

**RAY MINE TAILINGS STORAGE FACILITY
EIS EXECUTIVE SUMMARY**

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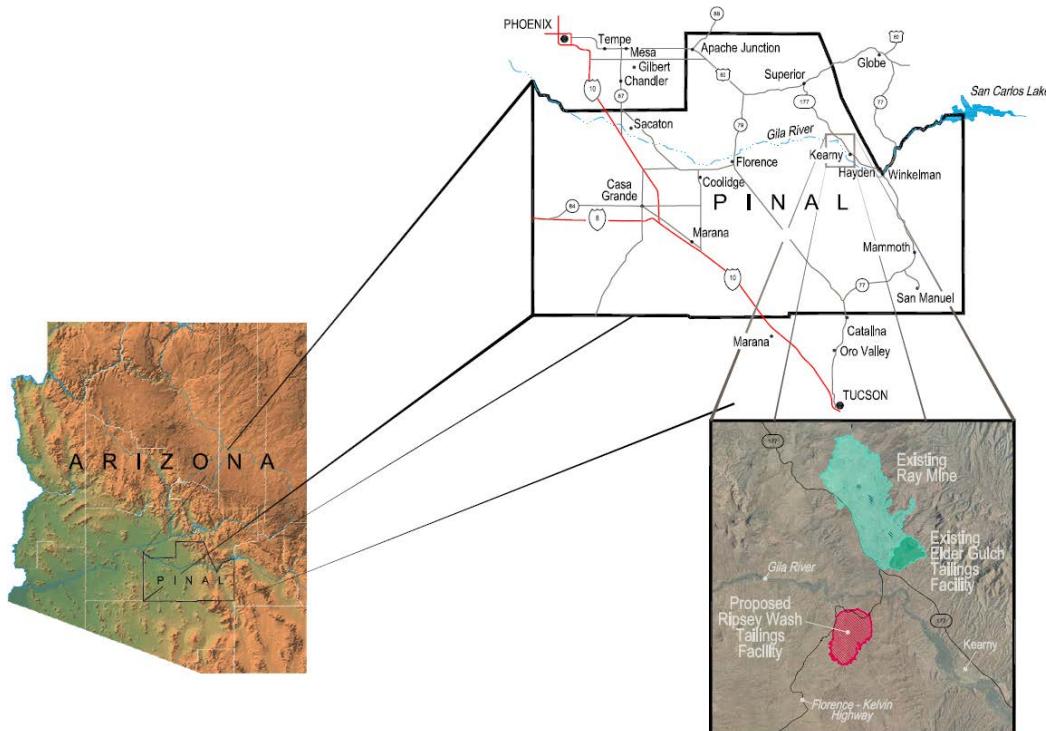
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EXECUTIVE SUMMARY

ES-1.0 INTRODUCTION

In March 2013, ASARCO LLC (Asarco) submitted a Section 404 permit application to the U.S. Army Corps of Engineers (Corps) for the construction and operation of a new tailings¹ storage facility (TSF) that would receive tailings generated at the Ray Mine, which is an existing open pit copper mine located in Pinal County, Arizona about 10 miles northwest of the community of Kearny and approximately 65 miles southeast of the city of Phoenix. See **Figure ES-1, General Location Map**.

Figure ES-1, General Location Map



Asarco's proposed TSF site is located in Ripsey Wash, approximately four miles southwest of the existing Elder Gulch TSF, the present site being used at the Ray Mine for tailings disposal.

The Corps required a permit application for the proposed Ripsey Wash TSF to comply with regulations promulgated under Section 404 of the Clean Water Act, as the Corps has determined the Ripsey Wash drainage and other ephemeral washes within the proposed Project footprint are "Waters of the United

¹ Tailings are the finely-ground rock material produced by the milling process, which separates copper-bearing minerals from non-economic material. Tailings should not be confused with overburden or development rock (sometimes referred to as waste rock), which is non-mineralized or uneconomic mineralized material excavated in order to access the copper-bearing ore that is mined and processed to generate a profit.

States" and subject to Corps jurisdiction. Asarco, as the Applicant, is proposing to place fill material within Waters of the United States, which triggers the requirement for a Section 404 permit.

With the Section 404 permit application submittal, the Corps determined that an environmental impact statement (EIS) would be prepared to comply with the National Environmental Policy Act (NEPA) and that they would be the lead agency for NEPA compliance. The EIS would be completed in accordance with procedures specified by Council on Environmental Quality (CEQ) regulations for NEPA (40 CFR §1500 – 1508), CEQ guidance, the Corps' NEPA Implementation Procedures for the Regulatory Program (33 CFR Part 325, Appendix B), and South Pacific Division's Standard Operating Procedure for Preparing and Coordinating EIS Documents (12509-SPD).

The Bureau of Land Management (BLM)², and the Bureau of Indian Affairs - San Carlos Irrigation Project (SCIP)³, and the Environmental Protection Agency (EPA)⁴ are NEPA cooperating agencies with the Corps on this EIS. These agencies have defined regulatory requirements associated with the Project and NEPA.

On August 26, 2013, the Corps published their Notice of Intent (NOI) to prepare an EIS for this Project in the *Federal Register*. A 60-day EIS scoping process was initiated to solicit comments about the Project from the general public, businesses, special interest groups, Native American tribes and government agencies. This comment period was originally slated to end on October 28, 2013; however, with the October 2013 shut-down of portions of the federal government, the Corps extended the scoping comment period for another 21 days, until November 18, 2013.

The Corps held two public scoping meetings: one on September 24, 2013 at the Ray Elementary School in Kearny (Arizona) and the other on September 25, 2013 at the Performing Arts Center at the Apache Junction High School in Apache Junction (Arizona). About twenty people attended both meetings. The Corps provided a court recorder at both meetings for verbal comments, but none were given. Twenty two letters and emails were received during the EIS scoping process.

In early January 2016, the Corps submitted an electronic copy of Ray Mine Tailings Storage Facility Draft EIS to the Environmental Protection Agency (EPA) in Washington D.C. so that the official Notice of Availability (NOA) for the Draft EIS could be published in the *Federal Register*. The Corps also placed a public notice on its website announcing the availability of the Draft EIS as required by the Corps South Pacific Division Standard Operating Procedure (SOP) for preparing and coordinating environmental impact statements (12509-SPD). In addition, the Draft EIS was posed on the Corps website, and hard copies of the Draft EIS were provided to the public libraries in the towns of Kearny and Superior.

On January 29, 2016, the NOA for the Ray Mine Tailings Storage Facility Draft EIS for public review was published in the *Federal Register*. A 45-day comment period was provided to solicit comments on the Draft EIS from the general public, businesses, special interest groups, Native American tribes and

² Because approximately 0.3 miles of tailings and reclaim water pipelines, a portion of the re-route for the Arizona National Scenic Trail (Arizona Trail), and rock material for reclamation would involve BLM administered lands and minerals, the BLM will use this EIS to support their decision-making processes.

³ The proposed Project would involve the relocation of a portion of an existing 69 kilovolt (kV) electric transmission line that is owned and managed by SCIP. Given the proposed relocation, SCIP will use this EIS to support their decision-making process involved with the possible relocation of the electric transmission line.

⁴ EPA has an independent reviewer role for all EIS documents published by federal agencies. In addition, based on its jurisdiction by law and special expertise associated with the Clean Water Act and Clean Air Act, EPA is a NEPA cooperating agency with the Corps on this EIS.

government agencies. This comment period was originally slated to end by the close of Monday, March 14, 2016; however, the EPA requested a 30-day extension to the comment period, which the Corps granted, extending the comment period until April 14, 2016. Subsequently, the EPA requested another extension for their Draft EIS review, which because of EPA's status as a cooperating agency, the Corps granted for EPA until the close of May 5, 2016.

In addition to the notice in the *Federal Register*, the Corps also placed public notices in local newspapers (*East Valley Tribune*, *Daily New Sun*, *Arizona Silver Belt*, and *Copper Area News*). These notices were published weekly during the weeks of February 1 through February 22, 2016, and they announced the availability of the Ray Mine Tailings Storage Facility Draft EIS for public review, along with the time and place for the Draft EIS public meeting where the public and interested parties could learn more about the Draft EIS and provide comments to the Corps.

In addition to the above notices, the Corps also directly notified those agencies, organizations and individuals on the Corps' EIS distribution list that the Ray Mine Tailings Storage Facility Draft EIS was available for review. The Corps provided CDs to those agencies, organizations and individuals who had earlier requested a copy of the Draft EIS.

The Corps held a public meeting for receipt of comment on the Draft EIS on February 24, 2016 at the Ray Elementary School in Kearny (Arizona). About twenty people attended both meetings. Story boards with various aspects of the project were set up for public review. Representatives of Corps and Asarco were in attendance to answer questions. James Stewart (Technical Manager from Asarco) made presentation about background of Ray Mine and need for a new tailings facility. Mike Langley (Corps) discussed NEPA and the 404 permit. The Corps provided a court recorder at the meeting for verbal comments, but none were given.

The Corps received 29 letters and emails regarding the Draft EIS. A variety of comments were received as set forth in **Table ES-1, Draft EIS Comments by Category**.

Table ES-1, Draft EIS Comments by Category

Comment Category	Number of Comments	Percentage of Total (%)
Minor Clarifications	277	24%
Wildlife	80	7%
Regulatory Aspects	69	6%
Mitigation: Project	59	5%
Geochemistry	53	5%
Surface Water	50	5%
Groundwater	50	5%
Design Considerations	48	4%
Recreation	34	3%
Alternatives	33	3%
Corps 404 (B)(1)	33	3%
Scope Of Analysis	31	3%
Monitoring	27	2%

Comment Category	Number of Comments	Percentage of Total (%)
Air Quality/Climate	26	2%
Cumulative Impacts	25	2%
Closure Financial Assurance	24	2%
Vegetation	22	2%
Proposed Action Alternative	21	2%
Visual Resources	19	2%
Mitigation: Waters of US	18	2%
Cultural Resources	18	2%
Noise	15	1%
Purpose & Need	14	1%
Socioeconomics	13	1%
Land Use	12	1%
Waters Of The US	12	1%
Reclamation/Closure	11	<1%
Geology	10	<1%
Transportation	8	<1%
Connected Actions	8	<1%
Soils	7	<1%
Geotechnical	7	<1%
No Action Alternative	6	<1%
Accidents & Spills	5	<1%
Background/Regional	5	<1%
Appendices	2	<1%
Ray Land Exchange	2	<1%
Irreversible & Irrecoverable Effects	1	<1%
Glossary	1	<1%
State Land Trust	1	<1%
TOTAL	1,157	100%

ES-2.0 PURPOSE AND NEED

Based on its current mine plan for the Ray Mine and the identified mineral resource of the site, Asarco expects that Ray Mine operations could continue for approximately another 50 years.⁵ Asarco has determined the need to create additional tailings storage to support up to approximately 750 million tons of material (tailings and embankment material).

Asarco's basic project purpose is mine tailings disposal, which is not water-dependent.⁶ The Project's purpose is the development of tailings disposal capacity that will allow the full utilization of the mineral resource at the Ray Mine, using infrastructure and processes already in existence at the mine.⁷

ES-3.0 DECISION FRAMEWORK

At the close of the Draft EIS review and comment period, the Corps considered comments submitted and has responded to those comments in a Final EIS (see Appendix L, Draft EIS Comments and Comment Responses). The Final EIS reflects changes or updates that result from the comments received on the Draft EIS.

After the release of the Final EIS, the Corps will issue a Record of Decision (ROD) regarding its decision on the Proposed Action. In the ROD, the Corps may decide to:

- Issue a 404 permit with or without special conditions on the Project described in the applicant's 404 permit application,
- Deny the 404 permit request, or
- Allow the applicant to withdraw the 404 permit application.

Similarly, after the release of the Final EIS, the BLM and SCIP will each issue individual RODs regarding decisions on those Project features or actions involved under their jurisdiction.

ES-4.0 ISSUES AND CONCERNs

The EIS scoping process produced a number of issues and concerns, which are summarized below:

⁵ Actual mine life depends on a variety of factors, including the price of copper and the cost of production (which can change with changes in technology). Thus, the current estimate of mine life and reserves could change over time.

⁶ As a general rule, the basic purpose of the project must be known to determine if the project is water-dependent (i.e., requires access to, or siting within, a special aquatic site in order to fulfill its basic purpose). If a proposed project is not water-dependent and would impact a special aquatic site (e.g., a wetland), then there is a strong regulatory presumption that practicable alternatives that do involve special aquatic sites are available, and that such alternatives have less adverse impact on the aquatic ecosystem. 40 C.F.R §230.10(a)(3); Army Corps of Engineers Standard Operating Procedures for the Regulatory Program, page 15 (July 2009).

⁷ See U.S. Army Corps of Engineers Standard Operating Procedures (SOP) for the Regulatory Program, page 15 (July 2009). The Corps SOP states that "the overall project purpose is used to evaluate less environmentally damaging practicable alternatives" and "must be specific enough to define the applicant's needs, but not so restrictive as to constrain the range of alternatives that must be considered under the 404(b)(1) guidelines."

- Aesthetics and Visual Resources: Identify Project-related impacts to visual resources;
- Air Quality and Climate: Identify Project-related air quality impacts;
- Cultural Resources: Identify cultural resources and conduct Native American consultation;
- Geology and Geochemistry: Identify the potential for acid rock drainage and metals transport from the proposed TSF;
- Surface Water Hydrology: Identify any water quality and quantity impacts to the Gila River as a result of the proposed TSF;
- Groundwater Hydrology: Identify any impacts to groundwater quality and hydrology within and surrounding the proposed TSF area;
- Land Use: Identify land disturbance and land use changes;
- Noise: Identify noise impacts;
- Recreation: Identify impacts to recreational activities and opportunities and the changes those activities cause, including impacts on primitive roads that provide access to BLM and State trust land in the project area;
- Roads and Transportation: Address Project construction and operations traffic impacts;
- Socioeconomics: Address the social, economic and lifestyle effects on residents in the local communities surrounding the Ray Mine;
- Soils: Identify site soil resources and adequacy for reclamation;
- Vegetation: Address Project-related impacts to vegetation;
- Waters of the US: Address Project-related impacts to waters of the US; and,
- Wildlife: Identify impacts to wildlife and wildlife habitats.

ES-5.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

The discussion of alternatives is the foundation of the EIS process (see 40 CFR §1502.14).

The Corps focused its assessment of TSF alternatives on where and how to develop tailings disposal capacity for 750 million tons of tailings, which would accommodate future operations at the Ray Mine and meet the purpose and need for the Project.

The Corps explored and evaluated various ideas and options during the selection and development of TSF alternatives for this EIS. To assist in the process, the Corps met numerous times with Asarco, representatives of cooperating and interested government agencies, visited the existing Ray Mine on many occasions to review current tailings disposal practices, and scrutinized the area surrounding the mine for possible TSF sites.

The Corps has documented the analysis in compliance with guidelines established under the Clean Water Act [40 CFR Part 230 Section 404(b)(1)] for avoidance and minimization of impacts to jurisdictional Waters of the U.S. The results of the Corps' analysis are provided in a July 17, 2015 study entitled *Alternative Screening and Clean Water Act Section 404(b)(1) Alternatives Analysis*.

The TSF alternatives to be considered in detail for this EIS are the no-action alternative, the proposed action TSF in Ripsey Wash, and the Hackberry Gulch TSF.

ES-5.1 NO ACTION ALTERNATIVE

NEPA regulations (40 CFR §1502.14(d)) require that EIS alternative analyses "include the alternative of no action". This alternative will serve as a baseline to compare the effects of the proposed action

alternatives. Under the no-action alternative, the Corps would deny the 404 permit, and Asarco's proposal for the construction and operation of a new TSF would not go forward.

ES-5.2 RIPSEY WASH TSF ALTERNATIVE – PROPOSED ACTION

The Ripsey Wash TSF presents the actions proposed by Asarco. This proposed facility would be located within the valley or basin area created by Ripsey Wash (and its tributaries) south of its confluence with the Gila River and approximately four miles southwest of the existing Elder Gulch TSF. See **Figure ES-2, Site Plan Layout for Ripsey Wash TSF Alternative**.

Similar to the ongoing tailings disposal operations at the existing Elder Gulch TSF, the Ripsey Wash TSF would be designed and operated as a closed-circuit (zero surface water discharge) facility. Asarco would continue to pump tailings material as slurry from the existing Ray Concentrator at the Ray Mine through an existing pipeline to the existing thickener, where the tailings would be "thickened". This process would remain unchanged from the existing operation.

As part of pre-tailings disposal construction activities, Asarco would construct two starter dams for the Ripsey Wash TSF. The first and largest of the starter dams would be approximately 150 feet high and located in Ripsey Wash near where the Florence-Kelvin highway currently crosses the wash; approximately 5.2 million cubic yards of alluvium and colluvium and Ruin Formation granite bedrock would be used to construct this starter dam. The second starter dam would be approximately 80 feet high and located in an unnamed drainage on the eastern side of the facility; approximately 400,000 cubic yards of alluvium/colluvium and Ruin granite material would also be used to construct this starter dam. The crest elevation of both starter dams would reach approximately 2,135 feet above mean sea level (amsl).

A new pipeline, pumping booster station, a lined drain-down tailings containment pond, a bridge across the Gila River, and other supporting infrastructure would be needed to transport tailings from the existing thickener to the Ripsey Wash TSF. Tailings would be discharged from spigots around the perimeter of the tailings areas, and water would accumulate at the rear of the TSF and would be pumped back to the Ray Concentrator via pipelines for reuse in the milling process. See **Figure ES-3, Process Flow Sheet for Ripsey Wash TSF Alternative**.

A 6.8-mile segment of the Arizona National Scenic Trail (Arizona Trail) would need to be relocated to allow construction activities and operations of the Ripsey Wash TSF. A 6.4-mile bypass would be constructed to the east of the Ripsey Wash TSF; this routing would conform to the original objectives of the Arizona Trail, which were to establish and maintain a diverse and scenic trail across the state of Arizona.

Various aspects of Ripsey Wash TSF are summarized in **Table ES-2, Summary of Ripsey Wash TSF Alternative**.

Figure ES-2, Site Plan Layout for Ripsey Wash TSF Alternative

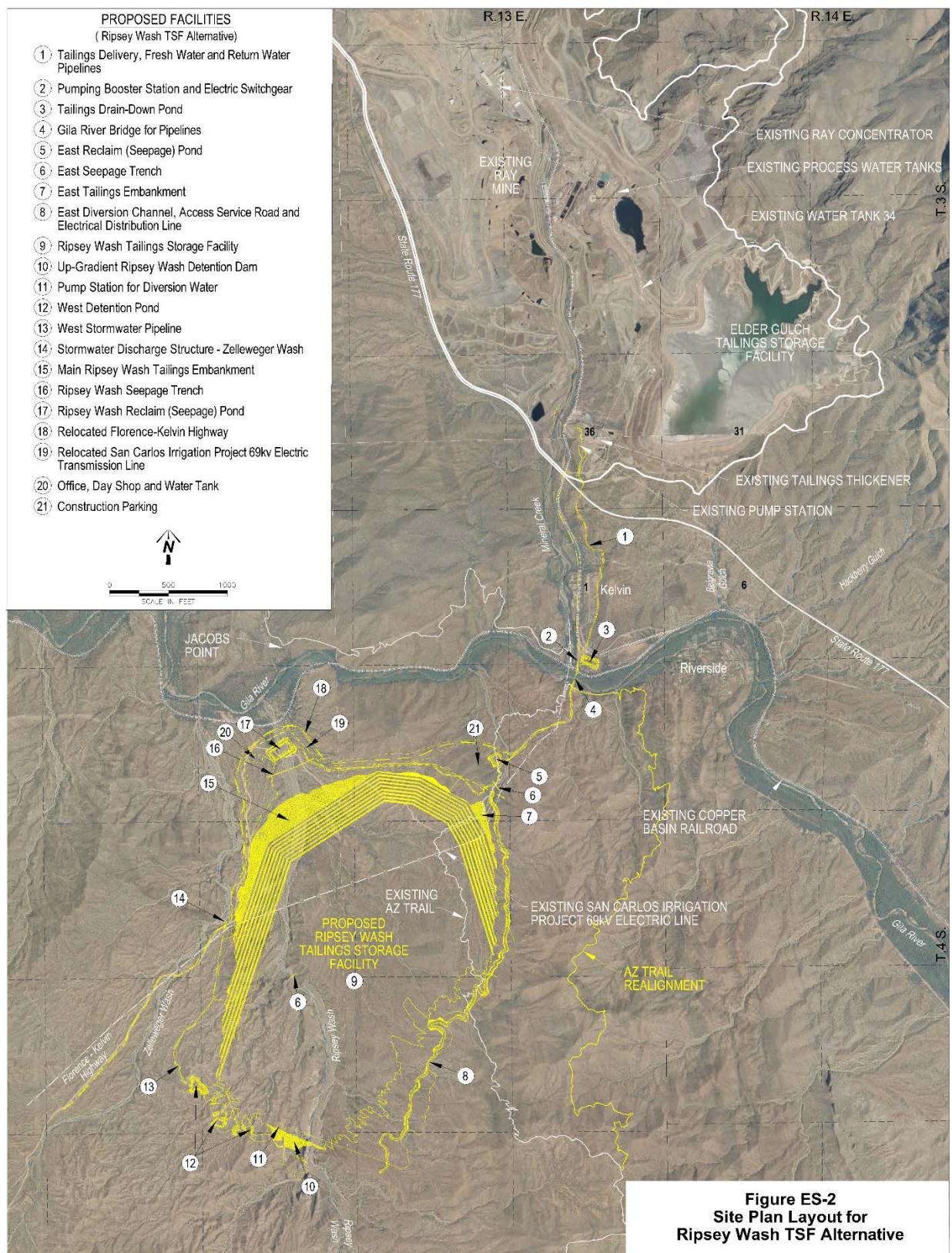
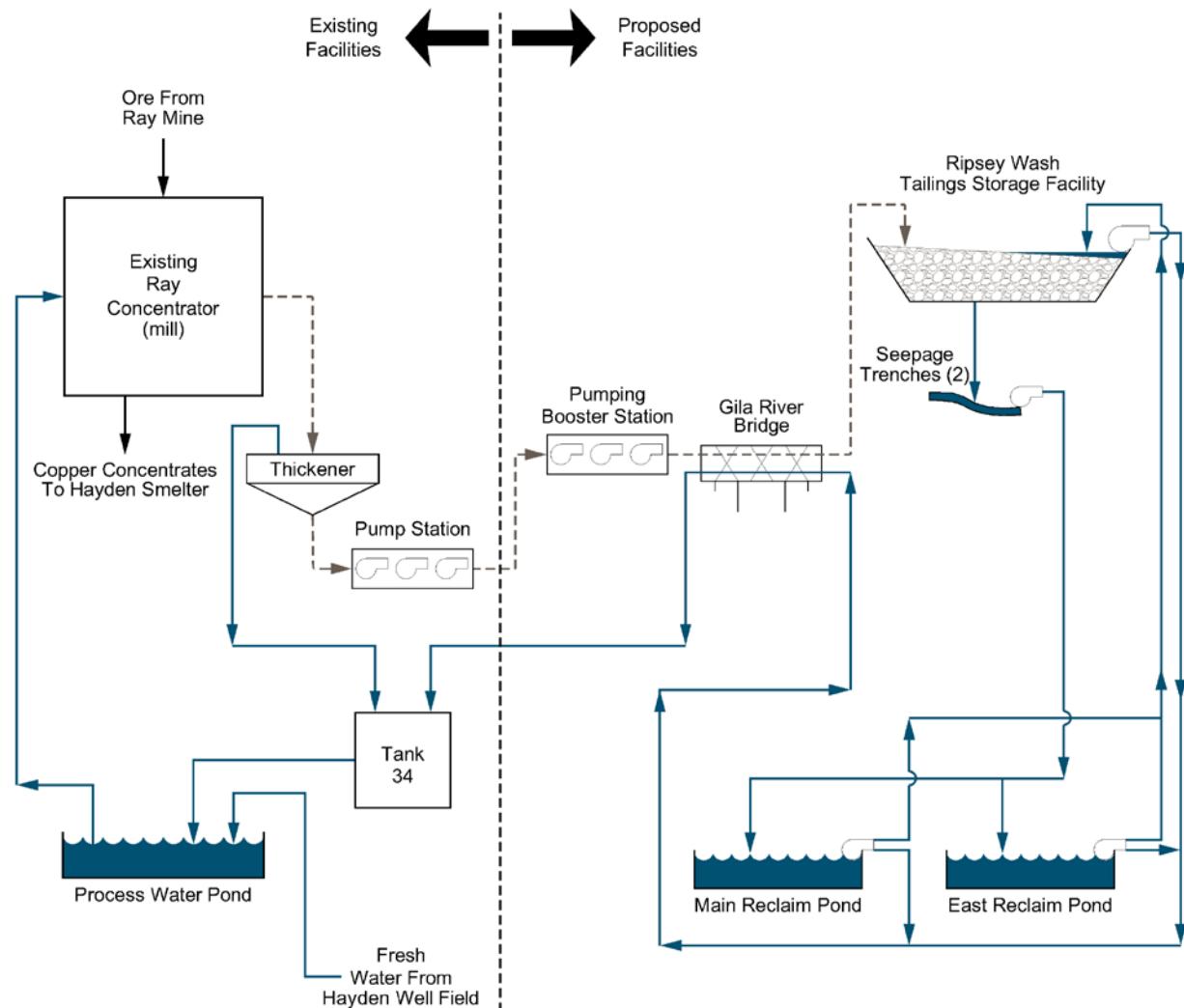


Figure ES-3, Process Flow Sheet for Ripsey Wash TSF Alternative

LEGEND

- Tailings Delivery Pipelines
- Return Water Pipelines

Note: See Figure ES-2, Site Plan Layout -
Ripsey Wash TSF.

Figure ES-3
Process Flow Sheet for
Ripsey Wash TSF Alternative

Table ES-2, Summary of Ripsey Wash TSF Alternative

BASIC CRITERIA FOR FULL CAPACITY		
Overall Facility Capacity (million tons)		751.3
Final Tailings Embankment Crest Elevation (feet above mean sea level)		2,440
Final Tailings Embankment Height (feet)		625
Number of Washes Needing Starter Dam Embankments		2
Rock Material Required for Starter Dam Embankments (million tons)		5.2
Length of Tailings and Water Pipelines (feet/miles)		20,592/3.9
ESTIMATED SURFACE AREA DISTURBANCE AT FULL CAPACITY (ACRES)		
Tailings Storage Facility		1,974
Stormwater Diversion Infrastructure		123
Onsite TSF Infrastructure		424
Offsite TSF Infrastructure		50
Florence-Kelvin Highway Realignment		37
Florence-Kelvin Highway Paving		22
Arizona Trail Re-alignment ⁽¹⁾		4
SCIP 69kV Power Line Re-alignment		2
Total		2,636
PROPOSED CONCEPTUAL MITIGATION AREA FOR WATERS OF US (ACRES)		
Sites A,B,C and D (San Pedro River Valley)		97.9
Sites E (Gila River Valley)		68.78
Total		166.68
LAND OWNERSHIP/ADMINISTRATION AT FULL CAPACITY		ACRES
		PERCENTAGE (%)
Private	54	2.1%
State of Arizona ⁽²⁾	2,573	97.6%
Bureau of Land Management ⁽³⁾⁽⁴⁾	9	0.3%
Total	2,636	100%

Table ES-2 Summary of Ripsey Wash TSF Alternative (continued)

WATER OF THE UNITED STATES	ACRES
Area of Direct Waters of U.S. Disturbance at Full Capacity	130.91
Area of Indirect Disturbance to Waters of the U.S.	3.74
Area of Jurisdictional Wetlands Disturbance at Full Capacity	0

Notes:

- Under an amendment to the National Trails System Act that established the Arizona Trail, the U.S. Secretary of Agriculture is the administering agency of the Arizona Trail, in consultation with the U.S. Secretary of Interior. For the re-aligned section of the Arizona Trail on BLM-administered lands, the BLM is the management agency. On state lands in the area within and surrounding the proposed Ripsey Wash TSF, Pinal County is the managing agency for the Arizona Trail.
- This acreage represents that the Ripsey Wash TSF site is currently located on lands owned and administered by the state of Arizona (through its State Lands Department [ASDL]). Asarco is pursuing the purchase of these lands from the state, and that purchase would transfer this ownership to "private property." The sale by the ASLD would be completed through an open auction process, the date for which is pending.
- Disturbance includes estimated three acres on BLM-administered for the re-routed Arizona Trail and trailhead, and approximately six acres for tailings/water return pipelines and re-routed SCIP powerline rights-of-way.
- The area designated is for BLM surface administered lands. The BLM also manages and administers approximately 2,300 acres of federal mineral estate beneath the area to be used for the Ripsey Wash TSF; the surface of this area is currently managed and administered by the ASLD. There are no known locatable minerals in this BLM-administered mineral estate; however, salable minerals excavated from within a portion of the footprint of the proposed TSF would be used for construction of the starter dam and as cover material during concurrent reclamation and as part of final closure. The BLM would need to authorize a mineral material sale for that rock material.
- See Appendix J, Conceptual 404 Mitigation Plan.

ES-5.3 HACKBERRY GULCH TSF ALTERNATIVE

The Hackberry Gulch TSF Alternative would be located south-southeast of the existing Elder Gulch TSF. See **Figure ES-4, Site Plan Layout for Hackberry Gulch TSF Alternative**.

The Hackberry Gulch TSF would be designed and operated as a closed circuit (zero surface water discharge) facility. See **Figure ES-5, Process Flow Sheet for Hackberry Gulch TSF Alternative**.

Most of the Hackberry Gulch TSF construction, operational, and closure techniques and practices would be the same or similar to those currently used at the existing Elder Gulch TSF or proposed for use at the Ripsey Wash TSF.

A new pipeline would be needed to pump tailings from the existing thickener to the proposed Hackberry Gulch TSF. In addition, a new service/access road would be required around the base of the existing Elder Gulch TSF to provide routing for the new pipeline and to access the new pumping booster station and lined drain-down containment pond, as well as the seepage trenches, reclaim ponds and related facilities located in the seven washes within the Hackberry Gulch TSF. A bypass road would be constructed to allow continued access to the Kane Spring Canyon. From the new pumping booster station, tailings would be pumped up to the TSF and discharged from spigots that surround the perimeter of the tailings areas, and decant water that accumulates at the back of the Hackberry Gulch TSF would be pumped back to the Ray Concentrator via pipelines for reuse in the milling process.

As part of pre-tailings storage construction activities, Asarco would construct a large, elongated starter dam for the Hackberry Gulch TSF that would cross several washes. This long starter dam would be required because the Hackberry Gulch TSF would be a "side-hill" facility (unlike the Ripsey Wash TSF which is essentially a "valley-fill" facility). The crest elevation of the starter dam would reach approximately 2,150 feet above mean sea level (amsl).

This starter dam embankment would serve as the base to retain tailings materials for the centerline embankment construction. Approximately 8.2 million cubic yards of material would be used to construct this starter dam.

Conventional construction equipment, such as front-end loaders, off-highway trucks, and bulldozers, would be used for starter dam construction. Due to the numerous washes that dissect the Hackberry Gulch TSF, multiple temporary haul roads would be needed within and external to, the footprint of the tailings impoundment for construction equipment and activity.

To promote long-term safety and to minimize the ingress and egress of traffic from TSF development and operational onto State Route 177, an overpass bridge for State Route 177 would be constructed to link TSF project activities on the northeast and southeast sides of the highway. This overpass would allow highway traffic to continue without interference from Asarco personnel and equipment as they access the planned four reclaim ponds and the monitoring/pumpback wells that would be located on the southwest side of the Hackberry Gulch TSF.

Various aspects of Hackberry Gulch TSF Alternative are summarized in **Table ES-3, Summary of Hackberry Gulch TSF Alternative**.

Figure ES-4, Site Plan Layout for Hackberry Gulch TSF Alternative

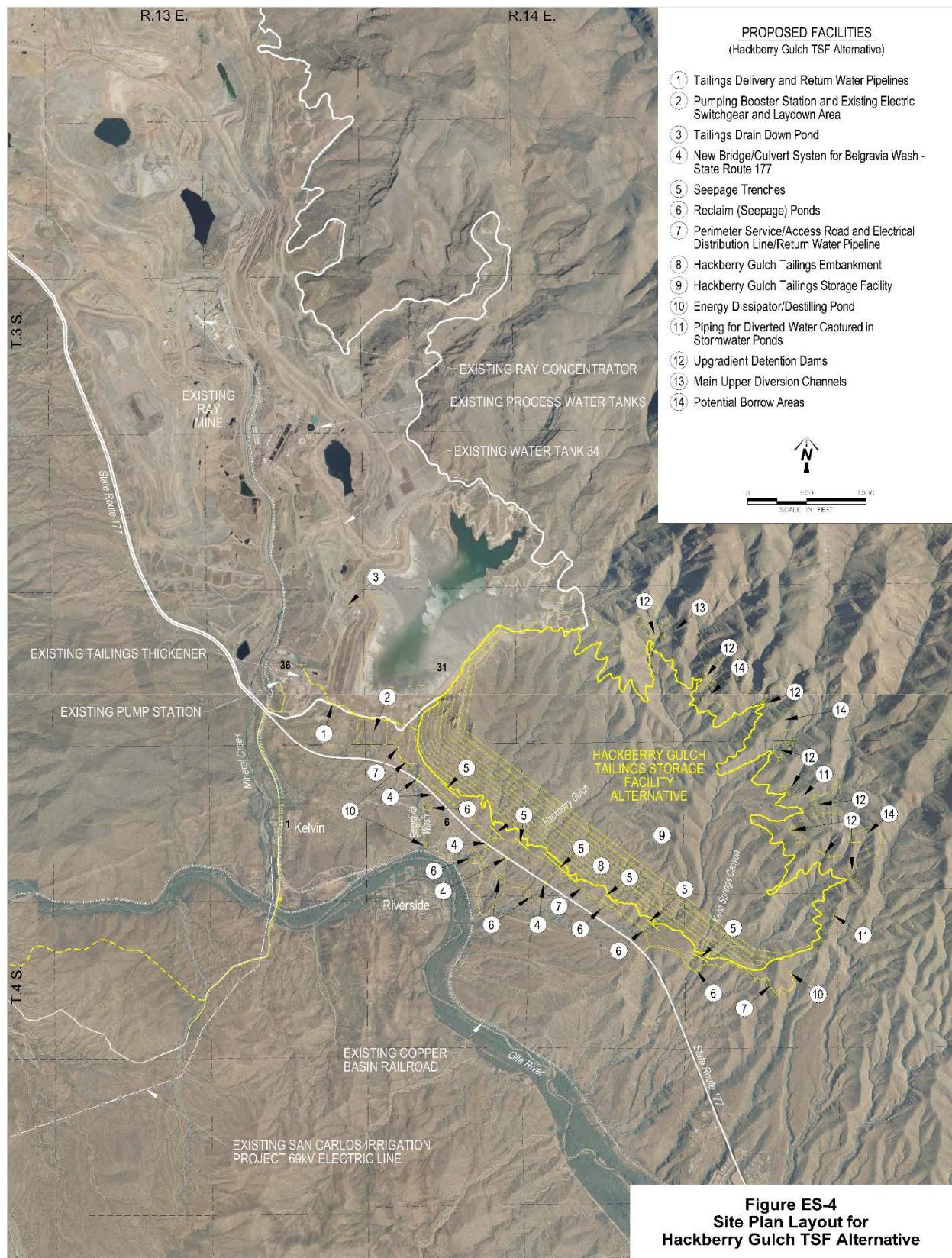
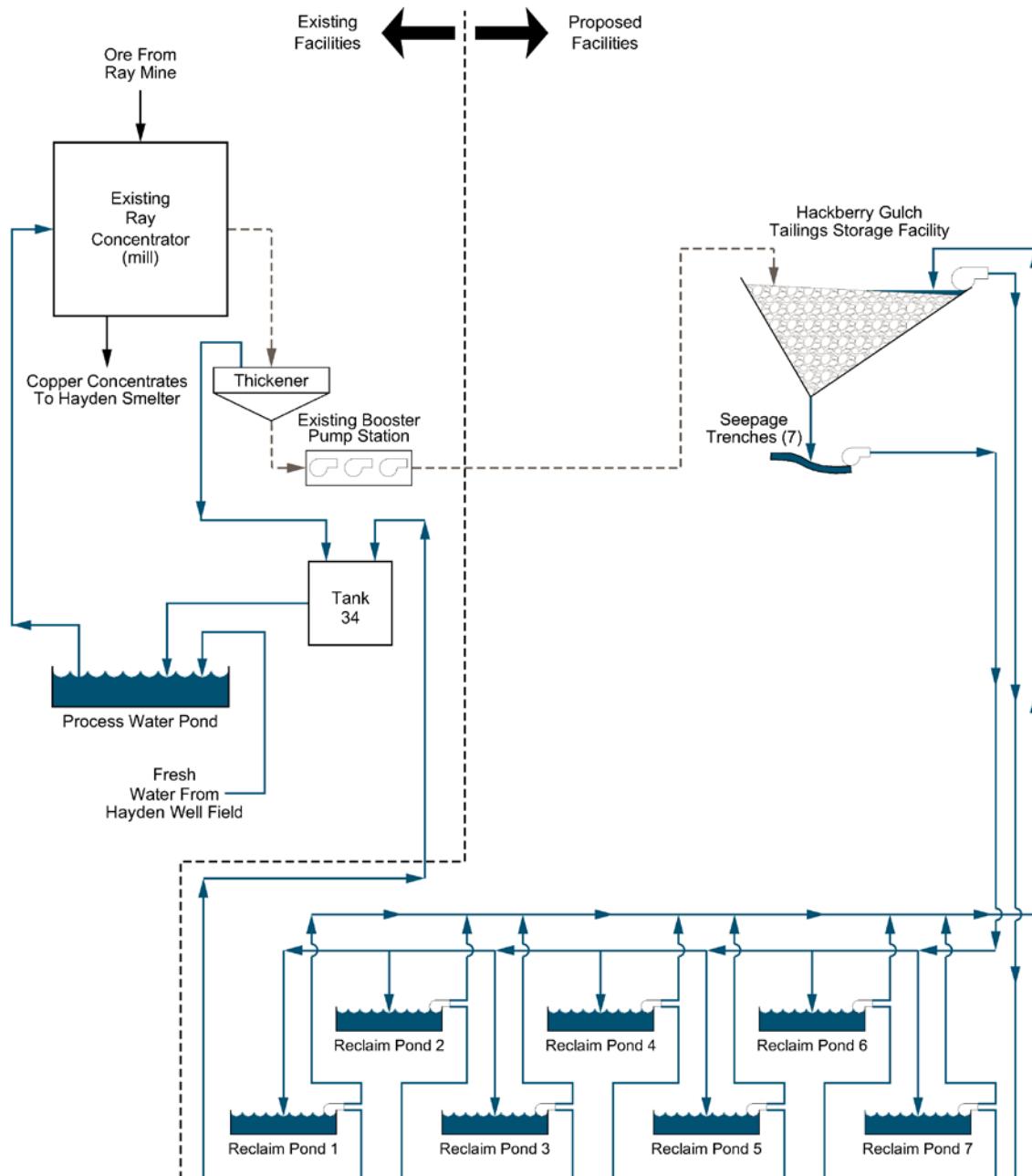


Figure ES-5, Process Flow Sheet for Hackberry Gulch TSF Alternative

**LEGEND**

- Tailings Delivery Pipelines
- Return Water Pipelines

Note: See Figure ES-4, Site Plan Layout
Hackberry Gulch TSF.

Figure ES-5
Process Flow Sheet for
Hackberry Gulch TSF Alternative

Table ES-3, Summary of Hackberry Gulch TSF Alternative

BASIC CRITERIA FOR FULL CAPACITY		
Overall Facility Capacity (million tons)		746.2
Final Tailings Embankment Crest Elevation (feet above mean sea level)		2,535
Final Tailings Embankment Height (feet)		610
Number of Washes Needing Starter Dam Embankments		7
Rock Material Required for Starter Dam Embankments (million tons)		8.2
Length of Tailings and Water Pipelines (feet/miles)		4,622/0.9
ESTIMATED SURFACE AREA DISTURBANCE AT FULLCAPACITY (ACRES)		
Tailings Storage Facility		1,996
Stormwater Diversion Infrastructure		116
Onsite TSF Infrastructure		96
Offsite TSF Infrastructure		28
Borrow Areas		54
Total		2,290
PROPOSED CONCEPTUAL MITIGATION AREA FOR WATERS OF US (ACRES) ⁽¹⁾		
Sites A, B, C and D (San Pedro River Valley)		N/A
Sites E (Gila River Valley)		N/A
Total		N/A
LAND OWNERSHIP/ADMINISTRATION AT FULL CAPACITY		ACRES
Private		1,141
State of Arizona		0
Bureau of Land Management ⁽²⁾		1,149
Total		2,290
WATERS OF THE UNITED STATES ⁽³⁾		Acres
Area of Direct Waters of U.S. Disturbance at Full Capacity (Estimated)		71.50
Area of Indirect Disturbance to Waters of the U.S. at Full Capacity (Estimated)		19.80
Area of Jurisdictional Wetlands Disturbance at Full Capacity (Estimated)		0.62
Notes:		
1. The compensatory mitigation that would be proposed for the Hackberry Gulch alternative would be similar to that currently proposed for the Ripsey Wash alternative. A Mitigation Ration Setting Checklist (MRSC) assessment has not been conducted for this alternative, so exact acreages are not available.		
2. The Hackberry Gulch site is partially located on public lands and over federal mineral estate administered by the Bureau of Land Management (BLM). Asarco is currently pursuing a land exchange with the BLM such that most of the Hackberry Gulch TSF would be located on "private property" owned by Asarco. The BLM Ray Land Exchange is pending. The placement of tailings at this site is independent of the land exchange. If the Hackberry Gulch TSF alternative is selected, the BLM would need to authorize a modification to Asarco's Section 3809 mine plan of operations to incorporate the construction, operation, and closure/reclamation of the Hackberry Gulch TSF, as well as the use of any rock material for the project that would be quarried from BLM-administered mineral estate. For additional discussion on the Ray Land Exchange, see Section 11.0, Asarco-BLM Ray Land Exchange, in Appendix G, Regional Activity.		
3. A formal delineation of Waters of the U.S. was not performed for this alternative. The extent of Waters of the U.S. was estimated from a review of aerial photography of the alternative footprint and some limited fieldwork.		

ES-5.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED EVALUATION

The Corps focused its formulation of TSF alternatives on where and how to develop tailings storage capacity for 750 million tons of tailings, which would accommodate future operations at the Ray Mine and meet the purpose and need for the project (see Section 2.0, Purpose and Need). In addition, the Corps conducted public scoping to determine the range of issues to be addressed in the EIS, and these issues helped shape the assessment of TSF alternatives (see Section 4.0, Issues and Concerns).

The Corps explored and evaluated various ideas and options during the selection and development of TSF alternatives for this EIS. To assist in the process, the Corps met numerous times with Asarco, representatives of cooperating and interested government agencies, visited the existing Ray Mine on many occasions to review current tailings storage practices, and scrutinized the area surrounding the mine for possible TSF sites.

The Corps considered a number of possible TSF alternatives, but many TSF alternatives were eliminated from consideration because they could not meet the purpose and need for the project, did not address important issues, or were impractical or unreasonable. The Corps has eliminated the following TSF alternatives from detailed evaluation in the EIS:

- Tailings storage within the Ray Mine open pit;
- Underground tailings storage;
- Ray Concentrator storage of tailings at multiple sites;
- Remote tailings storage (with off-site shipment and processing of ore material);
- Tailings storage in Devils Canyon;
- Tailings storage near community of Hayden;
- Tailings storage near Granite Mountain/Copper Butte;
- Tailings storage on the west side of the Ray Mine;
- Dewatered tailings storage (“dry-stack” tailings storage); and,
- Various location alternatives at the Ripsey Wash and Hackberry Gulch sites.

These alternatives dropped out during the alternatives screening process for various reasons or did not pass the practicability test consistent with the Clean Water Act Section 404(b)(1) guidelines that the Corps requires for 404 permits. The Corps has documented the alternative analysis in compliance with guidelines established under the Clean Water Act [40 CFR Part 230 Section 404(b)(1)] for avoidance and minimization of impacts to jurisdictional Waters of the U.S. This document is found with the EIS as **Appendix B, Alternative Screening and Section 404(b)(1) Alternatives Analysis**.

ES-6.0 ENVIRONMENTAL ANALYSIS

ES-6.1 AIR QUALITY/CLIMATE

ES-6.1.1 Existing Conditions

The area around the Ripsey Wash and Hackberry TSF sites has a subtropical desert climate.

Average daily temperatures in this region range from an average maximum low of around 31°F in January to average maximum highs approaching 99°F in July. Temperatures in the winter can dip below freezing (32°F), while summertime temperatures often climb above 100°F.

Annual average precipitation is typically around 13 to 14 inches, with most amounts occurring during July and August, which are part of the Arizona “monsoon season”. The summertime rain can be sporadic and locally intense, often associated with passing thunderstorms.

The average annual pan evaporation rate measured at the town of Winkelman, which is approximately 14 miles southeast of the Ray Mine, was nearly 96 inches for the period of record 1942 to 1980. The climate of the Southwest⁸ is changing. According to the EPA, the average annual temperature over the last century has increased about 1.5°F, and the average annual temperature is projected to climb an additional 2.5°F to 8°F by the end of this century.

ES-6.1.2 Environmental Consequences

Project activities of the Ripsey Wash or the Hackberry Gulch TSF would create fugitive dust and gaseous emissions, primarily during the construction activities, but these emissions would be localized and are not expected to cause any impacts to the existing ambient air quality of the region. With the exceptions of a portable crushing facility that may be required for initial construction and localized windblown emissions from disturbed areas during windy days, emissions would primarily be from mobile sources (such as front-end loaders, off-highway trucks, bulldozers and various support vehicles).

Vehicles and construction equipment used for TSF activities would use diesel and gasoline, and the combustion of these fuels would create greenhouse gases. However, the greenhouse gas emissions generated from the Project would have a negligible effect on climate change.

ES-6.2 SOILS

ES-6.2.1 Existing Conditions

Soil characteristics in the area of the Ripsey Wash and Hackberry Gulch TSF are related to where they are developing, which involve fan terraces, hills/mountains and floodplains. Given the presence of coarse fragments and shallow depths, the suitability for the vast majority of the soils overlying the Ripsey Wash and Hackberry Gulch TSF sites is rated as “poor” for reclamation.

ES-6.2.2 Environmental Consequences

With the exception of soil materials beneath within the starter embankments of the Ripsey Wash or Hackberry Gulch TSF, which would be removed during construction and used for the construction of the starter dams, site soils would be buried by tailings and during the construction of various TSF support facilities, such as detention dams and diversion structures, seepage trenches, and reclaim ponds. As a result, the productivity of these soils, in terms of vegetation production, would be permanently lost.

Because soils within the proposed TSF sites are classified as “poor” quality as a source of “topsoil” for reclaiming disturbed sites, their loss would not have a major impact on post TSF closure and reclamation.

⁸ The Southwest is bordered by the Pacific Ocean to the west, the Rocky Mountains to the east, and Mexico to the south. It includes the state of Arizona.

ES-6.3 GEOLOGY AND GEOCHEMISTRY

ES-6.3.1 Existing Conditions

The Ripsey Wash TSF site is underlain by the Ruin granite formation, which is generally classified as quartz monzonite and consists primarily of coarse-grained, porphyritic granite and aplite porphyry. The Ruin granite has been intruded by numerous porphyry dikes of Laramide age. The Tertiary-age San Manuel formation lies unconformably over the Ruin granite and is a sequence of sedimentary rocks comprised of an upper member of massive, poorly-sorted boulder conglomerate and a lower member of well-defined tuffaceous sandstone. Erosion of bedrock surfaces has led to the development of pediment surfaces and deposits of alluvium and gravel within the area's drainages.

The Hackberry Gulch TSF site is underlain by the Big Dome Formation, which consists of gradational and inter-fingering conglomerate and tuff beds. Only isolated covers of Quaternary colluvium and alluvium are found in the area, primarily within the drainages that bisect the Hackberry Gulch TSF site.

The ore materials processed at the Ray Concentrator are and will continue to be comprised mainly of Diabase and Pinal Schist. The following geochemical tests were performed to characterize the tailings geochemistry (solids and liquids), along with the borrow materials to be used for the construction of TSF starter dams:

1. X-ray diffraction to identify tailings mineralogy;
2. Acid Base Accounting (ABA) to quantify acid neutralization potential (ANP) and acid generating potential (AGP);
3. Water quality analyses of existing tailings liquids and decant water from the Elder Gulch TSF;
4. Meteoric Water Mobility Procedure (MWMP) tests on tailings and borrow materials to assess potential leachate quality; and,
5. Humidity Cell Tests (HCT) to simulate weathering and to allow for prediction and characterization of potential leachate quality.

ES-6.3.2 Environmental Consequences

The rock material from which copper is extracted would become the tailings that would be deposited in either the Ripsey Wash or Hackberry Gulch TSF sites. This deposition would cover the existing geologic structure and lithology of the site, and result in permanent changes to the topography of the area.

The results of geochemistry characterization and testing on tailings and borrow materials reveal a low potential to impact groundwater or surface water, with the design and operational safeguards proposed for the TSF. Kinetic testing revealed a low potential for any acid generation from tailings materials and confirmed that alluvium material to be used for construction activities are not acid-generating. The meteoric water mobility testing on both tailings and alluvium material also revealed that possible dissolution and mobilization of minerals from these materials are low.

ES-6.4 SURFACE WATER HYDROLOGY

ES-6.4.1 Existing Conditions

The proposed Ripsey Wash and Hackberry Gulch TSF sites are located within the Basin and Range physiographic province of Arizona, which is characterized by few perennial streams and low rainfall.

The Gila River is the principal drainage in the region. It is tributary to the Colorado River and has its headwaters in New Mexico. The Gila River near the Ray Mine is confined in a channel with steep,

earthen banks generally composed of mixed gravel, cobble and rock. Bank stability is low, and sloughing is commonly observed. The drainage area of the Gila River at its confluence with the Colorado River is approximately 60,000 square miles.

The San Carlos Reservoir, located approximately 40 miles upstream of the Ray Mine, impounds the Gila River behind the Coolidge Dam, which is operated for SCIP to meet downstream water demands. Annual flows in the Gila River near the Ray Mine are extremely variable because of natural variability, withdrawals for irrigation, and water discharge regulation from the Coolidge Dam.

Surface drainages within both TSF sites are ephemeral and flow only in response to precipitation events. These ephemeral drainages are known locally as “dry washes.”

The Ripsey and Zelleweger washes, along with an unnamed wash designated Eastern Wash located to the east of Ripsey Wash, are the main tributary drainages to the Gila River at the Ripsey Wash TSF site. These washes are generally braided, sandy-bottomed channels interspersed with upland vegetation and cacti. The washes can carry heavy sediment loads downstream toward the Gila River. Tributaries to these washes tend to have relatively confined channels but form large, broad alluvial fan deposits at the confluences with the main channels.

At the Hackberry TSF site, Belgravia Wash, Hackberry Gulch, Kane Springs Canyon, and several unnamed ephemeral washes are tributary to the Gila River. These ephemeral drainages are smaller, steeper and more incised than the Ripsey and Zelleweger washes.

ES-6.4.2 Environmental Consequences

The construction and operation of the Ripsey Wash TSF would remove runoff potential from approximately 16% of the Ripsey Wash drainage basin and approximately 20% of the East Wash drainage basin. Similarly, the Hackberry Gulch TSF and supporting infrastructure would remove runoff potential from ten different ephemeral watersheds, ranging from 1.7% in the G Wash to 81.0% in B Wash. However, the overall runoff loss to the Gila River from either TSF would be negligible, amounting to about 0.018% of the Gila River watershed.

The TSF at either site would be operated as zero surface water discharge facility, with any direct precipitation and runoff captured in the tailings impoundment being pumped back to the Ray Concentrator for reuse. Seepage through the tailings themselves and the underlying alluvium material beneath the TSF would be captured by down-drainage seepage trenches and routed to lined reclaim ponds, where the water would be pumped back to the tailings impoundment or to the Ray Concentrator for reuse. As tailings consolidate over time during operations, the permeability of the tailings materials themselves are expected to decrease and lessen the amount of infiltration through the tailings. The seepage collection and pump-back systems will continue to operate at closure and following closure to prevent seepage from entering the Gila River.

ES-6.5 WATERS OF THE U.S.

ES-6.5.1 Existing Conditions

No perennial or intermittent waters were found to occur within the footprints of either the Ripsey Wash or Hackberry Gulch TSF sites. The Gila River is a perennial stream that occurs adjacent to both TSF sites, but neither TSF footprint extends into the river’s corridor.

No seeps or springs were found at the Ripsey Wash TSF site. No isolated open water or vegetated wetlands occur within Ripsey Wash where the TSF is proposed. The only wetlands in the vicinity of the Ripsey Wash TSF site are adjacent to the Gila River, but outside of the TSF footprint.

Five wetland areas (including one or more seeps at each wetland) are found within the boundaries of the Hackberry Gulch TSF site. The five wetland areas exhibit seasonal or perennial surface water saturation and support wetland vegetation. Wetlands are also present along the Gila River adjacent to, but not included within, the Hackberry Gulch TSF footprint.

ES-6.5.2 Environmental Consequences

The Ripsey Wash TSF alternative would result in the direct disturbance of approximately 130.91 acres of jurisdictional ephemeral drainages that would be filled, excavated, dewatered or subject to surficial disturbances resulting in the loss or significant modification of their form, functions and values.

Implementation of Hackberry Gulch TSF alternative would result in the direct disturbance through filling, excavation or various construction activities of approximately 71.50 acres of Waters of the U.S., which include ephemeral drainages and wetlands for which their form, functions and values would be lost or significantly modified. The wetlands that would be impacted under this alternative are classified as “special aquatic sites” under the 404(b)(1) guidelines (40 CFR Part 230).

ES-6.6 GROUNDWATER HYDROLOGY

ES-6.6.1 Existing Conditions

Groundwater at the TSF sites is limited but occurs in both bedrock and in Quaternary sediments.

The regional bedrock has varying degrees of groundwater and its flow direction generally mirrors topography, from the mountains to the valley floors and then down-drainage. There can be preferential flow locally along fracture and fault systems in the bedrock. Fracture systems are influenced by structural episodes of faulting and folding, which have sheared, foliated or lineated the bedrock.

Quaternary sediments are found along the Gila River and many of its main tributary watersheds. The unconsolidated Quaternary sediments are formed by a mixture of clays, silts, sands and gravels. These alluvial sediments are recharged by infiltration of precipitation, by flow losses from drainages, and by discharge from the bedrock groundwater systems. The regional surface and groundwater systems are interdependent, and, in general, groundwater contributes in some areas to the Gila River baseflow (gaining reach), while surface flow in the Gila River contributes to groundwater recharge (losing reach) in other areas. Seasonal variation in this interrelationship is common.

The Ripsey Wash TSF site is located in the Donnelly Wash Groundwater Basin, which is a small 293 square mile basin in the northwestern portion of the Southeastern Arizona Groundwater Planning Area.

The Hackberry Gulch TSF site is located in the northern portion of the Lower San Pedro Groundwater Basin, which is a 1,624 square mile basin on the western side of the Southeastern Arizona Groundwater Planning Area.

ES-6.6.2 Environmental Consequences

Construction and operation of either TSF site would temporarily increase recharge to the Quaternary deposits from the footprint area of the TSF. The down-gradient seepage trenches are designed and would be constructed to capture groundwater movement through the Quaternary deposits beneath the

TSF, and this water would be returned to the Ray Concentrator for reuse. This activity would eliminate recharge to the Gila River. The loss of recharge to the Gila River Quaternary deposits would be less than 0.02% of Gila River basin recharge.

Bedrock groundwater recharge from the TSF would be limited, given the relatively low hydraulic conductivities of bedrock.

At and following closure, infiltration into the underlying alluvium and bedrock would decrease because tailings slurry would no longer be applied to the top of the TSF; the tailings themselves have low permeability and over time would consolidate, further decreasing permeability; and some water would be entrapped within the tailings. Asarco will continue to operate its seepage collection and pump-back systems at and following closure to prevent seepage from entering the Gila River.

ES-6.7 LAND USE

ES-6.7.1 Existing Conditions

The dominant land use in the vicinity of the Ripsey Wash and Hackberry Gulch TSF sites is mining. Other land uses within the region, including the areas that would be disturbed by either the Ripsey Wash or the Hackberry Gulch TSF sites, are dispersed recreation, open space, residential use, agriculture (cattle grazing) and wildlife habitat.

Copper mining has occurred in this area since the 1880s, a period extending for over 130 years. Early mining in this area was completed by underground techniques; however, by 1955 all major underground mining had ceased in the area around the current Ray Mine. The Ray Mine, which is an existing open-pit copper mine, began operations in 1952 and has been the prominent mine in the area since that time.

Other than the Arizona Trail, there are no developed recreational facilities within the areas to be used for either TSF. However, there are dispersed outdoor recreational activities that include hunting, four-wheeling, mountain biking, hiking, picnicking, camping, horseback riding, rock-hounding, fishing, river floating and water play in the Gila River, and general sightseeing. There is an existing network of primitive roads in the region that provide access for dispersed recreational activities.

A mixture of federal, state and private lands occurs in this area. Asarco owns and controls much of the private lands within and adjacent to the existing Ray Mine. Surface ownership at the Ripsey Wash TSF site may change to Asarco with the proposed forthcoming sale (auction)⁹ of state lands at Ripsey Wash site and to Asarco from federal ownership at the Hackberry Gulch TSF site with pending Asarco-BLM land exchange.¹⁰

ES-6.7.2 Environmental Consequences

Although mining has historically occurred in this region, the construction and operation of a new TSF would introduce a noticeable land use change within the immediate area. On a more regional basis, a new TSF at the Ray Mine would not change overall land uses in Pinal County, although land uses

⁹ An auction occurred in August 2018, and Asarco appears to have been the successful bidder.

¹⁰ Since 1994, Asarco has been engaged with the BLM on the Ray Land Exchange, which would transfer BLM-managed land within and surrounding the Ray Mine to Asarco in exchange for other desirable lands that would be provided to the BLM by Asarco. This land exchange is separate and distinct from the Asarco permitting work for a new TSF, but a portion of the lands that would be used for a Hackberry Gulch TSF alternative are included in the proposed land exchange.

immediately adjacent to the disturbed areas could be impacted due to the sights of and noise created by the TSF construction and operation, as well as the possible loss of access to adjacent areas.

The construction and operation of TSF sites would cause permanent impacts to rangeland, wildlife habitat, and dispersed recreation on land uses within the footprint of the TSF. Available livestock forage would be lost in the grazing allotment areas that would be affected by the construction and operation of the TSF. Site access restrictions would occur during this time frame, primarily because of land ownership patterns; it is expected that only sparse vegetation would reemerge on the area where tailings are placed, and not to the conditions that currently exist. The closed tailings site would never have the species composition or density of vegetation that exists today.

With the construction and operation of the Ripsey Wash TSF, a 6.8-mile segment of the existing Arizona Trail would be lost, but plans have been made to replace this segment of trail with a 6.4-mile segment to the east of the proposed Ripsey Wash TSF site. The existing trailhead on the Florence-Kelvin highway would also be replaced with a new trailhead near the intersection of Riverside Road and the Florence-Kelvin highway.

ES-6.8 NOISE

ES-6.8.1 Existing Conditions

Both TSF sites are located in relatively unpopulated and remote areas. Background noise levels range from near 30 dBA to approximately 80 dBA, depending on road traffic, wind, and wildlife activity (birds singing).

In general, the Ripsey Wash TSF site would be relatively quiet, typical of undeveloped rural and back country areas, with periodic noise from wind and/or thunderstorm activity being the principal sound sources. Traffic along the Florence-Kelvin highway would generate periodic noise. There could also be localized noise from off-highway vehicles (OHVs) using the two-track roads in the area, from the occasional over flight by jet aircraft and from train noise generated by the Copper Basin Railroad that operates north of the site.

The proposed Hackberry Gulch TSF site is located adjacent to the existing Ray Mine and the Elder Gulch TSF, as well as being directly adjacent to State Route 177. Portions of the proposed Hackberry Gulch TSF would be located on either side of this highway. There are permanently occupied residences and human receptors in the communities of Riverside and Kelvin, which are within approximately one mile of the proposed Hackberry Gulch TSF site. Current noise at the site is principally associated with traffic on State Route 177, as operations at the Elder Gulch TSF principally involve electric pump stations and minor equipment. Other noise would include train noise from the Copper Basin Railroad that operates to the west of the proposed Hackberry Gulch TSF. This site, like the proposed Ripsey Wash TSF site, would also be subjected to noise from wind and thunderstorm activity.

ES-6.8.2 Environmental Consequences

Noise impacts associated with either TSF would be short-term and primarily occur during early site development and construction activities, an estimated three-year period that would include road building, starter dam construction, seepage trench installation, detention dam and diversion ditch construction, and miscellaneous pipeline and utility installation. The noise would affect the recreational setting, with a shift from predominantly natural sounds to industrial noise.

Expected noise levels for construction is expected to peak at approximately 85 to 90 dBA at 50 feet; this noise level corresponds to the type of equipment to be used for this activity. Noise levels should attenuate to near background noise levels within a mile of project work; this would depend on the topography, time of day, wind conditions, and the level of ambient noise at the location of the listener.

Some blasting may be necessary during construction work, and this would only occur during daylight hours. It is assumed that typical surface-delay blasting methods would be used. Blasting would generate a single noise that would probably be heard several miles from the blast site. The blast noise would be similar to that from thunder or a sonic boom.

With the Ripsey Wash TSF, recreationists and hikers using the re-aligned Arizona Trail would be exposed to some increased noise levels, in particular during the construction of the detention dam up-drainage of the Ripsey Wash TSF, the diversion channel structure on the east side of the proposed TSF and from highway noise from the realigned Florence Kelvin highway.

The nearest residence to the Hackberry Gulch TSF site is about 1,200 feet away. The communities of Riverside and Kelvin are less than a half mile from the lower portions of the Hackberry Gulch TSF site. Residents of Riverside and Kelvin would be subject, during daylight hours, to construction noise that could reach 30 dBA over background levels.

ES-6.9 RECREATION

ES-6.9.1 Existing Conditions

The Ripsey Wash TSF project area currently offers a primarily semi-primitive motorized recreation setting south of the Gila River and a semi-primitive non-motorized setting north of the river. Although portions of the Hackberry Gulch TSF project area are considered a roaded modified setting due to the existing mine operations, the remaining area provides primarily semi-primitive motorized recreation opportunities.

The recreation opportunities within and immediately adjacent to the TSF sites are dispersed in nature. The one exception is the Arizona Trail, a portion of which is located within the eastern section of the proposed Ripsey Wash TSF site.

Dispersed recreational activities include hunting, hiking, camping, mountain biking, scenic driving, wildlife-viewing, OHV use, fishing, and rock collecting. Areas that support recreation in the region range from very primitive backcountry lands to developed facilities, including BLM designated wilderness areas, Arizona Game and Fish Department (AGFD) Game Management Units, Forest Service designated campgrounds and picnic areas, hiking trails, and off-highway vehicle (OHV) routes. Many of the larger communities in the region provide more formal recreation opportunities, such as parks, ball fields, golf courses, rodeo arenas and fairgrounds.

ES-6.9.2 Environmental Consequences

Dispersed recreational opportunities such as OHV riding, camping and hunting would be affected by the construction and operation of either the Ripsey Wash or Hackberry Gulch TSF.

Under the Ripsey Wash TSF, the Arizona Trail would be lost within and immediately adjacent to the TSF footprint. Relocation of the Arizona Trail would require replacing approximately 6.8 miles of existing trail with about 6.4 miles of new trail construction primarily along the eastern slopes of the Tortilla Mountains and about 0.2 miles of shared use along Riverside Drive. The Arizona Trail experience on the realigned trail, as well as the passage north of the Gila River, would be affected over the short term

(approximately three years) by noise and visual effects from construction of the Ripsey Wash TSF, associated facilities and the realigned Florence Kelvin highway. After construction, trail users would continue to experience visual impacts from the TSF and realigned highway, as well as some traffic noise.

Approximately 10.2 miles of OHV trails and several dispersed campsites would be eliminated with the Ripsey Wash TSF, and approximately 4.9 miles of primitive roads and several dispersed campsites would be eliminated within the Hackberry Gulch TSF footprint, primarily the Old Kelvin road. The Old Ray road is located adjacent to the Hackberry Gulch TSF may also need to be closed once the TSF operation reaches its full extent; closure of the Old Ray road would eliminate access to the abandoned Grey Horse Mine, a popular OHV destination and rock hounding attraction.

ES-6.10 CULTURAL RESOURCES

ES-6.10.1 Existing Conditions

The Corps established a permit area for the proposed Ripsey Wash TSF alternative that identifies a physical area for evaluation of direct and indirect effects to historic properties.

Thirty-seven archaeological sites have been recorded within the Ripsey Wash permit area that would be directly affected by the construction and operation of the TSF facilities. Twenty-two of these sites are considered eligible for listing on the National Register of Historic Places (NRHP), while the others are not considered eligible.

A formal permit area was not established for the Hackberry Gulch TSF alternative; however, an analysis area was developed that included the footprint for this TSF and all supporting infrastructure.

Approximately 57% of the Hackberry Gulch TSF analysis area has been previously inventoried. Within this area, 85 sites were recorded. Six of those sites were determined to be NRHP-eligible by the SHPO, and an additional 25 were recommended as eligible. The SHPO determined that two sites are not eligible, and an additional 14 sites were recommended as ineligible. Seven sites were not evaluated for eligibility, and 31 of these sites did not have their eligibility status recorded.

The Corps also initiated tribal consultation with 14 Native American tribes in September of 2013, requesting their participation in the Section 106 consultation process. The tribes were provided the opportunity to review and comment on cultural resources documentation that had been completed to date. The Corps received replies from four tribes expressing an interest in participating with the consultation process: Gila River Indian Community, Tohono O'odham Nation, Hopi Tribe, and White Mountain Apache Tribe. Tribal consultation will be ongoing as the project progresses through the 404 permit review process.

ES-6.10.2 Environmental Consequences

There are 22 NRHP-eligible sites located within the Ripsey Wash TSF permit area, and one site (the Florence-Kelvin highway bridge, known locally as the Kelvin Bridge) is already on the NRHP (Kelvin Bridge). Implementation of the Ripsey Wash TSF would adversely affect the NRHP-eligible sites located within the footprint for the TSF, but the Kelvin Bridge would not be affected by the project.

Based on the number of resources previously recorded in the Hackberry Gulch TSF analysis area, it is reasonable to expect that additional sites would be potentially impacted by the construction and operation of the Hackberry Gulch TSF. Additional surveys, eligibility determinations, testing, data recovery, and consultation with the SHPO and tribes would be required if this alternative were implemented. Construction and operation of the Hackberry Gulch TSF alternative would have an

adverse direct effect on an unknown number of NRHP-eligible properties. The adverse effects to these sites would result because they would be located within the construction footprint for the TSF and related facilities. This would cause an unavoidable effect of tailings disposal or excavation during construction of the facility. Mitigation would probably be required to minimize an adverse effect. Even after the footprint of the Hackberry Gulch TSF site is fully surveyed and historic properties documented, the potential would exist for the discovery of previously unknown resources during construction and operation. To address this contingency, mitigation would be required.

ES-6.11 SOCIOECONOMICS

ES-6.11.1 Existing Conditions

The proposed Ripsey Wash and Hackberry Gulch TSF sites are located in Pinal County.

The eastern part of Pinal County has a long history with copper mining, milling and smelting. Most households in eastern Pinal County identify with making a living from the copper industry, and these communities continue to obtain economic benefits from the high wage jobs associated with the copper mining, milling and smelting business.

As of 2010 census, the population of Pinal County was 375,770 people, making it the third most populous county in Arizona. For the period between 2000 and 2016, Pinal County population increased by nearly 120%. The majority of this population increase was located in the western portion of the county and resulted from suburban growth from the greater Phoenix area; however, over that same period, the populations of the communities of Kearny, Superior, Hayden and Winkelman have decreased.

The percentage of the population over 16 not in the labor force is higher in Kearny, Superior, Gold Canyon, Hayden and Winkelman than that for the state of Arizona (38.6% not in the labor force). Statewide unemployment rate is around 6%. Kearny has an unemployment rate less than 3%.

Kearny has median household income similar to the entire state, while Gold Canyon has a higher income and Superior, Hayden and Winkelman have lower median household incomes than the state average. Median earnings for individuals employed in mining have the highest for any reported earnings category.

ES-6.11.2 Environmental Consequences

The construction of a new TSF is estimated to provide up to 200 jobs to the Pinal County workforce during the estimated three years of construction activity, but employment levels would return to current levels once TSF operations commence, as the new TSF is simply designed to replace the current Elder Gulch TSF and would be operated with the current on-site workforce.

Construction jobs would have a negligible effect on the population of Kearny and other local communities because of the temporary duration of construction and because most of the expected construction workers are assumed to already live in Pinal County. Given the temporary nature of the construction work, any individuals who are presently living outside of the region would probably not uproot themselves or their families to move to Kearny for the short duration of the construction activity.

The construction and operation of the Ripsey Wash or Hackberry Gulch TSF would not have a measurable effect on the community and public services of Kearny and other Pinal County communities. No permanent increase in local population is expected as a result of the proposed TSF; thus, there would

be no influx of families, causing an increase in students for the local school systems. The existing law enforcement and fire protection personnel would continue to handle situations that arise.

ES-6.12 TRANSPORTATION

ES-6.12.1 Existing Conditions

The main highways within the region used by Asarco employees, contractors and suppliers are U.S. Highway 60, Arizona State Route 177, and the Florence-Kelvin highway.

U.S. Highway 60 is the main artery that connects the Apache Junction and Phoenix metro area with points east, including the towns of Superior and Globe.

SR 177 is a two-lane asphalt highway that connects Superior and Winkelman (about 32 miles). The Ray Mine complex is accessed from SR 177.

The Florence-Kelvin highway is a 32-mile two-lane Pinal County road that connects SR 179 (about three miles south of the town of Florence) with SR 177 near the Ray Mine. For approximately 16 miles east of SR 179, the Florence-Kelvin highway is paved with asphalt, but the remaining 16 miles is unpaved, including the portion that crosses Ripsey Wash.

ES-6.12.2 Environmental Consequences

Under either TSF action alternative, overall average daily traffic (ADT) levels on SR 177 would increase by approximately 5% during peak construction, which includes an approximate 15% ADT increase in the truck volume.

As one of the first aspects of Ripsey Wash TSF construction, Asarco would construct a new routing (approximately 1.4 miles in length) of the Florence-Kelvin highway to the north and northeast of the TSF. This new road segment would be paved with asphalt, meet required Pinal County road standards, and replace an approximate 1.8 mile long segment of the current Florence-Kelvin highway. This would reroute traffic away from Ripsey Wash TSF construction and greatly improve the condition of the Florence Kelvin highway.

During construction of the TSF tailings and return water pipelines, there could be minor delays to the local residences on Riverside Road and Centurion Lane.

Construction of the Hackberry Gulch TSF would impact traffic flow on SR 177 for an estimated 9 to 12 months with the installation of box culverts and a maintenance vehicle underpass. This construction work would necessitate speed limit reductions and traffic detours. In addition, given the proximity of SR 177 to the proposed Hackberry Gulch TSF work, traffic would be periodically stopped for certain construction activities, including blasting. These traffic delays could impact employees and contractors who commute on SR 177 from Kearny, Hayden and Winkelman, as well as non-Ray Mine traffic on SR 177, which includes local residents.

ES-6.13 VEGETATION

ES-6.13.1 Existing Conditions

The upland vegetation communities at both the Ripsey Wash TSF and the Hackberry Gulch TSF sites are characteristic of the Paloverde-Cacti-Mixed Shrub series of the Arizona Upland Subdivision of the Sonoran Deserts scrub.

ES-6.13.2 Environmental Consequences

The vegetation resources at either TSF site would be removed from the base of the impoundment dams and adjunct facilities (access roads, pump stations, etc.), and there would be an incremental burial of vegetation communities with tailings disposal. Portions of the vegetation communities subject to eventual burial may remain viable until the entire TSF floor is covered with tailings. Final reclamation would involve covering the tailings area with rock. Although the area might naturally revegetate to some degree, the site would not recover to the vegetative composition or density that currently exists.

ES-6.14 VISUAL RESOURCES

ES-6.14.1 Existing Conditions

The TSF project areas are located on the eastern edge of the Sonoran Desert subdivision of the Basin and Range Physiographic Province, which is characterized by its elongated, roughly parallel mountain ranges alternating with flat, closed (undrained) desert basins. The mountain ranges generally trend north-south and can be up to 100 miles in length. Typical landforms include creosote flats, bajada slopes, rugged mountains and steep walled canyons. Prominent landscape features in the region include the Pinal Mountains, Mineral Mountains, Dripping Springs Mountains, Tortilla Mountains, White Canyon, the Rincon and Copper Butte.

The Ripsey Wash TSF project area is primarily rural in character, with a generally natural, intact landscape, providing moderate to high visual resource values. The existing Florence-Kelvin highway is the primary modification within the project area, although the Ray Mine is visible in the distance from portions of the area. Visual resource values of the Hackberry Gulch TSF project area would be considered relatively low. Although surrounded by a largely natural landscape and the dramatic rise of the Dripping Springs Mountains to the east, views within this area are dominated by the existing Ray Mine and Elder Gulch TSF, visible for about five miles along SR 177.

Visual sensitivity is considered moderate to high within the Ripsey project area due to the extensive views of the area from the Arizona Trail. Sensitivity level of the Hackberry Gulch TSF site is considered moderate due to the presence of SR 177, designated as an Arizona Scenic Highway, and its visibility from nearby communities. Both alternative sites are located within the foreground-middleground distance zone of SR 177, Florence-Kelvin highway, the Arizona Trail, and local OHV routes.

ES-6.14.2 Environmental Consequences

The Ripsey Wash TSF would result in large scale, long term changes in the landscape that would create strong visual contrasts and cause major and highly noticeable changes to the area's existing character. The Hackberry Gulch TSF would also cause long term changes in the landscape, but the project would be expanding the extent of the existing adjacent modifications, which have already created major visual contrasts in the landscape.

The Ripsey Wash and the Hackberry TSF projects would be visible from portions of the Florence-Kelvin highway, SR 177, the Arizona Trail, and OHV routes in the vicinity of the TSF site. The Ripsey Wash TSF would be visible within the foreground/middleground to travelers on the Florence-Kelvin highway for a total distance of about 5.4 miles and to travelers on SR 177 for a distance of about 1.7 miles. The Ripsey Wash TSF would also be visible to Arizona Trail users (after realignment of the Florence-Kelvin highway) for a distance of approximately 7.8 miles, most of which would be located within the foreground/middleground view. The majority of these views (about 5.4 miles) would occur along the Arizona Trail's Gila River passage, located north of the river.

The realigned Florence-Kelvin highway proposed for the Ripsey Wash TSF alternative would be visible from about 8.1 miles of the Arizona Trail, all of which would be foreground/middleground views. About 5.7 miles of these highway views would be from the Gila River Canyons Passage. The highway's visual effects would result partly from the planned paving of approximately 3 miles of the existing highway and partly from the cuts and fills required for the realigned highway. The Ripsey Wash TSF alternative would result in 7.8 new miles of trail affected by views of mine facilities, in addition to the 6.0 miles of trail with views of the existing Ray Mine, totalling 13.8 miles with views of the existing or proposed facilities.

The Ripsey Wash TSF would also be visible from some of the high-elevation OHV trails east of SR 177 and some of the lower elevation OHV trails along the Florence-Kelvin highway. The Ripsey Wash TSF would also be visible in the background view from the White Canyon Wilderness Area, but views of the TSF site from the wilderness would be from relatively inaccessible areas with rugged and steep terrain that are expected to have limited public visitation.

The Hackberry Gulch TSF would be visible within the foreground/middleground view to travelers on SR 177 for a total distance of about 7.8 miles and to travelers on the Florence-Kelvin highway for approximately 3.1 miles. Under this alternative, the existing Arizona Trail would remain in place, but the Hackberry Gulch TSF would be visible in the foreground/middleground from about 4.6 miles of the Arizona Trail. The majority of these miles (approximately 3.3 miles) would be within the Tortilla Mountains Passage, south of the Gila River. The Hackberry Gulch TSF alternative would result in 1.7 new miles of trail affected by views of mine facilities, in addition to the 5.6 miles of trail with views of the existing Ray Mine, totalling 7.3 miles with views of the existing or proposed facilities.

The community of Riverside would have a permanent panoramic view of the Hackberry Gulch TSF site, but views from the community of Kelvin would be mostly screened by vegetation. Views of the Hackberry Gulch TSF from Kearney would be relatively limited and distant (over three miles away).

ES-6.15 WILDLIFE

ES-6.15.1 Existing Conditions

The topography, vegetation and water sources within the Ripsey Wash and Hackberry Gulch TSF sites create a diversity of habitats and habitat features that support a variety of terrestrial wildlife species.

Mammal game species potentially residing in or near the two TSF sites include: collared peccary or javelina, mule deer and mountain lion.

A variety of mammalian predators and furbearers are likely to inhabit the two TSF sites, including coyote, gray fox, bobcat, hooded skunk, western spotted skunk, striped skunk, raccoon, ringtail, white-nosed coati, and American beaver. Other mammal species expected to inhabit area include the rock squirrel, Harris antelope squirrel, white-throated woodrat, desert cottontail and black-tailed jackrabbit.

Several species of raptors are known to occur in the region of the two TSF sites. Most are present as year-round residents, but a few species, the zone-tailed hawk and elf owl, are present only as summer residents. Turkey vulture occurs as both a summer and year-round resident. Other possible year-round residents include prairie falcon, American peregrine falcon, Harris's hawk, red-tailed hawk, golden eagle, barn owl, great horned owl, and western screech owl. Cooper's hawk and sharp-shinned hawk are most likely present as winter residents.

Waterbirds include ducks, geese, wading birds, sandpipers, and other species dependent on aquatic habitats and associated shorelines and wetlands. Suitable habitat for waterbirds within the area of the two TSF sites is restricted primarily to the Gila River.

Upland gamebirds include the Gambel's quail, mourning dove, and white-winged dove. A number of songbird and other bird species associated with Sonoran Desertsrub communities may occur within the two TSF areas; these include greater roadrunner, gila woodpecker, common raven, canyon wren, rock wren, cactus wren, curve-billed thrasher, phainopepla, black-throated sparrow, northern cardinal and pyrrhuloxia.

Reptile occurrences would be similar for the two TSF sites and include zebra-tailed lizard, ornate tree lizard, regal horned lizard, reticulate Gila monster and western diamondback rattlesnake.

Two federally listed species were identified as having the potential to occur within or near the TSF sites; they are the southwestern willow flycatcher (endangered), and the western distinct population segment of yellow-billed cuckoo (threatened).

ES-6.15.2 Environmental Consequences

General effects on wildlife for either the Ripsey Wash TSF or the Hackberry Gulch TSF would be the physical loss of habitat, habitat fragmentation and isolation displacement of wildlife, increased competition for offsite resources, impacts to special wildlife habitats, and impacts to threatened, endangered and sensitive species.

Construction and operations of the TSF would result in permanent loss of habitat. Direct impacts to wildlife habitats would occur from grading for infrastructure, removal of borrow material, and the progressive burial of vegetation and wildlife habitat features by tailings disposal. Habitat loss through tailings deposition would occur incrementally over the life of the facility within the tailings impoundment. Because of this incremental loss, portions of wildlife habitats subject to eventual burial by tailings may remain viable to some extent as the TSF footprint is progressively covered with tailings.

The most common wildlife responses to noise and human presence are avoidance and accommodation. Displacement is unavoidable in the short-term and long-term under both TSF alternatives, and this displacement, in combination with habitat loss, has the potential to be the most significant effect on wildlife. Avoidance of disturbed areas would result in wildlife displacement from an area larger than the actual disturbed sites. The extent of this displacement would be related to the duration, magnitude and the visual prominence of the activity, as well as the extent of construction and operational noise levels above existing background levels.

Some segments of the Gila River and adjacent riparian habitat are close enough to the TSF facility to create indirect impacts during construction and operation on wildlife populations using the Gila River corridor, including the southwestern willow flycatcher (endangered) and the yellow-billed cuckoo (threatened), but such indirect impacts are expected to be minor.

ES-7.0 COMPARISON OF ALTERNATIVES

Table ES-4, Summary of Effects by Alternative, summarizes the effects of alternatives. The intensity of the impact is based on how the alternative would affect each resource. General terms used to describe impact intensity in this table are:

- **None** – No impact
- **Negligible** – An impact at the lowest levels of detection with barely measurable consequences.

- **Minor** – An impact with little loss of resource integrity and with changes that are small, localized, and of little consequence.
- **Moderate** – An impact that would alter the resource but not modify overall resource integrity, or an impact that could be mitigated successfully in the short term.
- **Major** – An impact that would be substantial, highly noticeable, and long term.

Table ES-4, Summary of Effects by Alternative

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Aesthetics and Visual Resources			
Visual effects for residents of Kearny, Kelvin and Riverside	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	None - View of TSF blocked by Tortilla Mountains.	Major - View of TSF would be a permanent feature for residences.
Visual effects for travelers on State Route 177	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor – visible in middleground for about 1.7 miles along this highway.	Major – permanent foreground and middleground view for 7.8 miles.
Visual effects for travelers on the Florence-Kelvin highway	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Major - permanent foreground and middleground view for 5.4 miles.	Major - permanent foreground and middleground view for 3.1 miles.
Visual effects for recreational users in the area, particularly those on the Arizona Trail	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Major - permanent and middleground view for about 7.6 miles north of Gila River.	Major - permanent foreground and middleground view for 4.6 miles.
Air Quality and Climate			
Compliance with federal and Pinal County air quality standards	Not applicable – proposed tailings facilities would not be constructed.	Compliance expected.	Compliance expected. More total emissions than Ripsey Wash TSF.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Air Quality and Climate			
Fugitive dust emissions (Construction)			
Annual Average for 3 Years	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	90 tons/year	64 tons/year
PM ₁₀		7 tons/year	6 tons/year
PM _{2.5}		Yr. 1 – 85 tons/year	Yr. 1 – 18 tons/year
Construction PM ₁₀ by year		Yr. 2 – 94 tons/year	Yr. 2 – 98 tons/year
		Yr. 3 – 92 tons/year	Yr. 3 – 76 tons/year
Fugitive dust emissions (Centerline Tailings Operations)	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.		
Annual Average for PM ₁₀		12.0 tons/year	20 tons/year
PM _{2.5}		2.0 tons/year	3 tons/year
Fugitive dust emissions (Upstream Tailings Operations)	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.		
Annual Average for PM ₁₀		16 tons/year	18 tons/year
PM _{2.5}		2 tons/year	3 tons/year
Gaseous emissions (Initial Development and Site Construction)			
Annual Average for 3 Years	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	18 tons/year	18 tons/year
NO _x		3 tons/year	3 tons/year
VOC		39 tons/year	28 tons/year
CO		<0.1 tons/year	<0.1 tons/year
SO ₂		2,978 tons/year	1,939 tons/year
CO ₂		<0.1 tons/year	<0.1 tons/year
CH ₄		<0.1 tons/year	<0.1 tons/year
N ₂ O		<0.1 tons/year	<0.1 tons/year

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Air Quality and Climate			
Gaseous emissions (Centerline Tailings Operations)			
Annual Average for 3 Years	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	<1 tons/year	0.3 tons/year
NO _x		<1 tons/year	0.1 tons/year
VOC		3 tons/year	2 tons/year
CO		<1 tons/year	4 tons/year
SO ₂		168 tons/year	183 tons/year
CO ₂		<0.1 tons/year	<0.1 tons/year
CH ₄		<0.1 tons/year	<0.1 tons/year
N ₂ O		<0.1 tons/year	<0.1 tons/year
Gaseous emissions (Upstream Tailings Operations)			
Annual Average for 3 Years	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	<1 tons/year	0.3 tons/year
NO _x		<1 tons/year	0.1 tons/year
VOC		3 tons/year	2 tons/year
CO		<1 tons/year	4 tons/year
SO ₂		168 tons/year	183 tons/year
CO ₂		<0.1 tons/year	<0.1 tons/year
CH ₄		<0.1 tons/year	<0.1 tons/year
N ₂ O		<0.1 tons/year	<0.1 tons/year
Windblown emissions to residents of Kelvin and Riverside	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible because TSF blocked from these communities by Tortilla Mountains	Moderate to Major, especially during windy days.
Visibility effects to any Class I areas in the vicinity of project	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible. Closest Class I area is Superstition Mountains Wilderness area located about 12 miles from TSF site.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Air Quality and Climate			
Climate change effects	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible TSF CO ₂ emissions represent 0.00001% of worldwide CO ₂ levels	Negligible TSF CO ₂ emissions represent 0.00001% of worldwide CO ₂ levels
Cultural and Historic Resources			
Effects to pre-historic and historic properties listed or eligible for listing on the National Register of Historic Places	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Direct effect to 20 NRHP-eligible sites to be disturbed	Unknown. Only 57% of tailings footprint surveyed for cultural resources. In that 57% surveyed area, 31 NRHP-eligible or recommended as being eligible by SHPO.
Potential to affect cultural resources, reserved rights, trust issues, traditional cultural properties, and other responsibilities of Native American tribes	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Unknown. Pending Native American consultation.	Same as Proposed Action.
Geochemistry			
Potential for tailings and construction borrow materials to generate acid rock drainage	None – proposed TSF would not be constructed.	Negligible – geochemical testing, including Meteoric Water Mobility Procedure Testing and 52-week Humidity Cell Testing revealed no acid rock drainage.	Same as Proposed Action.
Potential to leach metals from tailings	None – proposed TSF would not be constructed.	Negligible – geochemical testing, including Meteoric Water Mobility Procedure Testing and 52-week Humidity Cell Testing revealed no acid rock drainage.	Same as Proposed Action.
Geotechnical			
Potential for TSF failure	Not applicable – proposed tailings facilities would not be constructed.	Negligible with proper design, construction and operation.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Geotechnical			
Engineering Design and Construction Complexity	Not applicable – proposed tailings facilities would not be constructed.	“Valley-fill” placement of tailings allows for limited seepage control facilities. Ample space is available for installation of support infrastructure, such as seepage trenches and reclaim ponds.	Seepage control required in seven incised drainages – difficult to install and maintain. Need to install overpass and box culverts on State Route 177, with facilities on both sides of highway. Down-gradient reclaim ponds in incised drainages and limited room between these facilities and Gila River. Complex up-gradient diversion and detention dam infrastructure in steep topography. Major engineering logistics associated with working on either side of State Route 177.
Surface Water Hydrology and Watershed Resources			
Alteration of existing hydrologic systems by direct disturbance	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Remove 16% of runoff potential from Ripsey Wash and 20% of runoff potential from East Wash.	Loss of runoff potential from following drainages at Hackberry Gulch TSF site: Hackberry Gulch: 24.1% Kane Springs Canyon: 15.0% Belgravia Wash: 46.0% B Wash: 81.0% C Wash: 74.0% E Wash: 47.3% F Wash: 10.0% G Wash: 1.7% H Wash: 3.3%
Potential for increased down-drainage sediment levels	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor with proper controls, except if intense rainstorms that exceed design storm event used for control measures.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Surface Water Hydrology and Watershed Resources			
Alteration of downstream flow rates and any changes in the downstream water chemistry in the Gila River	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible. TSF footprint about 0.018% of Gila River watershed at confluence of Zelleweger Wash (immediately down-drainage of TSF).	Negligible. TSF footprint about 0.02% of Gila River watershed at USGS Kelvin gaging station (immediately down-drainage of TSF).
Impacts on existing surface water rights or uses	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible-Minor. No known springs or seeps in TSF footprint. Five stock watering tanks to be affected, but these tanks would be located on Asarco lands if ASLD sale is consummated.	Major. TSF would cover two springs, eleven seeps, two wetland areas, and one stock watering tank.
Waters of the U.S.			
Direct impacts to Waters of the U.S. (acres)	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	130.91 acres	71.50 acres
Wetland		0 acres	0.62 acres
Perennial/Intermittent		0 acres	1.65 acres
Ephemeral		130.91 acres	69.23 acres
Indirect impacts to Waters of the U.S. (acres)	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	3.74 acres	19.80 acres
Impact to Linear Feet of waters of the U.S.	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	168,490 feet	228,325 feet
Total Linear Impact to waters of the U.S. within Watersheds.		1.7%	2.3%
Potential changes in the functions and values of down-drainage wetlands and waters of the U.S. along Gila River.	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Unlikely to change functions and values of down-drainage wetlands and waters of the U.S. along Gila River. TSF footprint about 0.02% of Gila River watershed at confluence of Zelleweger Wash (immediately down-drainage of TSF).	Same as Proposed Action. TSF footprint about 0.02% of Gila River watershed at USGS Kelvin gaging station (immediately down-drainage of TSF).

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Groundwater Hydrology			
Potential to alter existing down-gradient groundwater hydrologic systems by tailings disposal	None – proposed tailings facilities would not be constructed.	Negligible with proper design, construction and operation.	Negligible with proper design, construction and operation.
Changes in down-gradient alluvial or bedrock groundwater chemistry from tailings disposal	None – proposed tailings facilities would not be constructed.	Minor with proper design, construction and operation. Modeling indicates down-gradient compliance with Arizona Aquifer Water Quality Standards.	Minor with proper design, construction and operation. Down-gradient compliance with Arizona Aquifer Water Quality Standards is expected.
Effectiveness of Seepage Control	Not applicable – proposed tailings facilities would not be constructed.	Good given “valley-fill” nature of TSF. Two seepage control points down-gradient (Ripsey Wash and East Wash) keyed to low-permeability Ruin Granite formation. Control of seepage expected with design safeguards for Hackberry Fault.	Difficult given “side-hill” construction and incised nature of seven drainages where seepage control would be implemented.
Impacts on existing groundwater wells registered with Arizona Department of Water Resources	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor as most wells owned or controlled by Asarco. 13 wells to be eliminated within TSF footprint. 18 wells located down-gradient (within 0.5 miles). Most wells for Asarco exploration or for baseline monitoring purposes.	Major as many wells <u>not</u> controlled by Asarco. 19 wells to be eliminated within TSF footprint. 23 wells located down-gradient (within 0.5 miles). Possible impact to 7 private (non-Asarco) down-gradient wells.
Land Use			
Total operational disturbance area (acres)	None – proposed tailings facilities would not be constructed.	2,636 acres	2,290 acres
Total operational disturbance by ownership (acres/%)			
Private	None – proposed tailings facilities would not be constructed.	54 acres / 2.1%	1,141 acres / 49.8%
State		2,573 acres / 97.6%	0 acres / 0%
BLM		9 acres / 0.3%	1,149 acres / 50.2%

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Land Use			
Effects on livestock grazing in the area	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor to grazing allotments. Remove land from following allotments: <u>A Diamond</u> : 2,426 acres or about 11.5% of allotment; and <u>Rafter Six</u> : 149 acres - about 0.06% of allotment.	Minor to grazing allotments. Remove land from following allotments: <u>Rafter Six</u> : 2,267 acres or about 8.4% of allotment; and <u>Troy</u> : 23 acres or about 0.04% of allotment.
Changes in future (post-project) land use	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Irreversible from present condition. Tailings would be covered with rock so substantial lower value for wildlife use and dispersed recreation values.	Same as Proposed Action.
Noise			
Construction Noise Effects	None – proposed tailings facilities would not be constructed.	Minor to residents of Kelvin and Riverside that are over one mile from proposed TSF site. Noise would be blocked by Tortilla Mountains, but some noise during construction of pipeline, pumping station, and supply trucks. Closest residence = 2,000 feet (Noise blocked by Tortilla Mtns.)	Moderate to major to residents of Kelvin and Riverside, as some residents within 0.25 mile of construction activities. Persistent daylight noise levels could increase up to 30 dBA over background noise levels for up to three years. Closest residence = 500 feet (noise <u>not</u> blocked)
Operation Noise Effects	None – proposed tailings facilities would not be constructed.	Negligible to residents of Kelvin and Riverside.	Minor to moderate to residents of Kelvin and Riverside.
Noise effects on wildlife	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor to moderate. Some displacement expected during construction activities. Construction of pipeline bridge could affect species along Gila River.	Minor to moderate. Some displacement expected during construction activities.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Noise			
Noise effects on recreational users, especially on ARIZONA TRAIL	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Moderate during construction and closure. Minor during operations. During construction, hikers on Arizona Trail would be exposed to some noise during construction of Ripsey Wash detention dam and East Wash diversion channel. During closure, noise associated with rock placement over tailings.	Negligible. Limited construction or operational noise to hikers on Arizona Trail.
Noise effects to worker health and safety	Not applicable – proposed tailings facilities would not be constructed.	Negligible with appropriate hearing protection.	Same as Proposed Action.
Accidents and Spills			
Potential of possibility of accident that would necessitate an emergency response	None – proposed tailings facilities would not be constructed.	The probability of accidents always exists, but incident level is expected to be minor given safety awareness and safety precaution measures.	Same as Proposed Action.
Potential for an accidental spill of tailings or other substances that could impact the environment, especially to the Gila River.	None – proposed tailings facilities would not be constructed.	Minor. Double tailings pipeline across Gila River planned, and tailings drain-down pond will be in place in event of problem or maintenance. Spill control contingency plans required by APP by Arizona DEQ in place to handle accidents and spills.	Same as Proposed Action.
Recreation			
Changes to the recreation setting.	Negligible. Character of the recreation setting would continue to gradually change over time as land uses change.	Major – TSF would dominate the view, altering the setting of most of the area from Semi-primitive Motorized with a primarily natural character to Roaded Modified setting with a more industrial character.	Moderate – TSF would dominate the view, but the character is already visually dominated by the existing mine facilities. The existing Roaded Modified setting would be expanded.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Recreation			
Disruption to developed recreational facilities, such as the Arizona Trail	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Moderate - Direct impact to Arizona Trail which must be relocated. Existing Arizona Trail to be replaced: 6.8 miles. New construction of Arizona Trail: 6.4 miles. Length of new Arizona Trail with views of Ripsey Wash TSF: 1.2 miles. No other developed recreation facilities in proposed Ripsey Wash TSF footprint.	None - no disturbance to Arizona Trail. No developed recreation facilities in proposed Hackberry Gulch TSF footprint.
Disruption to undeveloped or dispersed recreation opportunities, such as off-road recreation and hunting.	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor to Moderate. Off-road recreationists would no longer be able to travel in Ripsey Wash where covered by TSF footprint. Displacement of hunting to areas outside of TSF footprint. Primitive road access would remain available in upper reaches of Ripsey Wash drainage area including lands acquired by Asarco.	Minor to moderate. Displacement of off-road use and hunting to areas outside of TSF footprint. Primitive road access would remain available in upper reaches of Hackberry Gulch drainage area.
Potential disruption to visitors in White Canyon Wilderness area	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor. TSF would be visible from White Canyon Wilderness.	None. View blocked by Tortilla Mountains.
Roads / Transportation			
Potential disruption to road use/ traffic on the State Route 177	Negligible. Area would continue to be exposed to increased recreation activity.	Minor. There would be an estimated additional 115 vehicles per day using State Route 177 at peak construction. This would mean an approximate 15% ADT increase in the truck volume over existing conditions during peak construction	Moderate to Major. Traffic estimates the same as Proposed Action. Expect delays for box culvert and overpass installation during construction. Delays also during construction when blasting required. High visibility of highway and TSF construction activities could distract drivers.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Roads / Transportation			
Potential disruption to road use and traffic on the Florence-Kelvin highway	Negligible. Area would continue to be exposed to increased recreation activity.	<p>Minor to Moderate. Limited current traffic. A potential 50% increase in traffic during construction. Only minor increased traffic during operations. Re-routing of Florence-Kelvin highway should have negligible effect on traffic as re-route would be located in different right-of-way than existing road.</p> <p>Replace 1.8 miles of gravel county road</p> <p>Construct new 1.4 miles of paved road and pave 3 miles of gravel road.</p>	None expected
Maintenance impacts to State Route 177	None – proposed tailings facilities would not be constructed.	None expected.	Minor. Installation of box culverts and overpass would require detours and long-term maintenance.
Maintenance impacts to Florence-Kelvin highway	None – proposed tailings facilities would not be constructed.	Minor. Re-route of Florence-Kelvin highway to be paved with asphalt, which would lessen annual maintenance of new road stretch.	None expected
Primitive road impacts	None – proposed tailings facilities would not be constructed.	Major. Access on the Ripsey Wash primitive road in the area of the TSF would be eliminated as part of construction and operations	Negligible. Alternative access to Kane Spring Canyon would be provided.
Potential for accidents with any increased construction and operational road use	None – proposed tailings facilities would not be constructed.	Minor. Limited traffic on Florence-Kelvin highway.	Minor. Drivers could be distracted by highway and TSF construction activities.
Socioeconomics			
Employment	Not applicable – proposed tailings facilities would not be constructed.	Moderate during construction with potential for 200 additional workers (peak). Negligible to minor during operations with potential for slight increase in employment (up to 10 workers) over current Ray Mine workforce.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Socioeconomics			
Impacts to housing, utilities, public services and present lifestyles in local communities	Negligible. Area would continue to be exposed to increased recreation activity.	Negligible. Local communities and infrastructure should handle construction workforce.	Same as Proposed Action.
Soils			
Availability of soils for reclamation	Not applicable – proposed tailings facilities would not be constructed.	Lack of suitable soils for reclamation. No soil salvage planned.	Same as Proposed Action.
Potential of increased soil erosion and sedimentation	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor with proper controls, except if intense rainstorms exceed stormwater control features.	Same as Proposed Action.
Vegetation			
Impacts to vegetation communities	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Major. All vegetation to be removed (beneath tailings dams, drain-down ponds, and reclaim ponds), grubbed during installation of roads, or buried by tailings materials.	Same as Proposed Action.
Potential impacts to US Fish & Wildlife Service threatened and endangered plant species	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Unlikely to affect habitat for Acuna cactus (USFWS endangered species). Nearest known species over 7 miles away.	Same as Proposed Action. Nearest known Acuna cactus over 13 miles away.
Potential impacts to BLM sensitive plant species	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Possible impact to Pina Indian mallow (<i>abutilon parishii</i>) but nearest known species is 14 miles away	Same as Proposed Action. Nearest known Pina Indian mallow is over 9 miles away.
Potential spread of noxious weeds	Potential exists. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	No weeds found during field investigations, but weeds can have an aggressive nature and invade disturbed areas.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Wildlife			
Impacts to wildlife habitat	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Major. Direct impact to 2,636 acres at full build-out of tailings facilities. Some avoidance by wildlife of adjacent habitat likely during construction.	Major. Direct impact to 2,290 acres at full build-out of tailings facilities. Some avoidance by wildlife of adjacent habitat likely during construction.
Changes in wildlife use patterns	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Some displacement of wildlife expected during construction.	Same as Proposed Action.
Potential impacts to wildlife species of concern to Arizona Game and Fish Department	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	California leaf-nosed bat and Pocketed free-tail bat may use abandoned mine features located within proposed TSF footprint. Project development could result in loss of a few individual species if abandoned mine features are destroyed while occupied by these species.	Loss of perennial springs and associated surface water areas within TSF footprint would destroy suitable habitat for lowland leopard frog. No abandoned mine features affected by this alternative, so no roosting habitat in these features would be disturbed, thus unlikely to affect California leaf-nosed bat and Pocketed free-tail bat.
Potential impacts to US Fish & Wildlife Service threatened and endangered wildlife species	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	The Southwestern willow flycatcher (endangered) and Yellow-billed cuckoo (threatened) are known to occur within or adjacent to TSF. A biological assessment (BA) will be assembled to address possible impacts to these species and to propose mitigation measures for their protection from the development and operation of the TSF.	Same as Proposed Action.

Table ES-4, Summary of Effects by Alternative (continued)

ENVIRONMENTAL PARAMETER	NO ACTION ALTERNATIVE	RIPSEY WASH TSF (PROPOSED ACTION)	HACKBERRY GULCH TSF
Wildlife			
Potential impacts to BLM sensitive wildlife species	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Minor to Moderate. The following BLM sensitive species that may use habitat within or adjacent to the proposed TSF footprint: Desert purple martin Gilded flicker Golden eagle California leaf-nosed bat Cave myotis Greater Western bonneted bat Townsend's big-eared bat. Banner tailed kangaroo rat Peregrine falcon	Same as Proposed Action.
Impacts to fisheries in Gila River	Negligible. Area would continue to be exposed to natural geomorphic processes or other disturbances associated with recreation and ranch management.	Negligible. Site development and operations unlikely to have any adverse effects on fish and other aquatic species populations in the Gila River.	Same as Proposed Action.