

5.0 IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

5.1 RATIONALE

The Forest Service requested a NTC removal action at the Site based on the results of a Preliminary Assessment of the Site that was performed for the Forest Service by Dynamac. The Preliminary Assessment concluded, based on total mercury concentrations, that the Site was a major source of mercury and arsenic contamination in the Mazatzal Mining District and presented a threat to human health and the environment (Dynamac 2001, Executive Summary). This determination was based on total mercury, which does not have an established SRL. The ADEQ SRLs and EPA PRGs establish minimum soil cleanup levels for mercuric chloride and methyl mercury. Therefore, collecting speciated data as discussed above, was a central requirement for additional investigation performed in this EE/CA.

The previous section of this EE/CA compared mercury species analytical results to established minimum State of Arizona SRLs. If mercury species in a sample exceeded minimum State of Arizona SRLs, then a risk assessment was performed to evaluate the risks to a recreational user. Lastly, the EE/CA evaluated the potential for soil and retort tailings at the Site to impact surface water and groundwater above applicable water quality standards.

The factors used to determine the appropriateness of a removal action are described in Section 1. Based on the results of the sampling and analysis program and the streamlined risk assessment, the following table discusses the rationale for elimination or retention of the factors to be used to determine the appropriateness of a removal action.

Factor #	Factor Description	Action	Rationale
1	actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants, or contaminants.	Retained	Features on the Site meet these criteria.
2	actual or potential contamination of drinking water supplies or sensitive ecosystems.	Eliminated	The risk assessment evaluated that drinking water exposure pathways are incomplete.
3	hazardous substances in drums, barrels, tanks, or other bulk storage containers that may pose a threat of a release.	Eliminated	Containers are not present on the Site.
4	high levels of hazardous substances, pollutants, or contaminants in soils at or near the surface that may migrate.	Retained	
5	weather conditions that may cause hazardous substances, pollutants, or contaminants to migrate or to be released.	Retained	
6	threat of fire or explosion.	Eliminated	The threat of fire or explosion is not present at the Site.
7	availability of other appropriate Federal or State response mechanisms to respond to the release.	Not considered	USFS role
8	other situations or factors that may pose threats to public health, welfare, or the environment.	Eliminated	No additional situations or factors were identified that may pose a threat of a release of a hazardous substance.

As indicated in the table above, the appropriateness of a removal action at the Site would be considered primarily by Factors 1, 4, and 5.

5.2 OBJECTIVES

Soil, sediment, surface water, and air were identified as the primary media of concern at the Site, and potential human and ecological exposure pathways were identified in the PA. The three AOIs considered for removal action are RT, DSS, and RB. The downstream sediments are similar in characteristics to the retort tailings. Therefore, RT and DSS are combined into a single AOI identified as RT/DSS. RAOs for NTC removal action at the Site are as follows:

RT/DSS: Reduce potential exposure to human populations, animals, or the food chain to mercury species present in the retort tailings and downstream sediments. Reduce the potential for contaminant migration to surface water or groundwater.

RB: Reduce potential exposure to human populations, animals, or the food chain to mercury species present in the soils surrounding the retort building. Reduce the potential for contaminant migration to surface water or groundwater.

5.3 ARAR-BASED GOALS

Based upon the total arsenic analysis for the soil/sediment samples in the AOIs (Table 1), none of the site samples exceeded the background concentration range. Therefore, arsenic was removed as a COPC.

The EE/CA investigation indicated much of the mercury present in soils and retort tailings was in the non-extractable and least toxic form, cinnabar. Of the soil, retort tailings, and streambed sediment samples that were analyzed for mercury species, only three samples (RT-2-S, RB-6-S, and RB-7-S) had exceeded the RSRL for mercuric chloride/inorganic mercury-extractable, and only one sample (RB-7-S) had exceeded the NRSRL for mercuric chloride/inorganic mercury-extractable. No samples exceeded the RSRL for methylmercury/organic mercury-extractable. Since the exposures that would be experienced by receptors frequenting the AOIs are not consistent with the residential and non-residential (industrial/commercial worker) scenarios, an additional evaluation was performed for direct contact with soils/sediment in these areas (see Sections 3.0 and 5.4).

Potential impacts to surface water and groundwater were also considered. The applicable Arizona ARARs for surface water and groundwater are the SWQSs and AWQSs. The soil, streambed sediment, and retort tailings samples with the highest total mercury concentrations detected were further analyzed for leachable mercury using the SPLP method. The SPLP data indicated that mercury should not leach to surface water to concentrations exceeding the SWQSs. Only one out of ten soil samples indicated a potential to leach mercury to the groundwater in excess of the AWQS. However, this is too insignificant and is not anticipated to produce any exceedance of the water quality standards when attenuation and mixing are taken into account. Moreover, the groundwater exposure pathway was evaluated to be incomplete.

5.4 RISK-BASED GOALS

The results of the stream-lined risk evaluation yielded the following recreational use soil cleanup criteria (Section 3.1.2):

2,320 mg/kg (mercuric chloride/inorganic mercury –extractable)
770 mg/kg (methyl mercury – organic mercury – extractable)

The concentrations of the various mercury species were compared to the mercury species-specific recreational criteria to evaluate potential risk associated with the exposure scenario. None of the analytical soil/sediment results for mercury from any AOI exceeded the species-specific recreational soil criteria. Furthermore, mercury vapor (elemental) concentrations did not exceed the health-based elemental mercury air criterion for the recreational receptor. Therefore, based on the maximum concentrations of methyl mercury or mercuric chloride in soil/sediment or elemental mercury vapor (retort building), no unacceptable risk is expected to result with exposures to COPCs for the most sensitive of all the possible exposure scenarios (e.g., recreational visitors to the Site).