

SECTION 4

SACATON MINE

CASA GRANDE, ARIZONA

4.0 THE SACATON MINE – CASA GRANDE, ARIZONA

4.1 Introduction

The Sacaton mine is an example of a mining operation that meets all conditions listed in Wis. Stats. § 293.50:

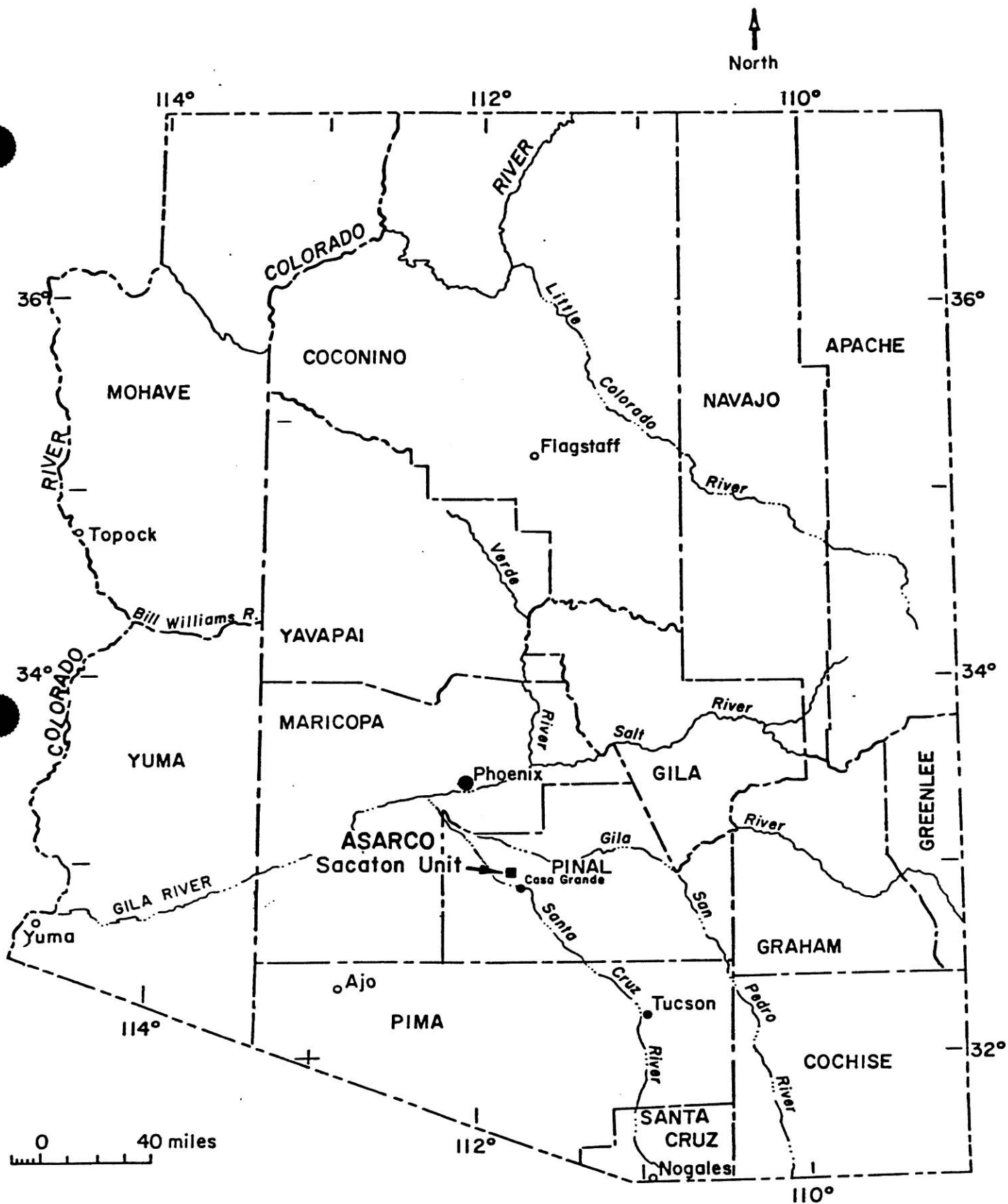
- § 293.50(2)(a) – Sulfide ore body with net acid generating potential: Yes. The mine pit water samples show a pH of 3.8 - 4.1.
- § 293.50(2)(a) – Has operated at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The mine operated from 1972 to 1984, a period of 12 years. There were no violations of any applicable environmental laws.
- § 293.50(2)(b) – Has been closed at least 10 years without the pollution of groundwater or surface water from acid drainage or the release of heavy metals: Yes. The operation closed in 1984; it has been closed more than 14 years. There have been no post-closure violations of any applicable environmental laws.
- § 293.50(2m)(a) – Not listed on the NPL: Yes. This site is not (and has not been) so listed.
- § 293.50(2m)(a) – Operator or successor still in business: Yes. ASARCO, Inc., owns the mine and was its operator. ASARCO is still in business.
- § 293.50(2m)(b) – Significant environmental pollution: None. Hydrological information demonstrates there has been no significant pollution of groundwater or surface water associated with this mine.

4.1.1 Project Overview

The ASARCO Sacaton mine is an open pit sulfide porphyry copper mine that operated from initial construction in 1972 until March 1984, when it was closed due to depletion of economic ore reserves. Although referred to by ASARCO as the Sacaton “Unit,” it is a discrete and geographically separate mine which was separately permitted. The term “Unit” refers only to the mine’s role as a part of ASARCO’s overall Arizona operations. The following descriptive information generally is taken from reference AS-40 [Appendix 4]¹³ and other public domain documents, as noted.

The mine is located approximately three air miles west of Casa Grande, Arizona, in Pinal County, and approximately 45 miles south-southeast of Phoenix (Figure 4-

¹³ Reference notations followed by “[Appendix 4]” included in the Appendix for this Section, which is bound with this report. All other numbered references are separately filed.



Location map of ASARCO Incorporated
Sacaton Unit

Figure 4-1

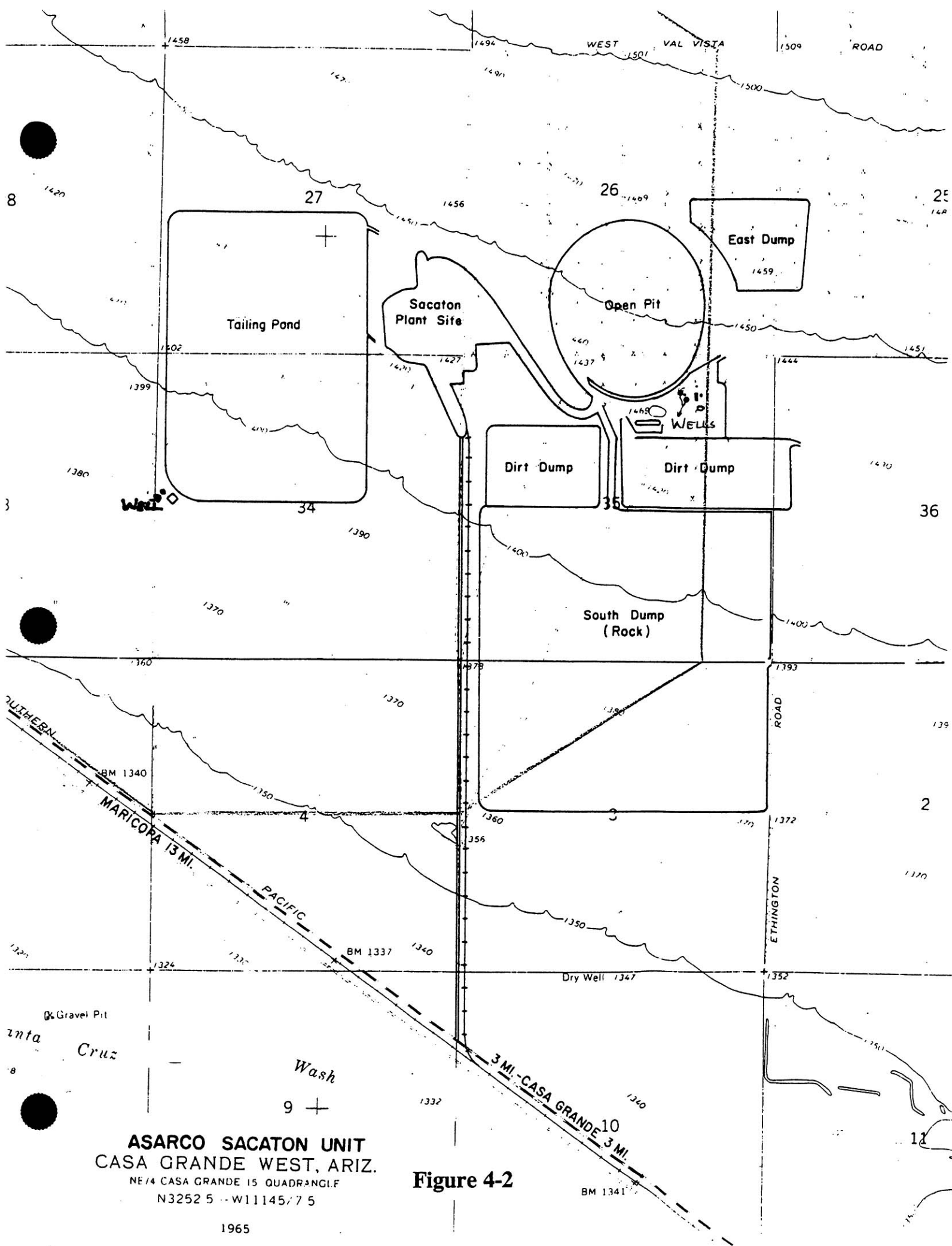
1). Ecologically, the site lies within the Sonoran Desert Section of the Basin and Range Lowlands Province of Arizona in the lower Santa Cruz Basin. As such, the area is characterized by broad, level valley plains, gently sloping pediments, and widely separated mountain ranges. Elevations at the mine vary from approximately 1360 feet msl to 1460 feet msl. Soils at the mine are Typic Natragids-Casa Grande Series, which originated from old, mixed alluvium and are classified as coarse loam in texture. Soils have very low levels of available plant nutrients. Climate at the mine is typical of the Sonoran Desert: temperatures ranging from 19° F to 117° F, with average annual precipitation of 8.6 inches, falling primarily in high-intensity, short-duration events. The mine site contains no surface water resources. Storm run-off waters from the site are drained toward the Santa Cruz River by minor tributaries to the Santa Rosa and Brawley washes. Groundwater flows generally are to the south and southwest and toward the open pit, which acts as a local sump (AS-10 [Appendix 4]).

The land areas south, southeast, and southwest of the mine support large-scale agricultural production, particularly cotton. Agriculture is the principal industry in the vicinity of the mine, although residential encroachment and development is now widespread in and around Casa Grande, a close distance to the east-southeast. Several large light-industrial facilities (including a Frito-Lay plant) have been constructed near the mine since it closed.

The Sacaton open-pit mine is roughly circular, and approximately 3,000 feet in diameter and 980 feet deep (AS-40 [Appendix 4]). During operation, the Sacaton mine consisted of the pit, crushing facilities and coarse ore stockpile, a flotation mill, a tailings disposal facility (TDF) that covered approximately 300 acres, a return water impoundment, an overburden dump, and a waste rock dump that covered approximately 500 acres. Ore reserves at the beginning of operations were estimated to be 33 million tons, and production from the open pit was approximately 11,000 tons per day (AS-42 [Appendix 4]). Although copper was the principal product from the mine, minor amounts of gold, silver, lead, zinc, and molybdenum also were produced.

Concentrates were sent by rail to the ASARCO smelter in El Paso, Texas. During the operating period, ASARCO sank a shaft just east of the pit in an attempt to access deeper ore reserves. Development of the underground mine was suspended, but the headframe remains at the site. Over the 15 years since mine closure, equipment and rolling stock have been removed from the site, the tailings disposal facility embankments have been covered with previously salvaged and stockpiled desert alluvial soil material and revegetated. Additional ASARCO mineral exploration on and around the site has occurred, and site security also has been maintained by full-time security employees.

A facility site map is included as Figure 4-2.



4.1.2 Information Reviewed

All pertinent documents on file at the Arizona Department of Environmental Quality (ADEQ)¹⁴ were examined. Because this mine was developed and closed before the enactment of Arizona's Aquifer Protection Permit regulations, those files do not contain the quantity of data typical for more recently permitted mines.

4.1.3 Agency Contacts

The following key individuals were contacted to obtain information for this submission:

NAME	AGENCY	PHONE	ADDRESS
Joanne Williams	Arizona Department of Environmental Quality ("ADEQ")	602-207-4700	3033 N. Central Ave. Phoenix, AZ 85012
Lowell Carty	Arizona Department of Environmental Quality, Superfund Unit	602-207-2300	3033 N. Central Ave. Phoenix, AZ 85012
Pamala Whitfield	Arizona Department of Environmental Quality Superfund Unit	602-207-4457	3033 N. Central Ave. Phoenix, AZ 85012
Nyal Niemuth	Arizona Department of Mines and Mineral Resources	602-255-3795	1502 W. Washington Phoenix, AZ 85012
Bill Hawes	Arizona Mine Inspector	602-542-5971	1700 W. Washington Phoenix, AZ 85012

4.2 Geologic Criteria

4.2.1 Sulfide Ore Body

ASARCO geologists first discovered the Sacaton mineral deposit in the early 1960s while examining an outcrop of leached capping composed of granite cut by several thin monzonite porphyry dikes (AS-40 [Appendix 4], AS-41, AS-42 [Appendix 4], AS-43). The nature of this original find indicated the likely presence of a porphyry copper-type ore body. Following this lead, ASARCO initiated a drilling program which defined copper mineralization zones. The zones were separated by the steeply dipping Sacaton fault. The

¹⁴ Prior to 1987, the ADEQ was known as the Arizona Department of Health Services (ADHS).

west zone contained the ore body which was ultimately accessed through the open pit. The deeper east zone was the target of the shaft referenced in Section 4.1.1.

The Oracle granite is intruded by monzonite and quartz monzonite porphyries within the ore bodies. These porphyries occur as monolithic breccias and mixed breccias as well as thin, well-defined dikes and large poorly defined dike-like intrusive masses. An irregular, pre-mineral breccia with fragments of granite intermixed within the porphyries occupied the center of the mined-out west ore body.

The Sacaton ore bodies exhibit extensive hydrothermal alteration. Alteration minerals include sericite, quartz, chlorite, biotite, and undifferentiated clays. The strongest alteration is coincident with the most intense sulfide mineralization.

As stated in AS-42:

“Hypogene sulfide mineralization (as pyrite, chalcopyrite, and molybdenite) occurs in veinlets, disseminations, and breccia cavity fillings. All pre-mineral rock types are mineralized. The total sulfide content varies from 1.5 percent to 4.0 percent by volume. The best hypogene mineralization occurs in an arcuate-shaped zone which underlies ore grade supergene mineralization. Within this zone the copper content averages over 0.40 percent as chalcopyrite and the pyrite ratio varies from 1:1 to 3:1.

“Supergene sulfides (chalcocite and minor covellite) occur as replacements of chalcopyrite and pyrite. Supergene mineralization in the west ore body (mined out) is irregular in thickness, configuration, grade, and continuity. The supergene blanket has a gentle to moderate northerly dip and varies in thickness from less than 50 feet on the margins to over 500 feet.”

4.2.2 Net Acid Generating Potential

The Sacaton mine was permitted, operated, and closed prior to enactment of the Arizona APP regulations in 1986, which require Arizona mining companies to obtain waste characterization data. Although the records and documents available for Sacaton, therefore, reflect little quantitative laboratory waste characterization data related specifically to acid rock drainage (ARD), they do offer extensive geological information which indicate the deposit has net acid generating potential (NAGP).

The most conclusive direct evidence of NAGP at the mine are data from analysis of water from the open pit, both during operations and two years following closure. When these data are compared with extensive groundwater monitoring beginning with background data collected in 1972, it is evident that the deposit has NAGP. Background groundwater quality and groundwater quality through operations and well into the closed period at Sacaton show pH ranges from 7.7 to 8.8 and specific conductivities in the 3400 to 6700 range, typical of regional groundwater quality in that part of Arizona (AS-22

[Appendix 4], AS-40 [Appendix 4]). Water quality in the open pit, however, is moderately to strongly acidic. A sample collected on July 10, 1979, during the operating period, had a pH of 3.8 and specific conductivity of 10,830 (AS-40 [Appendix 4]). Another sample collected on April 3, 1986, two years following closure, showed a pH of 4.1 and specific conductivity of 10,300 (AS-22 [Appendix 4]).

4.3 Ten-Year Operating and Ten-Year Closure Criteria

The Sacaton mine started construction in 1972 and operated until March 1984. The mine has been closed since then.

Mine planning and engineering were initiated in the late 1960s and early 1970s. The principal permit regulating Arizona mining, the Aquifer Protection Permit (APP), was established by rule under the Arizona Environmental Quality Act of 1986 (Arizona Revised Statutes, Title 49). Mining operations that were closed prior to 1986, including the Sacaton mine, were expressly grandfathered and are not subject to APP regulation (AS-6). Thus, the public information records on file with the Arizona Department of Environmental Quality/Mining Unit (ADEQ) are somewhat limited compared to more recently permitted mines.

The mine is located immediately adjacent to an important agricultural district and within sight of the city of Casa Grande, however, and was scrutinized closely during consideration of the site for conversion to a municipal landfill. Thus, had it caused any release of acid drainage or heavy metals to surface water or groundwater during its operational phase or since closure, it is implausible that ADEQ (then ADHS) personnel would not have made notations to that effect in the record. None were found.

ASARCO's mine planning included forethought for environmental considerations which were voluntary at the time, but would be requirements in today's regulatory climate. Early environmental considerations included installation of a groundwater monitoring well and analysis of groundwater quality prior to and during operations, analysis of pit water quality, design of the process water containment system and the tailings water return system to minimize seepage and percolation, revegetation planning and concurrent revegetation activities, and operation of the mine as a responsible corporate neighbor of Casa Grande (the mine employed approximately 400 people from the local area). In addition, in 1980, the mine conducted a comprehensive environmental assessment and hydrological study of the site and its environs in support of a Hazardous Waste Permit Application (AS-40 [Appendix 4]), which was required at that time by the State of Arizona. (This plan to designate and license mines as hazardous waste facilities was later discontinued.)

The TDF was designed to accept a slurry of 50 percent solids from the mill. Once in the TDF, solids settled and water was decanted through a decantation tower and underflow pipeline, and pumped back to the mill for reuse. According to the mine's Notice of Disposal (AS-39 [Appendix 4]), the decant system "...was installed to reclaim all water possible to protect the groundwater. Before operations began, a monitor well was drilled downstream of the disposal area so the effect of tailing water percolation could be evaluated."

AS-39 goes on to describe this monitor well which "...was drilled about 400' SW of the SW corner of the tailing dam...cased to a total depth of 400' with 8 5/8" casing, with perforations 155' to 400'. Alluvial gravel and clayey silt 0-135', conglomerate 135-400'." The static groundwater level was encountered at 201 feet.

A comparison of analytical data generated from the well in 1973 and from the tailing reclaim water in 1983 documents that the reclaim water was of much higher quality than the baseline groundwater (AS-39 [Appendix 4]). Sodium, sulfate, chloride, and total dissolved solids (TDS) levels in the reclaim water were significantly lower than background groundwater. Likewise, zinc, manganese, arsenic, total chromium, and lead were lower in the tailing reclaim water than in native groundwater.

The groundwater monitoring program at the mine began with analysis of groundwater prior to start of operations to determine background water quality. Beginning in 1975, groundwater was sampled biannually, once in January or February, and again in June or July. As stated in the report entitled, "Geology and Hydrology of ASARCO Sacaton Mine Unit, Pinal County, Arizona," Water Development Corporation, October 1980 (included as part of AS-40 [Appendix 4]):

"Comparison with the values (of the monitoring well) to the analyses of Casa Grande Ridge water and bedrock water (see Table 7 of report), and with samples from other wells completed in the Gasline conglomerate along the Casa Grande Ridge indicates the results of this sample are very representative of water along the ridge.

"The results of the biannual sampling indicates an overall improvement in water quality. Comparison of latest available analyses with the original analysis shows a decrease of 290 ppm in the sodium content, a decrease of 415 ppm in the bicarbonate, a 198 ppm decrease in chloride and the TDS content decreased from over 3000 ppm to approximately 2450 ppm, a decrease of 550 ppm.

"The water quality of the pond reclaim water is in fact of better quality than the native groundwater (see Table 8 of report), and seepage from the pond area would serve to improve local groundwater. The gradual improvement in water quality in the pond area is anticipated to continue at a very slow rate due to the comparatively small input from the pond area compared to the large volume of water stored in the conglomerate.

. . .

"The existing monitoring well is sited properly with respect to the position of the tailings pond. The data show that the monitor

well is functioning satisfactorily as a means of evaluating the pond seepage.”

The mine has been officially closed since March 29, 1984 (AS-5, AS-6, and others). In 1985, ASARCO determined that the closed facility might have ongoing value as a non-hazardous solid waste landfill for the greater Phoenix area. Accordingly, ASARCO submitted a landfill permit application to the ADEQ (then the Arizona Department of Health Services [ADHS]) (AS-38). Submittal of that application initiated a lengthy permitting and public review process. Information pertaining to the landfill permit is combined with the mining information in the public files at the ADEQ (AS-9 through AS-38). While the ADEQ believed that the landfill was permissible, local public opposition, including that from local governments, persuaded ASARCO to drop the landfill idea in late 1987 and prior to submittal of additional quantitative hydrological data.

There is no surface water resource on, or even near, the mine site. According to the Water Development Corporation report included in AS-40:

“Prior to development of the mine facilities, the area now occupied by the mine was crossed by a few poorly developed drainage (surface water) courses. The area drained by these features included approximately 3.5 square miles on the southern flank of the Sacaton Mountains. Given the small area drained by these features, and the low regional precipitation, these drainage features provide no dependable source of surface water, and very little flood potential. These features have been diverted around the mine facilities.”

Considerable data relative to groundwater was developed during the operational period of the mine and during the preliminary phase of permitting the site as a landfill following cessation of mining. According to information contained in the report entitled, “Groundwater Quality Protection Permit Application Proposal, ASARCO Sacaton Pit, Pinal County, Arizona,” Errol L. Montgomery & Associates, Inc., 1986 (AS-35 [Appendix 4]):

“Site conditions that would minimize impact on groundwater at the proposed landfill (the Sacaton pit) include: dry climate; easily controlled ephemeral surface water runoff; dewatered conditions in unconsolidated rocks and low permeability conditions in the underlying consolidated rocks penetrated by the pit; small groundwater inflow from the pit walls; an upward hydraulic gradient in the groundwater system below the mine pit; and naturally occurring poor chemical quality of groundwater.

. . .

“The mine pit penetrates the alluvial deposits, the conglomerates, and the top of the intrusive igneous rocks. A deep mine shaft located a few hundred feet southeast from the pit encountered

nearly dry conditions from surface to a depth of 1235 feet, which is about 200 feet below the bottom of the mine pit. Reports indicate that small amounts of groundwater seep from the pit walls [estimated at 2 to 32 gallons per minute, as noted in AS-10]. Tests indicate low permeability for the alluvial deposits and conglomerates. Permeability of the intrusive igneous rocks is low.

“The mine pit occurs over the Casa Grande Ridge, a bedrock high which extends south from the Sacaton Mountains. In the mine pit area, the contact between the basement rock complex and the overlying rock units is a low-angle, shaley fault zone, which is believed to function, together with overlying rocks, as a confining unit to groundwater flow. Two boreholes drilled downward from the base of the shaft, when the shaft was at a depth of 1224 feet, encountered groundwater. [Soon thereafter, this shaft produced artesian flows and filled with about 800,000 gallons of groundwater (AS-10).] Shut-in pressures on the boreholes were approximately 350 to 400 pounds per square inch (809 to 924 feet of head).”

(These high pressures imply strong upward head on the water in the pit, precluding any downward migration of contaminants.)

The information and data available relative to site geo-hydrological conditions demonstrate that the pit acts as a hydrologic sump, intercepting groundwater from the surrounding conglomerate and mineralized igneous rocks (AS-10 [Appendix 4]). Since there is no outflow from the pit, the water level is maintained by evaporation.

There are no records of any violations of applicable environmental laws, or of related enforcement or compliance actions, orders or agreements relating to acid drainage or the release of heavy metals either during the 12 years of operations or during the 14.5 years since the mine has been closed. Likewise, there is no historical information of any releases to the environment of acid drainage or heavy metals during either the period of operation or of closure.

4.4 Responsible Party Criteria

The mine was and is wholly owned by:

ASARCO, Inc.
180 Maiden Lane
New York, New York 10038
(212) 510-2014

Arizona operations, active and closed, are managed from ASARCO's office in Tucson, Arizona:

ASARCO, Inc.
Copper Operations
P.O. Box 5747
Tucson, Arizona 85703
(520) 798-7700

ASARCO, Inc. is a large and diversified mining and smelting company, which has been in operation in Arizona since the turn of the century.

The Sacaton mine is not, nor has it been, a Superfund site listed on the National Priorities List (NPL). The site was assigned a CERCLA Information System (CERCLIS) EPA identification number (AZD068397728) in 1980, when all large mining sites in Arizona were being classified by the Environmental Protection Agency (EPA). After a preliminary investigation, however, the site was removed from the CERCLIS in late 1986.

4.5 No Significant Environmental Pollution

As discussed previously, regional groundwater generally is of naturally poor quality (AS-22 [Appendix 4]). Groundwater data from the groundwater monitoring well located downgradient of the tailings disposal facility (Figure 4-2) demonstrate that groundwater quality during operations actually improved over the background data collected in 1973 prior to operations (AS-40 [Appendix 4]).

The Hexcel Corporation ("Hexcel") in Casa Grande, Arizona, maintained a 2.5-acre industrial waste disposal site located approximately 0.75 mile directly south of the mine (ASH-1 [Appendix 4]). In 1982, this site was found by the state to contain soil contaminated by chromium wastes (ASH-2). Since 1982, the site has been fully remediated under a Consent Order between Hexcel, the Arizona State Land Department ("ASLD"), and ADEQ (ASH-2). Although neither Hexcel nor this site is associated with either ASARCO or the Sacaton mine, it is helpful to understand why the Hexcel site is mentioned in mine-related files.

In 1967, Hexcel acquired a state lease to utilize a small constructed pond on this site to dispose of liquid chromium wastes (ASH-1, ASH-2, and ASH-3). Hexcel ceased disposal activities at this site in 1972 (ASH-10). In 1972, ASARCO leased surrounding lands

from the state as part of the Sacaton mine site development (ASH-11 [Appendix 4]). In obtaining this lease, ASARCO completed a legal lease exchange with Hexcel, wherein the small Hexcel site was incorporated into the larger ASARCO lease in exchange for certain considerations (*Id.*). In 1981, the ASLD severed the Hexcel site from the ASARCO leases. This lease arrangement was ASARCO's only tie to the site. As stated in ASH-11, "ASARCO never associated itself with the disposal or release of any hazardous substances on or from the site (Hexcel)."

In early 1992, a groundwater monitoring well on the Hexcel site revealed traces of chromium, selenium, and arsenic. There was (and is) no evidence that those contaminants were in any way related to the mine. Nonetheless, the Remedial Projects Unit (RPU) of ADEQ inquired of the ADEQ APP supervisor as to whether an APP existed for the Sacaton mine and, if so, whether groundwater information was available, since the mine was located nearby and generally upgradient of the Hexcel site (AS-7). The ADEQ APP supervisor responded that the mine did not have (nor was it required to have) an APP since it was considered officially closed on March 29, 1984, prior to inception of the APP program (AS-6 [Appendix 4]).

The record reveals no further internal or external correspondence regarding this matter. However, the 1992 report (ASH-5 [Appendix 4]) on groundwater monitoring at the Hexcel site (which raised this issue) also stated, "Montgomery and Associates identified five wells or mineral boreholes in the region in which arsenic levels in the groundwater were equal to or greater than ADEQ's MCL for drinking water (1986)." This citation (data presented in AS-22 [Appendix 4]) is the regional groundwater study performed for ASARCO during the initial permitting process for the proposed use of the Sacaton pit as a landfill. ASH-5 goes on to state, "The lateral extent of elevated levels of arsenic in the groundwater indicates that the arsenic does not have a local source." Both the Hexcel report (ASH-5 [Appendix 4]) and the Montgomery and Associates data (AS-22) conclude that regional native groundwater is highly mineralized.

The Sacaton mine has caused no significant environmental pollution from acid drainage or heavy metals release. The public records located at the Arizona DEQ, Mining Unit, provide no evidence whatsoever of any significant environmental pollution *of any type* from the mine either during operations or since the mine closed.

4.6 Assessment of Technology

From the perspective of environmental technology, the Sacaton mine was advanced for the time in which it was designed and operated. Although the mine was developed and operated prior to enactment of Arizona's major environmental legislation (Arizona Environmental Quality Act of 1986), ASARCO voluntarily incorporated then state-of-the-art environmental safeguards into the operation. Many of those elements are still considered standard concepts in planning, permitting, developing, and operating mines in the 1990s. To a larger and more sophisticated extent, many of those same concepts and technologies are also incorporated into the Crandon mine design. The environmental technologies used at Sacaton included:

- Groundwater monitoring down-gradient of the tailings impoundment;
- Collection and analysis of groundwater quality data prior to and during operations;
- Collection and analysis of pit water quality data;
- Diversion of run-on surface water around or away from facility components;
- Design of the tailings water return and the process water containment systems to minimize seepage and percolation, and to protect groundwater by incorporating steel in concrete piping and soil sealants over compacted soil bases;
- Use of bentonite to seal settling ponds and basins;
- Preparation of emergency spill response planning;
- Preparation of a mine site reclamation plan prior to the promulgation of reclamation legislation by the State of Arizona; and
- Concurrent and post-closure reclamation of the tailings impoundment embankments, waste rock disposal areas, and other sites by placement of growth media and the reestablishment of compatible vegetation, including trees and shrubs.

These methods and technologies have worked successfully for the Sacaton mine, as evidenced by the fact that during the operation period, and to date since closure, there have been no incidents of pollution of surface waters or groundwater attributable to the mine.

4.7

References (Items shown in boldface are included in Appendix 4. All other listed references have been separately filed with the WDNR.)

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
AS-1	ADEQ	Site Map	ASARCO Sacaton Unit	ASARCO/USGS	File	unk.	Site map on USGS Casa Grande West Quad
AS-2	ADEQ	Memo	Agency notice	Chet Oakley, Geologist AZ State Land Dept.	Multiple agencies	01/17/97	Clarification regarding request to renew State Mining Lease No. 11-35917 adjacent to Sacaton Unit.
AS-3	ADEQ	Memo	ASARCO Sacaton Mine	Dennis Turner	Jean Metzler, ADEQ	01/17/97	Hand written instructions for filing Sacaton info.
AS-4	ADEQ	Memo/Lease Application	Agency notice	Chet Oakley, Geologist AZ State Land Dept.	ADEQ	01/13/97	Notice and ASARCO application to renew State Mining Lease No. 11-35917. Request for comments.
AS-5	ADEQ	ADEQ Form	APP Program Facility Change	ADEQ	File	07/08/94	Change to activation of file. Info. on facility status and closed date.
AS-6	ADEQ	Memo	ASARCO Sacaton Unit	Roger Kennett, ADEQ	Lowell Carty, ADEQ	02/09/92	Response to AS-7 memo stating that Sacaton closed 3/29/84, is considered a closed facility and is exempt from APP program.
AS-7	ADEQ	Memo	Status of ASARCO Sacaton	Lowell Carty, ADEQ	Roger Kennett, ADEQ	01/24/92	Request for status and info regarding Sacaton and APP Permit.
AS-8	ADEQ	Invoice	APP Annual Registration Fee Inv.	ADEQ	ASARCO Sacaton	12/13/91	APP Fee invoice. Returned w/o payment as exempt - ceased operations prior to 1986 (date on which APPs required).
AS-9	ADEQ	Memo	ASARCO Sacaton - Landfill	Rob Larson, ADEQ	Debra Daniel, ADEQ	08/03/87	Request for comments re: landfill proposal report.
AS-10	ADEQ	Letter	ASARCO Sacaton Open Pit Mine	Errol L. Montgomery	Rob Larson, ADEQ	07/30/87	Response to ADEQ request regarding groundwater monitoring wells and monitoring program for landfill proposal.
AS-11	ADEQ	Letter	Draft: Sacaton Open Pit Mine	Errol L. Montgomery	Rob Larson, ADEQ	07/14/87	Draft of AS-10 letter. No new information.
AS-12	ADEQ	Letter	ASARCO Sacaton Open Pit Mine	Rob Larson, ADHS	Verle C. Martz, ASARCO	03/20/87	ADHS position that landfill proposal was permissible based on ASARCO preliminary report on hydrogeologic conditions.
AS-13	ADEQ	Memo	ASARCO Sacaton Open Pit Mine	John Robertson, ADHS	Rob Larson, ADHS	03/02/87	Internal ADHS (ADEQ) review of ASARCO preliminary report on hydrogeologic conditions relative to landfill permit application.
AS-14	ADEQ	Letter	Opposition to ASARCO landfill Proposal at Sacaton.	Casa Grande Branch of American Association of University Women	Licensing Div., ADHS	02/12/87	General letter in opposition to ASARCO proposal to use the Sacaton pit for a solid waste landfill.
AS-15	ADEQ	Agenda	Public forum format	Rob Larson, ADHS notes	Public audience	01/20/87	Agenda and notes for presentation at a public meeting.
AS-16	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniels, ADHS	01/06/87	Internal memo regarding request of Casa Grande City Council.
AS-17	ADEQ	Memo	Sacaton Unit; Open Pit Landfill	Rob Larson, ADHS	Skip Hellerud, ADHS	12/31/86	Internal ADHS status report on landfill proposal permit application.
AS-18	ADEQ	Memo	ASARCO Sacaton	Norm Weiss, ADHS	Chuck Anders, ADHS	12/30/86	Internal memo regarding briefing of Senator Alan Stephens.
AS-19	ADEQ	Newspaper	Hole Hog: Pit May become Landfill	Phyllis Gillespie, Arizona Republic	Public	12/29/86	Newspaper article regarding the ARASCO landfill proposal.
AS-20	ADEQ	Letter	ASARCO landfill proposal	Jean Simmons	Rob Larson, ADHS	12/19/86	Letter in opposition to landfill proposal.
AS-21	ADEQ	Memo	Landfill permit application meeting	Rob Larson, ADHS	Debra Daniel/Barry Abbott, ADHS	12/01/86	Agenda for ASARCO landfill permit application meeting.
AS-22	ADEQ	Letter	ASARCO submittal of hydro repts.	T.E. Scartaccini, ASARCO	A.O. Hellerud, ADHS	11/24/86	Submittal of ASARCO hydrogeological reports. GW quality data attached to this letter in ADEQ file.
AS-23	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniel, ADHS	11/19/86	Internal memo regarding scheduling of Casa Grande meeting.
AS-24	ADEQ	Letter	ASARCO	A. Thomas Cole, Cole & O'Neil, attorneys	Pat Nowack, ADHS	11/17/86	Payment for copies of documents.

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
AS-25	ADEQ	Letter	Request for documents clarification	A. Thomas Cole, Cole & O'Neil, attorneys	Pat Nowack, ADHS	11/10/86	Clarification regarding request for landfill related documents.
AS-26	ADEQ	Memo	Casa Grande City Council Meeting	Rob Larson, ADHS	Debra Daniels, ADHS	10/23/86	Scheduling of Casa Grande City Council meeting.
AS-27	ADEQ	Letter	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	City of Casa Grande	10/10/86	Letter of explanation of landfill status and permitting process.
AS-28	ADEQ	letter	Casa Grande Council Resolution	Jimmie Kerr, Mayor	ADHS	09/25/86	Letter and City Council Resolution in opposition to landfill prop.
AS-29	ADEQ	Memo	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Chuck Anders, ADHS	09/17/86	Internal memo discussing status report of landfill permit.
AS-30	ADEQ	Draft letter	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	City of Casa Grande	09/03/86	Draft letter re: status of landfill and permit process to Casa Grande.
AS-31	ADEQ	Letter	ASARCO Sacaton Mine/Landfill	William Baker, esq. Ellis, Baker, Lynch...	Lloyd Novick, ADHS	08/21/86	Maricopa-Stanfield I&DD opposition to landfill proposal.
AS-32	ADEQ	Letter/memos	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Errol Montgomery	08/20/86	Notice to ASARCO consultant regarding review of reports.
AS-33	ADEQ	Letter/attachs.	Sacaton Unit, Open Pit Landfill	Rob Larson, ADHS	Errol Montgomery	07/28/86	Notice to ASARCO consultant regarding review of NOD.
AS-34	ADEQ	Letter/NOD	Notice of Disposal	T.E. Scartaccini, ASARCO	A.O. Hellerud, ADHS	07/23/86	Notice of Disposal regarding the landfill proposal to initiate process. Attached is ambient groundwater data and quad map.
AS-35	ADEQ	Report	Groundwater Quality Protection Permit Application Proposal ASARCO Sacaton Pit	Errol L. Montgomery & Associates, Inc.	ADHS	06/16/86	Preliminary report on proposal for conducting GW studies.
AS-36	ADEQ	Memo	ASARCO's Landfill Permit Appl.	A.J. Gordon, ADHS	Arthur O. Hellerud, ADHS	01/22/86	Internal memo re: shortcomings in ASARCO landfill permit appl.
AS-37	ADEQ	Memo	ASARCO Proposal	A.J. Gordon, ADHS	Skip Hellerud, ADHS	10/25/85	Internal memo re: ADHS review of ASARCO landfill proposal.
AS-38	ADEQ	Letter	Proposal for Permit Application	B.K. Malone, ASARCO	Arthur Hellerud, ADHS	10/18/85	ASARCO proposal for landfill permit for Sacaton open pit.
AS-39	ADEQ	Letter/NOD	Notice of Disposal - Sacaton Unit	T.E. Scartaccini, ASARCO	Lyndon Hammon, ADHS	01/10/85	ASARCO Sacaton Unit Notice of Disposal and pre-mine GW data.
AS-40	ADEQ	Report/Appl.	Hazardous Waste Facility Permit Application to ADHS. Includes rept: Geology and Hydrology of ASARCO Sacaton Mine Unit, Pinal County, Arizona by Sheldon Clark	ASARCO Sacaton Unit	ADHS	10/17/80	Permit application relative to site mining operations. Much data. Geology and hydrology data from 1980 included. This is the principal document regarding the mine and mining operation. Also includes facility design/construction drawings.
AS-41	USGS	CD ROM	Mineral Resources Data System	USGS	n/a	06/01/96	General information for all US mines.
AS-42	CSM	Publication	The Sacaton Porphyry Copper Deposit In: Guidebook to the Geology of Central Arizona. 1978. p.83-84.	Robert B. Cummings	n/a		Overview of the geology of the Sacaton Mine site geology.
AS-43	CSM	Publication	Geology of the Sacaton Porphyry Copper Deposit, Pinal County, Arizona In: Advances in Geology of the Porphyry Copper Deposits, Southwestern North America. 1982. Univ. of Arizona Press. pages 507-521.	Robert B. Cummings	n/a		Definitive description of the Sacaton Mine geology.
ASH-1	ADEQ	Q&A doc.	Hexcel Chromium Disposal Site	ADEQ	n/a	02/17/93	Questions and answers regarding the Hexcel site.
ASH-2	ADEQ	Legal doc.	Consent Order	ADEQ	Hexcel Corporation	04/30/95	Consent Order file re: Hexcel cleaning up its disposal site.
ASH-3	ADEQ	Report	Risk Assessment/Hexcel Chromium Site, Casa Grande, Arizona	AZ Dept. Health Services	ADEQ	10/15/92	Human health risk assessment report for Hexcel disposal site.
ASH-4	ADEQ	Report	Summary of Remedial Investigation Documents and Remedial Action Plan Requirements for the Hexcel Corporation	Hydro Geo Chem, Inc.	Hexcel Corporation	12/22/92	Summary of actions at Hexcel site.

Ref. No.	File/ Publication Source	Type	Title	Author	To	Date	Remarks
			Disposal Site near Casa Grande, Arizona				
ASH-5	ADEQ	Report	Well Installation and Groundwater Monitoring Results at the Abandoned Chromium Disposal Site, Casa Grande, Arizona	Hydro Geo Chem, Inc.	Hexcel Corporation	10/30/92	Groundwater monitoring information and data.
ASH-6	ADEQ	Report	Groundwater Monitoring Results for September 1992 at the Hexcel Abandoned Chromium Disposal Site, Casa, Grande.	Hydro Geo Chem, Inc.	Hexcel Corporation	12/07/92	Groundwater monitoring information and data.
ASH-7	ADEQ	Memo	Possible Imminent Health Threat...	Dean Moss, ADHS	Tibaldo Canez, ADHS	01/30/81	Internal notice of discovery of the site.
ASH-8	ADEQ	Letter Rept.	Prelim. Results of Remediation.	Hydro Geo Chem, Inc.	Ron Miller, ADHS	06/06/85	Short report on preliminary remediation efforts at the site.
ASH-9	ADEQ	Memo	Hexcel Chromium Disposal Site	Dale Anderson, ADHS	Wes Shoner, ADHS	08/20/85	Regulatory interpretation of Hexcel site.
ASH-10	ADEQ	Legal memo	Hexcel Corporation's Chromium Site	David P. Kimball, III	Hexcel Corporation	05/01/87	Internal legal opinion (to Hexcel) regarding the Hexcel site.
ASH-11	ADEQ	Letter	Hexcel Corporation's Chromium Site	T.Scartaccini, ASARCO	Norm Weiss, ADEQ	03/02/88	ASARCO position regarding the Hexcel Site.
ASH-12	ADEQ	Legal memo	ASLD Liability on Hexcel Cleanup...	K.L. Mead, AZ ATG	ASLD	05/18/98	Legal position of Arizona State Land Dept. re: Hexcel Site.
ASH-13	ADEQ	Leases	ASDL State Leases to Hexcel	n/a	n/a	n/a	Copies of ASDL leases to Hexcel.