observed release is documented for the Surface Water Pathway.

3.4 Soil Exposure Pathway

In determining the score for the soil exposure pathway, the HRS evaluates: 1) the likelihood that there is surficial contamination associated with the Site (e.g., contaminated soil that is not covered by pavement or at least two feet of clean soil); 2) the characteristics of the hazardous substances in the surficial contamination (i.e., toxicity and quantity); and 3) the people or sensitive environments (targets) who actually have been, or potentially could be, exposed to the contamination. For the targets component of the evaluation, the HRS focuses on populations that are regularly and currently present on or within 200 feet of surficial contamination. The four populations that receive the most weight are residents, students, daycare attendees, and terrestrial sensitive environments.

The Site is unpaved with the exception of a small concrete pad located at Mine 12. There are no residences, schools, or daycare facilities on, or within 200 feet, of the Site. Most individual mine sites are accessible via dirt roads previously use for uranium mining operations. As noted in Section 3.3.2, the Site vicinity is known to be a habitat for three federally endangered, a potential habitat for one federally endangered species, and a known habitat for four federally threatened species (FWS 2013, WESTON 2008).

An observed release is documented by direct observation for the Soil Migration Pathway.

3.5 Air Migration Pathway

In determining the score for the air migration pathway, the HRS evaluates: 1) the likelihood that sources at a site actually have released, or potentially could release, hazardous substances to ambient outdoor air; 2) the characteristics of the hazardous substances that are available for a release (i.e., toxicity, mobility, and quantity); and 3) the people or sensitive environments (targets) who actually have been, or potentially could be, impacted by the release. For the targets component of the evaluation, the HRS focuses on regularly occupied residences, schools, and workplaces within four miles of the Site. Transient populations, such as customers and travelers passing through the area, are not counted.

The Site is unpaved with the exception of a small concrete pad located at Mine 12. There are no residences, schools, or daycare facilities on, or within one mile of the Site, but the Cove Day School, and approximately 400 residents are within four miles of the Site. Most individual mine sites are accessible via dirt roads previously use for uranium mining operations. There are no terrestrial sensitive environments onsite (WESTON 2008).

A potential for particulate release is documented for the Air Migration Pathway.

4.0 EMERGENCY RESPONSE CONSIDERATIONS

The National Contingency Plan [40 CFR 300.15 (b)(2)] authorizes the EPA to consider emergency response action at those sites which pose an imminent threat to human health or the environment. For the following reasons, a referral to EPA Region 9's Emergency Response Section does not appear to be necessary:

- There are no schools, daycare centers, or regularly occupied residences, on site and within 200 feet of potentially contaminated areas.

- The Site is currently abandoned. Mining operations at the Site ceased in 1967. The NAMLRP has conducted reclamation work throughout the Site. There are no residences, schools, or daycare facilities on, or within 200 feet of the Site (2, Appendix B).

5.0 SUMMARY

The Site is located in the Lukachukai Mountains, approximately 2 miles south of Cove, Apache County, Arizona on Navajo Nation territory. The geographic coordinates for the Site are 36° 31' 15" North latitude and 109° 13' 14" West longitude.

The Site is an abandoned uranium mine consisting of six mining sites within a single production area, connected by underground and surface workings. The six mining areas constitute a total combined area of approximately 68 acres. The individual mining sites are located near the top of prominent ridges on a mesa, named Mesa I by the United States Atomic Energy Commission (AEC) in 1950, in the Lukachukai Mountains. The Site is no longer being actively mined.

Uranium ore was mined at the Site intermittently from 1950 to 1967. The following businesses operated uranium mines during those years: F.A. Sutton, Inc. from 1950 to 1951, Navajo Uranium from 1951 to 1952, Kerr-McGee Oil Industries, Inc. from 1953 to 1958 and 1961 to 1963, and Vanadium Corporation of America from 1965 to 1967. During the years the Site was mined, mining activities were conducted year round. In 1967, Vanadium Corporation of America ceased mining operations and abandoned the Site.

WESTON visited and screened the six mines at the Mesa I Site in 2008, collected gamma radiation measurements using a combination sodium-iodide scintillation detector and a GPS unit, and characterized general site conditions. WESTON returned to the Site in 2010 to collect more comprehensive gamma measurements. The Site was found to have gamma radiation levels significantly above background, with maximum levels more the 50 times background. WESTON identified an area containing low-grade uranium ore that was physically inaccessible at a mesa ridge within Mines 11, 12, 14, and 15. During the site visits, WESTON collected gamma radiation readings that were above 50,000 counts per minute in sections of all six sites, as shown in Figure 4. The gamma radiation readings collected at Mine 13 were taken on top of a soil cap that was installed by NAMLRP during the reclamation process. Sections of the reclaimed area at Mine 13 appeared to have eroded over time.

A PA report was completed by the Navajo Nation Environmental Protection Agency - Navajo Superfund Program on April 12, 1991. On September 22, 1992, NSP completed a PA Reassessment report for the Site. The NSP noted in the PA Reassessment that the Site would be referred to the Navajo Nation Division of Natural Resources, Navajo Abandoned Mine Lands Reclamation Program.

The NAMLRP received funding from the United States Office of Surface Mining to reclaim part of the Site. The NAMLRP required that sites be reclaimed so that the residual gamma emission from the reclaimed surfaces did not exceed 50 micro roentgens per hour, approximately 50,000 counts per minute. In addition, the NAMLRP required

that the residual Radium-226 concentration in the first 6 inches of reclaimed soil did not exceed 25 picocuries per gram in order to be considered reclaimed. Reclamation activities conducted by the NAMLRP included backfilling adits, portals, highwalls, rimstrips, and pits at the individual mine sites with radioactive mine waste (low-grade uranium ore) left at the Site, diverting drainage from the backfilled areas, and closing open portals with polyurethane foam. The NAMLRP guidelines called for the creation of drain fields to receive water diverted from portals. Non-contaminated soil may also have been used as cap in some areas.

The Site vicinity is known to be a habitat for three federally endangered species, a potential habitat for one federally endangered species, and a habitat for four federally threatened species.

The spring-fed stream to the west of Mines 11, 12, and 14 was found to have evidence of three-parameter wetlands (i.e. areas with wetland hydrology, hydric soils, and hydrophytic vegetation). The wetlands in this stream would likely extend continuously along one or both banks of the stream.

Uranium contaminated groundwater has been identified significantly above background levels in six wells within 4 miles down-gradient of the Site, contamination at four of the wells was above the MCLs. At least two wells, 12T-341, and 303 RM-4 were taken offline in due to uranium metal and radiological contamination which may be in part attributable to the Site. Approximately 100 people are served by the Cottonwood Springs well, and 300 people may still be served by well 12T-341, both located within 4 miles of the Site.

Uranium waste rock generated during mining activities, with gamma radiation measurement significantly greater than background was found throughout the Site. The Site is immediately adjacent to drainage and an associated wetland area, and a surface water sample collected in the drainage confirms uranium contamination, which may be in part attributable to the Site. .

The following pertinent Hazard Ranking System factors are associated with the Site:

- There are 12 drinking water wells (active or historic) within 4 miles of the Site, serving a total population of at least 400. Uranium contamination above the MCL or significantly above background has been found in at least six wells, which may be in part attributable to the Site.

- Surface water flow runs to drainages below the individual mines that make up the Site. Surface water originating from the Mesa I Mines site then flows to the north toward Cove. The Site is immediately adjacent to drainage and an associated wetland area, and a surface water sample collected in the drainage confirms uranium contamination, which may be in part attributable to the Site.

- The Site is currently abandoned. Mining operations at the Site ceased in 1967. There are no residences, schools, or daycare facilities on, or within 200 feet of the Site.

6.0 REFERENCES

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AGS 1993 — Arizona Geological Survey, Geology and Production History of the Uranium Ore Deposits in the Lukachukai Mountains, Apache County, Arizona, By William Chenoweth, Grand Junction, Colorado, September, 1988.

E&E 1991 — Ecology and Environment, Inc., Preliminary Assessment Review of Mesa I Mine, May 28, 1991.

EPA 2013a — United States Environmental Protection Agency (EPA), Envirofacts Warehouse RCRAInfo Query Results, extracted September 5, 2013

EPA 2013b — EPA, EPA, Superfund Site Information and CERCLIS Query Results, data extracted September 5, 2013.

FWS 2013 — U.S. Fish and Wildlife Service, Environmental Conservation Online System, Apache County data extracted September 10, 2013.

NAMLRP 1989a — Navajo Abandoned Mile Lands Reclamation Project (NAMLRP), Cove AML Problem Area Map, 1989.

NAMLRP 1989b — NAMLRP Beclabito AML Field Office, Cove Inventory Volume 1, 1989.

NAMLRP 1990 — NAMLRP, Cove AML Problem Area Sketch Book, Sites # 1-179, 1990.

NAMLRP 2000 — NAMLRP, Mesa Grande AMLR Project Proposal Documents, July, 2000.

NNEPA 1991 — Navajo Nation EPA Superfund Program, Preliminary Assessment Report, Mesa I Mines, April 12, 1991.

NNEPA 1992 — Navajo Nation EPA Superfund Program, Site Inspection Summary Reports for Mesa I and Mesa II Mines, September 22, 1992.

NNEPA 1998 Navajo Nation EPA Superfund Program, Field Sample Plan, Cove Mesa Aggregated Uranium Mines, July 17, 1998.

NNEPA 2004 Navajo Nation EPA Superfund Program, Preliminary Assessment Report, Cove Mesa Aggregated Uranium Mines, December, 2004.

TGS 2007 TerraSpectra Geomatics, Abandoned Uranium Mines And The Navajo Nation - Navajo Nation AUM Screening Assessment Report And Atlas With Geospatial Data, August 2007.

VCA 1968 Vanadium Corporation of America, Lukachukai Mountains Mining Map, 1968.

WESTON 2008 Weston Solutions, Inc., Preliminary Assessment Report, Mesa I Mines, August, 2008.

WESTON 2010 Weston Solutions, Inc., Preliminary Assessment Report Amendment, Mesa I Mines, August, 2010.

APPENDIX A

Transmittal List

Appendix A
Transmittal List

Date: September 10, 2013
Site Name: Mesa I, Mines 10-15
EPA ID No.: NND983466772

A copy of the Abbreviated Preliminary Assessment Report for the Mesa I Mines site should be sent to the following recipients:

Eugene Esplain
Navajo Nation Environmental Protection Agency
Navajo Nation EPA
P.O. Box 2946
Window Rock, AZ 86515

APPENDIX B

Site Reconnaissance Observation Report/Photographic Documentation

SITE RECONNAISSANCE INTERVIEW AND OBSERVATIONS REPORT

DATEs: Initial Site Visit - July 2008
Additional Site Visit - August 2010

OBSERVATIONS MADE BY: Joe DeFao (2008), Weston Solutions, Inc.
Alex Grubb (2010), Weston Solutions, Inc.

SITE: Mesa I, Mines 10-15

EPA ID: NND983466772

2008 Site Visit:

A site visit was conducted on July 1 and July 2, 2008. During the visit, gamma radiation readings were collected in some areas of the Mesa I Mines site using a combination sodium-iodide scintillation detector and a GPS unit. A stand-alone scintillation detector was used as well. The following information was obtained and photographs were taken during the site visit:

On July 1, 2008, personnel from USEPA, NNEPA, and WESTON conducted a site visit of the Mesa I Mines. The following people were present: Jeff Inglis (USEPA), Stanley Edison (NNEPA), and Joe DeFao, Nels Johnson, and Tommy Evans (WESTON). The purpose of the visit was to provide WESTON with a general orientation of the mine sites in preparation for a more thorough site visit. The following day, on July 2, 2008, WESTON returned to the Mesa I Mines. Prior to returning to the site, WESTON notified personnel at the Cove Chapter House of the activities being conducted at the mines. In addition, WESTON inquired about the drinking water system used in the community of Cove. Chapter personnel identified Joe Ray Harvey (505-406-1708) as a contact. The Community of Cove is located approximately 3 miles north of the Mesa I Mines site.

Using maps and satellite imagery, WESTON attempted to locate the various mines that comprise the Mesa I site. The following mine sites were visited at the Mesa I Mines site: Mine 10, Mine 11, Mine 12, Mine 13, Mine 14, and Mine 15. Gamma radiation data was collected at Mine 11, Mine 12, and Mine 13. Gamma radiation was detected above background at all three mine sites. In some areas that were visited, particularly Mine 12, uranium ore outcroppings were exposed to the surface.

Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Photo 1: Potential reclaimed adit located at Mine 11.

Photo 2: WESTON employee holds sodium-iodide scintillation detector to exposed uranium ore at Mine 12.

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Photo 3: Mine tailings at Mine 12 mesa ridge.

Photo 4: Area reclaimed by the Navajo Abandoned Mines Reclamation Program at Mine 13.

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Photo 5: A WESTON employee collects gamma radiation readings in the drainage from the reclaimed portion of Mine 13.

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

2010 Site Visit:

In June, 2010, EPA tasked WESTON with revisiting the Mesa I Mines, as part of the continuing Navajo Abandoned Uranium Mines (AUM) radiological screening project. As part of a limited site screen, new gamma radiation measurements, additional site reconnaissance and further documentation took place at each site. The gamma radiation measurement results, site photographs, and gamma radiation maps from the 2010 limited site screens are presented in the following pages.

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 11 **Mine ID:** 93

Highest gamma radiation measurement:

805,281 counts per minute (cpm)

Describe any other radiological measurements:

A total of 4,643 gamma radiation measurements were collected from the mine site, ranging from 7,054 cpm to 805,281 cpm.

Average background = 15,624 cpm

Photo 1: Mesa I, Mine No. 11 (93) site

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Photo 2: Mesa I, Mine No. 11 (93) site

Photo 3: Mesa I, Mine No. 11 (93) site

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Photo 4: Mesa I, Mine No. 11 (93) site

Photo 5: Mesa I, Mine No. 11 (93) site

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 13 **Mine ID:** 94

Highest gamma radiation measurement:

235,955 counts per minute (cpm)

Describe any other radiological measurements:

A total of 2,224 gamma radiation measurements were collected from the mine site, ranging from 14,339 cpm to 235,955 cpm.

Average background = 14,842 cpm

Photo 1: Mesa I, Mine No. 13 (94) site

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Photo 2: Mesa I, Mine No. 13 (94) site

Photo 3: Mesa I, Mine No. 13 (94) site

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Photo 4: Mesa I, Mine No. 13 (94) site

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 10 **Mine ID:** 654

Highest gamma radiation measurement:

68,482 counts per minute (cpm)

Describe any other radiological measurements:

A total of 536 gamma radiation measurements were collected from the mine site, ranging from 14,085 cpm to 68,482 cpm.

Average background = 14,842 cpm

Photo 1. Mesa I, Mine No. 10 (654) site

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 12 **Mine ID:** 655

Highest gamma radiation measurement:

999,960 counts per minute (cpm)

Describe any other radiological measurements:

A total of 7,736 gamma radiation measurements were collected from the mine site, ranging from 14,568 cpm to 999,960 cpm. Measurements collected in the vicinity of the waste debris were found at levels up to approximately 1,000,000 cpm (the maximum gamma radiation level the equipment can detect).

Average background = 15,893 cpm

Photo 1. Mesa I, Mine No. 12 (655) site

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Photo 2. Mesa I, Mine No. 12 (655) site

Photo 3. Mesa I, Mine No. 12 (655) site

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Photo 4. Mesa I, Mine No. 12 (655) site

Photo 5. Mesa I, Mine No. 12 (655) site

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Photo 6. Mesa I, Mine No. 12 (655) site

Photo 7. Mesa I, Mine No. 12 (655) site

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 14 **Mine ID:** 656

Highest gamma radiation measurement:

999,960 counts per minute (cpm)

Describe any other radiological measurements:

A total of 5,311 gamma radiation measurements were collected from the mine site, ranging from 11,456 cpm to 999,960 cpm. Measurements collected in the vicinity of the waste debris were found at levels up to approximately 1,000,000 cpm (the maximum gamma radiation level the equipment can detect).

Average background = 12,417 cpm

Photo 1. Mesa I, Mine No. 14 (656) site

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Photo 2. Mesa I, Mine No. 14 (656) site

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Photographic Documentation
Mesa I, Mines 10-15 Site
Apache County, Arizona

Site: Mesa I, Mine No. 15 **Mine ID:** 657

Highest gamma radiation measurement:

999,960 counts per minute (cpm)

Describe any other radiological measurements:

A total of 611 gamma radiation measurements were collected from the mine site, ranging from 10,470 cpm to 999,960 cpm.

Average background = 12,471 cpm

Photo 1. Mesa I, Mine No. 15 (657) site

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Photo 2. Mesa I, Mine No. 15 (657) site

Photo 3. Mesa I, Mine No. 15 (657) site

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Photo 4. Mesa I, Mine No. 15 (657) site

Photo 5. Mesa I, Mine No. 15 (657) site

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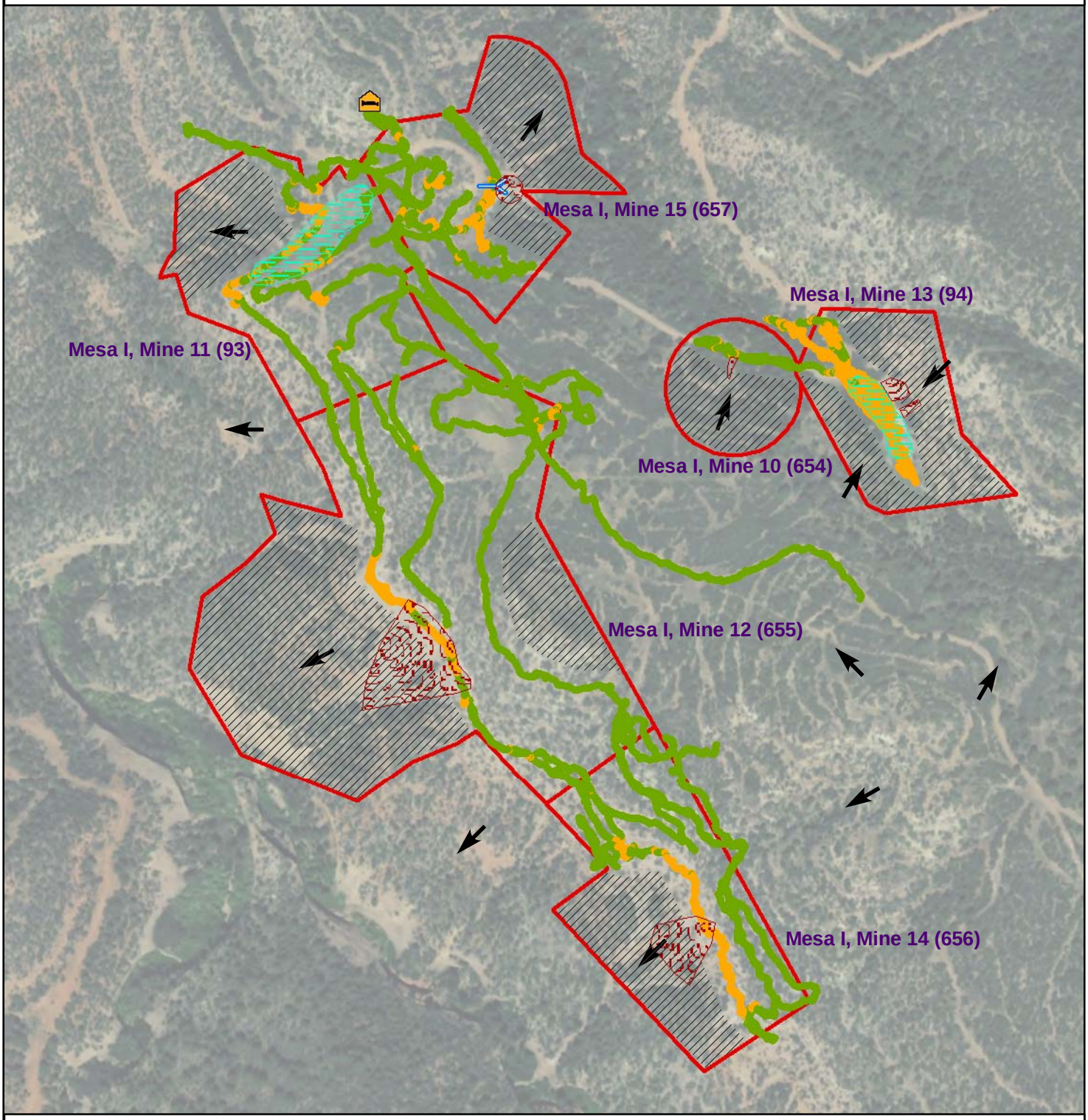
Figure A-1 - Gamma Radiation Measurements, Above Two Times Background
Mesa I, Mine No. 10 - 15 (93, 94, 654, 655, 656, 657)
Cove Chapter, Navajo Nation



Legend

Gamma Radiation Measurements

- < 2X Backgound
- > 2X Background

Gamma survey conducted 06/2010
Measured as counts per minute (cpm)

Average background = 14,348 cpm

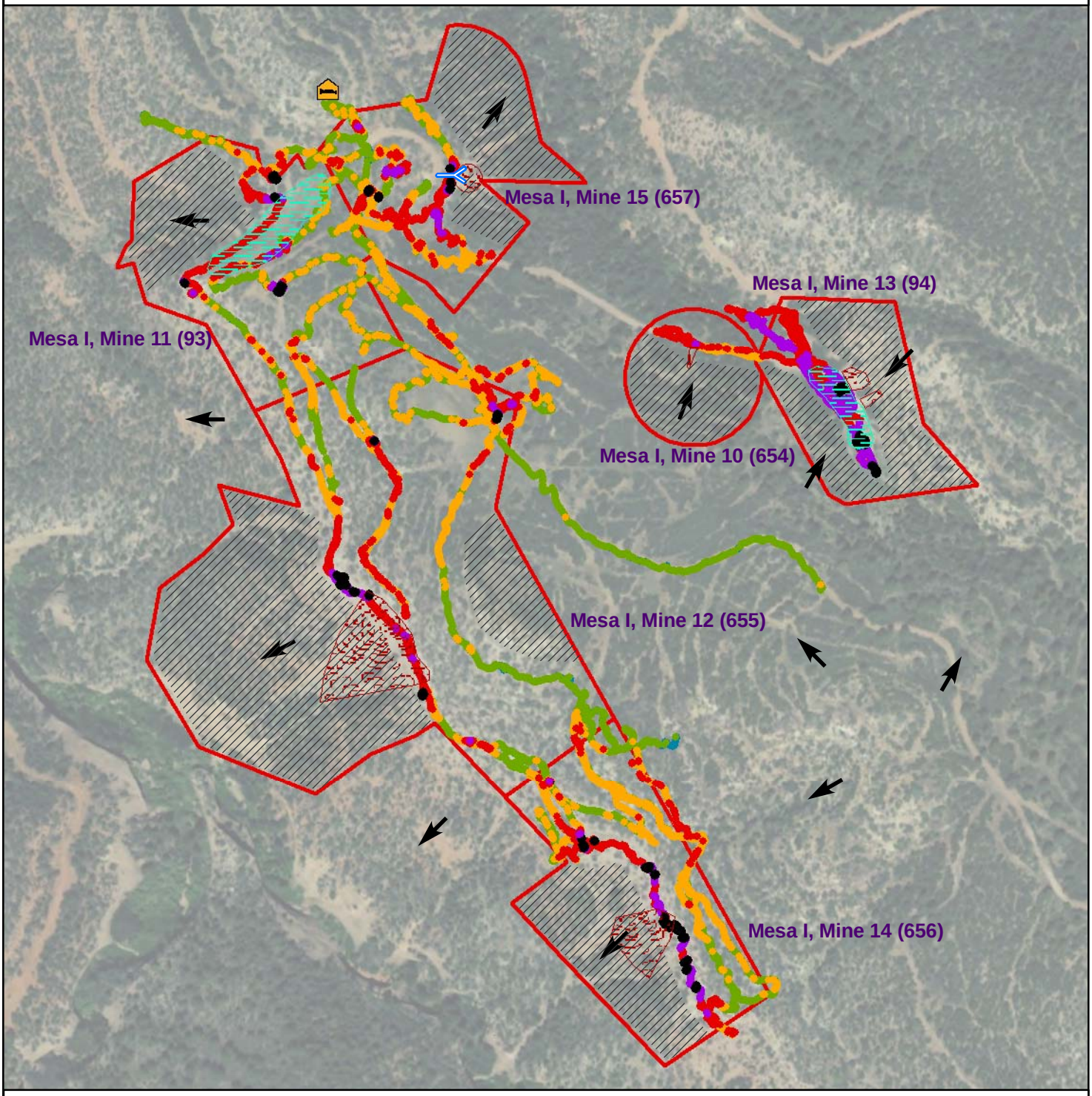
- General Direction Down-Slope
- Mine Claim Boundaries
- Observed Waste Pile
- Observed Reclamation Cap
- Inaccessible due to steep grades
- Observed Housing Structure
- Observed Adit

N

0 — 600 Feet

WESTON SOLUTIONS

Figure A-2 - Gamma Radiation Measurements
Mesa I, Mine No. 10 - 15 (93, 94, 654, 655, 656, 657)
Cove Chapter, Navajo Nation



Legend

Gamma Radiation Measurements

- 0 - 10,000
- 10,000 - 15,000
- 15,000 - 20,000
- 20,000 - 50,000
- 50,000 - 100,000
- > 100,000

General Direction Down-Slope

Mine Claim Boundaries

Observed Waste Pile

Observed Reclamation Cap

Inaccessible due to steep grades

Observed Housing Structure

Observed Adit

Gamma survey conducted 06/2010
Measured as counts per minute (cpm)
Average background 14,348 cpm

N

Feet
0 600

WESTON SOLUTIONS

APPENDIX C

Contact Log and Contact Reports

Appendix C
Contact Log and Reports

SITE: Mesa I, Mines 10-15
EPA ID NO.: NND983466772

Name	Affiliation	Phone	Data	Information
Joe Ray Harvey	Cove Chapter House	(505) 406-1708	08/07/08	Contact Report 1
Prestene Garnenez	Navajo Tribal Utility Authority	(928) 729-6221	08/08/08	Contact Report 2
Wilson Yee	US EPA Region IX	(415) 972-3484	06/19/13	Contact Report 3
Linda Reeves	US EPA Region IX	(415) 972-3445	09/04/13	Contact Report 4
Delfred Gene	NNEPA Public H_2O	(928) 871-6789	09/10/13	Contact Report 5

CONTACT REPORT 1

AGENCY/AFFILIATION: Cove Chapter House		
DEPARTMENT: N/A		
ADDRESS/CITY: P.O. Box 378/Red River		
COUNTY/STATE/ZIP: Apache/Arizona/86544		
CONTACT(S)	TITLE	PHONE
Joe Ray Harvey	Cove Chapter House Affiliate	(505) 406-1708
WESTON EMPLOYEE: Tara Fitzgerald		DATE: 08/07/08
SUBJECT: Groundwater use within 4 miles of the Mesa I Mines		
SITE NAME: Mesa I Mines		CERCLIS ID NO.: NND983466772

Joe Ray Harvey, and affiliate of the Cove Chapter House stated that the Cottonwood Springs well, which is operated by the Bureau of Indian Affairs, provides water for approximately 100 people. The Cottonwood Springs well is an artesian well located approximately 3 miles from the Mesa I Mines site. Mr. Harvey also stated that other artesian wells operated by the Bureau of Indian Affairs were not used any longer due to lead and uranium contamination. Mr. Harvey was unable to state specifically which wells were no longer operated due to contamination with the exception of the Hidden Spring well.

Mr. Harvey also stated that the Navajo Tribal Utilities Authority (NTUA) operates wells in the area of Cove. Mr. Harvey stated that these wells are tested either quarterly or monthly for radiological contaminants. Approximately 300 people in Cove use water provided by the NTUA.

CONTACT REPORT 2

AGENCY/AFFILIATION: Navajo Tribal Utility Authority		
DEPARTMENT: Environmental Compliance Laboratory		
ADDRESS/CITY: P.O. Box 170/Fort Defiance		
COUNTY/STATE/ZIP: Apache/Arizona/86504		
CONTACT(S)	TITLE	PHONE
Prestene Garnenez	Supervisor	(928) 729-6221
WESTON EMPLOYEE: Tara Fitzgerald		DATE: 08/08/08
SUBJECT: Groundwater use within 4 miles of the Mesa I Mines		
SITE NAME: Mesa I Mines		CERCLIS ID NO.: NND983466772

Prestene Garnenez of the Navao Tribal Utility Authority stated that the NTUA operates two wells serving the Cove area. The wells are 12T-7690 and 12T-666. Well 12T-7690 is currently offline due to radium contamination above the Maximum Contaminant Level of 5 µg/L. Ms. Garnenez was not aware of a well 12T-341 that was located within 4 miles of the Mesa I Mine site as of 1985. She stated that it was probably abandoned. Ms. Garnenez sent me a map of well 12T-666 (attached) but did not know where well 12T-7690 was located. Well 12T-666 is not located within 4 miles of the Mesa I Mines site.

CONTACT REPORT 3

AGENCY/AFFILIATION: United States Environmental Protection Agency, Region IX		
DEPARTMENT: Site Assessment Program		
ADDRESS/CITY: 75 Hawthorne Street / San Francisco		
COUNTY/STATE/ZIP: San Francisco/CA/94105		
CONTACT(S)	TITLE	PHONE
Wilson Yee	Site Assessment Manager	(415) 972-3484
WESTON EMPLOYEE: Alex Grubb		DATE: 06/19/2013
SUBJECT: Wetland Areas Near Mesa I Mines 10-15		
SITE NAME: Mesa I Mines 10 -15		CERCLIS ID NO.: NND983466772

Wilson Yee from the US EPA Site Assessment Program hiked up two tributaries to Cove Wash that drain nearby or through Mine Sites 10-15 on 10-11 June, 2013.

The stream to the west of Mines 11, 12, and 14, is spring-fed, and had surface flow at the time of the visit. He was only able to hike part way upstream, approximately 1.25 miles from the starting point, which was approximately 4 miles south of the Cove Chapter House. He found evidence of three-parameter wetlands (i.e. areas with wetland hydrology, hydric soils, and hydrophytic vegetation) in this stream. The wetlands in this stream would likely extend continuously along one or both banks of the stream. Since this stream is spring-fed, wetlands will likely be found in this tributary year-round, and wetland delineations can occur virtually any time of the year, barring high flows which may scour the streambanks and wetlands, and may pose wading hazards to personnel.

The second stream to the east of Mines 15, 10, and 13, is an ephemeral or intermittent stream, meaning that surface flows only occur during rain events, and for a limited time after rain events, unless there are springs in this system that were not encountered during the visit which may be a source of surface water to the stream for extended periods after rainfall. There was no surface flow at the time of the visits on 6/10 and 6/11, although there were very limited surface expressions of either seeps or small springs toward the mouth of the stream. He investigated soils and vegetation near the mouth of the stream and at the access road crossing, and did not find evidence for three-parameter wetlands during the time of the visits on 6/10 and 6/11. However, a follow-up visit to this stream during wet season (after snowmelt in April to May) should be conducted to further investigate the presence of wetlands in this tributary.

CONTACT REPORT 4

AGENCY/AFFILIATION: United States Environmental Protection Agency, Region IX		
DEPARTMENT: Drinking Water Office		
ADDRESS/CITY: 75 Hawthorne Street / San Francisco		
COUNTY/STATE/ZIP: San Francisco/CA/94105		
CONTACT(S)	TITLE	PHONE
Linda Reeves	Project Officer	(415) 972-3445
WESTON EMPLOYEE: Alex Grubb		DATE: 09/04/2013
SUBJECT: Drinking Water Wells Near Mesa I Mines 10-15		
SITE NAME: Mesa I Mines 10 -15		CERCLIS ID NO.: NND983466772

Linda Reeves from the US EPA Drinking Water Office stated that the Ellison Well was never connected to a public water system. The well is also called "12-7-12 Allison/Ellison Dug Well" and is not expected to be connected to a PWS. For unregulated wells such as this, there is no documentation on how many people may have used the well and for what purposes.

Water Well 309 may be the same source as Cove PM1, given the location and accuracy of old GPS equipment. Water Well 309 was sampled by USACE – (see attached table).

Pine Water Spring may be the same source as Cove PM3 given the location and accuracy of old GPS equipment. Pine Water Springs was sampled by USACE – (see attached table).

The attached spreadsheet includes the existing sample data. This sample data is available on the EPA website and in the Atlas.

CONTACT REPORT 5

AGENCY/AFFILIATION: Navajo Nation Environmental Protection Agency		
DEPARTMENT: Public Water Systems Supervision Program		
ADDRESS/CITY: Highway 264 Navajo Nation Fairgrounds Bldg W008-042/ Window Rock		
COUNTY/STATE/ZIP: Apache/AZ/86515		
CONTACT(S)	TITLE	PHONE
Delfred Gene	Civil Engineer	(928) 871-6789
WESTON EMPLOYEE: Alex Grubb		DATE: 09/10/2013
SUBJECT: Drinking Water Wells Near Mesa I Mines 10-15		
SITE NAME: Mesa I Mines 10 -15		CERCLIS ID NO.: NND983466772

Delfred Gene from the Navajo Nation EPA Public Water Systems Supervision Program ran a query of wells in the general site area, specifically looking for information related to the potentially closed drinking water sources: 12T-341 and 303-RM4 / PD&C #2. Mr. Gene did not find any new information related to the drinking water sources in question.

Water Well 309	Pine Water Springs	Deer Springs	Nez Spring	Cow Springs	P.H.S. 4-28-59	12-7-12 Allison/Ellison Dug Well	Ellison Wells	Cottonwood Spring	Aquaduct
Sampled by USACE 3/98	Sampled by USACE 3/98	Sampled by USACE 3/98	Sampled by USACE 3/98	Sampled by USACE 3/98	Sampled by USACE 3/98	EPA sample 2008	Sampled by USACE 3/98	Sampled by USACE 3/98	Sampled by USACE 3/98
MAPID = 34	MAPID = 26	MAPID = 59	MAPID = 32	MAPID = 33	MAPID = 38	5.500 Arsenic MCL 10 ug/L	MAPID = 36	MAPID = 37	MAPID = 27
SAMPLEID = RV990519CVW005	SAMPLEID = RV990518CVS014	SAMPLEID = RV991026CVS021	SAMPLEID = RV990329CVS006	SAMPLEID = RV990614CVS019	SAMPLEID = RV990329CVS005	61.000 Uranium MCL 30 ug/L	SAMPLEID = RV990517CVW004	SAMPLEID = RV990324CVS001	SAMPLEID = RV990518CVS013
RISKRANK = 54	RISKRANK = 60	RISKRANK = 12	RISKRANK = 22	RISKRANK = 33	RISKRANK = 42	0.400 Ra226 pCi/L	RISKRANK = 51	RISKRANK = 36	RISKRANK = 8
RANKTYPE = MORE	RANKTYPE = MORE	RANKTYPE = SOME	RANKTYPE = SOME	RANKTYPE = SOME	RANKTYPE = SOME	0.824 Ra228 pCi/L	RANKTYPE = MORE	RANKTYPE = SOME	RANKTYPE = LESS
LONGITUDE = -109.22164	LONGITUDE = -109.19786	LONGITUDE = -109.20115717	LONGITUDE = -109.26797	LONGITUDE = -109.27467	LONGITUDE = -109.21017	1.224 RaTotal MCL 5 pCi/L	LONGITUDE = -109.22561	LONGITUDE = -109.20956	LONGITUDE = -109.20277
LATITUDE = 36.56105	LATITUDE = 36.52601	LATITUDE = 36.50910417	LATITUDE = 36.53172	LATITUDE = 36.5547	LATITUDE = 36.57943	44.300 Gross Alpha pCi/L	LATITUDE = 36.57902	LATITUDE = 36.57853	LATITUDE = 36.52962
LONGITDMS = 109 13 17.91	LONGITDMS = 109 11 52.30	LONGITDMS = 109 12 4.165	LONGITDMS = 109 16 4.693	LONGITDMS = 109 16 28.78	LONGITDMS = 109 12 36.63	3.430 Gr. Alpha (excluding U) MCL 15 pCi/L	LONGITDMS = 109 13 32.18	LONGITDMS = 109 12 34.42	LONGITDMS = 109 12 9.980
LATITDMS = 36 33 39.769	LATITDMS = 36 31 33.645	LATITDMS = 36 30 32.775	LATITDMS = 36 31 54.202	LATITDMS = 36 33 16.895	LATITDMS = 36 34 45.958	21.000 Beta	LATITDMS = 36 34 44.481	LATITDMS = 36 34 42.723	LATITDMS = 36 31 46.626
SAMPLENAME = Water Well 309	SAMPLENAME = Pine Water Springs	SAMPLENAME = Deer Springs	SAMPLENAME = Nez Spring	SAMPLENAME = Cow Springs	SAMPLENAME = P.H.S. 4-28-59	7.51 pH Secondary MCL 6.5 - 8.5	SAMPLENAME = Ellison Wells	SAMPLENAME = Cottonwood Spring	SAMPLENAME = Aquaduct
ELEVATION = 6304.53	ELEVATION = 8076.21	ELEVATION = 8368.62	ELEVATION = 8258.56	ELEVATION = 7400.3	ELEVATION = 6137.4	6.90 Field pH	ELEVATION = 6134.09	ELEVATION = 6142.32	ELEVATION = 7441.54
SAMPLEDATE = 19990519	SAMPLEDATE = 19990518	SAMPLEDATE = 19991026	SAMPLEDATE = 19990329	SAMPLEDATE = 19990614	SAMPLEDATE = 19990329	1420.00 Conductivity umhos/cm	SAMPLEDATE = 19990517	SAMPLEDATE = 19990324	SAMPLEDATE = 19990518
SAMPLETIME = 18991230	SAMPLETIME = 18991230	SAMPLETIME = 18991230	SAMPLETIME = 18991230	SAMPLETIME = 18991230	SAMPLETIME = 18991230	4.170 Turbidity MCL 1ntu	SAMPLETIME = 18991230	SAMPLETIME = 18991230	SAMPLETIME = 18991230
METALS = 1	METALS = 1	METALS = 1	METALS = 1	METALS = 1	METALS = 1	-0.85 Corrosivity	METALS = 1	METALS = 1	METALS = 1
RADIO = 1	RADIO = 1	RADIO = 1	RADIO = 1	RADIO = 1	RADIO = 1	7.13 Collection temperature celsius	RADIO = 1	RADIO = 1	RADIO = 1
FIELDTYPE = Well	FIELDTYPE = Spring	FIELDTYPE = Spring	FIELDTYPE = Spring	FIELDTYPE = Spring	FIELDTYPE = Spring	283.0 T. Alkalinity (CaCO3) mg/L	FIELDTYPE = Well	FIELDTYPE = Spring	FIELDTYPE = Spring
LOCATION = Four Corner	LOCATION = Four Corner	LOCATION = Four Corner	LOCATION = Four Corner	LOCATION = Four Corner	LOCATION = Four Corner	281.0 Total Hardness NTUA desired maximum 500 mg/L	LOCATION = Four Corner	LOCATION = Four Corner	LOCATION = Four Corner
LOCATIONID = FourC	LOCATIONID = FourC	LOCATIONID = FourC	LOCATIONID = FourC	LOCATIONID = FourC	LOCATIONID = FourC	52.8 Calcium NTUA desired range 75-200 mg/L	LOCATIONID = FourC	LOCATIONID = FourC	LOCATIONID = FourC
ILCRRAD = 0.00012	ILCRRAD = 0.00016	ILCRRAD = 0	ILCRRAD = 3e-05	ILCRRAD = 2e-05	ILCRRAD = 3e-05	132.0 Calcium (CaCO3) NTUA desired range 75-200 mg/L	ILCRRAD = 6e-05	ILCRRAD = 1e-05	ILCRRAD = 1e-05
ALPHA = 84.6	ALPHA = 3.6	ALPHA = 0.454	ALPHA = 4.3	ALPHA = 13.6	ALPHA = 26.1	36.24 Magnesium mg/L	ALPHA = 35.5	ALPHA = 7.46	ALPHA = 3.19
BETA = 40.3	BETA = 5.98	BETA = 1.35	BETA = 3.43	BETA = 4.59	BETA = 8.7	149.0 Magnesium (CaCO3) mg/L	BETA = 17.6	BETA = 7.04	BETA = 2.8
LEAD210 = 0.973	LEAD210 = 7.1	LEAD210 = 0.453	LEAD210 = 1.2	LEAD210 = 0.541	LEAD210 = 0.398	786.0 Dissolved Solids Secondary MCL 500 mg/L	LEAD210 = 0.834	LEAD210 = 0.446	LEAD210 = 0.408
RADIUM226 = 0.441	RADIUM226 = 0.287	RADIUM226 = 0.054	RADIUM226 = 0.052	RADIUM226 = 0.188	RADIUM226 = 0.034	Chloride Secondary MCL 250 mg/L	RADIUM226 = 0.099	RADIUM226 = 0.032	RADIUM226 = 0.056
RADIUM228 = 0.651	RADIUM228 = 0.964	RADIUM228 = 0	RADIUM228 = 0.465	RADIUM228 = 0.759	RADIUM228 = 0.837	0.457 Fluoride Primary MCL 4.0; Secondary MCL 2.0 mg/L	RADIUM228 = 0.746	RADIUM228 = 0.668	RADIUM228 = 0.383
THORIUM228 = 0.015	THORIUM228 = 0.039	THORIUM228 = 0.115	THORIUM228 = 0.003	THORIUM228 = -0.006	THORIUM228 = 0.001	<0.3 Phosphate mg/L	THORIUM228 = 0.006	THORIUM228 = 0.015	THORIUM228 = -0.005
THORIUM230 = 0.02	THORIUM230 = 0.045	THORIUM230 = 0.02	THORIUM230 = 0.011	THORIUM230 = 0.003	THORIUM230 = 0	Sulfate Secondary MCL 250 mg/L	THORIUM230 = 0	THORIUM230 = -0.001	THORIUM230 = 0.016
THORIUM232 = -0.001	THORIUM232 = 0.028	THORIUM232 = 0	THORIUM232 = 0	THORIUM232 = 0	THORIUM232 = 0	<0.3 Nitrate Primary MCL 10	THORIUM232 = 0	THORIUM232 = 0.003	THORIUM232 = 0.001
URANIUM234 = 45	URANIUM234 = 2.23	URANIUM234 = 0	URANIUM234 = 2.48	URANIUM234 = 12	URANIUM234 = 14.2	<0.3 Nitrite Primary MCL 1 mg/L	URANIUM234 = 20.4	URANIUM234 = 8.66	URANIUM234 = 3.04
URANIUM235 = 0.707	URANIUM235 = 0.031	URANIUM235 = 0.064	URANIUM235 = 0.032	URANIUM235 = 0.276	URANIUM235 = 0.47	ND Mercury Primary MCL .002 ug/L	URANIUM235 = 0.525	URANIUM235 = 0.237	URANIUM235 = 0.029
URANIUM238 = 38	URANIUM238 = 1.42	URANIUM238 = 0.167	URANIUM238 = 1.91	URANIUM238 = 5.92	URANIUM238 = 8.73	160 Boron ug/L	URANIUM238 = 13.8	URANIUM238 = 5.59	URANIUM238 = 2.05
TOTAL_U = 83.707	TOTAL_U = 3.681	TOTAL_U = 0.231	TOTAL_U = 4.422	TOTAL_U = 18.196	TOTAL_U = 23.4	56000 Calcium ug/L	TOTAL_U = 34.725	TOTAL_U = 14.487	TOTAL_U = 5.119
HI = 3.20478	HI = 3.09303	HI = 1.55746	HI = 1.70058	HI = 1.71652	HI = 1.26811	0.380 Iron Secondary MCL .3 mg/L	HI = 3.17603	HI = 0.70147	HI = 0.3468
ILCRSTA = 0.00021	ILCRSTA = 9e-05	ILCRSTA = 0	ILCRSTA = 7e-05	ILCRSTA = 0	ILCRSTA = 0.00012	34000 Magnesium ug/L	ILCRSTA = 0.00014	ILCRSTA = 0.00011	ILCRSTA = 0
ALUMINUM = 51.7	ALUMINUM = 7370	ALUMINUM = 30.9	ALUMINUM = 22	ALUMINUM = 53.2	ALUMINUM = 34.2	1300 Potassium ug/L	ALUMINUM = 44.5	ALUMINUM = 32.8	ALUMINUM = 44.8
ANTIMONY = 0	ANTIMONY = 0	ANTIMONY = 0	ANTIMONY = 0	ANTIMONY = 0	ANTIMONY = 6.5	240000 Sodium ug/L	ANTIMONY = 0	ANTIMONY = 0	ANTIMONY = 0
ARSENIC = 9.8	ARSENIC = 4.3	ARSENIC = 0	ARSENIC = 3.5	ARSENIC = 0	ARSENIC = 5.8	280.0 Hardness as CaCO3 (calculated) mg/L	ARSENIC = 6.3	ARSENIC = 5.1	ARSENIC = 0
BARIUM = 241	BARIUM = 84.4	BARIUM = 19.3	BARIUM = 37	BARIUM = 402	BARIUM = 55.2	ND AluminumSecondary MCL .05-.2 mg/L	BARIUM = 131	BARIUM = 92.4	BARIUM = 15.2
BERYLLIUM = 0	BERYLLIUM = 0.33	BERYLLIUM = 0	BERYLLIUM = 0	BERYLLIUM = 0	BERYLLIUM = 0	ND Antimony Primary MCL .006 mg/L	BERYLLIUM = 0	BERYLLIUM = 0	BERYLLIUM = 0
CADMIUM = 0	CADMIUM = 4.3	CADMIUM = 0	CADMIUM = 0	CADMIUM = 0	CADMIUM = 0	0.1400 Barium Primary MCL 2 mg/L	CADMIUM = 0	CADMIUM = 0	CADMIUM = 0
CALCIUM = 64900	CALCIUM = 45400	CALCIUM = 46800	CALCIUM = 64900	CALCIUM = 130000	CALCIUM = 46100	ND Beryllium Primary MCL .004 mg/L	CALCIUM = 47400	CALCIUM = 66700	CALCIUM = 58300
CHROMIUM = 0	CHROMIUM = 12.1	CHROMIUM = 0.33	CHROMIUM = 0	CHROMIUM = 0	CHROMIUM = 0	ND Cadmium Primary MCL .005 mg/L	CHROMIUM = 0	CHROMIUM = 0	CHROMIUM = 0
COBALT = 0	COBALT = 4.3	COBALT = 0.87	COBALT = 0	COBALT = 0	COBALT = 0.99	ND ChromiumPrimary MCL .1mg/L	COBALT = 0	COBALT = 0	COBALT = 0
COPPER = 16.8	COPPER = 333	COPPER = 0	COPPER = 5.9	COPPER = 0	COPPER = 0.86	ND Cobalt ug/L	COPPER = 52.4	COPPER = 0	COPPER = 461
IRON = 0	IRON = 9470	IRON = 43.2	IRON = 319	IRON = 0	IRON = 22.5	0.0450 Copper Primary MCL action level 1.3 mg/L	IRON = 279	IRON = 43.5	IRON = 0
LEAD = 0	LEAD = 100	LEAD = 0	LEAD = 0	LEAD = 0	LEAD = 0	0.0070 Lead Primary MCL action level .015 mg/L	LEAD = 3.2	LEAD = 0	LEAD = 0

MAGNESIUM = 23200	MAGNESIUM = 9910	MAGNESIUM = 4030	MAGNESIUM = 6380	MAGNESIUM = 17600	MAGNESIUM = 28000	0.0240 Manganese Secondary MCL .05 mg/L	MAGNESIUM = 26800	MAGNESIUM = 24800	MAGNESIUM = 8480
MANGANESE = 0	MANGANESE = 125	MANGANESE = 51	MANGANESE = 14.4	MANGANESE = 3.6	MANGANESE = 3.7	2.70 Molybdenum ug/L	MANGANESE = 72.5	MANGANESE = 0.84	MANGANESE = 0
MERCURY = 0.053	MERCURY = 0.057	MERCURY = 0	MERCURY = 0.061	MERCURY = 0	MERCURY = 0.083	2.600 NickelB ug/L	MERCURY = 0	MERCURY = 0.074	MERCURY = 0
NICKEL = 0	NICKEL = 18.7	NICKEL = 0	NICKEL = 0	NICKEL = 0	NICKEL = 0	0.00280 SeleniumPrimary MCL .05 mg/L	NICKEL = 0	NICKEL = 0	NICKEL = 0
POTASSIUM = 1980	POTASSIUM = 7210	POTASSIUM = 790	POTASSIUM = 916	POTASSIUM = 0	POTASSIUM = 0	ND Silver Secondary MCL .10 mg/L	POTASSIUM = 729	POTASSIUM = 1180	POTASSIUM = 1030
SELENIUM = 8.5	SELENIUM = 0	SELENIUM = 4.3	SELENIUM = 0	SELENIUM = 0	SELENIUM = 34.3	ND ThalliumPrimary MCL .002 mg/L	SELENIUM = 0	SELENIUM = 21.7	SELENIUM = 0
SILVER = 0	SILVER = 0	SILVER = 0	SILVER = 0	SILVER = 0	SILVER = 0	13.0 Vanadiumug/L	SILVER = 0	SILVER = 0	SILVER = 0
SODIUM = 88500	SODIUM = 5130	SODIUM = 3910	SODIUM = 5000	SODIUM = 14400	SODIUM = 235000	0.8100 Zinc Secondary MCL 5 mg/L	SODIUM = 236000	SODIUM = 176000	SODIUM = 5830
THALLIUM = 5.4	THALLIUM = 0	THALLIUM = 3.8	THALLIUM = 3.4	THALLIUM = 4	THALLIUM = 0		THALLIUM = 6.2	THALLIUM = 0	THALLIUM = 0
VANADIUM = 20.8	VANADIUM = 13.3	VANADIUM = 7.4	VANADIUM = 2.6	VANADIUM = 5	VANADIUM = 22.9		VANADIUM = 11.4	VANADIUM = 19.5	VANADIUM = 2.6
ZINC = 11.7	ZINC = 9940	ZINC = 3.2	ZINC = 29.2	ZINC = 7.2	ZINC = 32.5		ZINC = 196	ZINC = 4.6	ZINC = 5.1
FILTRATION = 0	FILTRATION = 0	FILTRATION = 0	FILTRATION = 0	FILTRATION = 0	FILTRATION = 0		FILTRATION = 0	FILTRATION = 0	FILTRATION = 0
PRESERVED = 1	PRESERVED = 1	PRESERVED = 1	PRESERVED = 1	PRESERVED = 1	PRESERVED = 1		PRESERVED = 1	PRESERVED = 1	PRESERVED = 1
TEMPERATUR = 13.2	TEMPERATUR = 12.6	TEMPERATUR = 14.5	TEMPERATUR = 17	TEMPERATUR = 16.1	TEMPERATUR = 14.2		TEMPERATUR = 13.4	TEMPERATUR = 21.3	TEMPERATUR = 12.2
PH = 7.98	PH = 7.72	PH = 6.8	PH = 7.72	PH = 7.68	PH = 7.6		PH = 8.13	PH = 7.43	PH = 7.73
CONDUCTIVI = 839	CONDUCTIVI = 356	CONDUCTIVI = 334	CONDUCTIVI = 345	CONDUCTIVI = 719	CONDUCTIVI = 356		CONDUCTIVI = 1354	CONDUCTIVI = 1159	CONDUCTIVI = 490
ORP = 336	ORP = 307	ORP = 336	ORP = 300	ORP = 266	ORP = 262		ORP = 318	ORP = 284	ORP = 284
LUDUM19 = 8-14	LUDUM19 = 18-22	LUDUM19 = 8-10	LUDUM19 = 12-15	LUDUM19 = 10-13	LUDUM19 = 12-15		LUDUM19 = 8-12	LUDUM19 = 12-18	LUDUM19 = 13-18
WATERLEVEL = 0	WATERLEVEL = 0	WATERLEVEL = 0	WATERLEVEL = 0	WATERLEVEL = 0	WATERLEVEL = 0		WATERLEVEL = 0	WATERLEVEL = 0	WATERLEVEL = 0
BACTERIAPR = 0	BACTERIAPR = 0	BACTERIAPR = 1	BACTERIAPR = 0	BACTERIAPR = 0	BACTERIAPR = 0		BACTERIAPR = 0	BACTERIAPR = 0	BACTERIAPR = 0
							NOTES = DON ELLISON (12.7.12 A),Sample ID changed from CV990517CVS004 to RV990517CVW00		NOTES = AREA 1-1/2

NOTES = Taken at Water Troug

APPENDIX D

Latitude and Longitude Calculations Worksheet

Latitude and Longitude Calculation Worksheet (7.5' quads)
Using an Engineer=s Scale (1/50)

Site Name Mesa I Mines **CERCLIS #** NND983466772

AKA

Address Apache County

City **State** AZ **ZIP**

Site Reference Point

USGS Quad Name Cove **Scale** 1:24,000

Township **Range** **Section** 3 3 3

Map Datum 1927 1983 (Check one) **Meridian**

Map coordinates at southeast corner of 7.5' quadrangle (attach photocopy)

Latitude E > AN **Longitude** E > AW

Map coordinates at southeast corner of 2.5' grid cell

Latitude E > AN **Longitude** E > AW

Calculations

LATITUDE(x)

A) Number of ruler graduations between 2.5' (150") grid lines **(a)**

B) Number of ruler graduations between south grid line and the site reference point **(b)**

C) Therefore, a/150 = b/x, where **x= Latitude in decimal seconds, north of the south grid line**

Expressed as minutes and seconds (1' = 60") = E > AN

Add to grid cell latitude = E > AN + E > AN

Site latitude = 36E31 > 15 AN”

LONGITUDE(y)

A) Number of ruler graduations between 2.5' (150") grid lines **(a)**

B) Number of ruler graduations between south grid line and the site reference point **(b)**

C) Therefore, a/150 = b/x, where **x= Longitude in decimal seconds, west of the east grid line**

Expressed as minutes and seconds (1" = 60") = E > AW

Add to grid cell longitude = E > AN + E > AN

Site longitude = 109E13 > 14 AW@

APPENDIX E

EPA Quick Reference Fact Sheet:

(Site Assessment: Evaluating Risks at Superfund Sites)

United States Environmental Protection Agency | Office of Solid Waste and Emergency Response | Publication 9345.4-03FS | September 1993

EPA

SITE ASSESSMENT:
Evaluating Risks at Superfund Sites

Office of Emergency and Remedial Response
Hazardous Site Evaluation Division 5204G

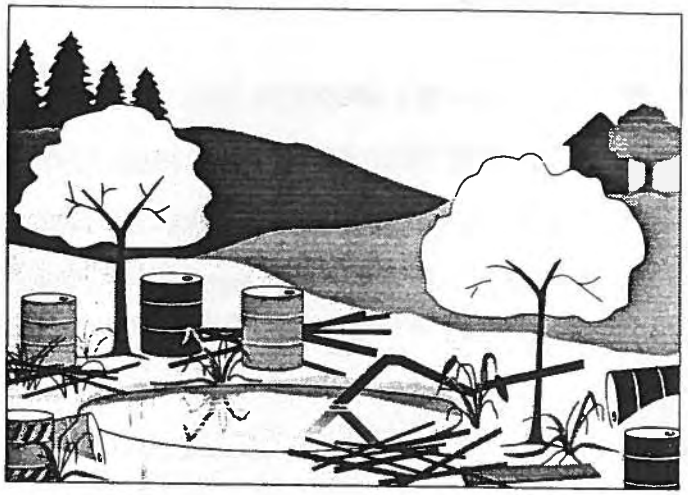
Quick Reference Fact Sheet

The Challenge of the Superfund Program

A series of headline-grabbing stories in the late 1970s, such as Love Canal, gave Americans a crash course in the perils of ignoring hazardous waste. At that time, there were no Federal regulations to protect the country against the dangers posed by hazardous substances (mainly industrial chemicals, accumulated pesticides, cleaning solvents, and other chemical products) abandoned at sites throughout the nation. And so, in 1980 Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, to address these problems.

The major goal of the Superfund program is to protect human health and the environment by cleaning up areas, known as "sites," where hazardous waste contamination exists. The U.S. Environmental Protection Agency (EPA) is responsible for implementing the Superfund program.

At the time it passed the Superfund law, Congress believed that the problems associated with uncontrolled releases of hazardous waste could be handled in five years with $1.6 billion dollars. However, as more and more sites were identified, it became apparent that the problems were larger than anyone had originally believed. Thus, Congress passed the Superfund Amendments and Reauthorization Act (SARA) in 1986. SARA expanded and strengthened the authorities given to EPA in the original legislation and provided a budget of $8.5 billion over five years. Superfund was extended for another three years in 1991.



What is EPA's Job at Superfund Sites?

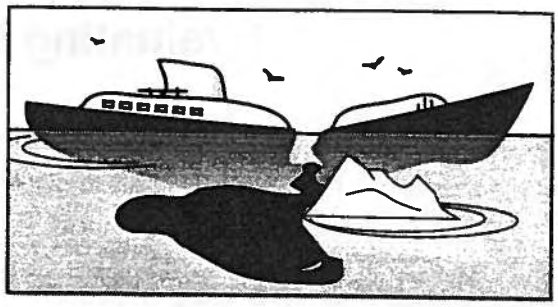
For more than 10 years, EPA has been implementing the Superfund law by:

- Evaluating potential hazardous waste sites to determine if a problem exists;
- Finding the parties who caused the hazardous waste problems and directing them to address these problems under EPA oversight or requiring them to repay EPA for addressing these problems; and
- Reducing immediate risks and tackling complex hazardous waste problems.

The Superfund site assessment process generally begins with the discovery of contamination at a site and ends with the completion of remediation (i.e., cleaning up the waste at a site) activities. This fact sheet explains the early part of the process, called the *site assessment* phase.

The National Response Center

The National Response Center (NRC), staffed by Coast Guard personnel, is the primary agency to contact for reporting all oil, chemical, and biological discharges into the environment anywhere in the U.S. and its territories. It is responsible for:



- Maintaining a telephone hotline 365 days a year, 24 hours a day;
- Providing emergency response support in specific incidents; and
- Notifying other Federal agencies of reports of pollution incidents.

To report a pollution incident, such as an oil spill, a pipeline system failure, or a transportation accident involving hazardous material, call the NRC hotline at **800-424-8802.**

1 Site Discovery

Hazardous waste sites are discovered in various ways. Sometimes concerned residents find drums filled with unknown substances surrounded by dead vegetation and call the NRC, EPA, or the State environmental agency; or an anonymous caller to the NRC or EPA reports suspicious dumping activities. Many sites come to EPA's attention through routine inspections conducted by other Federal, State, or local government officials. Other sites have resulted from a hazardous waste spill or an explosion. EPA enters these sites into a computer system that tracks any future Superfund activities.

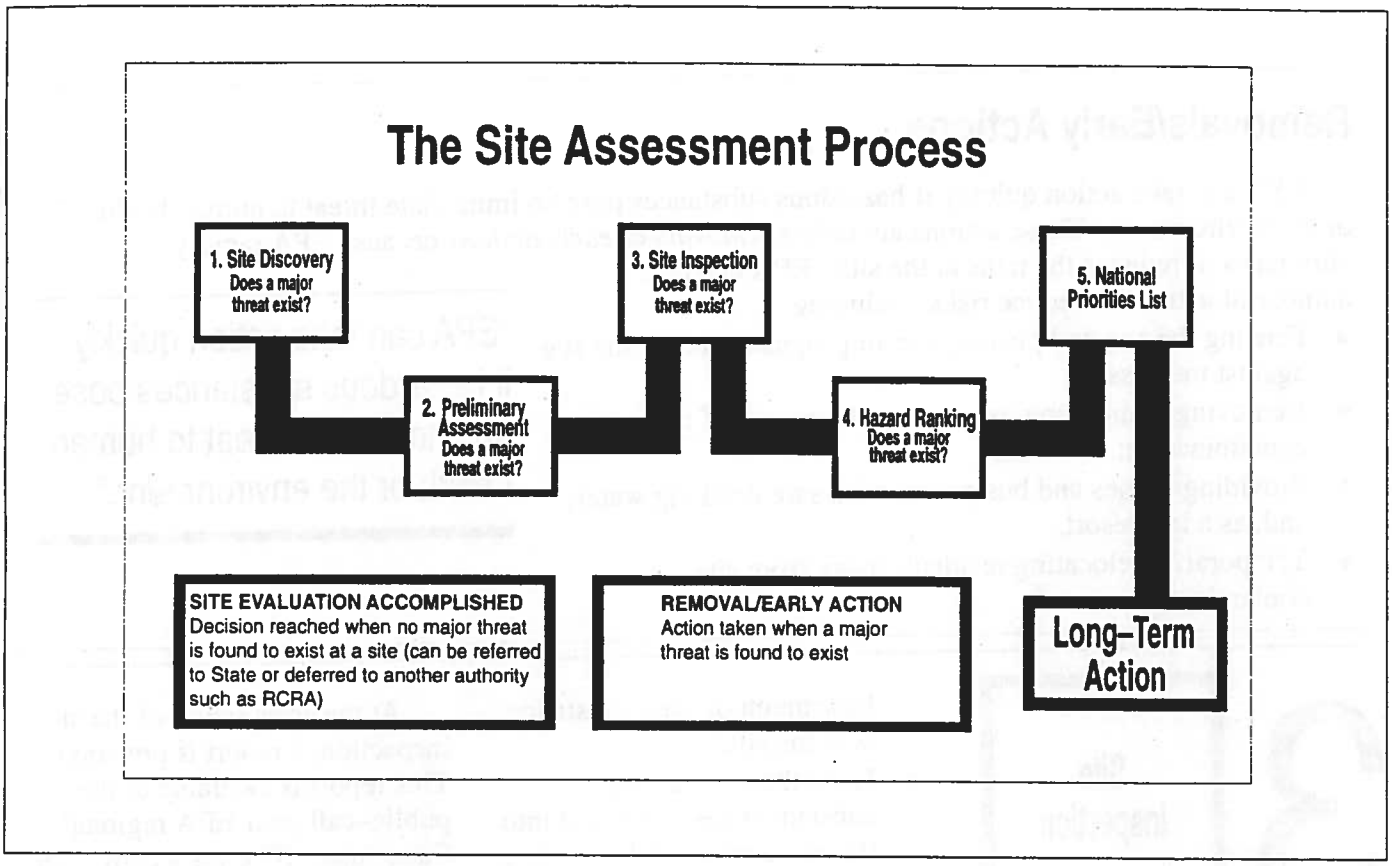
2 Preliminary Assessment

After learning about a site, the next step in the site assessment process is to gather existing information about the site. EPA calls this the *preliminary assessment.* Anyone can request that a preliminary assessment be performed at a site by petitioning EPA, the State environmental agency, local representatives, or health officials.

During the preliminary assessment, EPA or the State environmental agency:

- Reviews available background records;
- Determines the size of the site and the area around it;
- Tries to determine whether hazardous substances are involved;
- Identifies actual or potential pollution victims, such as the nearby population and sensitive environments;
- Makes phone calls or interviews people who may be familiar with the site; and
- Evaluates the need for early action using EPA's removal authority.

By gathering information and possibly visiting the site, EPA or the State environmental agency is able to determine if major threats exist and if cleanup is needed. Many times, the preliminary assessment indicates that no major threats exist.



However, if hazardous substances do pose an immediate threat, EPA quickly acts to address the threat. When a site presents an immediate danger to human health or the environment—for example, there is the potential for a fire or an explosion or the drinking water is contaminated as a result of hazardous substances leaking out of drums—EPA can move quickly to address site contamination. This action is called a *removal* or an *early action.* Additional information on early actions can be found on page 4.

EPA or the State environmental agency then decides if further Federal actions are required. Of the more than 35,000 sites discovered since 1980, only a small percentage have needed further remedial action under the Federal program.

A report is prepared at the completion of the preliminary assessment. The report includes a description of any hazardous substance release, the possible source of the release, whether the contamination could endanger people or the environment, and the pathways of the release. The information outlined in this report is formed into hypotheses that are tested if further investigation takes place. You can request a copy of this report once it becomes final— just send your name and address to your EPA regional Superfund office. See page 8 for further information on these contacts.

Sometimes it is difficult to tell if there is contamination at the site based on the initial information gathering. When this happens, EPA moves on to the next step of the site assessment, called the *site inspection.*

Making Polluters Pay

One of the major goals of the Superfund program is to have the responsible parties pay for or conduct remedial activities at hazardous waste sites. To accomplish this goal, EPA:

- Researches and determines who is responsible for contaminating the site;
- Issues an order requiring the private parties to perform cleanup actions with EPA oversight; and
- Recovers costs that EPA spends on site activities from the private parties.

Removals/Early Actions

EPA can take action quickly if hazardous substances pose an immediate threat to human health or the environment. These actions are called *removals* or *early actions* because EPA rapidly eliminates or reduces the risks at the site. EPA can take a number of actions to reduce risks, including:

- Fencing the site and posting warning signs to secure the site against trespassers;
- Removing, containing, or treating the source of the contamination;
- Providing homes and businesses with safe drinking water; and, as a last resort,
- Temporarily relocating residents away from site contamination.

"EPA can take action quickly if hazardous substances pose an immediate threat to human health or the environment."

3 Site Inspection

If the preliminary assessment shows that hazardous substances at the site may threaten residents or the environment, EPA performs a site inspection. During the site inspection, EPA or the State collects samples of the suspected hazardous substances in nearby soil and water. EPA may initiate a concurrent SI/remedial investigation at those sites that are most serious and determined early as requiring long-term action. Sometimes, wells have to be drilled to sample the ground water. Site inspectors may wear protective gear, including coveralls and respirators, to protect themselves against any hazardous substances present at the site. Samples collected during the site inspection are sent to a laboratory for analysis to help EPA answer many questions, such as:

- Are hazardous substances present at the site? If so, what are they, and approximately how much of each substance is at the site?
- Have these hazardous substances been released into the environment? If so, when did the releases occur, and where did they originate?
- Have people been exposed to the hazardous substances? If so, how many people?
- Do these hazardous substances occur naturally in the immediate area of the site? At what concentrations?
- Have conditions at the site gotten worse since the preliminary assessment? If so, is an early action or removal needed? (See box above.)

Often, the site inspection indicates that there is no release of major contamination at the site, or that the hazardous substances are safely contained and have no possibility of being released into the environment. In these situations, EPA decides that no further Federal inspections or remedial actions are needed. This decision is referred to as *site evaluation accomplished.* (See page 5 for more details on the *site evaluation accomplished* decision.)

At the completion of the site inspection, a report is prepared. This report is available to the public–call your EPA regional Superfund office for a copy. See page 8 for the phone numbers of these offices.

"During the site inspection, EPA or the State collects samples of the suspected hazardous substances in nearby soil and water."

At sites with particularly complex conditions, EPA may need to perform a second SI to obtain legally defensible documentation of the releases.

Because EPA has limited resources, a method has been developed to rank the sites and set priorities throughout the nation. That method, known as the *Hazard Ranking System*, is the next step in the site assessment process.

4 Hazard Ranking System

EPA uses the information collected during the preliminary assessment and site inspection to evaluate the conditions at the site and determine the need for long-term remedial actions. When evaluating the seriousness of contamination at a site, EPA asks the following questions:

- Are people or sensitive environments, such as wetlands or endangered species, on or near the site?
- What is the toxic nature and volume of waste at the site?
- What is the possibility that a hazardous substance is in or will escape into ground water, surface water, air, or soil?

Based on answers to these questions, each site is given a score between zero and 100. Sites that score 28.5 or above move to the next step in the process: listing on the *National Priorities List*. Sites that score below 28.5 are referred to the State for further action.

Site Evaluation Accomplished

In many instances, site investigators find that potential sites do not warrant Federal action under the Superfund program. This conclusion can be attributed to one of two reasons:

- The contaminants present at the site do not pose a major threat to the local population or environment; or
- The site should be addressed by another Federal authority, such as EPA's Resource Conservation and Recovery Act (RCRA) hazardous waste management program.

When investigators reach this conclusion, the site evaluation is considered accomplished. A site can reach this point at several places during the site assessment process, namely at the conclusion of the preliminary assessment or the site inspection, or once the site is scored under the Hazard Ranking System.

5 National Priorities List

Sites that are listed on the *National Priorities List* present a potential threat to human health and the environment, and require further study to determine what, if any, remediation is necessary. EPA can pay for and conduct remedial actions at NPL sites if the responsible parties are unable or unwilling to take action themselves. There are three ways a site can be listed on the National Priorities List:

- It scores 28.5 or above on the Hazard Ranking System;
- If the State where the site is located gives it top priority, the site is listed on the National Priorities List regardless of the HRS score; or
- EPA lists the site, regardless of its score, because all of the following are true about the site:
  - The Agency for Toxic Substances and Disease Registry (ATSDR), a group within the U.S. Public Health Service, issues a health advisory recommending that the local population be *dissociated* from the site (i.e., that the people be temporarily relocated or the immediate public health threat be removed);
  - EPA determines that the site poses a significant threat to human health; and
  - Conducting long-term remediation activities will be more effective than addressing site contamination through early actions.

The list of proposed sites is published in the *Federal Register*, a publication of legal notices issued by Federal agencies. The community typically has 60 days to comment on the list. After considering all comments, EPA publishes a list of those sites that are officially on the National Priorities List. When a site is added to the National Priorities List, the site assessment is completed. Long-term actions take place during the next phase. See page 6 for more details on long-term actions.

As a Concerned Citizen, How Can I Help ?

- Read this fact sheet.
- Call EPA with any potential sites in your area.
- Provide EPA with site information.
- Comment on proposed listing of sites on the National Priorities List.
- If the site is listed on the NPL, work with your citizens' group to apply for a technical assistance grant.

Addressing Sites in the Long Term

Once a site is placed on the National Priorities List, it enters the long-term or remedial phase. The stages of this phase include:

- ✓ Investigating to fully determine the nature and extent of contamination at the site, which can include a public health assessment done by the ATSDR;
- ✓ Exploring possible technologies to address site contamination;
- ✓ Selecting the appropriate technologies—also called remedies;
- ✓ Documenting the selected remedies in a record of decision (ROD);
- ✓ Designing and constructing the technologies associated with the selected remedies;
- ✓ If necessary, operating and maintaining the technologies for several years (e.g., long-term treatment of ground water) to ensure safety levels are reached; and
- ✓ Deleting the site from the National Priorities List, completing Superfund's process and mission.

Some Commonly Asked Questions

Q: **What exactly is a site?**
A: EPA designates the area in which contamination exists as the "site." Samples are taken to define the area of contamination. At any time during the cleanup process the site may be expanded if contamination is discovered to have spread further.

Q: **How long will it take to find out if a threat exists?**
A: Within one year of discovering the site, EPA must perform a preliminary assessment. The preliminary assessment allows EPA to determine if there is an immediate danger at the site; if so, EPA takes the proper precautions. You will be notified if you are in danger. EPA may also contact you to determine what you know about the site.

Q: **What is the State's role in all these investigations?**
A: The State can take the lead in investigating and addressing contamination. It also provides EPA with background information on (1) immediate threats to the population or environment, and (2) any parties that might be responsible for site contamination. The State shares in the cost of any long-term actions conducted by the Superfund program, comments on the proposal of sites to the National Priorities List, and concurs on the selected remedies and final deletion of sites from the National Priorities List.

Q: **Why are private contractors used to assess sites?**
A: EPA has a limited workforce. By using private contractors, EPA is able to investigate more sites. Also, EPA is able to draw on the expertise of private contracting companies.

Q: **Why are there so many steps in the evaluation process? Why can't you just take away all the contaminated materials right now, just to be safe?**
A: When EPA assesses a site, it first determines if contamination poses any threats to the health of the local population and the integrity of the environment. Dealing with worst sites first is one of Superfund's national goals. By evaluating contamination in a phased approach, EPA can quickly identify sites that pose the greatest threats and move them through the site assessment process. Once EPA understands the conditions present at a site, it searches for the remedy that will best protect public health and the environment. Cost is only one factor in weighing equally protective remedies. Many sites do not warrant actions because no major threat exists. However, if a significant threat does exist, EPA will take action.

about Superfund Sites

Q: **If a site is added to the National Priorities List, how will we know when EPA has completed the cleanup efforts?**

A: EPA notifies the public and requests their comments on the actions proposed to treat site contaminants. In addition, the community is notified when a site will be deleted from the National Priorities List. The entire process can take as long as 7 years; at sites where ground water is contaminated, it can take even longer.

Q: **I live next door to a site and I see EPA and contractor personnel wearing "moon suits." Am I safe?**

A: EPA and contractor personnel wear protective gear because they might actually be handling hazardous materials. Also, these people are regularly exposed to contaminants at different sites and do not always know what contaminants they are handling. EPA takes steps to protect the public from coming in contact with the site contamination. If a dangerous situation arises, you will be notified immediately.

Q: **If a site is added to the National Priorities List, who pays for the activities?**

A: EPA issues legal orders requiring the responsible parties to conduct site cleanup activities under EPA oversight. If the parties do not cooperate, Superfund pays and files suit for reimbursement from responsible parties. The sources of this fund are taxes on the chemical and oil industries; only a small fraction of the fund is generated by income tax dollars.

Q: **How can I get more information on any health-related concerns?**

A: Contact your EPA regional Superfund office for more information. The ATSDR also provides information to the public on the health effects of hazardous substances. Ask your EPA regional Superfund office for the phone number of the ATSDR office in your region.

Q: **How can I verify your findings? What if I disagree with your conclusions?**

A: You can request copies of the results of the site assessment by writing to your EPA regional Superfund office. The public is given the opportunity to comment on the proposal of a site to the National Priorities List and the actions EPA recommends be taken at the site. If a site in your community is listed on the National Priorities List, a local community group may receive grant funds from EPA to hire a technical advisor. Call your EPA regional Superfund office (see page 8) for the location of an information repository and for information on applying for a **technical assistance grant.**

Q: **How can I get further information? How can I get a list of the sites EPA has investigated?**

A: Contact your EPA regional Superfund office (see page 8) for more information and a list of sites in your area.

Important Phone Numbers

For information on the Superfund program or to report a hazardous waste emergency, call the national numbers below.

U.S. EPA Headquarters Hazardous Site Evaluation Division

☎ Site Assessment Branch
703-603-8860

Federal Superfund Program Information

☎ EPA Superfund Hotline
800-424-9346

Emergency Numbers:

Hazardous Waste Emergencies

☎ National Response Center
800-424-8802

ATSDR Emergency Response Assistance

☎ Emergency Response Line
404-639-0615

For answers to site-specific questions and information on opportunities for public involvement, contact your region's Superfund community relations office.

EPA Region 1: *Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont*

☎ Superfund Community Relations Section
617-565-2713

EPA Region 2: *New Jersey, New York, Puerto Rico, Virgin Islands*

☎ Superfund Community Relations Branch
212-264-1407

EPA Region 3: *Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia*

☎ Superfund Community Relations Branch
800-438-2474

EPA Region 4: *Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee*

☎ Superfund Site Assessment Section
404-347-5065

EPA Region 5: *Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin*

☎ Office of Superfund
312-353-9773

EPA Region 6: *Arkansas, Louisiana, New Mexico, Oklahoma, Texas*

☎ Superfund Management Branch, Information Management Section
214-655-6718

EPA Region 7: *Iowa, Kansas, Missouri, Nebraska*

☎ Public Affairs Office
913-551-7003

EPA Region 8: *Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming*

☎ Superfund Community Involvement Branch
303-294-1124

EPA Region 9: *Arizona, California, Hawaii, Nevada, American Samoa, Guam*

☎ Superfund Office of Community Relations
800-231-3075

EPA Region 10: *Alaska, Idaho, Oregon, Washington*

☎ Superfund Community Relations
206-553-2711

APPENDIX F

References

References are included on the attached CD