

**USEPA Region 9 Tronox Radiological Survey and
Cove Wash Investigation
Biological Assessment Report
April 2015**

This Biological Assessment Report is being completed as part of the Section 7 Informal Consultation Process. The purpose of this document is to assess the effects of the proposed action on federally protected resources.

The proposed actions include scientific investigation activities: airborne radiological surveys over areas in the Northern Agency of the Navajo Nation, and data collection to characterize surface water, sediment, and mining waste impacts in the Cove Wash watershed within the Navajo Nation.

Project Background

From the late 1940s to the 1980s, the Kerr-McGee Corporation mined more than seven million tons of uranium ore on or near the Navajo Nation. In 2014, the United States entered into a historic legal settlement that will provide almost \$1 billion to investigate and clean up approximately 50 uranium mines on or near the Navajo Nation that were operated by Kerr-McGee Corporation. Approximately 26 of these mines are in the Cove and Lukachukai areas.

Based on review of existing data and USEPA screening-level studies conducted in 2013, documentation of the presence of waste piles on mesas in the Lukachukai Mountains, and in surface waters and springs that drain these areas, are associated with elevated levels of gamma radiation and/or elevated concentrations of uranium. Studies have also documented potential ongoing impacts of mining activities to drinking water wells and livestock watering sources used by Cove residents. There are also high value natural and cultural resources in this area which may also be impacted by the mining legacy, and which require inventories to be conducted as part of USEPA's planning phases.

Action Area

USEPA will perform an airborne radiological environmental survey at the Tronox mine sites located in the Navajo Nation between the towns of Cove and Teec Nos Pos, Arizona (**Figure 1**). USEPA will conduct water quality sampling of surface water and sediment within the Cove Wash watershed.

The proposed survey will consist of using the ASPECT System to conduct a 183 square mile gamma radiological survey and generate a set of radiological products that will be used to locate and assess areas of radiological contamination. A review of topographic maps for the region indicates this area is a mixture of flat terrain, mountains and canyons and mesa terrain. Approximately 70 mines are located throughout the survey area.

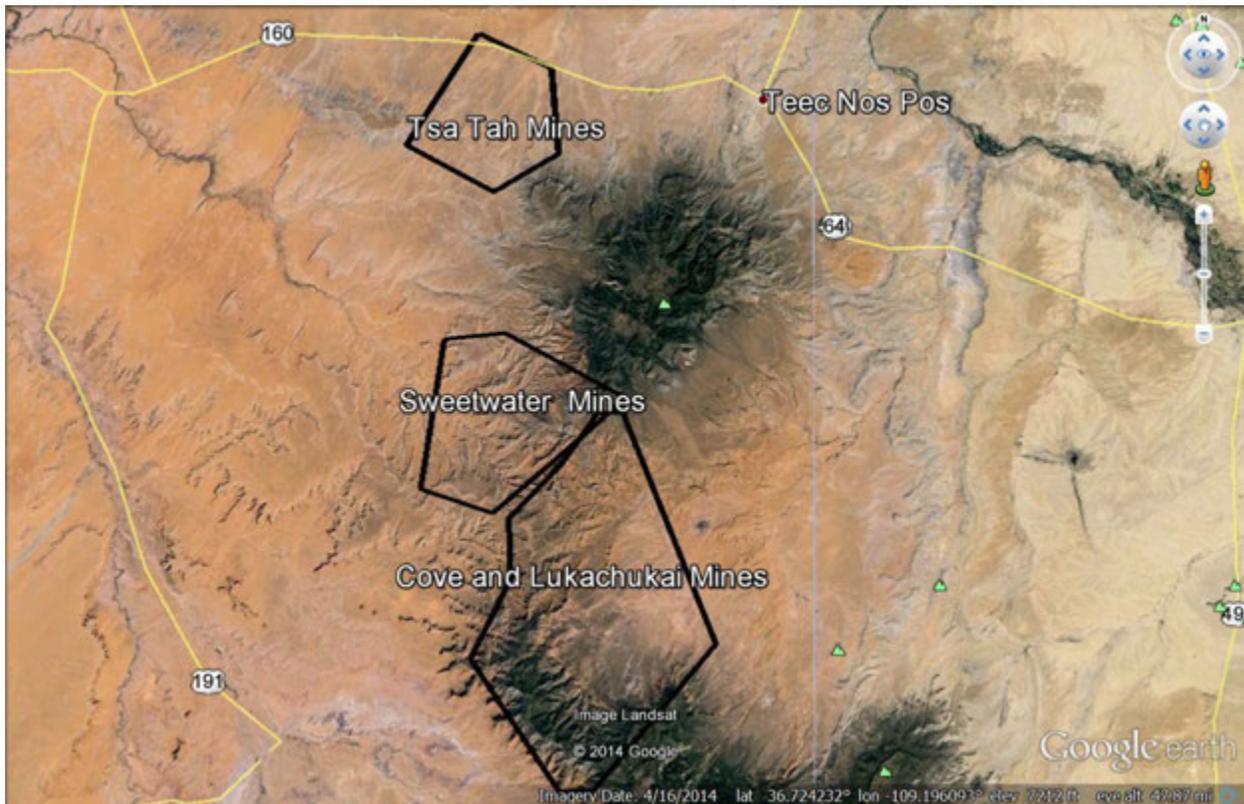


Figure 1 – Project Area

Project Description

The Cove Wash investigation activities planned for May to July 2015 include aerial gamma radiation surveys in May 2015, and surface water and sediment sampling in the Cove Wash watershed in June-July 2015. The data collected in Summer 2015 will provide baseline information for understanding the extent of mining-related impacts, help identify data gaps, and provide the basis for planning future cleanup activities. Planned activities do not include any construction or ground disturbance using mechanized equipment. USEPA activities are limited to scientific investigations of mining impacts, and biological and cultural resource surveys required under CERCLA statutes.

The May to July 2015 activities are proposed in order to accomplish the following objectives:

- 1) Identify impacted vs. unimpacted areas of the 50 Abandoned Uranium Mine properties
- 2) Define and designate areas of interest in the study area that pose human health and ecological risks,

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- 3) Provide extensive walk-over gamma scan surveys of the drainages and washes that extend throughout the study area, and
- 4) Provide initial samples and analyses of existing sources of surface water, surface and subsurface soils in washes.

Sensitive Species Considered

No formal biological surveys have been completed for 2015 investigation activities. This Biological Assessment relies on sensitive species lists obtained from ECOS and Arizona Game and Fish for Apache County (attached). Current population and habitat conditions of protected species that may be present are not known.

Given the lack of site-specific information regarding species that may be present in the project area, USEPA will assume the presence of Mexican spotted owl during both planning and implementing Summer 2015 activities. Biological resource surveys are planned for Summer 2015 and into the next year.

Species lists identify 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 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*).

USEPA also provided coordinates of the project area sent to Navajo Nation Department of Fish and Wildlife (NNDFW) to identify sensitive species that may be present in the project area. NNDFW noted potential presence of Mexican spotted owl (MSO), Navajo sedge (*Carex specuicola*), and Zuni fleabane (*Erigeron rhizomatus*) based on the project area coordinates.

USEPA conducted three site visits for wetland delineation and reconnaissance purposes in June 2013, August 2013, and August 2014. USEPA was accompanied by NNDFW and Navajo Nation EPA Water Quality staff during the August 2014 visit. Riparian canopy was noted to be limited, due to lateral restriction by the narrow canyon landscape. Although portions of the Cove Wash tributary network have perennial surface flows from spring sources, no fish were observed in the stream or in isolated pools during any site visits.

Chad Smith of NNDFW noted the potential presence of the MSO in the project area for two USEPA investigations planned during nesting season. However, MSO population distribution maps are not available to assist with investigation planning. USEPA requested that NNDFW be available during initial surveys of the project area in early summer, for the purpose of preliminary owl and suitable habitat surveys to assist USEPA in planning future stages of the

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investigation. USEPA expects to better understand the presence of MSO suitable habitat in the project area for future MSO protocol survey needs with the assistance of NNDFW. Photographs of two species of tadpoles provided to NNDFW in August 2014 were not identified to be individuals of the sensitive species in the lists above.

Discussions and preliminary reconnaissance surveys were conducted with NNDFW botanist Andrea Hazelton in August 2014 in the project area, to identify the presence of wetlands and special status plant species within the Cove Wash tributary network. No unique habitats, specifically hanging gardens wetlands, were identified during these preliminary surveys. These preliminary surveys did not identify the presence of Navajo sedge in the typical areas of the stream banks, seeps, or springs. Zuni fleabane was not observed on access roads we used to access the tributaries and other areas that might be suitable habitat. However, these surveys are noted as preliminary, and botanical surveys are planned for the entire project area in Summer 2015 with Navajo botanist Arnold Clifford.

Summary of USFWS and USEPA Discussions on April 10 and 21, 2015

USEPA staff held a coordination call with USFWS staff in the Flagstaff and Phoenix offices on April 10, 2015. General information was provided about USEPA's planned activities for Summer 2015 in the Cove area (see detailed descriptions below). USFWS also provided general information about potential endangered species concerns related to USEPA's planned activities.

The most significant concerns were related to potential effects to MSO during aerial gamma radiation surveys (see ASPECT Survey below). Potential effects from overflights are related to proximity of the aircraft to nesting birds, to noise levels from the aircraft potentially flushing birds from nests, and/or leading to preoccupation of the birds during nesting. Because the aerial surveys are planned in early May 2015, during MSO nesting season, and given the low altitude that the surveys will be conducted, there is a potential for these activities to disturb nesting birds if they are present in the survey area.

Stream sampling activities have the potential to disturb nesting birds, if they are present in the canyon survey area. The sampling work is planned to occur within the canyon areas of the watershed, which are suitable nesting habitat for MSO. The sampling work is also scheduled to occur during the nesting season. The close proximity of sampling personnel to suitable nesting areas may also flush birds from their nests, and/or lead to preoccupation of the birds during nesting.

Given the lack of comprehensive inventory data regarding the presence of MSO, and given the history of MSO presence in the Lukachukai Mountains during mine reclamation activities, it was agreed that USEPA would assume the presence of MSO during both planning and implementing Summer 2015 activities.

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Concerns were also raised about potential effects to sensitive plant species that may be impacted by sampling activities to be conducted within the Cove Wash stream valley (see Cove Wash Investigation below).

From this initial call, the need for more detailed information was identified, and a follow-up call was held on April 21, 2015 with USEPA, the ASPECT team, and USEPA's contractors to provide USFWS with additional detail and clarifications to better assess potential effects. A summary follows of the additional details provided to USFWS.

ASPECT Survey May 4-13, 2015

The purpose of this survey will be to document, through airborne gamma spectral data, the effective one meter dose rate, total airborne gamma count, and uranium concentration of the environment within the survey area. To accomplish this survey, a set of regular spaced lines will be flown at a fixed above ground altitude (AGL) using a constant ground speed. All data will be processed by taking into consideration both cosmic radiation inputs coupled with an aircraft specific calibration function to produce calibrated radiological products. It is estimated that the survey will require 7 to 9 days to complete with interim product generation being accomplished at the end of each flight.

Visible imagery is collected using a high resolution digital camera system. All data are geo-referenced with embedded geographical coordinates and can use in a variety of GIS systems. Collected data are processed using onboard algorithms while the aircraft is in flight and preliminary data results are sent using a satellite system to the ASPECT reach back team for QA/QC analysis.

The survey boundary for the Cove and Lukachukai Mines area is given in **Figure 2**. Due to terrain constraints, the flight design is broken into four zones to provide line coverage over the entire area while permitting the aircraft adequate maneuvering space to avoid terrain obstacles. Small areas around the western peaks may be missed but it is estimated that greater than 95 percent of the area can be surveyed. Again due to terrain features on the western portion of the area, a deviation from 300 Ft. AGL to 500 Ft. AGL survey altitude will be necessary. It is anticipated that survey altitudes may actually be greater, based on completed aerial surveys conducted in December 2014, average altitudes flown were between 750 Ft. AGL to 1000 Ft. AGL.

A photographic survey of the area is also proposed. Pending weather, this survey is designed to be conducted at an altitude of 5000 ft. AGL and will provide 100 percent photographic coverage (**Figure 3**). A line spacing of 3200 ft. will be used for all photographic lines. The photographic survey is estimated to require about two hours to complete and can be accomplished at any time during the deployment with favorable weather and light.

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Table 1 provides details on the number of flight lines and approximate flight duration for each survey zone.

Specific details discussed on these calls included the following:

1. What is the typical elevation of overflights over the tops of the mesas and in the canyons?
Based on the radiological surveys conducted in December 2014 in the Cove and Lukachukai area, flight altitudes were in the range of 300-1000 feet above ground level (AGL). However, the lowest altitude that the plane can safely fly in mountainous terrain is 500 Ft. AGL. Flight altitudes above canyon areas are typically greater than above the mesas. Flight altitudes for collecting aerial imagery is in the range of 500-1000 Ft. AGL.
2. What is the typical spacing of transects, and are there overlapped areas between adjacent flight lines?
The transects have 300-foot spacing. There are no overlapped areas.
3. What is the maximum number of times that any single spot on the ground will be flown over?
Once daily. Based on December 2014 flyovers, flight lines that were not completed end-to-end as planned were completed on subsequent days. Given difficulties with terrain, it is expected that similar situations will arise with incomplete flight lines. When this occurs, transects can be planned for completion on subsequent days to minimize disturbance effects on any given day.
4. What are the sound pressure levels (in dB) that we can expect at the ground surface, and at 50 feet above the ground surface, and at 100 feet above ground surface? In the canyons?
At 300 Ft. AGL, which is the closest to the ground that the aircraft can safely fly, sound pressure levels will be 70 dBA. 69 dBA is the threshold of potential disturbance to MSO cited by the 2012 Recovery Plan. At every 100 feet further from the ground, we can expect sound pressure levels to be reduced by another 10 dB. Therefore, at 500 Ft. AGL, which is the lowest altitude flown in this area in December 2014, sound pressure levels will be in the range of 50 dBA.
5. Are there potential modifications, i.e. flying higher above ground surface, transect spacing, etc. that can be considered and still meet the mission goals?
Given the discussion with USFWS, it was understood that a potential modification to reduce potential effects was to plan flight lines over the same areas for nonconsecutive days. Since disturbance effects from flyovers are related to the aircraft noise, these can be minimized by not returning to complete flight lines on the same day.

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6. How many days of flights are needed to cover the project area?
Approximately five, dependent on weather conditions. However, no more than a few hours are needed in the mountainous areas (see Zones 1 and 3, **Table 1**).
7. How many hours per day?
About 4-5 hours per day, again depending on weather conditions.
8. Do you expect that more flights may be needed (e.g., based on the results)?
This is possible, however, no additional flights are planned during the 2015 nesting season for MSO.

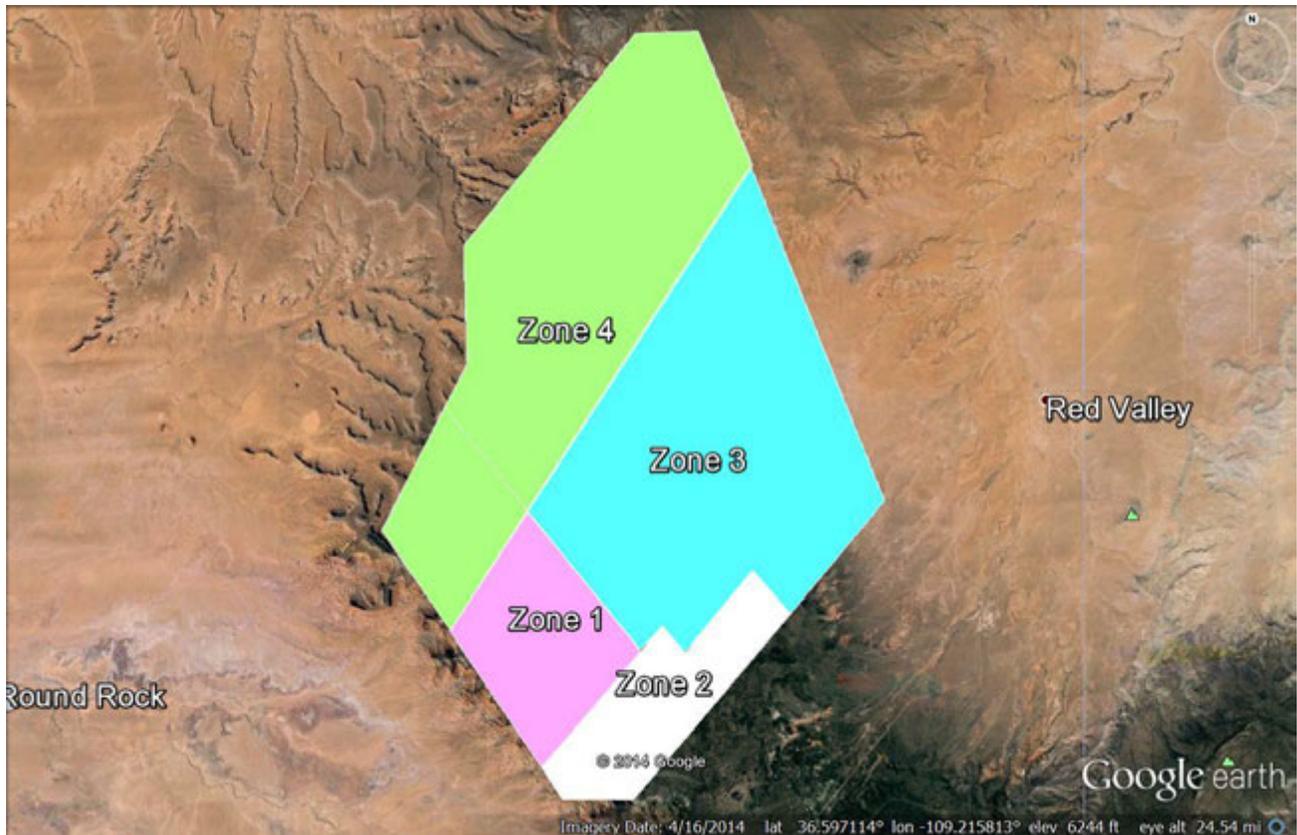


Figure 2 – Cove and Lukachukai Survey Zones

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Table 1. Radiological Survey Estimates – Cove and Lukachukai Mine Area

Survey Zone	Altitude AGL	Line Spacing	Direction Flown	Number of Lines	Total Survey Distance	Total Survey Time
		Ft.			Nm	Hrs.
1	300 – 500	300	327	56	176	2.5
2 (Complete)	N/A	N/A	N/A	N/A	N/A	N/A
3	300-1000	300	42	72	416	3.5
4 (Complete)	N/A	N/A	N/A	N/A	N/A	N/A
Photos	500-1000	N/A	Variable	52	100	1
5	300-1000	300	300	110	536	6
Mines	500	N/A	Variable	52	100	1
			Totals	342	1328	14

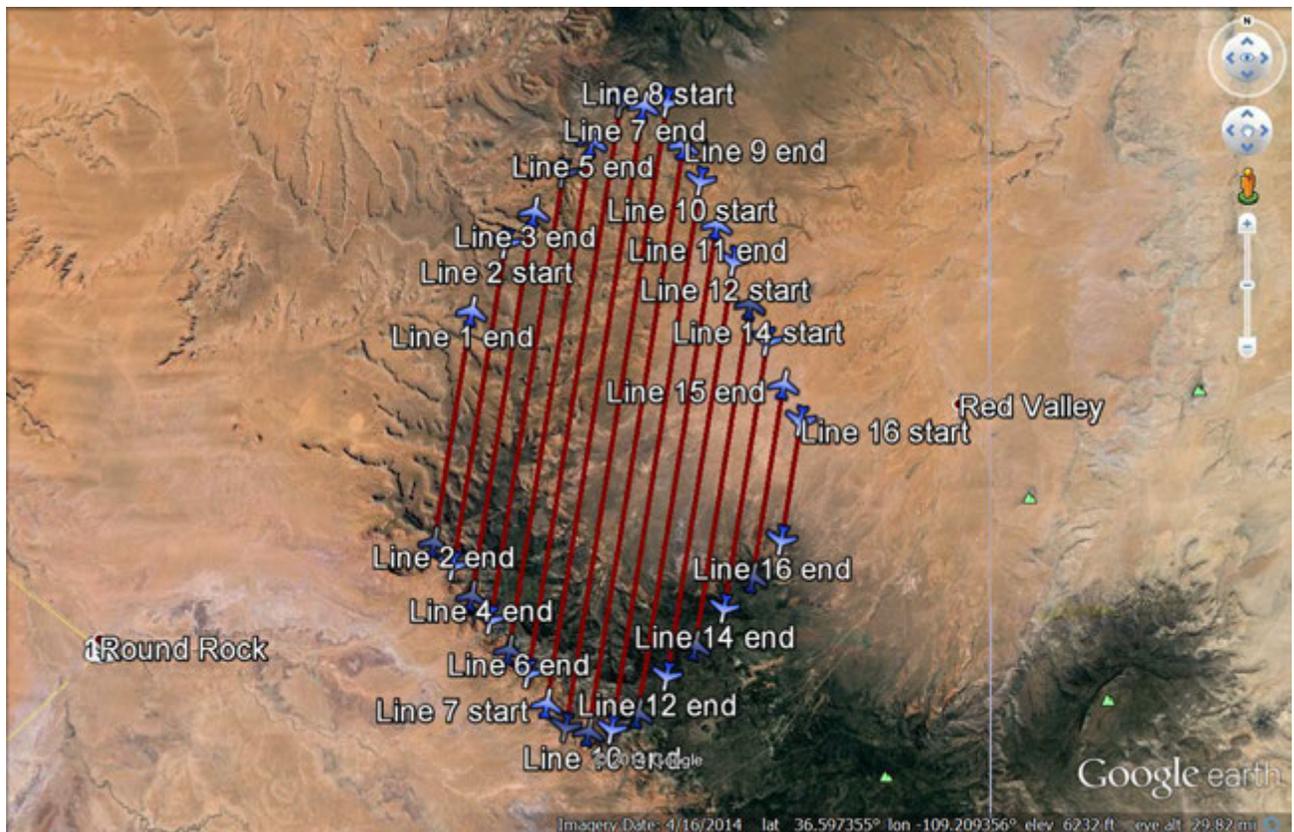


Figure 3 – Cove and Lukachukai Photo Survey Lines

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Cove Wash Investigation June 15th through July 15th

This project investigates the extent of contamination throughout the Cove watershed (**Figure 4**), as a result of historic uranium mining operations in the area. The Summer 2015 activities include an investigation of the surface water, sediment, and groundwater migration pathways. Limited subsurface samples will be collected, to a depth of approximately 18-inches with a hand auger. Seeps and springs encountered during the assessment will also be sampled to further identify potential contamination sources and pathways. It is estimated that up to 200 water and sediment samples will be collected depending on flow conditions. Waste volumes in the drainages will be estimated during the surface water sampling, and gamma scanning will be performed. The field work for this phase includes 10 personnel in two 5-person teams for a duration of 10 days.

1. What areas will be sampled within canyon reaches?
Surface flow, pools, sediment, and flows from seeps and springs.
2. What kind of activities are planned?
Grab samples from surface flow, pools, and seeps/springs. Use of small trowels to collect sediment in depositional areas within the stream channel. Hand augering up to 18" to collect samples of stream sediment and mining waste piles within the stream valley. Waste piles of coarse material were encountered on upland areas below mesa walls which have in some cases migrated to the stream bank.
3. How many people will be involved in the sampling?
Up to 10 people, in two separate teams of 5 each.
4. What kind of equipment will be used for sampling?
Hand equipment only: disposable trowels, sample jars, hand augers with single-use heads, handheld radiological and geolocational equipment.
5. What areas/features of the canyons, stream channels, and banks will be sampled?
Hydrographic features such as streams, pools, seeps, and springs. Depositional features such as sediment bars within the stream channel. Mining waste piles will be the only features outside of stream channels that will be sampled and scanned.
6. What precautions can be taken to avoid impacting endangered plant species during sampling, esp. augering activities?
Discussions with USFWS identified a number of strategies to avoid and/or minimize impacts to wetland plants. USEPA will require an orientation for the sampling personnel of the sensitive plant species and habitats that may be encountered during the sampling efforts. Avoiding the collection of sediment samples where vegetation has established will further reduce any potential impacts. Lastly, personnel will be instructed to avoid

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and/or minimize the trampling of vegetation, especially wetland vegetation, while conducting sampling activities.

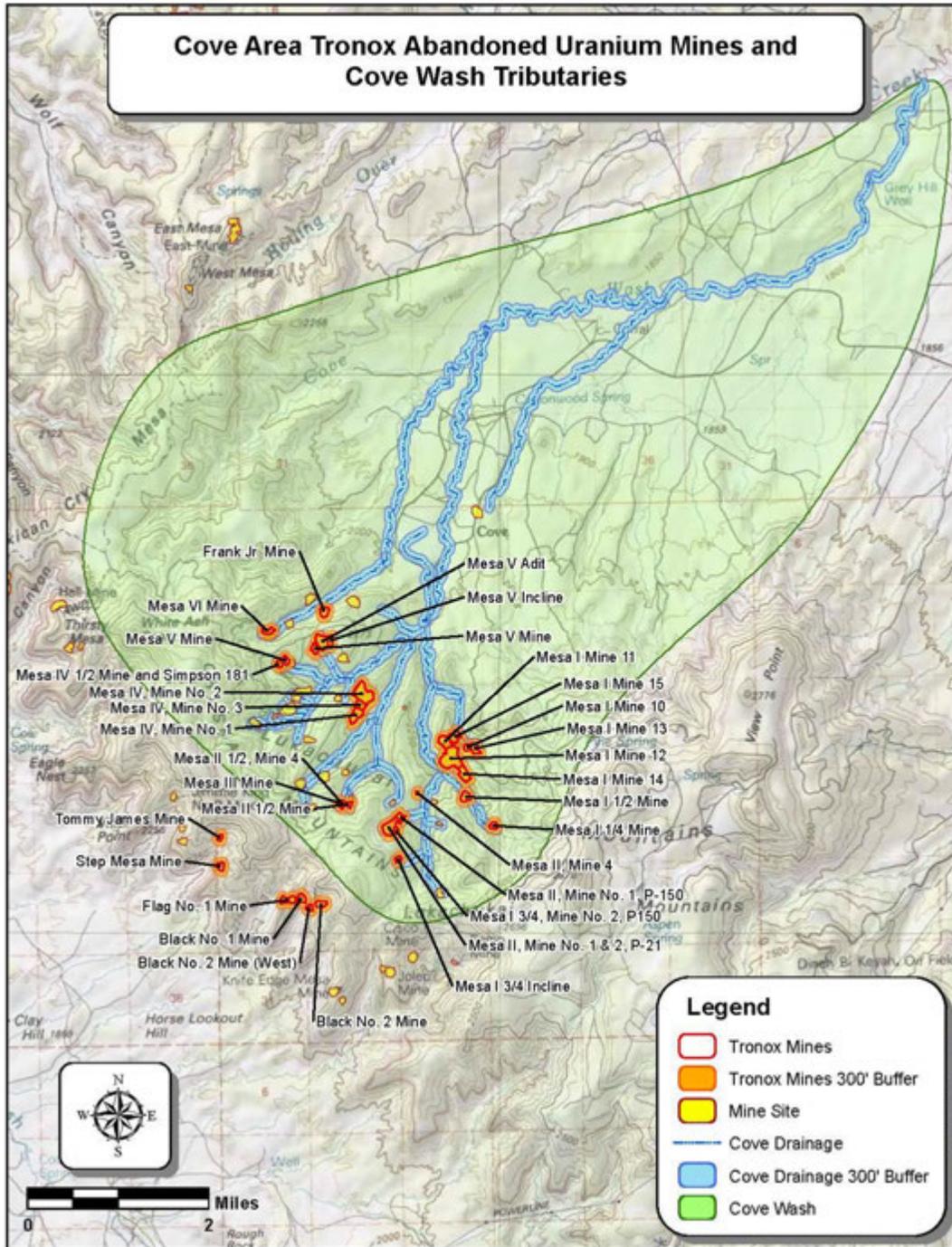


Figure 4 – Cove Wash Investigation

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Effects Analysis

Based on discussions with USFWS and NNDFW staff scientists, USEPA concludes that the proposed activities and protective measures described below may affect, but are not likely to adversely affect, federally protected resources in the Action Area.

ASPECT Surveys: Given the time of year, low flight altitude, potential to generate sound pressure levels above 69 dBA, and potential to fly over the same location twice during the surveys, USEPA's proposed actions may affect MSO during nesting season.

However, the lowest altitude that the aircraft could maintain during December 2014 surveys was 500 Ft. AGL in mountainous terrain, due to associated safety concerns. At 500 Ft. AGL the aircraft produces sound pressure levels of 50 dBA at ground level. Future surveys, assuming flight altitudes greater than 500 Ft. AGL at all times, will be maximally 50 dBA, or lower in the canyons. Since the threshold sound pressure level of 69 dBA was cited in the MSO Recovery Plan as a disturbance to nesting birds, proposed surveys are not likely to affect MSO given the low likelihood of safely surveying at altitudes lower than 500 Ft. AGL and low associated sound pressure levels.

Both radiological and aerial imagery surveys will not require flying over the same areas more than once a day. USEPA will plan flights so that any areas that need to be reflighted will not be flown on the same day to reduce any potential effects to the level of not likely to adversely affect MSO.

Cove Wash Investigation: Given the time of year that USEPA proposes to conduct its sampling activities, the proximity of sampling personnel to suitable nesting areas in the canyons may affect MSO that may be present. Sampling activities within aquatic habitats, which include collecting stream sediment, may affect Navajo sedge or other wetland species that may root in wet or moist sediments and soil.

USEPA sampling activities within the canyon areas are not expected to last more than a day for each canyon reach. USFWS advised to keep the time needed to collect samples within suitable nesting habitats, i.e. ledges, crevices, potholes, to the minimum needed to reduce the disturbance effects to nesting birds. USEPA was also advised not to linger or otherwise disturb MSO if they are encountered. All of these protective measures will be incorporated into personnel training. Given the short amount of time that personnel will be in canyon areas, and given the incorporation of protective measures into sampling protocols, the proposed activities are not likely to adversely affect MSO.

USEPA will also incorporate protective measures for avoiding adverse effects to protected plant species. USEPA will require an orientation for the sampling personnel of the sensitive plant species and habitats that may be encountered during the sampling efforts. Avoiding the

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collection of sediment samples where vegetation has established will further reduce any potential impacts. Lastly, personnel will be instructed to avoid and/or minimize the trampling of vegetation, especially wetland vegetation, while conducting sampling activities. Given the incorporation of protective measures into sampling protocols, the proposed activities are not likely to adversely affect Navajo sedge and Zuni fleabane.