



# Memorandum

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**Date:** January 20, 2016  
**To:** Trevor Baggione, WQD Director  
**From:** Jason Sutter, Surface Water Hydrogeologist  
**Subject:** Review of Proposed Designated Use Changes to Mineral Creek

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In September, 2007, ASARCO LLC (Asarco) initially provided ADEQ with a draft Use Attainability Analysis (UAA) supporting changes to designated uses assigned to Mineral Creek in Arizona Administrative Code Title 18, Chapter 11, Article 1 (AAC R18-11-1), Appendix B. The currently assigned designated uses to the Mineral Creek segment in question include Aquatic and wildlife warm water (A&Ww), full body contact (FBC), fish consumption (FC), agricultural irrigation (AgI), and agricultural livestock watering (AgI) (AAC R18-11-1), Appendix B. Asarco presented information supporting removing of all uses except Partial Body Contact (PBC).

Asarco reaffirmed its support in subsequent letters to ADEQ dated June 4, 2008 and October 19, 2015. The segment in question consists of a 6.4 mile concrete lined diversion channel, a portion of which is a tunnel (4.7 miles) that has rerouted Mineral Creek around the active Ray Mine operations located near Kearny, Arizona. The channel is located wholly on Asarco property and no public access is allowed.

In 2007, Asarco hired SWCA, a consulting firm, to complete a UAA for the diverted portion of Mineral Creek. Asarco provided the SWCA Technical Memorandum to ADEQ in September 2007 and again in June 2008. ADEQ used the memo and additional rationale provided by Asarco in its letters as the basis for the review of Asarco's requested revisions.

According to the Environmental Protection Agency (EPA), states may remove a designated use if the State can demonstrate that attaining the designated use is not feasible due to one or more of the following six factors:

1. Naturally occurring pollutant concentrations prevent the attainment of the use; or
2. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4. Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; or

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5. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6. Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.  
<http://www.epa.gov/wqs-tech/use-attainability-analysis-uaa>)

Based upon the information provided in the Asarco correspondence and SWCA Technical Memorandum, I agree that the appropriate designated use for the diversion channel should be limited to partial body contact (PBC). The diversion channel and associated tunnel have modified the natural channel and it is not feasible to restore the water body to its natural condition. Features such as a sand and gravel substrate, riparian vegetation and sunlight are lacking within the diversion channel and tunnel resulting in an inability to support aquatic and wildlife. The lack of pool and riffle habitat along with no aquatic life do not allow for a functioning fishery. Additionally, there are no agricultural diversion and livestock grazing taking place within or near the diversion channel on Asarco property. Recreational opportunities do not exist within the channel as access is restricted to Asarco staff and there is insufficient water for full immersion negating the need for full body contact protection. Applying the PBC designated use is appropriate as access to and use of the stream is limited to Asarco staff collecting water quality samples with little chance for immersion or consumption.

Currently the Mineral Creek segment description in AAC R18-11-1, Appendix B reads “Tributary to Gila River at 34°17’ 42”/112°13’ 34”. In effect, this includes Mineral Creek from its headwater to its confluence with the Gila River. Since the diversion channel is in the middle of the overall reach, the revised segmentation will include three reaches. The segment descriptions and proposed PBC designated use for the diversion channel are summarized in the following table:

MG	Mineral Creek	Headwaters to 33°12'34"/110°59'58"			A&Ww			FBC			FC		AgL
MG	Mineral Creek (diversion channel)	33°12'34"/110°59'58" to 33°09'18"/110°58'32"						PBC					
MG	Mineral Creek	End of diversion channel to confluence with Gila River			A&Ww			FBC			FC		AgL

Removing the designated uses and associated water quality standards will not degrade water quality in downstream waters as the Consent Order in United States and State of Arizona v. ASARCO Incorporated, CIV No. 98-0137 PHX ROS requires that discharges from the diversion channel meet water quality standards as it reenters the naturel channel of Mineral Creek.

The proposed changes are included in the 2016 Triennial Review rules package that will be released for public notice in early 2016.

Attachments

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ASARCO LLC letter to ADEQ dated October 19, 2015  
ASARCO LLC letter to ADEQ dated June 4, 2008



October 19, 2015

**Submitted via e-mail ([lestarge.wendy@azdeq.gov](mailto:lestarge.wendy@azdeq.gov))**

Wendy LeStarge  
Arizona Department of Environmental Quality  
1110 West Washington St.  
Mail Code 5415B-2  
Phoenix, AZ 85007

Re: Comments of ASARCO LLC on Proposed Revisions to Surface Water Quality Standards, 21 A.A.R. 1895 (September 18, 2015)

Dear Ms. LeStarge:

ASARCO LLC (Asarco) submits the following comments on the above-referenced proposed revisions to Arizona's surface water quality standards ("SWQS"). These proposed changes revisions were developed pursuant to the requirement in Section 303(c) of the Clean Water Act ("CWA"), 33 U.S.C. § 1313(c), that states review their standards at least once every 3 years (the "triennial review").

Asarco is a subsidiary of Americas Mining Corporation and its parent, Grupo México, S.A.B. de C.V., is among the leading producers of primary copper in the world. Asarco is itself a domestic producer of primary refined copper and associated co-products, principally gold, silver, selenium and tellurium. Within Arizona, Asarco operates three copper mines (Ray, Mission and Silver Bell) and four mills (one at Ray, one at Hayden and two at Mission), two leach SX-EW facilities (Ray and Silver Bell) and an INCO oxygen flash smelter (Hayden). Asarco's operations produce a significant proportion of the nation's primary refined copper each year.

Each of Asarco's facilities within Arizona holds either an individual or a general AZPDES permit; one site (Mission) also possesses both an individual AZPDES permit from ADEQ and an individual NPDES permit from EPA (the latter covering activities occurring on tribal land). Revisions to SWQS can have an effect on the limits contained in individual permits and the control measures needed under general permits. Asarco therefore has an interest in the proposals being made during this triennial review.

Asarco generally supports the proposed rules proposal, specifically the aspects noted below. Asarco also has a few additional minor comments and suggestions on the proposal, also noted below.

**ASARCO LLC ~ 5285 E. Williams Circle, Suite 2000, Tucson, AZ 85711**

### **Aspects of Proposal Supported**

**Mineral Creek Segmentation:** For the reasons initially set forth in its September 28, 2007 submission to ADEQ, Asarco supports the designation of a discrete new segment of Mineral Creek (comprising the diversion tunnel and concrete-lined channel) that will have partial body contact as the only assigned designated use. Uses designated in Mineral Creek above the tunnel inlet and below the end of the lined channel would remain unchanged. Our understanding is that ADEQ intended to include identification of this new segment as part of the previous triennial review, but inadvertently neglected to include it in the proposed rule and therefore did not feel comfortable including it as part of the final rule package. It subsequently was included in the current proposal.

The nature of these areas (e.g., concrete lined, with a large portion enclosed in a tunnel), combined with water management measures that periodically remove nearly all water from these segments, preclude attainment of other uses. Asarco therefore believes that identification of the proposed new segment is justified. However, as noted in the next paragraph, Asarco believes minor clarifications to the proposed latitude and longitude for the new segment are needed.

*Clarification of latitude and longitude:* Asarco recently surveyed the precise location of the tunnel inlet and the end of the concrete-lined diversion channel, which define the proposed new segment. The correct coordinates for these locations are as follows: (1) the tunnel inlet is at 33° 12' 24" latitude, -110° 59' 58" longitude; and (2) the end of the lined channel is at 33° 07' 56" latitude and -110° 58' 34" longitude. These are slightly different than the coordinates in the proposal, but more accurately reflect the location of the tunnel and channel.

**Site-Specific Standards (proposed A.A.C. R18-11-115):** Asarco supports the enhanced flexibility provided by the proposed changes to the rule on development of site-specific standards. This flexibility will be achieved both by recognizing additional grounds for adoption of site-specific criteria (including that natural adaptive processes that have resulted in species becoming more tolerant of a particular pollutant), as well as by allowing a broader range of studies to be submitted in support of requests for site-specific standards (provided that the elements of the study are approved in advance by ADEQ). This greater flexibility will allow ADEQ and regulated entities to better address the complex situations sometimes found in Arizona's surface waters, and is not inconsistent with any provision of the CWA or its implementing regulations.

**Schedules of Compliance (proposed A.A.C. R18-11-121):** Asarco supports the proposal to eliminate the requirement that compliance schedules for existing point sources (other than stormwater discharges) may extend for no longer than three years. The proposal would instead require compliance to be achieved as soon as possible, and sets out factors that ADEQ should consider to evaluate the appropriate length of a compliance schedule. This approach is consistent with the language in § 301 of the CWA and the relevant implementing regulation, 40 C.F.R. § 122.47(a)(1) (which has been adopted in Arizona pursuant to A.A.C. R18-9-A905(A)(3)(f)). It is also consistent with EPA guidance on the topic. *See Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits* (May 10, 2007). Adopting the proposed changes

would bring Arizona's rules into alignment with the most current EPA guidance on the topic and allow dischargers the time needed to address particularly challenging situations that sometimes arise.

Timing: Asarco supports ADEQ's decision to complete the public participation process for this limited triennial review prior to October 20. This will allow it to be considered by EPA without having to address all the changes made in EPA's recent revisions to the 40 C.F.R. Part 131 regulations. See 80 Fed. Reg. 51020, 51022 (August 21, 2015). Although these Part 131 changes do not appear at first blush as if they will require major revisions to the current ADEQ rules, having to further delay this oft-delayed package even further is not in the interests of ADEQ or permittees. ADEQ's decision to proceed with this limited triennial review as drafted, and to address any revisions necessary to conform to the recent changes to Part 131 in the next triennial review, is eminently reasonable.

Revisions to numeric criteria to reflect lack of EPA approval in 2009: Because EPA did not approve certain proposed changes to numeric criteria made in the last triennial review, those revised criteria cannot be used in developing limits in AZPDES permits. Because the (non-approved) criteria were listed in the state rules, permittees easily could be confused when different criteria were used in crafting permit limits for their discharges. Revising the state rules to reflect the EPA-approved criteria for the particular 21 pollutants and uses in question will eliminate this source of confusion.

### **Additional Comments**

Removal of full criteria tables for hardness-dependent metals: ADEQ proposes to remove the tables in Appendix A listing criteria for hardness-dependent metals at each level of hardness between 1 mg/L and 400 mg/L, on the grounds that these tables are "overly precise." 21 A.A.R. at 1899. ADEQ proposes to replace these tables with the applicable formula for calculating hardness-dependent criteria at each hardness level, and to list in the rules the criteria only for "representative" hardness levels (20 mg/L, 100 mg/L and 400 mg/L).

If ADEQ finalizes this approach, it should provide on its web site either the full tables for each hardness-dependent metal, or an online calculator that would allow users to calculate the applicable criteria at each hardness level between 1 mg/L and 400 mg/L. The equations for calculating hardness can be confusing and difficult to use for those not familiar with them.

Definition of surface water: The existing regulatory definition of surface water (A.A.C. R18-11-101(41)) tracks the federal agencies' definitions of the term "waters of the United States" ("WOTUS") from 1986. ADEQ's intent always has been to track in the SWQS regulations the federal CWA definition of WOTUS. As ADEQ is well aware, that federal definition has been held to be overly broad in some respects by two Supreme Court decisions. The agencies first adopted guidance to interpret the Supreme Court decisions (last revised in 2008), and recently adopted a new regulatory definition. That new regulatory definition, however, has been stayed by

multiple courts pending the resolution of numerous legal challenges to the rule. As a result, the 2008 guidance remains in effect in Arizona.

The current definition of “surface water” does not reflect either the 2008 guidance or the new rule. Asarco requests that ADEQ clarify in the preamble to the final rule that notwithstanding the outdated definition contained in the rules, the phrase “surface water” will be interpreted for purposes of the SWQS as applying to WOTUS as defined by governing legal precedent. Asarco also suggest that in the next triennial review, ADEQ consider replacing the phrase “surface water” with the phrase “navigable waters,” which is defined in the statute by reference to the CWA definition of WOTUS. See A.R.S. § 49-201(22). Using that general definition would not necessitate revisions to reflect every governing judicial decision or change in the federal rules.

Thank you for the opportunity to comment on the proposed revisions to the state SWQS. Should you have any questions on these comments, please contact me at (520) 356-2229.

Sincerely,

A handwritten signature in black ink, appearing to read "Duane M. Yantorno". The signature is fluid and cursive, with the first name being the most prominent.

Duane M. Yantorno  
Corporate Manager State and Federal  
Regulatory Affairs

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June 4, 2008

**BY HAND DELIVERY**

Ms. Shirley Conard  
Water Quality Division  
Arizona Department of Environmental Quality  
1110 W. Washington Street  
5415A-1  
Phoenix, AZ 85007

Re: Comments of ASARCO LLC on Proposed Revisions to Surface Water Quality Standards, 14 A.A.R. 1281 (April 25, 2008); Use Designations within Tunnel and Lined Channel at Ray Mine.

Dear Ms. Conard:

The purpose of this letter is to provide the comments of ASARCO LLC ("Asarco") on ADEQ's proposed revisions to the surface water quality standards, A.A.C. R18-11-101 *et seq.* Asarco participated in the development of, and supports, the broader comments on the proposal submitted by the Surface Water Quality Standards Coalition and the Arizona Mining Association ("AMA"). Asarco will not repeat those comments here.

The purpose of this letter is to formally submit on the record previously submitted information that Asarco believes support the removal or modification of certain designated uses currently applicable to the tunnel and lined channel at the Asarco Ray Mine. These manmade features were constructed to convey flow in Mineral Creek around mining operations. Work on the lined channel and an extension to the pre-existing tunnel segment was completed subsequent to the last triennial review (which was finalized in March 2002).

The tunnel and lined channel do not, and cannot be expected to, mimic a natural stream channel. Nevertheless, as currently structured, the same designated uses apply to these manmade features as apply in the balance of Mineral Creek (i.e., aquatic and wildlife (warm water), fish consumption, full body contact, and agricultural livestock watering). Moreover, it is possible that the implementation procedures for certain narrative standards (most notably the new

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biological integrity standard) could also apply within the tunnel and lined channel because of the aquatic and wildlife (warm water) designation, even though physical constraints (such as darkness in the tunnel, and lack of substrate or vegetation throughout) preclude development of the sort of natural ecosystem on which the standard is predicated.<sup>1</sup>

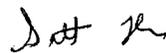
The enclosed materials are structured as a use attainability analysis, and seek the removal of the fish consumption use, modification of the full body contact use to partial body contact, and removal of the aquatic and wildlife (warm water) use or clarification that only acute criteria apply. Asarco is not requesting that uses be altered for any portion of the natural channel of Mineral Creek above the tunnel inlet or below the outlet of the lined channel. In essence, Asarco is suggesting that Mineral Creek be segmented, and that the uses in the tunnel and lined channel segment be modified while remaining uses remain unchanged.

The bases for this request are explained more fully in the enclosed materials originally provided to ADEQ in September 2007. Based on conversations with ADEQ personnel, it appears that ADEQ received, but did not thoroughly evaluate, the attached materials in preparing the proposed rule package. Asarco is therefore resubmitting these materials as a formal comment letter.

Please call if you have any questions regarding this letter or the attached materials.

Very truly yours,

FENNEMORE CRAIG, P.C.



Scott H. Thomas

Encl.

cc: Steve Sexton, Asarco (w/o enclosure)  
Brian Munson, Asarco (w/o enclosure)

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<sup>1</sup> Asarco would question the classification of these features as perennial and wadeable, which is necessary for the biological standard implementation procedures to apply (as well as those for bottom deposits), but there is enough ambiguity in those terms that Asarco cannot be certain as to the applicability of the proposed new procedures

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September 28, 2007

## Hand Delivered

Steve Pawlowski  
Manager, Surface Water Monitoring and Standards Unit  
Arizona Department Of Environmental Quality  
1110 West Washington Street  
Phoenix, Arizona 85007

Re: Possible Use Reclassification of Mineral Creek Diversion Tunnel and Lined Channel

Dear Steve:

Consistent with our earlier discussions, please consider this letter and the accompanying materials to be a draft use attainability analysis in support of changing or removing certain designated uses applicable to the diversion tunnel and lined channel constructed by ASARCO LLC ("Asarco") pursuant to the Consent Decree in United States and State of Arizona v. ASARCO Incorporated, CIV No. 98-0137 PHX ROS (entered January 23, 1998) and the subsequently issued Section 404 permit, No. 904-004-MB (August, 1999). The tunnel and lined channel are approximately 6.4 miles in length and convey flow in Mineral Creek around mining operations at the Ray Mine. These constructed or modified features bear little resemblance to a natural water, and are more closely analogous to a canal. The uses that can be achieved in these constructed features are not the same as those in the more natural portions of the Creek, making a change in designated uses pursuant to A.A.C. R18-11-104(H) appropriate, as explained further below and in the accompanying materials.

**Area Where Reclassification is Sought:** The area for which a reclassification is sought extends from the inlet to the diversion tunnel (latitude 33° 12' 33.59 N, longitude 110° 59' 58.12 W) to the end of the lined channel (latitude 33° 07' 55.15 N, longitude 110° 53' 25.86 W). This is a distance of approximately 6.4 channel miles (4.7 miles of diversion tunnel and 1.7 miles of lined channel).

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Asarco is not seeking to remove or change any uses applicable to Mineral Creek at any point above the diversion tunnel inlet or below the outlet of the lined channel.

**Uses Sought to be Removed or Changed in Reclassified Segment:** The uses currently applicable to all of Mineral Creek are as follows: Aquatic and wildlife (warm water fishery), full body contact, fish consumption, and agricultural livestock watering. For the diversion tunnel and lined channel, the following changes in uses are appropriate: the fish consumption standard should be removed; the full body contact standard should be removed or changed to partial body contact; and the aquatic and wildlife (warm water fishery) standard should be removed or limited to application of acute criteria.

**Background:** Mining activities have been conducted along Mineral Creek for over a century. Historical records suggest that Mineral Creek was so named because of exposed mineralization in the area. Operations were ultimately consolidated into the Ray Mine, owned by Kennecott. Asarco purchased the Ray Mine from Kennecott in 1986.

In the 1960s, there were no hydrologic control structures along the Creek. As aerial photos attest, the Creek would often be dry, but in significant storm events would carry large volumes of water that would scour the Creek banks. These large flows had the potential to be extremely disruptive of expanding mining operations. As a result, Kennecott undertook two significant construction projects.

The first project was construction of the original Mineral Creek diversion tunnel (approximately 3.64 miles in length) to carry flow in Mineral Creek around the area into which the open pit was being expanded. The second project, necessary to ensure that flows down the Creek during storm events did not overwhelm the capacity of the diversion tunnel to convey, was construction of Big Box Dam at the northern edge of the mine property. The purpose of Big Box Dam was to control flow rates in lower Mineral Creek during large storm events. Both Big Box Dam and the original diversion tunnel were completed prior to adoption of the Clean Water Act in 1972.

Over the years, mining operations continued to expand, including in areas above the original diversion tunnel inlet. With the passage of the Clean Water Act, and subsequent adoption of water quality criteria applicable to the Creek, surface water monitoring in Mineral Creek occurred in a variety of contexts. As applicable criteria became more stringent, and test methods more sensitive, water quality criteria were not always met.

Ultimately, concerns about Mineral Creek water quality led to negotiation of the consent decree referenced above, which was finalized in early 1998. The work ultimately undertaken to implement that decree included extending the Mineral Creek diversion tunnel to the north (taking it around existing and proposed mining operations) and lining with concrete roughly 1.7 miles Mineral Creek, from the tunnel outlet to a point south of most mining operations. (This point is

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roughly 0.5 miles from the confluence of Mineral Creek and the Gila River.) The overall solution also entailed construction of a cut-off wall and pump back system at the end of the lined channel and controls along the side of the lined channel to prevent storm water from entering the channel. Finally, stained gravels were removed in the portion of Mineral Creek from below the end of the lined channel to the Highway 177 bridge. Work in waters of the United States necessary to complete these projects was ultimately authorized by the Army Corps of Engineers in the 1999 Section 404 permit referenced above.

Currently, in times of low rainfall, there is no flow at all from the dam. For example, the last time that water flowed through the outlet in Big Box Dam was on June 1, 2007. Even in low flow conditions, some water does continue to be present at the tunnel outlet because water infiltrates (seeps) into the tunnel (as discussed further below) in relatively small volumes. When there is no flow into the tunnel inlet from upstream, flow at the tunnel outlet is typically in the range of 60-80 gpm as a result of the seepage into the tunnel. As ADEQ is aware, the water seeping into the tunnel has selenium present at levels above the aquatic and wildlife (warm water fishery) chronic criterion of 2 parts per billion. (The selenium appears to be natural in origin.) Therefore, when there is no inflow to the tunnel, water exiting the tunnel and leaving the lined channel may exceed the surface water quality standard for selenium. In addition, during low flow conditions, water in the lined channel is very sluggish and slow moving and there are periodic issues with low dissolved oxygen levels at the channel outlet.

**Criteria for Removing or Downgrading a Designated Use:** The criteria under which ADEQ will evaluate the removal of a designated use or the adoption of a subcategory subject to less stringent water quality criteria are set forth at A.A.C. R18-11-104(H), which reads as follows:

H. The Director may remove a designated use or adopt a subcategory of a designated use that requires less stringent water quality criteria, provided the designated use is not an existing use and it is demonstrated through a use attainability analysis that attaining the designated use is not feasible for any of the following reasons:

1. A naturally-occurring pollutant concentration prevents the attainment of the use;
2. A natural, ephemeral, intermittent, or low-flow condition or water level prevents the attainment of the use;
3. A human-caused condition or source of pollution prevents the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;
4. A dam, diversion, or other type of hydrologic modification precludes the attainment of the use, and it is not feasible to restore the surface water to its

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original condition or to operate the modification in a way that would result in attainment of the use;

5. A physical condition related to the natural features of the surface water, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, precludes attainment of an aquatic life designated use; or

6. Controls more stringent than those required by § 301(b) and § 306 of the Clean Water Act [33 U.S.C. § 1311 and § 1316] are necessary to attain the use and implementation of the controls would result in substantial and widespread economic and social impact.

These provisions track closely the comparable federal provisions in 40 C.F.R. § 131.10(g). No changes to A.A.C. R18-11-104 have been identified by ADEQ as appropriate in the triennial review process currently underway.

As discussed further below, several of the factors listed in 18 A.A.C. R18-11-104(H), most notably factors 4 and 5, support the requested changes in designated uses.

**Basis for Requested Use Designation Changes:** With the completion of the construction projects discussed above, water flows through 6.4 miles of engineered structures (diversion tunnel and concrete-lined channel). The physical characteristics of those features justify a change in uses along their length. A summary of the requested changes and the basis for each proposal is presented below.

1. **Fish Consumption:** The fish consumption designated use should be removed in the tunnel and lined channel. The reasons supporting removal of this use are as follows:

- The diversion tunnel and lined channel lack critical elements necessary to support harvestable populations of fish or other aquatic organisms (clams, turtles, crayfish or frogs). Specifically, as discussed in the attached memorandum from SWCA, the tunnel and lined channel exhibit the following features that make them unsuitable habitat for fish or macroinvertebrates: generally shallow water (with periods of no flow at all), lack of substrate, lack of canopy cover, lack of pools or riffles, low DO, lack of aquatic or riparian vegetation, lack of sunlight (in the tunnel), and temperature issues (e.g., in the lined channel, where there is no canopy cover for shade, the water temperature is elevated).
- Big Box Dam limits the ability of fish to enter the area from upper Mineral Creek. Even if fish did make it past the dam, long-term survival along this 6.4 mile reach would be limited by the factors discussed above (as well as the periodic lack of water).

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- The 6.4 mile stretch in question is located entirely on Asarco property. No public access is allowed. Asarco is aware of no evidence of historical fishing in this area, and the restrictions on access ensures that no fishing or other harvesting of aquatic organisms could occur in these areas even if such organisms were present.

For these reasons, the fish consumption use should be removed from the tunnel and lined channel.

2. Full Body Contact: The full body contact use is inappropriate for the following reasons:

- Even when water is flowing through Big Box Dam, the depth of the water in the tunnel and lined channel along most of their length is very shallow (normally only 1-2 inches in depth in the lined channel). Opportunities for complete physical immersion are very few.
- As discussed above, seepage into the tunnel can result in some regular flow from the tunnel outlet even without water coming through Big Box Dam. In such times, flow volume is approximately 60-80 gpm and the flow that does occur spreads out in the lined channel and becomes very shallow.
- The only place along the 6.4 mile reach in which water could routinely be present in quantities allowing full body contact is a small area at the end of the diversion tunnel, before the water spreads out in the lined channel, where there is a dip in the tunnel to help slow down water when flows are high. Water can accumulate to a depth of several feet at this location. However, the presence of water in this small area at the end of the tunnel, where potential human contact occurs only when Asarco personnel annually inspect the tunnel's condition, does not justify application of the full body contact use.
- As discussed above, the 6.4 mile reach in question is located wholly on Asarco property and access is limited. No public access is allowed, and access cannot occur along the creek from upstream because of the presence of Big Box Dam. As a practical matter, therefore, expected human contact with water in the tunnel and lined channel is virtually non-existent.

For these reasons, the full body contact use should be removed. At most, a partial body contact use is appropriate.

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3. Aquatic and Wildlife (Warm Water Fishery): For some of the same reasons described above with respect to fish consumption, the aquatic and wildlife (warm water fishery) designation should be removed.

- The same biological factors discussed above with respect to the fish consumption use also limit the ability of the tunnel and lined channel to serve as habitat for other aquatic species. The tunnel and lined channel exhibit the following features that make them unsuitable habitat for fish or macroinvertebrates: shallow water; lack of substrate; lack of canopy cover; lack of pools or riffles; low DO; lack of aquatic or riparian vegetation; temperature issues (e.g., in the lined channel, where there is no canopy cover for shade, the water temperature is elevated); and (in the tunnel) total darkness, precluding plant photosynthesis.
- Big Box Dam limits the ability of most aquatic species to gain access to this 6.4 mile stretch from upstream.
- Although nearly all waters listed in the surface water quality standards have some aquatic and wildlife use designated, no such use is assigned to the Phoenix area canals. The 6.4 mile reach comprising the tunnel and lined channel essentially serves a similar function to a canal (i.e., conveyance of water), and does not provide the type of habitat that merits an aquatic and wildlife use designation.

For these reasons, no aquatic and wildlife use should be assigned to the diversion tunnel and lined channel. Regardless of the quality of the water in these constructed features, an aquatic and wildlife community analogous to that in a natural stream is not going to flourish because of the physical constraints discussed above.

If ADEQ believes some aquatic and wildlife use must be assigned, then only acute (and not chronic) criteria should apply in the tunnel and lined channel. The physical constraints discussed above preclude the long term presence of aquatic organisms, so acute-only criteria would be appropriate if an aquatic and wildlife use is retained.

**No Existing Uses will be Removed**: A.A.C. R18-11-104(H) precludes removal of an existing use. "Existing use" is defined as those uses actually attained in a water on or after November 28, 1975, whether or not the use has been designated. See A.A.C. R18-11-101(23). In this case, as noted above, water quality issues have been observed in Mineral Creek for a long time. Applicable water quality criteria, as well as test methods and detection levels, have changed over time, but it is unlikely that water quality was sufficient on a consistent basis to meet the uses that are recommended above be changed or removed.

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Moreover, the concept of existing use is difficult to apply to these engineered features. The diversion tunnel is an entirely man-made creation that does not follow the path of the original Mineral Creek. It is simply an engineered conveyance transferring flow (when it exists) around a portion of mining operations. The lined channel, although it does follow the path of Mineral Creek, is essentially a new creation and also is nothing more than a conveyance structure. As discussed above, the purpose of these engineered features is to convey water around mining operations. Given these facts, the notion of an "existing use" is hard to apply to these engineered structures.

In short, the completion of work on these engineered features, which occurred since the last triennial review was proposed in May 2001, has essentially resulted in creation of a new conveyance system (akin to a canal) to which ADEQ should assign appropriate designated uses, rather than treating the tunnel and lined channel as identical to the remaining portions of Mineral Creek.

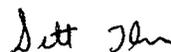
**Conclusion:** For the foregoing reasons, with respect to the Mineral Creek diversion tunnel and lined channel, ADEQ should: (1) remove the fish consumption designated use; (2) remove the full body contact use (or change it to partial body contact); and (3) remove the aquatic and wildlife (warm water fishery) designated use (or assign only acute criteria).

**Attachments:** Enclosed with this letter are the following: (1) a technical memorandum supporting this request, prepared by SWCA Environmental Consultants (focusing on the physical constraints to the channel and diversion tunnel serving as habitat for fish or other aquatic organisms); and (2) photos depicting various points along the tunnel and lined channel (as well as Big Box Dam). An index to the attachments appears on the following page.

If you have any questions on the contents of this letter or require further information, please do not hesitate to call. We would be happy to meet with the Department to further discuss this request and the underlying basis for it.

Very truly yours,

FENNEMORE CRAIG, P.C.



Scott H. Thomas

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cc: Steve Sexton, Asarco  
Keith Warren, Asarco  
Krishna Parameswaran, Asarco  
Brian Munson, Asarco

## Index to Attachments

<u>Tab</u>	<u>Description</u>
1	SWCA technical memorandum
2	Photo - Big Box Dam, looking upstream from near tunnel inlet (11/2006)
3	Photo - tunnel inlet (11/2006)
4	Photo - interior of tunnel (11/2006)
5	Photo - energy dissipater below tunnel outlet (11/2006) (taken during routine maintenance operation to remove accumulated silt from low spots in channel designed to slow high flows)
6	Photo - same dissipater; tunnel outlet visible in background (11/2006)
7	Photo - lined channel downstream of tunnel outlet (9/2007)
8	Photo - lined channel downstream of tunnel outlet (9/2007)
9	Photo - end of lined channel, looking toward Mineral Creek (9/2007)

**1**



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## Technical Memorandum

**To:** Mr. Steve Sexton, ASARCO Ray Mine

**From:** Ken Kertell, SWCA Environmental Consultants

**Date:** September 27, 2007

**Re:** Mineral Creek Use Attainability Analysis / SWCA Project No. 13398

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### MINERAL CREEK WATERSHED

Mineral Creek originates in the Pinal Mountains at the southern end of the Tonto National Forest and flows for approximately 15 miles in a mostly southerly into the Gila River near Kelvin, Arizona. The size of the Mineral Creek watershed is estimated at 122 square miles. Mineral Creek has gone dry in recent years. Above Big Box Dam, the stream flows through narrow, steep-walled canyons and wider gravel and boulder flats, and over bedrock outcroppings. Riparian canopy is relatively dense in upper Mineral Creek, except where the stream flows through extremely narrow canyons. Below Big Box Dam, natural reaches of the stream channel (i.e., those not the subject of engineered control measures noted below) are still relatively narrow, the stream bottom is gravel, and there is little or no canopy cover.

Mineral Creek is a heavily disturbed system. The headwaters have been heavily grazed and impacted by fire. Drainage from waste piles, which are estimated at 150,000 tons at 0.7% Cu from sulfide and oxide ore produced between 1906 and 1918 at the Gibson Mine, has entered the upper Mineral Creek Watershed from mine adits in the area.<sup>1</sup> Mineral Creek is dammed (Big Box Dam) above the ASARCO Ray Mine and downstream flows are diverted around the mine via the Diversion Tunnel and concrete-lined stormwater channel before exiting into a short, relatively natural reach of Mineral Creek immediately upstream of the Gila River. The entire reach of Mineral Creek below Big Box Dam flows through property owned by ASARCO.

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<sup>1</sup> U.S. Environmental Protection Agency. 2001. *Total Maximum Daily Load for Copper in Pinto Creek, Arizona.*

## BIOLOGICAL CONDITIONS

### Fish

**Fish Community (Lower Mineral Creek).** In lower Mineral Creek, below Big Box Dam, fish sampling was conducted during several years in the 1990s. Sampling was conducted by the Arizona Game and Fish Department (AGFD) in 1993 and 1998, by the U.S. Fish and Wildlife Service (USFWS) in 1995, and by SWCA Environmental Consultants (SWCA) in 1997 and 1998. These surveys were conducted prior to the completion of the diversion tunnel extension and lined channel. Fish sampling by AGFD in 1993 and 1998 was conducted upstream (Indian Gardens and near Little Box Dam) and downstream (near the State Route [SR] 177 bridge) of Ray Mine operations. In 1995, the USFWS sampled lower Mineral Creek near the SR 177 Bridge. Fish sampling by SWCA in 1997 was conducted immediately below the Diversion Tunnel Outlet,<sup>2</sup> and in 1998, sampling was conducted near Indian Gardens (below Big Box Dam) above the new tunnel and cement-lined channel.

In 1993 and 1998, no fish were captured in Mineral Creek below Ray Mine operations.<sup>3,4</sup> Compared with Mineral Creek upstream of Ray Mine, AGFD noted that the downstream sites had significantly less overhead and instream cover. Upstream of Ray Mine operations in 1993 and 1998, fish captured by AGFD included native (roundtail chub [*Gila robusta*] and longfin dace [*Agosia chrysogaster*]) and non-native species (mosquitofish [*Gambusia affinis*], green sunfish [*Lepomis cyanellus*], and fathead minnow [*Pimephales promelas*]).

In 1995, the USFWS claimed to have captured four species of fish in lower Mineral Creek, but the report is unclear regarding which species (native or non-native) were captured.<sup>5</sup> The USFWS suggested that a major flood event that year had resulted in fish re-colonizing Mineral Creek via the Gila River rather than from upstream.

In 1997, mosquitofish was the only fish species collected by SWCA in Mineral Creek at the Diversion Tunnel Outlet below Ray Mine operations.<sup>6</sup> In 1998, SWCA collected three non-native species (mosquitofish, green sunfish, and fathead minnow) above Ray Mine operations at Indian Gardens.<sup>7</sup> The former sampling location has been eliminated by the extension of the tunnel.

**Fish Community (Upper Mineral Creek).** In upper Mineral Creek, above Big Box Dam, fish sampling and surveys were conducted in 2000, 2002, and 2006 by AGFD; in 2007, they were conducted jointly by AGFD and SWCA. Sampling in 2007 was restricted to Big Box Reservoir.<sup>8</sup>

AGFD reported observing two native (Gila chub [*Gila intermedia*]<sup>9</sup> and longfin dace) and one non-native species (green sunfish) in upper Mineral Creek in 2000.<sup>10</sup> However, no fish were reported in upper

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<sup>2</sup> A stilling basin, designed to dissipate the flows exiting the tunnel, was formerly located at the original Diversion Tunnel Outlet. This area has since been cement lined as part of the creation of the lined channel.

<sup>3</sup> Arizona Game and Fish Department. 1993. *Mineral Creek/Ray Mine Fisheries and Habitat Survey*.

<sup>4</sup> Arizona Game and Fish Department. 1998. *Spot Check Survey, Mineral Creek, Pinal County, Arizona*.

<sup>5</sup> U.S. Fish and Wildlife Service. 1997. *Environmental Contaminants in Sediments and Fish of Mineral Creek and the Middle Gila River, Arizona*.

<sup>6</sup> SWCA Environmental Consultants. 1998. *Ecological Assessment of the Mineral Creek Wetland (WRAP Evaluation Area A)*.

<sup>7</sup> SWCA Environmental Consultants. 1999. *Ecological Assessment of the Area C Wetland*.

<sup>8</sup> As part of the Ray Mine Consent Decree Work Plan Project, ASARCO in 2002 raised the lower outlet of Big Box Dam to trap sediments in order to raise the water table and create a reservoir with adjacent wetlands and riparian vegetation. Prior to 2002, there was no stationary water above the dam; at that time, the area above the dam consisted of the confluence of two natural, intermittent Sonoran Desert streams, Mineral Creek and Devils Canyon.

Mineral Creek by AGFD in 2002 and 2006.<sup>11,12</sup> AGFD is uncertain about the cause of the disappearance of fish since 2000 in upper Mineral Creek.<sup>13</sup>

In 2007, the only fish species captured in Big Box Reservoir was green sunfish.<sup>14</sup> The presence of green sunfish, which preys on other smaller fish, will probably preclude the future colonization of this area by native species from upper Mineral Creek; AGFD has periodically reintroduced longfin dace in upper Mineral Creek.<sup>15</sup> The AGFD staff present during the 2007 sampling visit had never seen flow in upper Mineral Creek reduced to such a low level.

**Conclusion.** The previous evaluation demonstrates that aquatic habitat in Mineral Creek previously supported native and non-native fish species between Big Box Dam and the diversion tunnel inlet and non-native fish species below the lined channel. However, the evaluation also demonstrates that fish are often absent from Mineral Creek both above and below Ray Mine operations; this can be attributed in large part to a variety of physical conditions that preclude the development of a robust fish community. The periodic absence of fish and low documented fish diversity when fish are present below Big Box Dam result from the following factors: 1) Mineral Creek is a small, low-gradient stream with channel alterations; 2) there is no cobble or boulder substrate, only gravel (in addition to providing substrate complexity, boulders also contribute significantly to “surface roughness,” which refers to the stream’s ability to withstand the erosive force of high flows); and 3) the water is very shallow, the flow velocity is generally low, and flows are unpredictable (in some cases, no water is flowing at all). These conditions (small stream with channelized segments, relatively homogeneous substrate, and generally low and sometimes nonexistent flow) contribute to limited habitat availability for fish. During several recent years, aquatic habitat below Big Box Dam has been limited to shallow, stagnant, isolated puddles. In 2007, for example, planned biomonitoring along Mineral Creek near the Gila River was canceled because of the absence of flowing water. However, even when water is flowing along this reach of Mineral Creek, there is, with the exception of Indian Gardens immediately below Big Box Dam, little in the way of physical habitat structure to support a fish community; there are no pools (with the exception of an artificially maintained dip in the cement at the end of the tunnel where water occasionally can accumulate to a depth of several feet) or other areas that fish (and their prey) need for concealment and feeding, such as boulders, undercut banks, snags (woody debris), etc.

The diversion tunnel and lined channel are particularly unsuitable for fish. Along this reach, the substrate consists of smooth cement; there is no substrate heterogeneity. In addition to the absence of boulders, cobble, or large, woody debris, there also is no gravel or soil accumulation in the tunnel for the establishment of wetland or riparian vegetation and the only location along the lined channel where sediment accumulates is at the tunnel outlet where soil and vegetation need to be removed periodically to prevent flooding. Substrate complexity is an important ecological parameter for aquatic biota. A smooth cement substrate provides no cover (pools and riffles) or spawning substrate for fish, no habitat for benthic invertebrates (which serve as the main diet of many species of fish) or wetland plants, and no resistance to the erosive energy of water flowing downstream. The absence of these physical features in

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<sup>9</sup> In 2005, the USFWS listed Gila chub as an endangered species with Critical Habitat. The stretch from upper Mineral Creek to the Big Box Reservoir was included in the area designated Critical Habitat. However, this area has been devoid of fish since 2000, according to AGFD.

<sup>10</sup> Arizona Game and Fish Department. 2006. *Summary of Mineral Creek Field Survey: March 15–16 2006*.

<sup>11</sup> Ibid.

<sup>12</sup> Arizona Game and Fish Department. 2002. *Summary of Mineral Creek Field Survey: September 4, 2002*.

<sup>13</sup> Arizona Game and Fish Department. 2007. Personal communication.

<sup>14</sup> SWCA Environmental Consultants. 2007. *Summary of 2007 Fish Sampling Activities Conducted by the Arizona Game and Fish Department and SWCA Environmental Consultants at Big Box Reservoir and Mineral Creek North of the Ray Mine Complex, Pinal County, Arizona*.

<sup>15</sup> Arizona Game and Fish Department. 2007. Personal communication.

the tunnel and lined channel makes these areas unsuitable for the development of a significant fish community and the organisms upon which they feed.

The Arizona Department of Environmental Quality (ADEQ) may remove a designated use or adopt a subcategory of a designated use that requires less stringent water quality criteria, provided that the designated use is not an existing use and it is demonstrated through a Use Attainability Analysis (UAA) that attaining the designated use is not feasible for a variety of specific reasons, including:

- A dam, diversion, or other type of hydrologic modification precludes the attainment of the use, and it is not feasible to restore the surface water to its original condition or to operate the modification in a way that would result in attainment of the use; or
- A physical condition related to the natural features of the surface water, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, precludes attainment of an aquatic life designated use.

The foregoing analysis demonstrates that: 1) a resource of harvestable sport fish is not present in Mineral Creek (below Big Box Dam); 2) the physical conditions of Mineral Creek (below Big Box Dam) generally are not favorable for development of a significant population of harvestable fish; 3) the physical conditions in the tunnel and lined channel preclude development of fish population; and 4) even if game fish were present in this reach of the creek, limited access would preclude significant fish harvest. For this reason, a fish consumption designated use is inappropriate for the tunnel and lined channel.

## **Macroinvertebrates**

Macroinvertebrate surveys have not been conducted in the diversion tunnel or along the lined channel. Nevertheless, it is clear that these areas do not provide habitat conditions suitable for macroinvertebrates for the following reasons: 1) the water is shallow (when present at all); 2) the water temperature along the lined channel is high because of the absence of canopy cover and sluggish flow (the water temperature would be expected to be somewhat lower in the tunnel, but factors other than water temperature [cement substrate, absence of vegetation, no sunlight] preclude the development of an invertebrate community there); 3) at most times (except when storms cause water to be released from Big Box Dam), the dissolved oxygen (DO) level in the water is often very low because of sluggish flow (rapidly moving water tends to contain a lot of dissolved oxygen, while stagnant water contains little) and warm water temperature (cooler water holds more oxygen); 4) the proper substrates and habitats (pools and riffles) for invertebrate growth are absent in both the lined channel and the tunnel; and 5) there is no aquatic or riparian vegetation. In a stream environment, habitat for macroinvertebrates includes the rocks and sediments of the stream bottom, the plants in and around the stream, leaf litter and other decomposing organic material that falls into the stream, and submerged logs, sticks, and woody debris.

Macroinvertebrates need the shelter and food these habitats provide and tend to congregate in areas that provide the best shelter, the most food, and the most DO. Because of the absence of these physical habitat conditions, the tunnel and lined channel would not be expected to support an aquatic community, regardless of water quality conditions. The absence of these features in the tunnel and lined channel make these areas unsuitable for macroinvertebrates and the organisms that feed on them, meaning that an aquatic and wildlife (warm-water fishery) use designation is inappropriate for this reach.

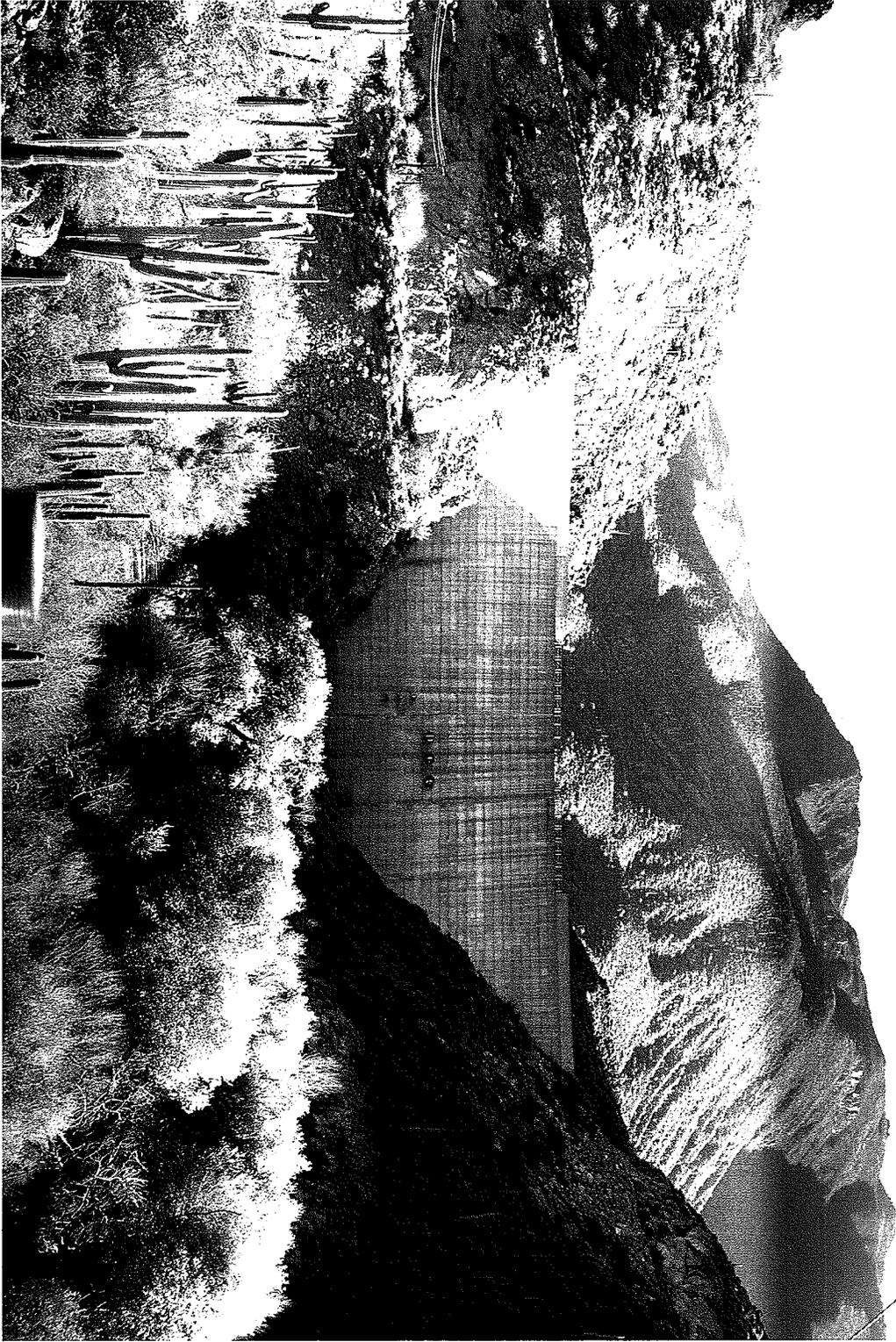
The previous evaluation demonstrates that the physical characteristics of the diversion tunnel and lined channel preclude colonization of this area by aquatic macroinvertebrates. The inability of macroinvertebrates to colonize the diversion tunnel and lined channel has resulted from the absence of habitat conditions (i.e., substrate, shelter, and food) necessary to support aquatic invertebrate populations.

ADEQ may remove a designated use or adopt a subcategory of a designated use that requires less stringent water quality criteria, provided that the designated use is not an existing use and it is demonstrated through a UAA that attaining the designated use is not feasible for a variety of specific reasons, including:

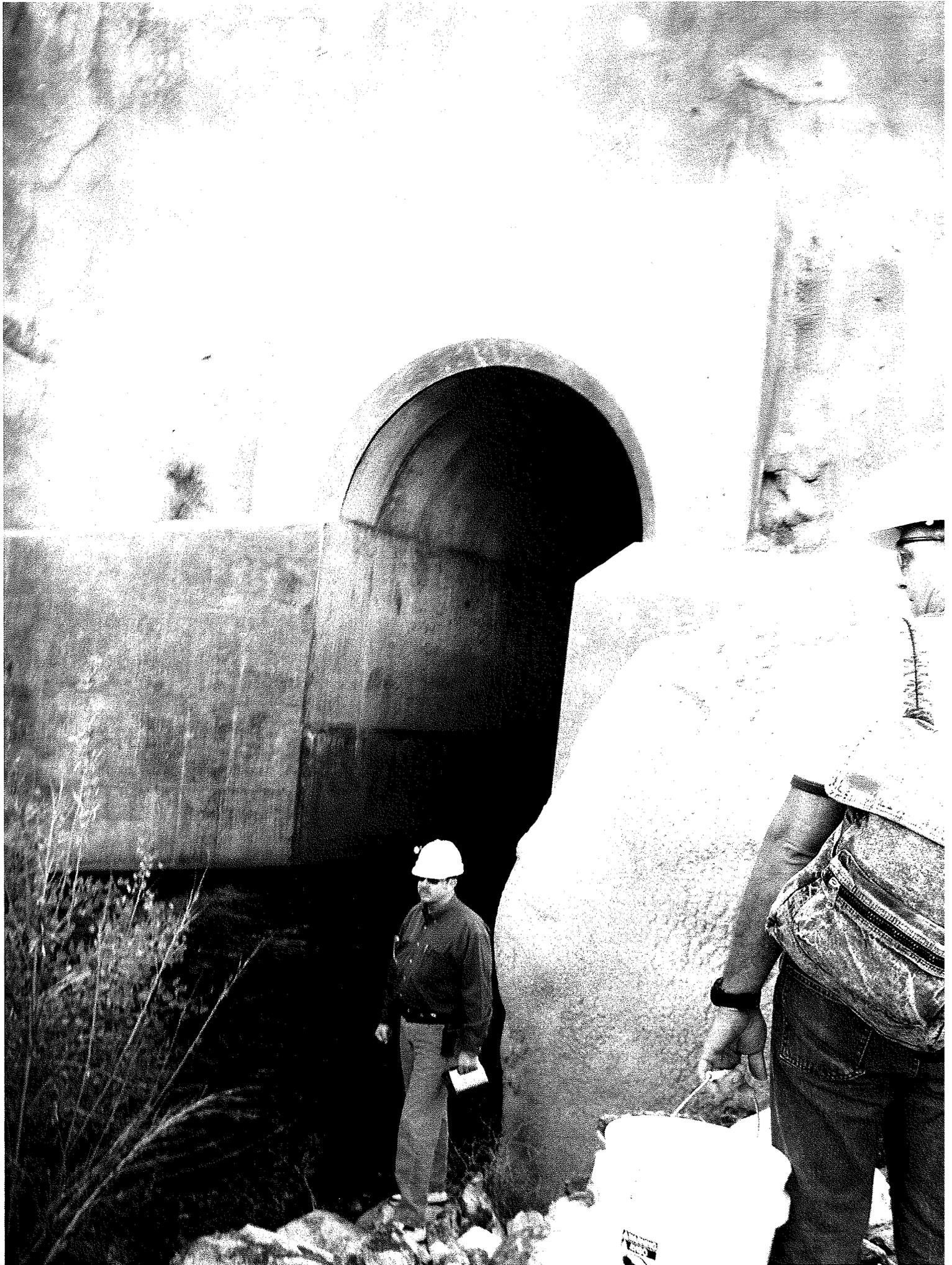
- A dam, diversion, or other type of hydrologic modification precludes the attainment of the use, and it is not feasible to restore the surface water to its original condition or to operate the modification in a way that would result in attainment of the use; or
- A physical condition related to the natural features of the surface water, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, precludes attainment of an aquatic life designated use.

The above analysis demonstrates that as a result of the absence of proper substrate and habitat conditions (cover, pools and riffles, and food), there is no potential for the future attainability of macroinvertebrate use of the diversion tunnel and lined channel.

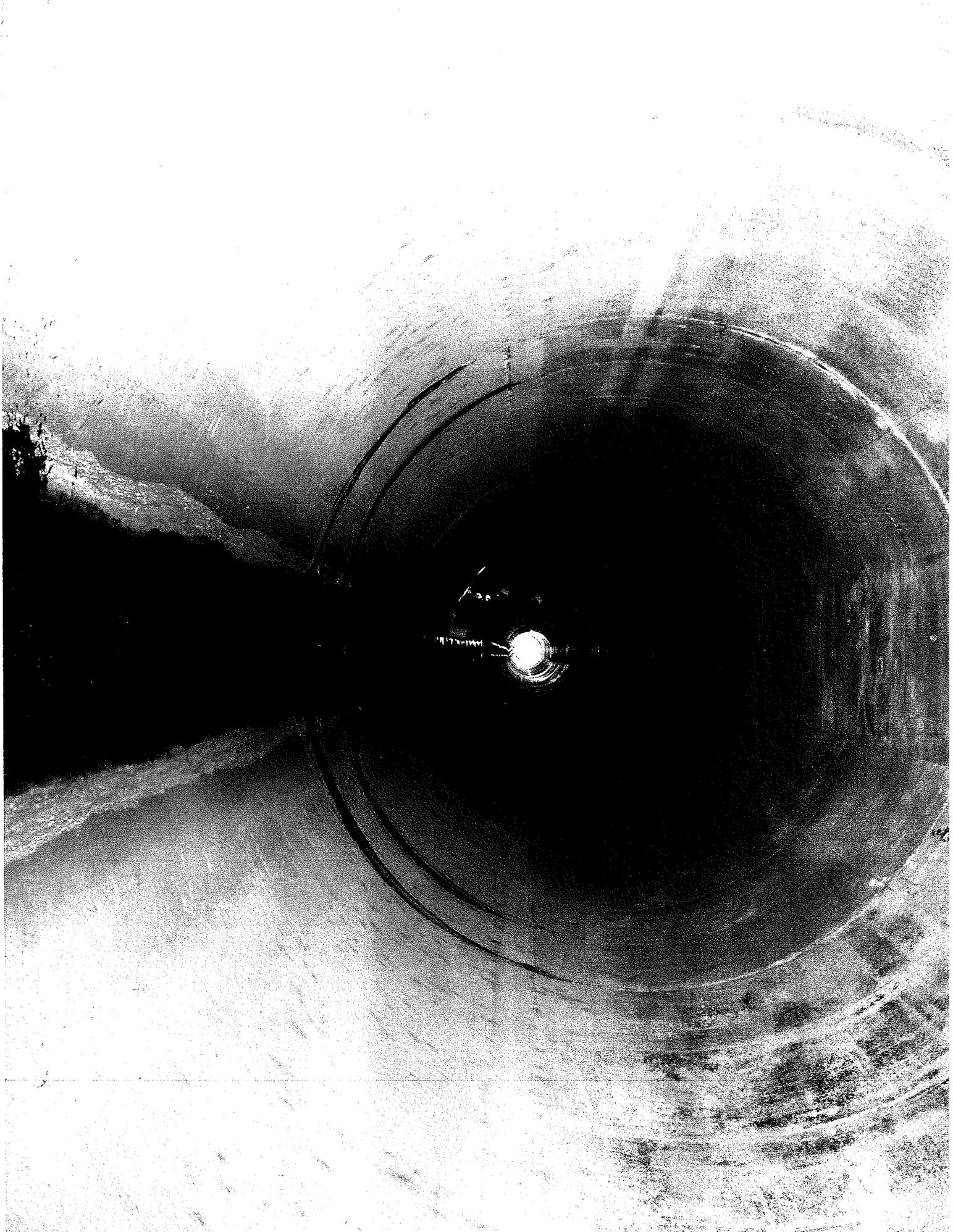
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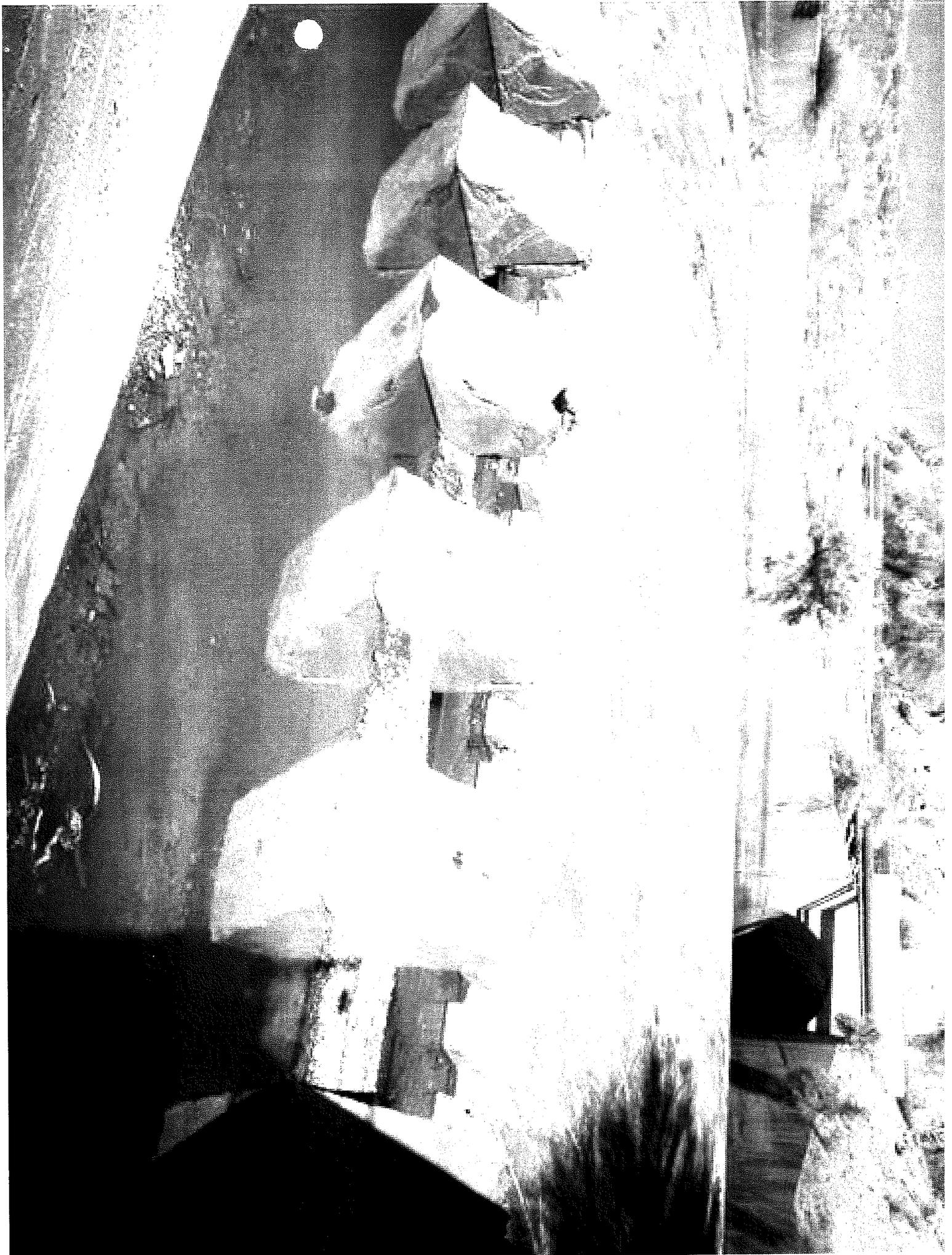
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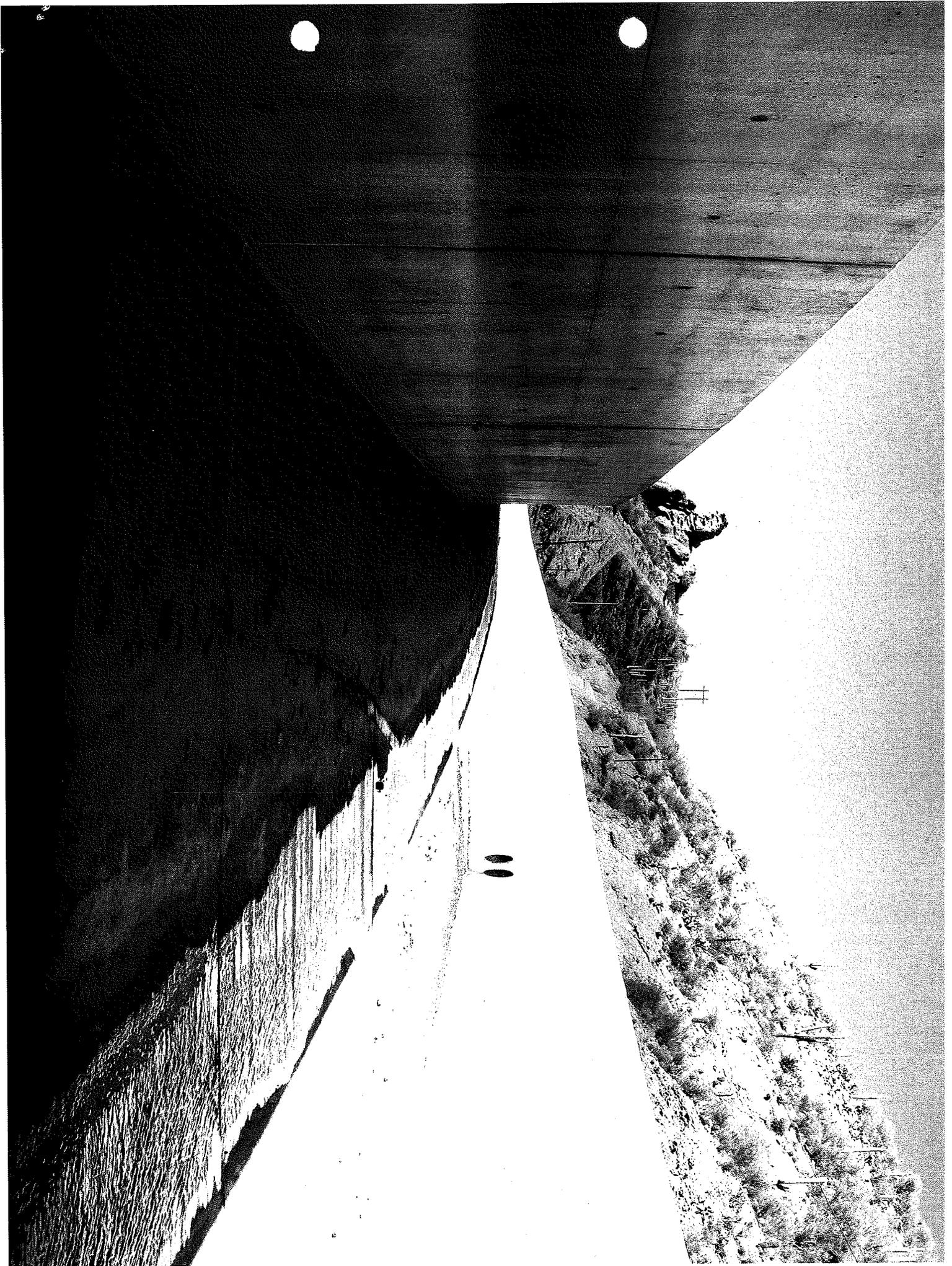
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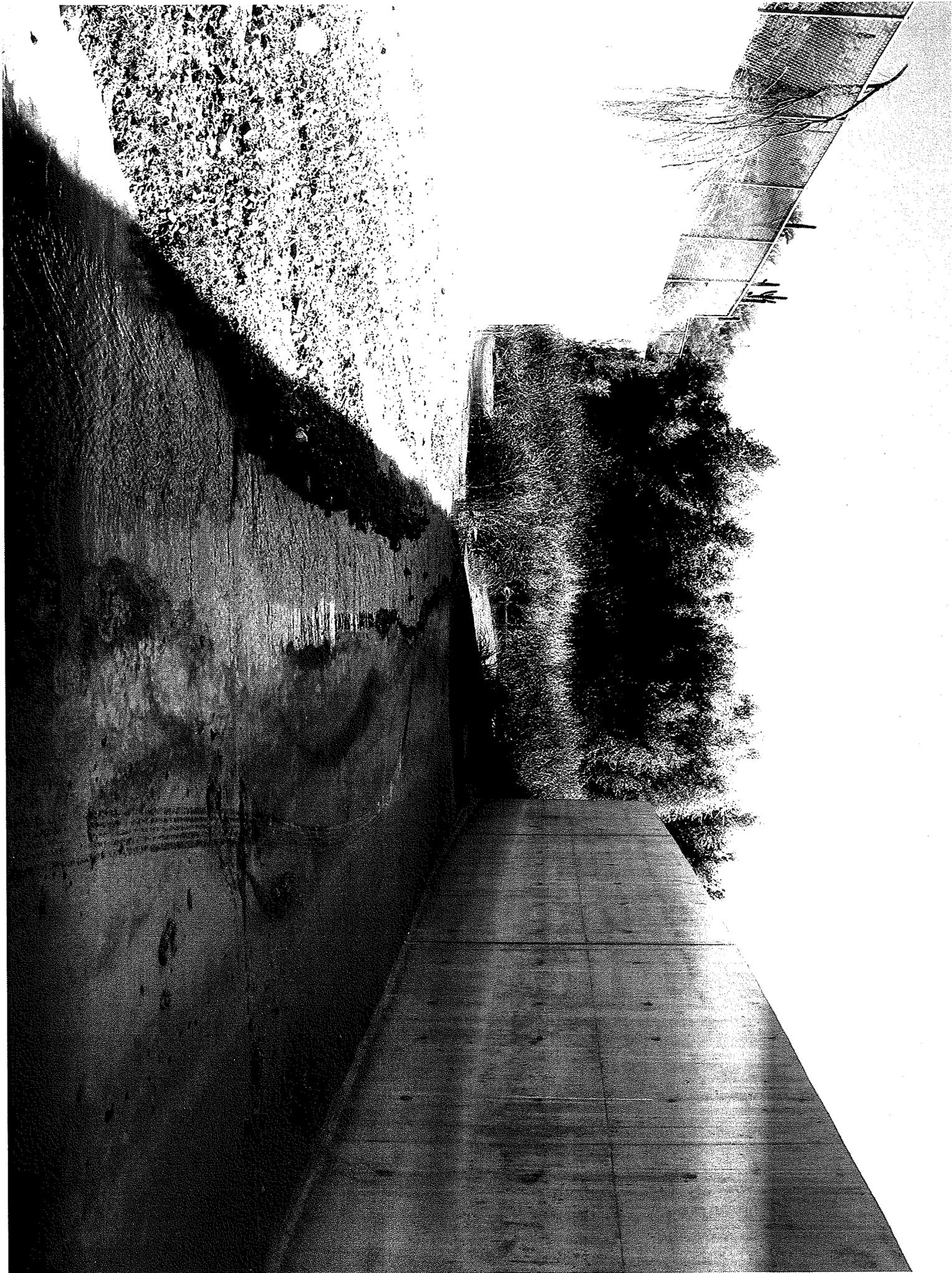
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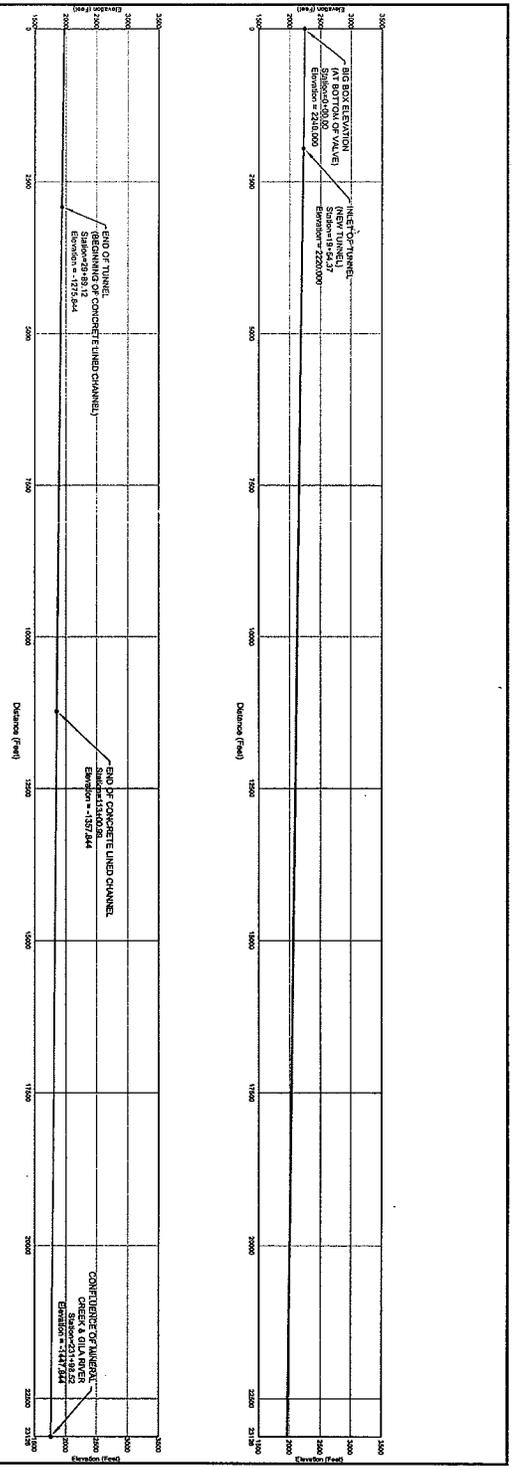


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**MINERAL CREEK SECTION**

HORIZONTAL SCALE  
 0 1500  
 VERTICAL SCALE  
 0 150'

**LEGEND**

MINERAL CREEK DIVERSION TUNNEL

MINERAL CREEK CONCRETE LINER CHANNEL

PROJECT: ASARCO RAY DRAWINGS DRAWING: ENVIRONMENTAL CONTROLS FOR MINERAL CREEK	
DATE: 10/20/05 SCALE: AS SHOWN SHEET NO: 7	DRAWN BY: J. L. BROWN CHECKED BY: J. L. BROWN DATE: 10/20/05
	MWH 10000 W. 10th Avenue Golden, CO 80401