UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Ramm Power Group LLC Project No. 14869-000

NOTICE OF INTENT TO FILE APPLICATION FOR
Original FERC LICENSE

Pursuant to 18 C.F.R. § 5.5, Ramm Power Group LLC notifies the Federal Energy Regulatory Commission of its intention to file an Application for an Original License for the Sacaton Pumped Hydro Storage Project, Project No. 14869-000.

The following information is provided consistent with the requirements of 18 C.F.R. § 5.5.

The exact name and business address of the applicant(s) is:

Applicant's Name:	Ramm Power Group LLC
Address:	7425 East Columbia Drive Spokane Washington 99212

Project Number:
The FERC Project No. is 14869-000

Unequivocal Statement of Intent:
Ramm Power Group LLC intends to file an application for an original license for the Project utilizing the Commission's Traditional Licensing Process. (See attached Justification)

Type of Principal Project Works to be Licensed:

Location of the Project:

State or Territory:	Arizona
County:	Pinal
Township or nearby town:	Casa Grande

The installed capacity of the project is: 160 MW

Names and Mailing Addresses of Entities Listed in 18 C.F.R. § 5.5(b)(8):
Please see the Initial Consultation Contact List to get the names and addresses of Federal, state, and interstate resource agencies, Indian tribes, and members of the pubic

likely to be interested your project. If one of the categories listed in (a) through (f) does not apply to your project, say so and explain why.

(a) The County in which the Project is located, and in which any Federal Facility that is used or to be used by the Project is located:

County Name: Pinal County
Address: 31 N. Pinal Street
Florence Arizona 85132

(b) Each city or town in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

City/Town Name: Casa Grande
Address: 510 E. Florence Blvd.
Casa Grande Arizona 85122

(c) Each city or town that has a population of 5,000 or more people and is located within 15 miles of the existing Project dams:

City/Town Name: Casa Grande
Address: 510 E. Florence Blvd.
Casa Grande Arizona 85122

(d) Each irrigation district, drainage district, or similar special purpose political subdivision in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

Irrigation District Name: San Carlos Irrigation and Drainage District
Address: 120 S. 3rd St.
Collidge, Az 85128

Drainage District Name: City of Casa Grande Wastewater Treatment Plant
Address: 1194 W. Kortsen Road
Casa Grande AZ 85122

(e) Each irrigation district, drainage district, or similar special purpose political subdivision that owns, operates, maintains, or uses any Project facility or any Federal facility that is or is proposed to be used by the Project: **NA**

Name: SRP Desert Basin Generating Station
Address: 1872 N Burris Rd, Casa Grande, AZ 85193

(f) Every other political subdivision in the general area of the Project that there is reason to believe would likely be interested in, or affected by, this notification.

Political Subdivision Name: Arizona City
Address: 1Main Street
Arizona City, Az 85123

(g) Affected Indian Tribes.

Indian Tribe Name: Ak Chin Indian Community Council
Address: Chairman
42507 W. Peters & Nall Road
Maricopa AZ 85239

Indian Tribe Name: Cocopah Tribal Council
Address: Chairperson
County 15th & Avenue G
Somerton AZ 85350

Indian Tribe Name: Colorado River Tribal Council
Address: Chairman
Rt. 1 Box 23-B
Parker AZ 85344

Indian Tribe Name: Fort McDowell Yavapai Tribal Council
Address: President
P.O. Box 17779
Fountain Hills AZ 85268

Indian Tribe Name: Gila River Indian Community Council
Address: Governor
P.O. Box 97
Sacaton AZ 85247

Indian Tribe Name: Havasupai Tribal Council
Address: Chairperson
P.O. Box 10

Supai AZ 86435

Indian Tribe Name: Hopi Tribal Council
Address: Chairman
P.O. Box 123
Kykotsmovi AZ 86039

Indian Tribe Name: Hualapai Tribal Council
Address: Chairperson
P.O. Box 179
Peach Springs AZ 86434

Indian Tribe Name: Hualapai Tribe
Address: P.O. Box 310
Peach Springs AZ 86434

Indian Tribe Name: Kaibab Paiute Tribal Council
Address: Chairperson
HC65 Box 2
Fredonia AZ 86022

Indian Tribe Name: Navajo Nation
Address: President
P.O. Box 9000
Window Rock AZ 86515

Indian Tribe Name: Navajo Nation
Address: Historic Preservation Department
P.O. Box 4950
Window Rock AZ 86515

Indian Tribe Name: Pascua Yaqui Tribal Council
Address: Chairman
7474 S. Camino de Oeste
TucsonAZ 85746

Indian Tribe Name: Quechan Tribal Council
Address: President
P.O. Box 1899
Yuma AZ 85366

Indian Tribe Name: Salt River Pima-Maricopa Indian Community-Council
Address: President

10005 E. Osborn
Scottsdale AZ 85256

Indian Tribe Name: San Carlos Tribal Council
Address: Chairman
P.O. Box 0
San Carlos AZ 85550

Indian Tribe Name: San Juan Southern Paiute Council
Address: President
P.O. Box 1989
Tuba City AZ 86045

Indian Tribe Name: Tohono O'odham Nation
Address: Chairman
P.O. Box 837
Sells AZ 85634

Indian Tribe Name: Tonto Apache Tribal Council
Address: Chairperson
Tonto Reservation #30
Payson AZ 85541

Indian Tribe Name: White Mountain Apache Tribal Council
Address: Chairman
P.O. Box 700
Whiteriver AZ 85941

Indian Tribe Name: Yavapai-Apache Community Council
Address: Chairman
2400 W. Datsi St.
Camp Verde AZ 86322

Indian Tribe Name: Yavapai-Prescott Board of Directors
Address: President
530 E. Merritt Street
Prescott AZ 86301

Indian Tribe Name: Pima Maricopa Indian Community
Address: 10005 E. Osborn Rd.
Scottsdale, AZ 85256

(h) Other interested agencies or stakeholders.

Federal Agency Name: Advisory Council on Historic Preservation
Address: Executive Director
401 F Street NW Suite 308
Washington DC 20001-2637

Federal Agency Name: Bureau of Indian Affairs
Address: Regional Director
U.S. Department of the Interior
400 North 5th Street
Phoenix AZ 85004

Federal Agency Name: Bureau of Indian Affairs
Address: U.S. Department of the Interior
Regional Director
P.O. Box 1060
Gallup NM 87305

Federal Agency Name: Bureau of Indian Affairs
Address: U.S. Department of the Interior
Director
1849 C Street NW
MS 2624 MIB
Washington DC 20240

Federal Agency Name: Federal Emergency Management Agency
Address: Regional Administrator
1111 Broadway Suite 1200
Oakland CA 94607-4052

Federal Agency Name: Federal Emergency Management Agency
Address: Director
500 C Street SW
Washington DC 20472

Federal Agency Name: Federal Energy Regulatory Commission
Address: Division of Dam Safety and Inspections
Regional Engineer
901 Market Street Suite 350
San Francisco CA 94103

Federal Agency Name: National Park Service
Address: U.S. Department of the Interior
Regional Director
12795 Alameda Parkway
Denver CO 80225

Federal Agency Name: National Park Service
Address: U.S. Department of the Interior
Director
1849 C Street NW
Washington DC 20240

Federal Agency Name: Naval Seafloor Cable Protection Office
Address: Naval Facilities Engineering Command
NAVFACOFP/C
1322 Patterson Ave SE Suite 1000
Washington DC 20374-5065

Federal Agency Name: Office of Senator Dyrsten Sieema U.S. Senator
Address: 317Hart Senate Office Building
Washington DC 20510

Federal Agency Name: Office of Senator Martha McSally U.S. Senator
Address: 404 Russell Senate Office Building
Washington DC 20510

Federal Agency Name: U.S. Army Corps of Engineers
Address: District Engineer 1325 J Street
Sacramento CA 95814-2922

Federal Agency Name: U.S. Army Corps of Engineers
Address: District Engineer
P.O. Box 2711
Los Angeles CA 90053-2325

Federal Agency Name: U.S. Army Corps of Engineers
Address: Commander
441 G Street NW
Washington DC 20314

Federal Agency Name: U.S. Army Corps of Engineers

Address: Division Commander
1455 Market St
San Francisco CA 94103-1398

Federal Agency Name: U.S. Bureau of Land Management
Address: U.S. Department of the Interior
Director
1849 C Street NW MIB 5655
Washington DC 20240

Federal Agency Name: U.S. Bureau of Land Management
Address: U.S. Department of the Interior
State Director
One North Central Avenue Suite 800
Phoenix AZ 85004-2203

Federal Agency Name: U.S. Bureau of Reclamation
Address: U.S. Department of the Interior
Commissioner
1849 C Street NW
Washington DC 20240

Federal Agency Name: U.S. Bureau of Reclamation
Address: U.S. Department of the Interior
Regional Director
125 South State Street Room 6107
Salt Lake City UT 84138-1102

Federal Agency Name: U.S. Bureau of Reclamation
Address: U.S. Department of the Interior
Regional Director
P.O. Box 61470
Boulder City NV 89006-1470

Federal Agency Name: U.S. Coast Guard Navigation Standards
Address: Division Commandant (CG-5533)
2100 2nd St. SW Stop 7580
Washington DC 20593-7580

Federal Agency Name: U.S. Department of Agriculture - Forest Service
Chief
1400 Independence Ave SW
Washington DC 20250-0003

Federal Agency Name: U.S. Department of Agriculture - Forest Service

Address:	Regional Forester 333 Broadway SE Albuquerque NM 87102
Federal Agency Name:	U.S. Department of Commerce
Address:	Office of the Secretary Secretary 1401 Constitution Avenue NW Washington DC 20230
Federal Agency Name:	U.S. Environmental Protection Agency
Address:	Region 9: Environmental Review Office 75 Hawthorne Street San Francisco CA 94105
Federal Agency Name:	U.S. Environmental Protection Agency
Address:	Administrator Ariel Rios Building 1200 Pennsylvania Ave NW Washington DC 20460
Federal Agency Name:	U.S. Fish and Wildlife Service
Address:	Regional Director 500 Gold Avenue SW P.O. Box 1306 Albuquerque NM 87102
Federal Agency Name:	U.S. Fish and Wildlife Service
Address:	Arizona State Office Field Supervisor 2321 W. Royal Palm Road Suite 130 Phoenix AZ 85021
Federal Agency Name:	U.S. Fish and Wildlife Service
Address:	U.S. Department of the Interior Director 1849 C Street NW Room 3238 Washington DC 20240-0001
Federal Agency Name:	U.S. Forest Service
Address:	1400 Independence Avenue SW Washington DC 20250-0003
Federal Agency Name:	United States Geological Survey

Address: Regional Director
345 Middlefield Road
Menlo Park CA 94025

Federal Agency Name: United States Geological Survey
Address: U.S. Department of the Interior
Director
12201 Sunrise Valley Dr
Reston VA 20192

State Agency Name: Arizona Cooperative Extension
Address: University of Arizona
Director
Forbes Building Room 301
Tucson AZ 85721-0036

State Agency Name: Arizona Cooperative Fish and Wildlife Research - Unit
Address: State of Arizona
Leader
104 Biological Sciences East Building
University of Arizona
Tucson AZ 85721-0001

State Agency Name: Arizona Game and Fish Department
Address: Director
5000 W. Carefree Highway
Phoenix AZ 85086-5000

State Agency Name: Arizona State Land Department
Address: Natural Resources Division
Director
1616 W Adams St
Phoenix AZ 85007-2614

State Agency Name: Arizona State Parks

Address: SHPO
1300 West Washington
Phoenix AZ 85007

State Agency Name: Commerce and Economic Development Division
Address: Arizona Department of Commerce
1700 W Washington St Suite 600
Phoenix AZ 85007

State Agency Name: Department of Environmental Quality
Address: Northern Regional Office
1801 W. Route 66 Suite 117
Flagstaff AZ 86001

State Agency Name: Department of Environmental Quality
Address: Director
Phoenix Main Office
1110 W Washington St
Phoenix AZ 85007

State Agency Name: Department of Environmental Quality
Address: Southern Regional Office
400 W. Congress Suite 433
Tucson AZ 85701

State Agency Name: Office of the Attorney General
Address: Attorney General
1275 W. Washington Street
Phoenix AZ 85007

State Agency Name: Office of the Governor
Address: Governor
1700 West Washington
Phoenix AZ 85007

Public Member Name: American Canoe Association
Address: Executive Director
1340 Central Blvd. Suite 210
Fredericksburg VA 22401

Public Member Name: American Rivers
Address:1101 14th St. NW Suite 1400
Washington DC 20005

Public Member Name:	American Whitewater
Address:	Executive Director P.O. Box 1540 Cullowhee NC 28723
Public Member Name:	Trout Unlimited
Address:	227 SW Pine Street Suite 200 Portland OR 97204

Letter Requesting Use of the Traditional Licensing Process

January 15, 2020

Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Subject: Request for Approval to Use the Traditional Licensing Process for the Sacaton Pumped Hydro Storage Project; **Project No. 14869-000**

Dear Secretary:

Pursuant to Section 5.3 of the Commission's regulations, 18 CFR § 5.3, **Ramm Power Group LLC** hereby requests use of the Traditional Licensing Process ("TLP") for the licensing of the **Sacaton Pumped Hydro Storage Project**. Concurrent with this filing, but under separate cover, Ramm **Power Group LLC** is filing its Notification of Intent and Pre-Application Document for the Project.

We address below the following considerations to justify our request to use the TLP.

Likelihood of Timely License Issuance [18 CFR § 5.3(c)(1)(ii)(A)]

The TLP would be the most expeditious process for this project in that the strict schedule of the ILP will not apply so that Ramm can move through pre-filing process quicker and have time to develop a settlement agreement with interested parties as the TLP is a notice-and-comment process.

This project will consist of two 80 MW Ternary Pump Storage Turbines. The project capabilities will be 160 MW for 12 hours.

The site is be located at an existing open pit mine with the pump storage plant utilizing an existing 1200' deep open pit mine for the lower reservoir and an adjacent plateau for the upper reservoir location.

A transmission interconnection is planned to a local utility and discussions are progressing to that end. Impact to undisturbed land should be minimal as the entire project, except transmission lines, is located on land previously impacted by mining activities.

Penstocks connecting the upper reservoir with the lower reservoir will comprise the following: A single 200' long 12' diameter steel penstock with entrance transition will extend from the suction in the upper reservoir, through the upper reservoir dam and connect with the top of a 14' diameter vertical shaft. The shaft, extending from the

surface some 1250' in depth, will connect to a horizontal tunnel with bifurcation for water delivery to two 80-megawatt (MW) ternary style pump turbines. The low-pressure draft tube outlets from each turbine will connect to form a single 14' diameter low pressure draft tube. The connecting tube will extend a distance of approximately 2200' from the turbines (powerhouse) to the lower reservoir located in the bottom of the open pit.

The tentative location of the powerhouse is to be underground, close to the high-pressure shaft, with an approximate elevation of 200' MSL Located in the powerhouse will be (2) 80-MW ternary style pump turbine units, associated switchgear, and controls. The final elevation and dimensions of the powerhouse will be based upon the turbine selection which is yet to be determined.

Located adjacent the upper reservoir will be a ~ 200 megavolt-ampere (MVA) substation for converting the 38 kilovolt (KV) generator/motor voltage for overland transmission. New Transmission lines shall be installed extending some 2500' from the new substation to a local transmission utility.

Mining infrastructure, which presently exists, can be refurbished and repurposed and excavations exist with suitable hydraulic head, providing ideal locations for the penstocks, fore and after bays, as are sizable tonnages of clay and rock construction materials. In addition, grid power access is adjacent to closed mining sites.

The Sacaton Pumped Hydro Storage Project will utilize the approximately 2000 acres of land and facilities formerly known as the Sacaton Copper Mine. The Sacaton porphyry copper deposit, worked by Asarco as an open pit mine, employed 400 people from the local area. The Sacaton Mine produced 11,000 tons of copper a day between 1972 until it closed in March 1984 due to depletion of its economic ore reserves. This activity resulted in environmental studies being undertaken and ground impacted as a result of the mining activities. Upon closure, the impacted ground and associated facility has been remediated by the ASARCO Multi-State Environmental Custodial Trust in conjunction with the Arizona Department of Environmental Quality.

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. 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.

As a result of the previously conducted environmental examinations, land impact and reclamation, the Sacaton Closed Loop Pumped Hydro Storage Project will not adversely impact the existing environment. It will reside on private ground with existing road and power line easements in existence. The existing open pit will be utilized as the aft bay and a Forebay will be constructed within the already impacted facility. A breach in the Forebay dam would result in water entering the existing pit and would not pose any harm to adjacent communities. Utilizing this impacted facility that has previously utilized a significantly more potentially environmentally business with minimal environmental impact off site indicates that utilizing this facility for a PHS facility will be straightforward and mutually beneficial to the local community and provide the ability to utilize significantly more carbon friendly power thus reducing the carbon foot print of power in Arizona.

Permits required to complete the project as presently constituted would include:

- An aquifer protection plan
- Building Permits
- Air Quality permit (for construction and operation)

Although permits will be required to properly construct and operate this project, there is likely no significant contentious issues with the identified stake holders. Minimal dispute resolution is anticipated because of the intended utilization of this previously impacted land. There will be no facilities constructed that will be greater than those which presently exist, and no added impact will exist. In contrast, this facility will add to the economy of the local community and reduce the carbon foot print of power (electrical) generation.

Complexity of the Resource Issues [18 CFR § 5.3(c)(1)(ii)(B)]

Because of the project location, utilization of previously impacted land and the design of the project (closed loop), the proposed project presents very few, if any, resource issues of any complexity. It is unlikely that the Sacaton PSH project will adversely affect threatened or endangered species or their designated critical habitat under the Endangered Species Act. In addition, the Sacaton PSH project relies only on temporary withdrawals from surface waters or groundwater for the sole purposes of initial fill and periodic recharge needed for project operation.

Level of Anticipated Controversy [18 CFR § 5.3(c)(1)(ii)(C)]

Because of the project location, utilization of previously impacted land and the design of the project (closed loop), the proposed project we anticipate that the only issues to be resolved will be purchase of the land from the environmental trust, and the source of the original charge (1,500,000 cubic meters) and make up water (100 gpm).

Elim Mining has stated their interest in resurrecting the property as an active mine. We have informed Elim in writing of our intent to develop this project as well as the rights conveyed from the Federal Power Act for this license. We anticipate a period of awareness and hope to solve the land ownership challenges through negotiation.

Relative Cost of the Traditional Licensing Process Compared to the Integrated Licensing Process [18 CFR § 5.3(c)(1)(ii)(D)]

Us of TLP will reduce both the cost of work not required for this facility because of its location and design, and the cost to the project by reducing the pre-construction period. We estimate that $ 1,000,000 per month will be saved by reducing the licensing time frame.

The Amount of Available Information and Potential for Significant Disputes Over Studies [18 CFR § 5.3(c)(1)(ii)(E)]

The Sacaton Pumped Hydro Storage project has had environmental assessments and monitoring since the early 1970's. Historical studies are available from this time frame. In addition, an environmental review and subsequent environmental testing and remediation has been undertaken by the ASARCO Multi-State Environmental Custodial Trust in conjunction with the Arizona Department of Environmental Quality. The test work and findings documentation is available. As a result of this significant amount of information, and the present standing of the property in the eyes of the ADEQ, we do not expect significant dispute over studies and believe that the existing information available will be sufficient for licensing purposes with FERC.

Other Pertinent Factors [18 CFR § 5.3(c)(1)(ii)(F)]

For all of the foregoing reasons, the **Ramm Power Group LLC** respectfully requests that the Commission grant this request and authorize the **Ramm Power Group LLC** to use the TLP for the licensing of the Project.

As required by 18 CFR § 5.3(d)(1), the **Ramm Power Group LLC** is concurrently providing copies of this request to all affected resource agencies, Indian tribes, and potentially interested parties. As required by 18 CFR § 5.3(d)(2), the **Ramm Power Group LLC** is publishing notice of this request simultaneously with the publication of notice of availability of the NOI and PAD in the Casa Grande Dispatch for general circulation in the counties where the Project is located.

By this letter, the **Ramm Power Group LLC** is notifying the resource agencies, Indian tribes, and potentially interested parties that comments on this application must be provided to the Commission and the **Ramm Power Group LLC** no later than 30 days following the filing date of this document. All comments should reference **Project No.**

14869-000 — Sacaton Pumped Hydro Storage Project, and they should address, as appropriate to the circumstances of the request, the following topics:

- Likelihood of timely license issuance;
- Complexity of the resource issues;
- Level of anticipated controversy;
- Relative cost of the TLP compared to the ILP;
- The amount of available information and potential for significant disputes over studies; and
- Other factors believed by the commenter to be pertinent.

Comments should be submitted to the Commission electronically pursuant to 18 CFR § 385.2003(c), or by sending an original and eight copies to:

Office of the Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Copies of the comments should be sent to Ramm Power Group LLC 7425 East Columbia Drive Spokane Washington 99212.

Respectfully submitted,

Dr. Michael A. Werner
Managing Director,
Ramm Power Group LLC
7425 East Columbia Drive
Spokane, Washington 99212

CERTIFICATE OF SERVICE

I hereby certify that I caused to be served, by U.S. First Class Mail, the Notice of Intent to File Application for a New License upon all interested parties designated on the attached service list in the Sacaton Energy Storage Project No. 14869, in accordance with Rule 2010 of the Rules of Practice and Procedure, 18 C.F.R. § 385.2010.

January 15, 2020

Signature

Pre-application Document (PAD)

SACATON ENERGY STORAGE PROJECT

Project No.14869

Applicant: Ramm Power Group LLC

Date: January 15, 2020

§ 5.6 (d)(1) - Process plan and schedule. The process plan must include:

Time frames for pre-application consultation, information gathering, and studies

SACATON PUMPED STORAGE PROJECT P-14869

INTEGRATED LICENSING PROCESS PLAN
TEMPLATE--Draft EA

Application Date 1/15/20

Process Plan and Schedule
(shaded milestones are unnecessary if there are no study disputes; if due date falls on a weekend or holiday, the due date is the following business day)

Responsible Entity	Pre-Filing Milestone	Date	FERC Regulation
Applicant	File NOI/PAD with FERC	1/15/20	5.5, 5.6
FERC	Tribal Meeting	2/14/20	5.7
FERC	Notice of Commencement of Proceeding & SD1 issued	3/15/20	5.8
FERC	Scoping and Site Visit	4/14/20	5.8(b)(viii)
All stakeholders	NOI/PAD/SD1 comments due	5/14/20	5.9
FERC	Issue SD2 if needed	6/28/20	5.1
Applicant	File Proposed Study Plan	6/28/20	5.11(a)
All stakeholders	Study Plan Meeting	7/28/20	5.11(e)
All stakeholders	Study Plan Comments due	9/26/20	5.12
Applicant	File Revised Proposed Study Plan	10/26/20	5.13(a)
All stakeholders	Revised Proposed Study Plan Comments due	11/10/20	5.13(b)
FERC	Director's Study Plan Determination	11/25/20	5.13(c)
mandatory cond. Ag.	Any Study Disputes due[1]	12/15/20	5.14(a)
Study D. Panel	Third Panel Member selected	12/30/20	5.14(d)(3)
Study D. Panel	Panel Convenes	1/4/21	5.14(d)
Applicant	Applicant Comments on Study Dispute due	1/9/21	5.14(j)
Study D. Panel	Technical Conference held	1/14/21	5.14(j)
Study D. Panel	Panel Finding Issued	2/3/21	5.14(k)
FERC	Director's Study Dispute Determination	2/23/21	5.14(l)
Applicant	First Study Season	Spr/Sum 21	5.15(a)
Applicant	Initial Study Report	11/25/21	5.15(c)(1)
All stakeholders	Initial Study Report Meeting	12/10/21	5.15(c)(2)
Applicant	Initial Study Report Meeting Summary	12/25/21	5.15(c)(3)
All stakeholders	Study Disputes/Request to Modify Study Plan due	1/24/22	5.15(c)(4)
All stakeholders	Responses to Disputes/Study Requests	2/23/22	5.15(c)(5)
FERC	Directors Study Plan Determination	3/25/22	5.15(c)(6)
Applicant	Second Study Season	Spr/Sum 22	5.15(a)
Applicant	Updated Study Report due	11/25/22	5.15(f)
All stakeholders	Updated Study Report Meeting	12/10/22	5.15(f)
Applicant	Updated Study Report Meeting Summary	12/25/22	5.15(f)
All stakeholders	Study Disputes/Request to Modify Study Plan due	1/24/23	5.15(f)
All stakeholders	Responses to Disputes/Study Requests	2/23/23	5.15(f)
FERC	Directors Study Plan Determination	3/25/23	5.15(f)

Applicant	Preliminary Licensing Proposal due	8/18/19	5.16(a)
All stakeholders	Comments on Preliminary Licensing Proposal	11/16/19	5.16(e)
Applicant	License Application filed	1/15/20	5.17
Applicant	Public Notice of License Application filing	1/29/20	5.17(d)(2)

Responsible Entity	Post-Filing Milestone	Date	FERC Regulation
FERC	Tendering Notice of new application	1/29/20	5.19
FERC	Director's Additional Studies Determination/Deficiencies	2/14/20	5.19(e); 5.20(a)(2)
FERC	Ready for Environmental Analysis and Application Acceptance	3/15/20	5.22
All stakeholders	Comments, Interventions, recommendations, prescriptions due	5/14/20	5.23(a)
Applicant	Requests 401 Certification	5/14/20	5.23(b)
Applicant	Reply Comments due	6/28/20	5.23(a)
FERC	Issue Draft EA/EIS	12/25/20	5.25(a)
All stakeholders	Comments on EA due	1/24/21	5.25(c)
Agencies	Modified 4(e) and Fishway Prescriptions	3/25/21	5.25(d)
FERC	Issue Final EA	6/23/21	
FWS/NMFS	ESA biological opinion as needed	5/9/21	ESA
FERC	Issue License Order	8/22/21	

Proposed location and date for scoping meeting and for the site visit [§ 5.8 (b)(3)(viii)]:

ASARCO Sacaton Mine Site
22580 West Maricopa/ Casa Grande Highway
Casa Grande, Pinal County, AZ 85222

§ 5.6 (d)(2) - Project location, facilities, and operations.

(i) Contact information of each person authorized to act as agent for applicant:

Adam Rousselle
2113 Middle Street Suite 102
Sullivans Island, SC 29482
267-254-6107

(ii) Maps of land use within project boundaries (township, range and section, state, county, river, river mile, and closest town) and, if applicable, federal and Tribal lands, and location of proposed facilities:

See figures 1- 8B on pages 47-55 of attached
Site Improvement Plan
Sacaton Mine Site
“2019-03-11 Sacaton SIP Report Final.pdf”

(ii) Detailed description of proposed facilities

(A) Composition, dimensions, and configuration of dams, spillways, penstocks, powerhouses, tailraces, etc. proposed to be included as part of the project or connected directly to it:

PROJECT OVERVIEW

This project will consist of two 80 MW Ternary Pump Storage Turbines. The project capabilities will be 160 MW for 12 hours.

The site is be located at an existing open pit mine with the pump storage plant utilizing an existing 1200' deep open pit mine for the lower reservoir and an adjacent plateau for the upper reservoir location.

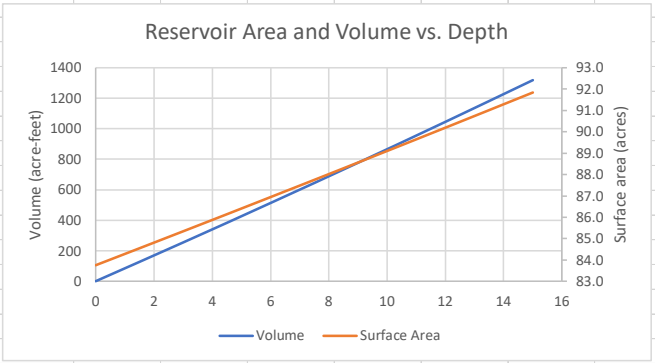
A transmission interconnection is planned to a local utility and discussions are progressing to that end.

Impact to undisturbed land should be minimal as the entire project, except transmission lines, is located on land previously impacted by mining activities.

UPPER RESERVOIR & DAM

upper reservoir

	assumed dam slope:		3	ft H: 1 ft V	
	depth interval for calcs:		3.0	ft	
				(usable)	
width (ft)	length (ft)	area (ac)	depth (ft)	volume (AF)	elev (m)
2000	2000	91.8	15	1316	450.0
1982	1982	90.2	12	1043	449.1
1964	1964	88.6	9	775	448.2
1946	1946	86.9	6	512	447.3
1928	1928	85.3	3	254	446.3
1910	1910	83.7	0	0	445.4
	generating time for power calc:			11	hrs
		average head:		854	ft
		assumed efficiency:		80%	
		estimated power:		84	MW



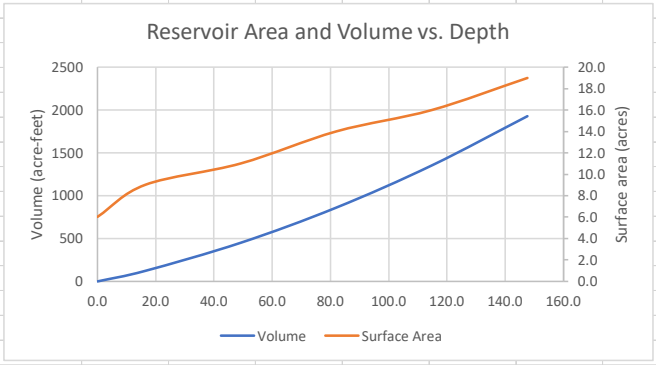
Optimization of the upper reservoir and dam are under way. The data and chart above describe the differing scenarios under consideration. Further engineering must be accomplished in order to finalize the project.

LOWER RESERVIOR

lower reservoir (mine open pit)

area (ac)	depth (ft)	volume (AF)	elev (m)
26.0	213.3	3387	230.0
22.0	180.4	2600	220.0
19.0	147.6	1927	210.0
16.0	114.8	1353	200.0
14.0	82.0	861	190.0
11.0	49.2	451	180.0
9.0	16.4	123	170.0
6.0	0.0	0	165.0

hours for power calc:	11	
average head:	854	ft
assumed efficiency:	80%	
estimated power:	75	MW



Optimization of the lower reservoir is under way. The data and chart above describe the differing scenarios under consideration. Further engineering must be accomplished in order to finalize the project.

PENSTOCK & TAILRACE

Penstocks connecting the upper reservoir with the lower reservoir will comprise the following: A single 200' long 12' diameter steel penstock with entrance transition will extend from the suction in the upper reservoir, through the upper reservoir dam and connect with the top of a 14' diameter vertical shaft. The shaft, extending from the surface some 1250' in depth, will connect to a horizontal tunnel with bifurcation for water delivery to three 80-megawatt (MW) ternary style pump turbines. The low-pressure draft tube outlets from each turbine will connect to form a single 14' diameter low pressure draft tube. The connecting tube will extend a distance of approximately 2200' from the turbines (powerhouse) to the lower reservoir located in the bottom of the open pit.

POWERHOUSE
The tentative location of the powerhouse is to be underground, close to the high-pressure shaft, with an approximate elevation of 200' MSL Located in the powerhouse will be (2) 80-MW ternary style pump turbine units, associated switchgear, and controls. The final elevation and dimensions of the powerhouse will be based upon the turbine selection which is yet to be determined.

TRANSMISSION LINES
Located adjacent the upper reservoir will be a ~ 200 megavolt-ampere (MVA) substation for converting the 38 kilovolt (KV) generator/motor voltage for overland transmission. New Transmission lines shall be installed extending some 2500' from the new substation to a local transmission utility.

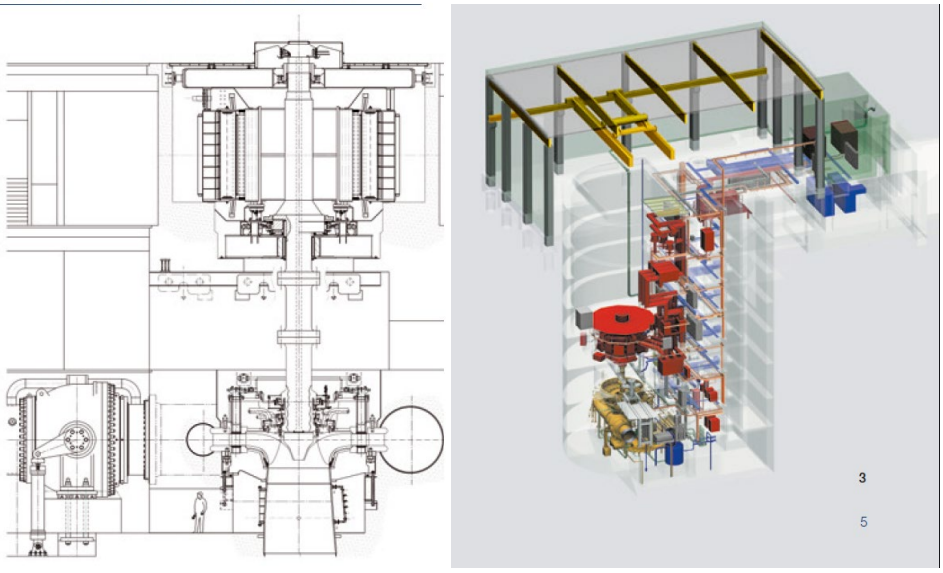
(B) Reservoir normal maximum water surface area and elevation and gross storage capacity:

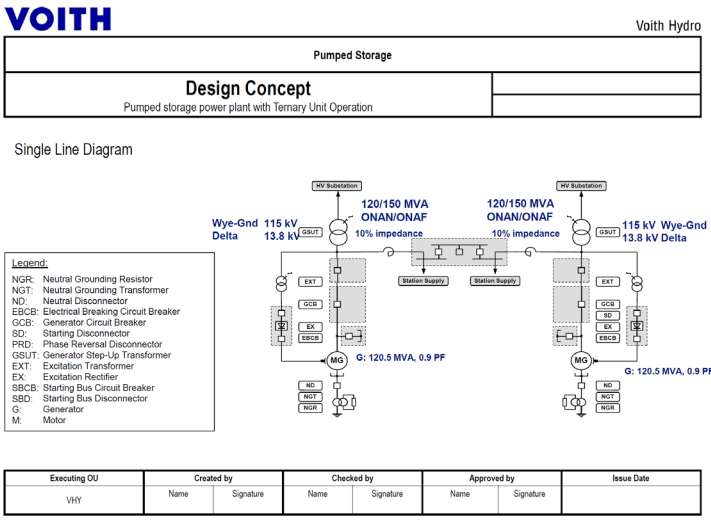
Please see Volume columns above for acre feet calculations.

(C) Number, type and capacities of turbines and generators, and installed (rated) capacity of proposed turbines or generators:

Two 80-MW Ternary Style Turbines, manufactured by Voith Hydro Power. Please see below our Conceptual Single Line Diagram, cross section of a ternary machine and conceptual installation scheme for two of the Ternary Units.

Cross section of a Pump turbine/ Generator unit





(D) Number, length, voltage, and interconnections of any primary transmission lines proposed to be included as part of the project, including a single-line diagram showing the transfer of energy from the project to the transmission grid or point of use:

The project has four opportunities to interconnect to the grid and the applicant is in discussions with each of the transmission-owning utilities. Also see above concept diagram.

(E) Energy production (estimate of dependable capacity, average annual, and average monthly energy production):

Twelve hours daily, 160 MW, average monthly capacity of 57,600 MWh, and an average annual capacity of 700,800 MWh.

(iv) Current (if applicable) and proposed project operation, including any daily or seasonal ramping rates, flushing flows, reservoir operations, and flood control operations:

N/A

(v) Existing license and project operations (if applicable):

n/a

(1) Description of current license requirements (i.e., the requirements of the original license as amended during the license term):

n/a

(2) A summary of project generation and outflow records for the five years preceding filing of the Pre-Application Document:

n/a

(3) Current net investment:

$5,100,000.00

(4) Project compliance history, if applicable, including a description of any recurring situations of non-compliance:

n/a

(vi) A description of any new facilities or components to be constructed, plans for future development or rehabilitation of the project, and changes in project operation:

See Project Summary Above

§ 5.6 (d)(3)(i) - Existing environment and resource impacts. A potential applicant must, based on the existing, relevant, and reasonably available information, include a discussion with respect to each resource that includes:

(A) Description of existing environment (See 5.6 (d)(3)(ii)-(xiii) below)
(B) Summaries (with references to sources of information or studies) of existing data or studies regarding the resource *(Include here or incorporate into resource sections 5.6 (d)(3)(ii)-(xiii) below)*

The attached Site Improvement Plan for the Sacaton Mine Site provides a comprehensive and current understanding of each of the following:

See “2019-03-11 Sacaton SIP Report Final.pdf”

(C) A description of any known or potential adverse impacts and issues associated with the construction, operation or maintenance of the proposed project, including continuing and cumulative impacts:

The following table of contents excerpt from 2019-03-11 Sacaton SIP Report Final.pdf addresses the environment within and surrounding the project as well as guidance on remediation based upon qualitative and quantitative studies:

(D) A description of any existing or proposed project facilities or operations, and management activities undertaken for the purpose of protecting, mitigating impacts to, or enhancing resources affected by the project, including a statement of whether such measures are required by the project license, or were undertaken for other reasons. The type and amount of the information included in the discussion must be commensurate with the scope and level of resource impacts

caused or potentially caused by the proposed project. Potential license applicants are encouraged to provide photographs or other visual aids, as appropriate, to supplement text, charts, and graphs included in the discussion.

The applicant has not as of yet undertaken any physical project work.

§ 5.6 (d)(3)(ii) - Geology and soils. Descriptions and maps showing the existing geology, topography, and soils of the proposed project and surrounding area. Components of the description must include:

(A) Description of geological features, including bedrock lithology, stratigraphy, structural features, glacial features, unconsolidated deposits, and mineral resources.

(B) Description of soil types, occurrence, physical and chemical characteristics, erodability and potential for mass soil movement, and soil characteristics:

Figure 5A Exploratory Boring and Test Pit Locations
Figure 5B Exploratory Boring and Test Pit Locations in Mill and Ore Processing Area

(C) Description of reservoir shorelines and streambanks, including

(1) Steepness, composition (bedrock and unconsolidated deposits), and vegetative cover:

Please see the following pages of the attached report: 2019-03-11 Sacaton SIP Report Final.pdf

(2) Existing erosion, mass soil movement, slumping, or other forms of instability, including identification of project facilities or operations that are known to or may cause these conditions.

Please see the following pages of the attached report: 2019-03-11 Sacaton SIP Report Final.pdf

§ 5.6 (d)(3)(iii) - Water resources. A description of the water resources of the proposed project and surrounding area. This must address the quantity and quality (chemical/physical parameters) of all waters affected by the project, including but not limited to the project reservoir(s) and tributaries thereto, bypassed reach, and tailrace.

This project does not use any Commerce-Clause water or navigable water way. The water source is either ground water or polluted water within the mine inner workings. Please refer to the following pages for specific references to water source and containment:

(G) Project effects on seasonal variation of water quality data, including

(1) Water temperature and dissolved oxygen, including seasonal vertical profiles in the reservoir. The reservoirs will be newly constructed, and the ground water treated as appropriate for the turbine warranty.

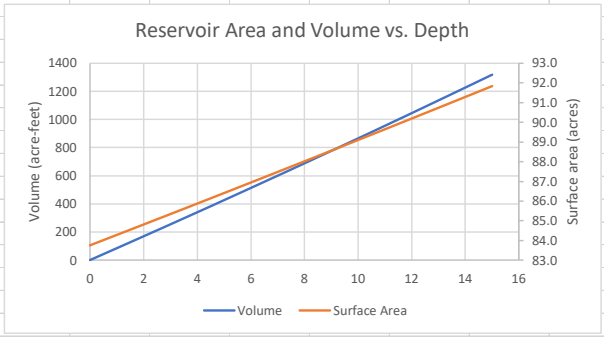
(2) Other physical and chemical parameters to include, as appropriate for the project; total dissolved gas, pH, total hardness, specific conductance, chlorophyll, suspended sediment concentrations, total nitrogen (mg/L as N), total phosphorus (mg/L as P), and fecal coliform (*E. Coli*) concentrations.

Current water quality within the mine working can be found on these pages:

(H) The following data with respect to any existing or proposed lake or reservoir associated with the proposed project; surface area, volume, maximum depth, mean depth, flushing rate, shoreline length, substrate composition.

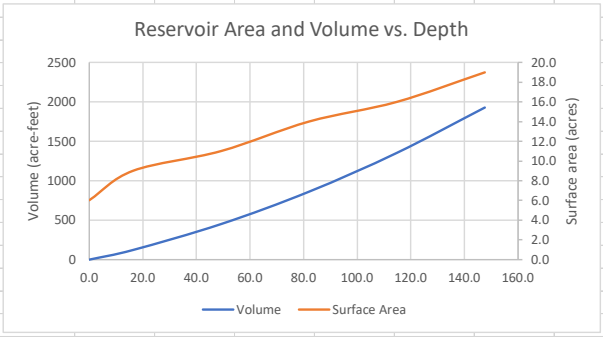
upper reservoir

		assumed dam slope:	3	ft H: 1 ft V	
		depth interval for calcs:	3.0	ft	
				(usable)	
width (ft)	length (ft)	area (ac)	depth (ft)	volume (AF)	elev (m)
2000	2000	91.8	15	1316	450.0
1982	1982	90.2	12	1043	449.1
1964	1964	88.6	9	775	448.2
1946	1946	86.9	6	512	447.3
1928	1928	85.3	3	254	446.3
1910	1910	83.7	0	0	445.4
		generating time for power calc:		11	hrs
		average head:		854	ft
		assumed efficiency:		80%	
		estimated power:		84	MW



lower reservoir (mine open pit)

		area (ac)	depth (ft)	volume (AF)	elev (m)
		26.0	213.3	3387	230.0
		22.0	180.4	2600	220.0
		19.0	147.6	1927	210.0
		16.0	114.8	1353	200.0
		14.0	82.0	861	190.0
		11.0	49.2	451	180.0
		9.0	16.4	123	170.0
		6.0	0.0	0	165.0
		hours for power calc:		11	
		average head:		854	ft
		assumed efficiency:		80%	
		estimated power:		75	MW



(I) Gradient for affected downstream reaches:

Current water quality within the mine works can be found on these pages:

§ 5.6 (d)(3)(iv) - Fish and aquatic resources. A description of the fish and other aquatic resources, including invasive species, in the project vicinity. This section must discuss the existing fish and macroinvertebrate communities, including the presence or absence of anadromous, catadromous, or migratory fish, and any known or potential upstream or downstream impacts of the project on the aquatic community. Components of the description must include:

(A) Identification of existing fish and aquatic communities

There are no aquatic organisms within the project boundaries. Please see:

(B) Identification of essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act and established by the National Marine Fisheries Service

There are no aquatic organisms within the project boundaries. Please see:

(C) Temporal and spatial distribution of fish and aquatic communities and trends with respect to:

There are no aquatic organisms within the project boundaries. Please see:

(1) Species life stage composition
n/a
(2) Standing crop
n/a
(3) Age and growth data
n/a
(4) Spawning run timing
n/a
(5) Extent and location of spawning, rearing, feeding, and wintering habitat
n/a

§ 5.6 (d)(3)(v) - Wildlife and botanical resources. A description of the wildlife and botanical resources, including invasive species, in the project vicinity. Components of this description must include:

(A) Upland habitat(s) in the project vicinity, including the project's transmission line corridor or right-of-way and a listing of plant and animal species that use the habitat(s):

Please see:

Further evaluation of vegetation and animal cover study are located here:

(B) Temporal or special distribution of commercially, recreationally, or culturally important species:

Please see:

Further evaluation of vegetation and animal cover study are located here:

§ 5.6(d)(3)(vi) Description of floodplains, wetlands, riparian, and littoral habitat. A description of the floodplain, wetlands, riparian habitats, and littoral in the project vicinity.

(1) A list of plant and animal species, including invasive species, that use the wetland, littoral, and riparian habitat:

Please see 5.6(d) above

(2) Map of wetlands, riparian and littoral habitat:

Please see:

APPENDIX D: Vegetation Evaluation Reference Information

(3) Estimates of acreage for each type of wetland, riparian, or littoral habitat, including variability in such availability as a function of storage at a project that is not operated in run-of-river mode

Initial review of these issues can be found in APPENDIX D: Vegetation Evaluation Reference Information

§ 5.6 (d)(3)(vii) - Rare, threatened, and endangered species. A description of any listed rare, threatened and endangered, candidate, or special status species that may be present in the project vicinity. Components of this description must include:

(A) Description of listed rare, threatened and endangered, candidate, or special status species in the project vicinity.

We are unaware of any endangered species in the project vicinity.

Please see:
Table 2-3. Species Observed within Transects Located within the Ecological Reference. 15

(B) Identification of habitat requirements:

n/a

(C) References to known biological opinion, status reports, or recovery plans pertaining to a listed species:

n/a

(D) Extent and location of federally designated critical habitat or other habitat for listed species in the project area:

Please see:
Table 2-3. Species Observed within Transects Located within the Ecological Reference.

(E) Temporal and spatial distribution of the listed species within the project vicinity:

Please see:
Table 2-3. Species Observed within Transects Located within the Ecological Reference. 15

§ 5.6 (d)(3)(viii) - Recreation and land use. A description of the existing recreational and land uses and opportunities within the project boundary. The components of this description include:

(A) Text description illustrated by maps of existing recreational facilities, type of activity supported, location, capacity, ownership and management

There are no recreational activities as this site was once a superfund site.

(B) Recreational use of lands and waters compared to facility or resource capacity:

There are no recreational activities as this site was once a superfund site.

(c) Existing shoreline buffer zones within the project boundary:

n/a

(D) Current and future recreation needs from existing state or regional plans:

There are no recreational activities planned as this site was once a super fund site.

(E) If the potential applicant is an existing licensee, its current shoreline management plan or policy, if any, with regard to permitting development of piers, boat docks and landings, bulkheads, and other shoreline facilities on project lands and waters:

n/a

(F) A discussion of whether the project is located within or adjacent to a:

(1) Designated or under study for inclusion in the National Wild and Scenic River system:

n/a

(2) A state-protected river segment:

n/a

(G) Description of project lands under study for inclusion in the National Trails System or as a Wilderness Area:

n/a

(H) Regionally or nationally important recreation areas:

n/a

(I) Non-recreational land use and management within the project boundary:

n/a

(J) Recreational and non-recreational land use and management adjacent to the project boundary:

n/a

§ 5.6 (d)(3)(ix) – Aesthetic Resources. A description of the visual characteristics of the lands and waters affected by the project. Components of this description include a description of the dam, natural water features, and other scenic attractions of the project and surrounding vicinity. Potential applicants are encouraged to supplement the text description with visual aids.

Please see the following maps that describe the project's location and situational awareness:

Appendix D pages 149-161 photographs 1-12

§ 5.6 (d)(3)(x) - Cultural Resources. A description of the known cultural or historical resources of the proposed project and surrounding area. Components of this description include:

(A) Identification of any historic or archaeological site in the proposed project vicinity, with particular emphasis on sites or properties either listed in, or recommended by the State

Historic Preservation Officer or Tribal Historic Preservation Officer for inclusion in, the National Register of Historic Places

There are no historic or archaeological sites within or adjacent to the project boundary.

(B) Existing discovery measures, such as surveys, inventories, and limited subsurface testing work, for the purpose of locating, identifying, and assessing the significance of historic and archaeological resources that have been undertaken within or adjacent to the project boundary

Please see the attached comprehensive study. There are no such sites within or adjacent to the project boundary.

This project is remediating an abandoned copper mine, and no archeological studies will be performed within the project site.

(C) Identification of Indian tribes that may attach religious and cultural significance to historic properties within the project boundary or in the project vicinity; as well as available information on Indian traditional cultural and religious properties, whether on or off of any federally recognized Indian Reservation.

n/a

§ 5.6 (d)(3)(xi) - Socio-economic Resources. A general description of socio-economic conditions in the vicinity of the project. Components of this description include general land use patterns (e.g., urban, agricultural, forested), population patterns, and sources of employment in the project vicinity.

This is a desert community comprising no agriculture or forests. The site is a prior super fund site.

§ 5.6 (d)(3)(xii) - Tribal Resources. A description of Indian tribes, tribal lands, and interests that may be affected by the project Components of this description include:

(A) Identification of information on resources specified in paragraphs (d)(2)(ii)-(xi) of this section to the extent that existing project construction and operation affecting those resources may impact tribal cultural or economic interests, e.g., impacts of project-induced soil erosion on tribal cultural sites.

n/a

(B) Identification of impacts on Indian tribes of existing project construction and operation that may affect tribal interests not necessarily associated with resources specified in paragraphs (d)(3)(ii)-(xi) of this section, e.g., tribal fishing practices or agreements between the Indian tribe and other entities other than the potential applicant that have a connection to project construction and operation.

n/a

§ 5.6 (d)(3)(xiii) – River Basin Description. A general description of the river basin or sub-basin, as appropriate, in which the proposed project is located, including information on:
(A) Area of river basin and sub-basin and length of stream reaches

n/a

(B) Major land and water use in project area

Industrial and n/a

(C) All dams and diversion structures in the basin or sub-basin, regardless of function

There is no river basin and thus, no dams, structures, tributaries rivers or streams.

(D) Tributary rivers and streams, the resources of which are or may be affected by project operations

See C above

§ 5.6 (d)(4) - Preliminary issues and studies list for each resource area. Based on the resource description and impacts discussion required by paragraphs (d)(1) and (d)(2) of this section; the Pre-Application Document must include with respect to each resource area identified above, a list of:

(i) Issues pertaining to the identified resources;

n/a

(ii) Potential studies and information gathering requirements associated with the identified issues;

(iii) Relevant qualifying Federal and state or tribal comprehensive waterway plans;

n/a

(iv) Relevant resource management plans.

n/a

§ 5.6 (d)(5) - Summary of contacts. An appendix summarizing contacts with federal, state, and interstate resource agencies, Indian tribes, non-governmental organizations, or other members of the public made in connection with preparing the Pre-Application Document sufficient to enable

the Commission to determine if due diligence has been exercised in obtaining relevant information.

Federal, state and interstate resource agencies:

Federal Energy Regulatory Commission

Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007-2935

City Clerk, Casa Grande
510 E Florence Blvd
Casa Grande, AZ 85122

Indian tribes:

Secretary
Gila River Indian Community
PO Box 97
Sacaton, AZ 85147
(520) 562-9841

Secretary
Ak-Chin Indian Community
42507 W Peters & Nall Rd.
Maricopa, AZ 85238
(520) 568-4566

Secretary
Tohono O'Odham Nation
PO Box 837
Sells, AZ 85634

Non-governmental organizations and members of the public

ASARCO Multi-State Environmental Custodial Trust
Le Petomane XXV Inc.
Not individually but solely as the Trustee of the ASARCO Multi-State Environmental Custodial Trust
35 East Wacker Drive, Suite 690
Chicago, IL 60601

§ 5.6 (e) PURPA Benefits. If applicable, the applicant must also provide a statement of whether or not it will seek benefits under section 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA) by satisfying the requirements for qualifying hydroelectric small power

production facilities in § 292.203 of this chapter. If benefits under section 210 of PURPA are sought, a statement of whether or not the applicant believes the project is located at a new dam or diversion (as that term is defined in § 292.202(p) of this chapter), and a request for the agencies' view on that belief, if any.

This project is not a PURPA project.

ADDITIONAL COMPREHENSIVE MAILING LIST

Advisory Council on Historic Preservation
Executive Director
401 F Street NW Suite 308
Washington DC 20001-2637

Bureau of Indian Affairs
U.S. Department of the Interior
Regional Director
400 North 5th Street
Phoenix AZ 85004

Bureau of Indian Affairs
U.S. Department of the Interior
Regional Director
P.O. Box 1060
Gallup NM 87305

Bureau of Indian Affairs
U.S. Department of the Interior
Director
1849 C Street NW
MS 2624 MIB
Washington DC 20240

Federal Emergency Management Agency
Regional Administrator
1111 Broadway Suite 1200
Oakland CA 94607-4052

Federal Emergency Management Agency
Director
500 C Street SW
Washington DC 20472

Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
Regional Engineer

901 Market Street Suite 350
San Francisco CA 94103

National Park Service
U.S. Department of the Interior
Regional Director
12795 Alameda Parkway
Denver CO 80225

National Park Service
U.S. Department of the Interior
Director
1849 C Street NW
Washington DC 20240

Naval Seafloor Cable Protection Office
Naval Facilities Engineering Command NAVFAC-OFP/C
1322 Patterson Ave SE Suite 1000
Washington DC 20374-5065

Office of Senator Dyrsten Sieema, U.S. Senator
317Hart Senate Office Building
Washington DC 20510

Office of Senator Martha McSally, U.S. Senator
404 Russell Senate Office Building
Washington DC 20510

U.S. Army Corps of Engineers
District Engineer
1325 J Street
Sacramento CA 95814-2922

U.S. Army Corps of Engineers
District Engineer
P.O. Box 2711
Los Angeles CA 90053-2325

U.S. Army Corps of Engineers
Commander
441 G Street NW
Washington DC 20314

U.S. Army Corps of Engineers
Division Commander
1455 Market St

San Francisco CA 94103-1398

U.S. Bureau of Land Management
U.S. Department of the Interior
Director
1849 C Street NW MIB 5655
Washington DC 20240

U.S. Bureau of Land Management
U.S. Department of the Interior
State Director
One North Central Avenue Suite 800
Phoenix AZ 85004-2203

U.S. Bureau of Reclamation
U.S. Department of the Interior
Commissioner
1849 C Street NW
Washington DC 20240

U.S. Bureau of Reclamation
U.S. Department of the Interior
Regional Director
125 South State Street Room 6107
Salt Lake City UT 84138-1102

U.S. Bureau of Reclamation
U.S. Department of the Interior
Regional Director
P.O. Box 61470
Boulder City NV 89006-1470

U.S. Coast Guard Navigation Standards Division
Commandant (CG-5533)
2100 2nd St. SW Stop 7580
Washington DC 20593-7580

U.S. Department of Agriculture - Forest Service
Chief
1400 Independence Ave SW
Washington DC 20250-0003

U.S. Department of Agriculture - Forest Service
Regional Forester
333 Broadway SE
Albuquerque NM 87102

U.S. Department of Commerce
Office of the Secretary
Secretary
1401 Constitution Avenue NW
Washington DC 20230

U.S. Environmental Protection Agency
Region 9: Environmental Review Office
75 Hawthorne Street
San Francisco CA 94105

U.S. Environmental Protection Agency
Administrator
Ariel Rios Building 1200 Pennsylvania Ave NW
Washington DC 20460

U.S. Fish and Wildlife Service
Regional Director
500 Gold Avenue SW P.O. Box 1306
Albuquerque NM 87102

U.S. Fish and Wildlife Service
Arizona State Office
Field Supervisor
2321 W. Royal Palm Road Suite 130
Phoenix AZ 85021

U.S. Fish and Wildlife Service
U.S. Department of the Interior
Director
1849 C Street NW Room 3238
Washington DC 20240-0001

U.S. Forest Service
1400 Independence Avenue SW
Washington DC 20250-0003

United States Geological Survey
Regional Director
345 Middlefield Road
Menlo Park CA 94025

United States Geological Survey
U.S. Department of the Interior
Director

12201 Sunrise Valley Dr
Reston VA 20192

American Canoe Association
Executive Director
1340 Central Blvd. Suite 210
Fredericksburg VA 22401

American Rivers
1101 14th St. NW Suite 1400
Washington DC 20005

American Whitewater
Executive Director
P.O. Box 1540
Cullowhee NC 28723

Trout Unlimited
227 SW Pine Street Suite 200
Portland OR 97204

Arizona Cooperative Extension
University of Arizona
Director
Forbes Building Room 301
Tucson AZ 85721-0036

Arizona Cooperative Fish and Wildlife Research Unit
State of Arizona
Leader
104 Biological Sciences East Building
University of Arizona
Tucson AZ 85721-0001

Arizona Game and Fish Department
Director
5000 W. Carefree Highway
Phoenix AZ 85086-5000

Arizona State Land Department
Natural Resources Division
Director
1616 W Adams St
Phoenix AZ 85007-2614

Arizona State Parks

SHPO
1300 West Washington
Phoenix AZ 85007

Commerce and Economic Development Division
Arizona Department of Commerce
1700 W Washington St Suite 600
Phoenix AZ 85007

Department of Environmental Quality
Northern Regional Office
1801 W. Route 66 Suite 117
Flagstaff AZ 86001

Department of Environmental Quality
Director
Phoenix Main Office
1110 W Washington St
Phoenix AZ 85007

Department of Environmental Quality
Southern Regional Office
400 W. Congress Suite 433
Tucson AZ 85701

Office of the Attorney General
Attorney General
1275 W. Washington Street
Phoenix AZ 85007

Office of the Governor
Governor
1700 West Washington
Phoenix AZ 85007

Ak Chin Indian Community Council
Chairman
42507 W. Peters & Nall Road
Maricopa AZ 85239

Cocopah Tribal Council
Chairperson
County 15th & Avenue G
Somerton AZ 85350

Colorado River Tribal Council

Chairman
Rt. 1 Box 23-B
Parker AZ 85344

Fort McDowell Yavapai Tribal Council
President
P.O. Box 17779
Fountain Hills AZ 85268

Gila River Indian Community Council
Governor
P.O. Box 97
Sacaton AZ 85247

Havasupai Tribal Council
Chairperson
P.O. Box 10
Supai AZ 86435

Hopi Tribal Council
Chairman
P.O. Box 123
Kykotsmovi AZ 86039

Hualapai Tribal Council
Chairperson
P.O. Box 179
Peach Springs AZ 86434

Hualapai Tribe
P.O. Box 310
Peach Springs AZ 86434

Kaibab Paiute Tribal Council
Chairperson
HC65 Box 2
Fredonia AZ 86022

Navajo Nation
President
P.O. Box 9000
Window Rock AZ 86515

Navajo Nation
Historic Preservation Department
P.O. Box 4950

Window Rock AZ 86515

Pascua Yaqui Tribal Council
Chairman
7474 S. Camino de Oeste
Tucson AZ 85746

Quechan Tribal Council
President
P.O. Box 1899
Yuma AZ 85366

Salt River Pima-Maricopa Indian Community Council
President
10005 E. Osborn
Scottsdale AZ 85256

San Carlos Tribal Council
Chairman
P.O. Box 0
San Carlos AZ 85550

San Juan Southern Paiute Council
President
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Site Improvement Plan
Sacaton Mine Site

ASARCO Multi-State Environmental Custodial Trust
Pinal County, AZ

March 11, 2019

PREPARED FOR

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LIST OF ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ADEQ	Arizona Department of Environmental Quality
ABA	Acid base accounting
4AGP	acid generating potential
ASARCO	American Smelting and Refining Company
APP	Aquifer Protection Permit
ARD	Acid Rock Drainage
BADCT	Best Available Demonstrated Control Technology
bgs	below ground surface
cy	cubic yards
E. C.	Electrical conductivity
GPL	Groundwater Protection Level
gpm	gallons per minute
gpm/ft	gallons per minute per foot
ICP-MS	inductively coupled plasma mass spectroscopy
LCU	Lower Conglomerate Unit
mg/kg	milligrams per kilogram
mm	millimeters
MSCU	Middle Silt and Clay Unit
NAG	Non-Acidic Generating
NNP	Net Neutralizing Potential
NOAA	National Oceanic and Atmospheric Administration
NP	Neutralizing Potential
NRCS	Natural Resources Conservation Service
O.M.	Organic matter
PAG	Potentially Acid-Generating
pcf	pounds per cubic foot
PFDS	Precipitation Frequency Data Server
PMF	Probable Maximum Flood
PGM	Plant Growth Media
psf	pounds per square foot
SAR	Sodium Adsorption Ratio
SIP	Site Improvement Plan
Site	Former Sacaton Mine Site
SPLP	Synthetic Precipitation Leaching Procedure
SRL	Soil Remediation Level
Tetra Tech	Tetra Tech, Inc.
Trust	ASARCO Multi-State Environmental Custodial Trust
TSF	Tailings Storage Facility
tsf	tons per square foot

Acronyms/Abbreviations	Definition
UAU	Upper Alluvial Unit
UMWA	Underground Mine Workings Area
WRD	Waste Rock Dump

1. INTRODUCTION

The former Sacaton Mine site (Site) is approximately 2,000 acres in size and located 6 miles northwest of the City of Casa Grande in Pinal County, Arizona. The Site is an inactive copper mine located on private land with ownership including surface and mineral rights. Tetra Tech, Inc. (Tetra Tech) has prepared this Site Improvement Plan (SIP) on behalf of the ASARCO Multi-State Environmental Custodial Trust (the Trust). In 2009, ASARCO filed for Chapter 11 bankruptcy, and upon confirmation of the bankruptcy plan in December 2009, 18 ASARCO sites, including the Site, were conveyed to the Trust. The main objective of the Trust is to remediate the Site and, if possible, to sell the Site. Consistent with the Trust Agreement, the Trust performs all site activities consistent with work plans approved by The Arizona Department of Environmental Quality (ADEQ), defined by the Trust Agreement as the lead agency for Site. The ADEQ has defined the Trust's environmental obligation to reduce potential Site risks to humans and the environment, and to stabilize mining-related structures, tailings storage facilities and waste rock dumps. Therefore, the objective of the SIP as discussed herein are to realize the environmental objectives as defined by ADEQ.

Tetra Tech has developed this SIP following general guidance provided by ADEQ and the Trust. The SIP provides a brief background of the Site, a summary of findings from multiple site investigations performed from 2009 to 2018, and actions to support ADEQ's objectives. The SIP design and approach were previously presented to the ADEQ on December 5, 2018. The designs presented in this SIP report are essentially the same as those presented to the ADEQ in December 2018, with a modification to the cover material source location for TSF and Mill Areas, and the design of a water storage reservoir for construction water.

1.1. Background

The Sacaton Mine was originally operated by American Smelting and Refining Company (ASARCO) beginning in 1972. ASARCO identified two primary ore bodies: 1) West Ore Body and 2) East Ore Body. The West Ore Body was successfully mined by open pit methods to extract the sulfide porphyry copper. ASARCO planned to mine the East Ore Body using underground mining methods; however, the mine closed in 1984 due to the declining price of copper.

Mining of the open pit began in 1972, but the on-site processing of ore did not commence until 1974. The pit is roughly circular and measures approximately 3,000 feet in diameter at the native ground surface and is 1,040 feet deep. During operations the mine consisted of the open pit, crushing facilities, coarse ore stockpiles, a flotation mill, maintenance and administration buildings, a 390-acre tailings storage facility (TSF), a return water impoundment, an approximately 80-acre Alluvium Soil Storage Area, and a 760-acre waste rock dump (WRD). Ore was mined and processed at a rate of approximately 11,000 tons per day and copper was the principal product; however, like many polymetallic deposits, minor amounts of gold, silver, lead, zinc, and molybdenum were also recovered economically. Concentrates were sent by rail to the ASARCO smelter in El Paso, Texas. During the operating period of the open pit mine, ASARCO sank two shafts southeast of the pit to access deeper ore reserves. Development of the underground mine was subsequently suspended but the headframe, and main production and ventilation shafts remained at the Site.

In 1984, ASARCO ceased open-pit mining operations upon depletion of the West Ore Body reserves and the declining price of copper. At the same time, development of an underground mine on the eastern boundary of the Site was also shut down due to economic conditions in the copper industry. The current physical layout of the Site is the result of the historical mining, milling, and maintenance activities. The Site

consists of several major features, including the mine open pit, the TSF, the WRD, the Alluvium Soil Storage Area, the Underground Mine Workings Area (UMWA), and the Mill Area. Other features include a tank farm, truck shop and other ancillary support facilities, laboratory/assay building, abandoned equipment boneyards, and an administrative area. **Figure 1** provides an overview of the Site and shows the prominent Site features**. Figure 2** shows details of the TSF, the Mill area, Tank Hill, the Mine Pit, the UMWA, the Alluvium Soil Storage Area, and the WRD.

After operations ceased, portions of the exposed slopes of the WRD and the TSF were capped with 1 to 5 feet of native Site soil and revegetated by ASARCO. Similarly, approximately 80 % of the WRD surface was covered and revegetated. The mining and milling equipment were removed from the Site. Water samples collected from the open pit during mining operations in July 1979, and 2 years after closure in April 1986, indicated a pH ranging from 3.8 to 4.1, respectively. This indicates that the geologic deposit and waste rock are potentially acid-generating (PAG). No geochemical characterization data of the waste rock or geologic units has been identified. Because the Site was closed prior to 1986, it is not subject to the Arizona Aquifer Protection Permit (APP) requirements (Tetra Tech, 2017).

As stated in the Introduction, the Site was conveyed to the Trust in December of 2009. Since that time, the Trust has conducted activities primarily to support Site permitting and to gather the necessary data to support the preparation of this SIP, which are presented in Section 2.0 of this document.

As a result of potential health and safety issues due to the poor condition of a number of Site buildings/structures, the ADEQ requested that the first phase of Site demolition be started in 2018. Much of the historic buildings/structures utilized during Site operations were demolished in late 2018 as part of a multi-phase demolition program. The first phase of Site demolition tasks was discussed in a 2019 demolition completion report (Tetra Tech, 2019). A summary of Site demolition activities is provided in Section 3.0.

It should be noted that historically the Site included the operations of ASARCO, and TruStone, an entity that produced cement block using tailing material under agreement with ASARCO. The TruStone facility is located on the southern area of the Site property (**Figure 2**). As previously discussed with ADEQ, the TruStone facility was not considered in the creation of the SIP. Any future activities proposed for the TruStone facility will be addressed under a separate scope of work.

1.1.1. Site Location

The former Sacaton Mine is situated between the Sacaton Mountains and the City of Casa Grande in Pinal County, Arizona. It is bounded to the north by Val Vista Road and the south by Maricopa Highway which runs southeast into the town of Casa Grande. The area of the Site covers approximately 3,000 acres in total, 2,000 of which were disturbed by mining activities (ASARCO, 1993). The legal description for the Site is Township 5 South, Range 5 East, Sections 25, 26, 27, 34, 35, and 36, and Township 6 South, Range 5 East, Section 3.

1.1.2. Geologic Setting

The Site is in the northeastern part of the Sonoran Desert sub-province of the Basin and Range Province (Klawon et al., 1998). The Basin and Range Province in Arizona is a physiographical province characterized by alluvium-filled basins and intervening mountain ranges that formed as a result of normal faulting related to extension of the earth's crust. The landscape consists of small, low-lying mountain ranges and broad minimally dissected basins. Bedrock in the area is exposed in these mountain ranges and in outlying inselbergs. Most of the area is covered in alluvium deposited by the Santa Cruz River and smaller washes during the late quaternary period. The geology and geomorphology of the area indicate that material has been eroded from the adjacent mountains and transported to the surrounding piedmonts and basins.

Observations from the open pit indicate that alluvium materials at the Site are underlain by lithified conglomerates, mineralized and non-mineralized plutonic igneous rock, and non-mineralized metamorphic rock (ENVIRON, 2012). The mineralized plutonic rocks were the target of the mining operations at the Site.

1.1.3. Regional Hydrogeology

The Site is located within the Pinal Active Management Area (groundwater management area). From ground surface to bedrock, the major hydrogeologic units consist of the:1) Upper Alluvial Unit (UAU); 2) Middle Silt and Clay Unit (MSCU); 3) Lower Conglomerate Unit (LCU); 4) Plutonic-igneous rocks; and 5) Basement Complex. The UAU is composed of unconsolidated to slightly consolidated interbedded sands and gravels, with some finer grained lenses (ADWR, 2010). The MSCU is composed of silts, clays, and sands. The LCU is composed of semi-consolidated to consolidated coarse granitic sands, gravels, cobbles, and boulders. Underlying the LCU are low-permeability Plutonic-igneous rocks (ADWR, 2010). The Plutonic-igneous rocks contains both mineralized and nonmineralized deposits. In general, the Plutonic-igneous rocks produce limited groundwater because of their low permeability, with most groundwater flow via interconnected fractures and faults. At the Site, dewatering of this unit was not required during construction of two shafts. Underlying the Plutonic-igneous rocks is the Basement Complex. The Basement Complex is separated from the Plutonic-igneous rocks by a basement fault that underlies the Site. The Basement Complex has more extensive fracturing and faulting than the overlying Plutonic-igneous rocks resulting in more groundwater flow within this hydrostratigraphic unit. Approximately 800 gallons per minute (gpm) of groundwater pumping was required from the Basement Complex during the sinking of the main shaft at the Site.

The main regional and uppermost aquifer system for this area is the UAU. Groundwater flow in this unit is away from the Casa Grande Ridge and toward the southeast and southwest. The mine pit is located in an area of a bedrock high, overlying the Casa Grande Ridge. The UAU lies above the water table at the Site, but the aquifer is an important source of water closer to the Santa Cruz Wash. The closest production or water supply wells completed in this unit are located 1.5 miles or more from the Site. The Casa Grande municipal wells are located 6 or 7 miles away from the Site. Domestic wells produce approximately 5 gallons per minute (gpm) and municipal and irrigation wells produce up to 3,000 gpm (Montgomery & Associates, 1986) with a specific capacity of 10 to 150 gpm per foot (gpm/ft) of drawdown.

Beneath the unconsolidated deposit is a Tertiary age, firmly lithified conglomerate termed the LCU (M&A, 1986). The LCU is comprised of boulders, gravel, sand, and clay. Due to the degree of lithification and the presence of fines, this formation is a poorly producing aquifer. Aquifer tests and airlift tests yielded specific capacities between 0.02 gpm/ft. to 0.4 gpm/ft.

Below the LCU are the Plutonic-igneous rocks, both mineralized and non-mineralized. The mineralized Plutonic-igneous rocks were the source of ore during mine operations. This formation has low hydraulic conductivity that is enhanced by occasional fracture and fault zones.

Underlying the Plutonic-igneous rocks is the Basement Complex, composed of Pre-Cambrian-age gneiss, schist, and granite. The Basement Complex was encountered at a depth of approximately 1,235 feet below ground surface (bgs) at the Site.

1.2. Objectives

The primary objectives of the SIP are to: 1) Mitigate Potential Human/Ecological Health Hazards; 2) Mitigate Offsite Transport of Tailings/Waste Rock Sediments and Wind-Blown Dust; and 3) Stabilize TSF, WRD, and UMWA.

2. SITE CHARACTERIZATION

Tetra Tech conducted Site characterization to further define the identified source areas and potentially impacted soils at the Site, and to further investigate groundwater conditions to provide the information necessary for the preparation of this SIP. The Site characterization activities included the following:

- Groundwater Characterization;
- Stormwater Evaluation;
- Geochemical Assessment;
- Geotechnical Assessment;
- Vegetation Assessment; and
- Impacted Soil Investigation.

Figures presenting sampling locations and Site features are referenced in the sections below. Analytical laboratory results are summarized in a series of tables included as **Appendix A1**.

2.1. Groundwater Characterization

Montgomery & Associates (1986) performed a comprehensive evaluation of post-mining groundwater conditions at the Sacaton Mine as part of an attempt by ASARCO to utilize the open pit for a solid waste landfill. Site-specific pre-1986 water-quality and water-level data are limited; however, the available data are provided in the 1986 Montgomery & Associates report. Montgomery & Associates also conducted field investigations in 2013 on behalf of Russell Mining Corporation as part of a due-diligence study and reported results in an Interim Data Report (Montgomery & Associates, 2013).

The hydrogeology of the Sacaton Mine area consists of four main hydrogeologic units: 1) UAU; 2) LCU; 3) Plutonic-igneous rocks; and 4) Basement Complex. The regional MSCU hydrogeologic unit is not present at the Site.

The UAU is the primary source of groundwater for the region; however, this unit appears to be above the water table and is unsaturated at the Site. The UAU is approximately 100 feet thick in the walls of the open pit mine and seeps or springs have not been observed emanating from this unit.

The top of the LCU within the open pit is at a depth of approximately 100 feet and has a maximum thickness of approximately 580 feet in thickness. The lower portion of the LCU appears to be saturated at the Site based on several small seeps and springs that have been observed in the walls of the open pit (ENVIRON, 2012). The potentiometric surface for the LCU at the mine pit is project at a depth of approximately 400 feet bgs. The bottom of the LCU is at a depth of approximately 680 feet. Therefore, approximately 280 feet of the LCU is saturated at the mine pit.

The Plutonic-igneous rocks are exposed in the walls of the open pit. The surface of the Plutonic-igneous rocks is at a depth of approximately 680 feet at the mine pit. The base of this unit was not encountered in the open mine pit; however, the main shaft at the Site encountered it at a depth of 1,235 feet bgs. Groundwater flow in this unit is primarily controlled by fractures and faults. A ventilation shaft was sunk to a depth of approximately 1,070 feet bgs near the open pit mine. Fractured plutonic rocks encountered during the construction of this shaft did not require significant groundwater pumping to maintain dry conditions in the shaft. A second shaft (Main Shaft) is located within a few hundred yards of the ventilation shaft. It was sunk to a depth of approximately 1,800 feet bgs. A groundwater pumping rate of approximately 800 gpm was required at the completion of the Main Shaft construction to maintain relatively dry conditions in the shaft. Therefore, permeable fractures and faults are present between depths of 1,070 to 1,800 feet

bgs in the Plutonic-igneous rocks and Basement Complex. The combined potentiometric surface for the Basement Complex/Plutonic-igneous rock systems is at a depth of approximately 270 feet bgs. The potentiometric surface for the LCU is at an approximate depth of 400 feet bgs. Therefore, the potential groundwater flow direction is upward from the Basement Complex/Plutonic rock system into the LCU.

In 2017, Tetra Tech performed an evaluation of groundwater condition surrounding the open pit mine and pit lake (Tetra Tech 2017). The primary focus of the investigation was to determine if the pit lake is acting as a terminal groundwater sink and if groundwater in the pit was impacting local groundwater quality. Tasks performed during the 2017 groundwater characterization included: 1) A review of historical information and data; 2) A Site inspection to locate existing monitoring wells and historical geologic core hole; and 3) Collection of water-levels and water samples from existing wells, core holes, shafts and the mine pit lake. A technical memorandum was prepared and submitted to ADEQ on December 21, 2017 presenting the results of the groundwater characterization (Tetra Tech, 2017).

The 2017 investigation determined that the mine pit lake water level is at an approximate depth of 930 feet bgs (Tetra Tech, 2017). Similarly, the investigation estimated potentiometric surface for the Basement Complex/Plutonic-igneous rocks system is at a depth of approximately 270 feet and the LCU is at a depth of 400 feet bgs. Therefore, the mine pit lake is approximately 660 feet below the Basement Complex/Plutonic-igneous rock systems and the mine pit lake is over 530 feet below the LCU potentiometric surface at the Site. Because of this hydraulic head difference, there is a high hydraulic gradient into the open pit resulting in groundwater flow into the open pit.

The memo concluded that:

> *"The results of the sampling efforts are consistent with previous sampling results, and do not suggest that water in the pit is impacting groundwater quality. The recently collected water level measurements, along with the previously recorded groundwater levels throughout the site indicate groundwater flow towards the open pit. The addition of the isotopic analysis of the pit lake provides another source of evidence to conclude that the pit lake is subject to significant evaporation and limited recharge, thus preventing water flowing from the pit lake into the surrounding groundwater system."*

Based on these data and Tetra Tech's analysis, the ADEQ determined that additional investigation of potential groundwater impacts at the Site are not warranted (ADEQ, Email Communication, April 5, 2018).

2.2. Stormwater Evaluation

The focus of the 2018 stormwater evaluation conducted by Tetra Tech was to identify drainage patterns, the potential for erosion of on-Site materials and conveyance of mine-related waste by surface water offsite. Emphasis was placed on evaluating drainages that may transport constituents of concern offsite. The evaluation included a desktop analysis, sediment sampling, drainage characterization, and an assessment of future management goals.

The desktop analysis concluded that upland ephemeral drainages convey stormwater along the natural gradient generally toward the northern and eastern boundaries of the Site. The upland drainage catchments, delineated on **Figure 3**, are undeveloped, sparsely vegetated, and consist of fine-grained soils that are easily eroded. The Site is located within an arid continental desert that sees an average of 8-9 inches of rain throughout the year. Rainfall events are predominantly short-duration, high-intensity monsoon storm events during the summer months, and low-intensity, prolonged events during the winter months.

A physical investigation of Site drainage features and conditions was conducted in May 2018. The investigation focused on specific areas of the Site that were previously observed to have been damaged by erosion and require constructed modifications to minimize future damage. These areas included the TSF, WRD, and the North Haul Road. Based on observations during the site pedestrian survey, it appears that channels and berms have historically been installed to either divert offsite stormwater around the Site or convey it through. However, these structures are highly susceptible to siltation and erosion, and have largely failed in the absence of ongoing maintenance.

Sediment samples were collected at seven locations from the channels and stormwater detention ponds around the TSF. Sediment samples were analyzed for total metals concentrations to evaluate the level of wind and water erosion transport of tailings outside the TSF. Results are presented in Table A-1 (included in **Appendix A1**) and were evaluated against the 2007 Arizona Soil Remediation Levels (SRLs) and the 2017 Tier 1 Cleanup Standards. A single sample collected from the TSF southwest detention pond at 3.5 feet bgs contained copper and uranium concentrations of 10,600 mg/kg and 26.3 mg/kg, respectively. Both constituents exceed the Arizona residential SRL for total copper (3,100 mg/kg) and uranium (16 mg/kg); however, the sample results were below non-residential standards for copper (41,000 mg/kg) and uranium (200 mg/kg).

The following list of observations summarizes the findings of the stormwater investigation by area. For reference, **Figure 4** presents a Site layout with primary Site drainage features identified.

- TSF Perimeter:
  - North – The diversion channel is mostly functioning as intended, capturing offsite run-on and diverting it to the northwest corner of the TSF for offsite discharge. At the discharge location in the northwest corner the channel has lost integrity allowing some water to drain back toward the TSF, as opposed to continuing to flow offsite to the west. Riprap armoring has been placed on the south embankment of the diversion channel at the entry points of offsite ephemeral swales.
  - West – Two parallel diversion and collection channels are present along the west side of the TSF. Sedimentation within the channels has limited the capacity and the channel berms or embankments are eroded and undercut in places, potentially allowing stormwater to exit the collection channel to the west before reaching the southwest detention pond.
  - East – Along the eastern perimeter, a small berm appears to create a 15-foot wide channel collecting contact water along the toe of the southern half of the TSF and route it into the southeast detention pond. Lack of channel definition, due to sedimentation, and erosion of the channel berm in places create opportunities for stormwater to bypass the detention pond.
- North Haul Road:
  - As indicated on **Figures 3** and **4**, stormwater from the central upland catchment area concentrates and crosses the North Haul Road between the open pit and Mill/Mechanical Area. This North Haul Road connects the open pit, UMWA and WRD areas of the site with the Mill/Mechanical Area.
  - Sedimentation in the channel upstream of the road crossing is evident and ephemeral flows cross the road at a wide low-water crossing. The road crossing is susceptible to scour and erosion during storm events.

- Waste Rock Dump:
  - Based on the pedestrian survey of the Site, there do not appear to be any constructed diversion channels or channels constructed around the WRD to carry run-off from the pile.
  - A berm is present along the eastern WRD boundary and appears to be functioning to keep run-on away from the pile.
- Other Site Areas:
  - There are no significant drainage features associated with the Mill/Mechanical Area.
  - Within the UMWA, a small detention basin just outside and to the southwest of the fenced yard area was identified. This basin appears to have been some sort of wash out or discharge detention pond potentially associated with the construction of the mine shaft(s). There is a gray residue/sediment present within the pond that was sampled during the investigation, with total chromium results of (60.7 and 63.5 mg/kg). There are no regulatory standards for total chromium; however, the 2007 SRLs do include screening levels for chromium III. The SRLs for chromium III are 30 mg/kg for residential and 65 mg/kg for non-residential. It is unlikely that the total chromium concentrations measured in this pond are all chromium III, but both sample results are below non-residential chromium III standards.

Stormwater management decisions developed based on these findings, and incorporated into the improvement plan for the Site, are discussed in Section 3.0.

2.3. Geochemical Evaluation

The Site was developed in a porphyry copper deposit. The typical geochemical conceptual model of a copper porphyry would assume that there is a potential for the presence of sulfides and therefore acid rock drainage (ARD) generation. The geochemical assessment work that was performed by Tetra Tech included the collection of discrete samples of tailing, waste rock, and soil materials from various locations throughout the site to provide a basic understanding of material characteristics to support the development of the SIP.

To provide basic geochemical characterization of the materials, the elemental composition (total metals) of tailing and waste rock was determined and samples were also subjected to Synthetic Precipitation Leaching Procedures (SPLP) testing. The elemental composition of the TSF and WRD samples was determined by whole rock analysis using aqua regia (HNO_3/HCl digestion), followed by analysis using inductively coupled plasma mass spectroscopy (ICP-MS) and/or inductively coupled plasma atomic emission spectroscopy (ICP-AES). SPLP simulates the static potential for reaction with meteoric water (precipitation), dissolution, and release of trace elements to the environment, and is designed as a screening procedure for the Site. SPLP uses a sulfuric and nitric acid (60:40 ratio) lixiviant with a pH of 5.0 to simulate the effects of meteoric precipitation leaching the rock. The resulting leachate is analyzed for indicator parameters, inorganics, and metals.

The results of analytical testing of tailing samples are presented in Table A-2, waste rock sample results are included in Table A-3, and the results of analyses performed on potential cover material from the Alluvium Soil Storage Area are presented in Table A-4 (**Appendix A1**).

Conclusions from the evaluation of geochemical testing of the tailing and soil underlying the TSF are listed below:

- Metals concentration in tailings does not exceed residential Soil Remediation levels (SRLs) or ADEQ Groundwater Protection Levels (GPLs).

- In select areas, there is up to an order-of-magnitude reduction in copper concentrations from tailings to underlying soils.
- Several other metals were observed with slight concentration decreases. These metals included molybdenum, nickel, silver, zinc, and uranium.
- No major reduction in metals concentration was observed in underlying soil for most constituents (up to 30 feet below tailings/native soils contact).

To specifically assess the potential for ARD generation of Site materials that could potentially be used as riprap to armor stormwater channels, Tetra Tech conducted a geochemical investigation at the Site that consisted of collecting samples of crushed rock and waste rock. The rock was then evaluated for potential use as riprap. Three crushed rock samples were collected from stockpiled material near the former crushing operation on the WRD (ROCK-01, ROCK-02, and ROCK-03) and waste rock samples were collected from five test pits (WRD-TP-27, WRD-TP-30, WRCA_TP-04, WRCA-TP-08, and WRCS-TP-20; locations shown on **Figure 5a**). The samples were analyzed using a static acid base accounting (ABA) method (EPA-600 ABA) and Net Acid Generating Potential, or NAG pH, in addition to analysis of total metals concentrations and leachable metals by Synthetic Precipitation Leaching Procedure (SPLP). Table A-5, included in **Appendix A1**, presents a summary of the ABA tests.

The ABA results provide data on the sulfur content of the material and the acid generating potential (AGP) and neutralization potential (NP). From this data two different calculations are performed to develop a Net Neutralizing Potential (NNP), which is the difference between the neutralization potential and the acid generating potential (NNP = NP-AGP), and the Neutralization Potential Ratio (NPR), which is the ratio of NP to AP (NPR = NP/AGP). The ABA testing is considered a conservative method, in that samples are crushed and ground prior to testing, per the analytical method, creating additional surface area within the sample matrix. It is expected that the ABA concentrations would be less for riprap sized rock samples.

The risk of ARD has been found to be highest for samples with NNP values less than -20 t $CaCO_3$/kt rock and is low when the NNP is greater than 20 t $CaCO_3$/kt rock (INAP, 2015). An NPR greater than two is thought to have a low ARD risk while samples with an NPR less than one have a high ARD risk (INAP, 2015). Materials with a higher risk of ARD are characterized as potentially acid generating (PAG). Another analysis method that was used to assess the ARD risk of site materials is the NAG pH test. This static testing method involves the addition of hydrogen peroxide to a sample and determination of the pH after 24 hours. NAG pH levels below 4.5 are usually characterized as PAG while values above six are characterized as non-acid generating.

Results from the investigation are presented below:

- One crushed rock sample exhibited clear PAG characteristics while the other two samples had indications of PAG but were inconclusive.
- One waste rock sample exhibited clear non-acid generating (NAG) characteristics while all others had indications of PAG, but were inconclusive.

The concern over using this material as a source of riprap, is that if the material is placed in drainage channels or other surface water conveyances, there is a potential that repeated water contact may generate acid and in turn leach metals from the rock into the water flowing over it. The test method may provide somewhat conservative results because the samples are crushed and ground prior to testing, per the analytical method. However, in considering whether the rock material is suitable for use as riprap based on the results of this limited evaluation, there are enough indications of acid generating potential within the rock material in the WRD that Tetra Tech does not recommend using waste rock as riprap, unless additional kinetic testing or field, bench-scale testing is performed. Furthermore, based on observations of the various material sampled and tested during the field investigation, there are no visual characteristics that could be

used to classify material as either PAG or NAG in the field. Therefore, riprap from offsite commercial sources will be imported as needed.

2.4. Geotechnical Evaluation

Tetra Tech conducted a geotechnical investigation of the former Sacaton Mine to characterize subsurface conditions and perform a slope-stability analysis for the proposed tailings impoundment regrading and fill placement. The investigation consisted of nine exploratory borings and 35 exploratory test pits at the locations shown in **Figure 5a**. Three exploratory borings and four test pits were advanced in the TSF; one boring and seven test pits were advanced in the Alluvium Soil Storage Area; four borings and 24 test pits were advanced in the WRD; and one boring was advanced on Tank Hill. Many of the geotechnical test locations, especially test pits within the WRD area, were selected to locate suitable material for use as cover material. Geotechnical logs for all borings and test pits advanced at the Site are presented in **Appendix B** and a summary of geotechnical laboratory test results are presented in **Appendix A2**.

General findings from the geotechnical evaluation are presented below:

- Alluvium material is classified as clayey-sand to silty-sand.
- Typical gradations are less than 3% gravel, 60-70% sand, and 30-40% silt to clay sized particles:
  - Consistent across Alluvium Soil Storage Area, Tank Hill, and northeast portion of WRD;
  - Confirms with field observations that material is not erosion-resistant.
- Gravel-cover material classified as silty sand, but with high gravel content (30%):
  - Field observations indicate that this material is much more erosion resistant than alluvium.
- Tailing material classified as sandy-silt to silty-sand (approaching 50% fines):
  - Moisture content in borings near embankment were relatively low (4-23%), although one 4- to 5-foot zone of tailings (TSF-BH-07) at a depth of approximately 60’ appeared near saturation.
  - Moist conditions were encountered in test pits across the surface of the tailing to depths of up to 20 feet (10-15%), but material was not saturated.

Strength testing was conducted on tailing and alluvium material for stability analyses and it was determined that existing side slopes on the TSF are geotechnically stable under static and pseudo-static conditions.

Soils underlying the TSF were sampled during the geotechnical evaluation from boring TSF BH-08 (see **Figure 4**). The samples were collected at 4 feet and 30 feet below the tailings/native soils contact. Laboratory test results are presented in **Appendix A2**.

Utilizing the material properties from the geotechnical testing on samples of tailing and native soil underlying the tailing, Tetra Tech conducted a slope-stability analysis for the TSF side slopes, considering the maximum slope section near the southwest corner of the TSF. The stability analysis was performed using the computer program SLIDE developed by Rocscience. This program performs a series of iterations utilizing the simplified Janby and Bishop methods to determine possible rotational failure surfaces and the factor of safety for each failure surface (see Slide Models included in **Appendix C**). For the pseudo-static analysis, the design peak ground acceleration of 0.111g was selected, based on the USGS National Seismic Design Mapping application, for an earthquake with a 2 % probability of exceedance in any 50-year period (approximately 2,500-year return frequency).

The results of this evaluation determined that under current conditions the side slopes of the TSF are geotechnically stable under static and pseudo-static conditions. A second set of analyses were performed considering the regrading of the lower slope to a 3H:1V slope. Under this configuration, the stability of the embankment slopes was improved, the slope would be better protected from erosion and it would promote the establishment of vegetation. The factors of safety obtained from these analyses, which were used in developing the regrading plans for the TSF as described in Section 3.3, are presented below in **Table 2-1**.

Table 2-1. Slope Stability Factors for Safety

Case	Calculated Factor of Safety	Horizontal Seismic Coefficient (%g)	Recommended Minimum Factor of Safety
Stability under Static Conditions (no earthquake seismic loading)			
Existing Slope Configuration	1.96	--	1.5
Lower Slope Re-Graded to 3H:1V	2.16	--	1.5
Stability under Pseudo-Static Conditions			
Existing Slope Configuration	1.47	0.111	1.1
Lower Slope Re-Graded to 3H:1V	1.58	0.111	1.1

2.5. Cover Material Investigation

As part of the site investigations, Tetra Tech also performed an assessment of cover materials. There were two parts to the cover material investigation: 1) Identify and evaluate sources of material present on-site that could be used as cover or plant growth medium; and 2) Evaluation of the existing soil covers in place over portions of the TSF and WRD. Cover materials are planned to be used to mitigate the following risks:

- Wind-blown dust transport;
- Offsite transport of sediments via stormwater runoff;
- Potential exposure to fine sediments and acid drainage in ponded areas; and
- Slope erosion – exposure/transport of mine waste and tailings.

2.5.1. Cover Material Sources

Significant quantities of alluvium material are available in multiple stockpile locations including the Alluvium Soil Storage Area, located to the northeast of the open pit, the Tank Hill, and the Northeast and Northwest stockpiles of the Waste Rock Dump. As summarized in Section 2.4, alluvium material present in these stockpiles is consistently classified as clayey-sand to silty-sand. While there is a large quantity of this alluvium material present, observations of previous reclamation efforts on the TSF and WRD indicate that this material is not erosion resistant and does not perform well as cover especially on steeper slopes. Observations of previously reclaimed slopes indicates that the best performing cover material, from an erosion control perspective, is a gravel-cover material present on side slopes of the TSF and WRD.

Site investigations and evaluation of site topographic survey information have identified an estimated 400,000 cubic yards (cy) of gravel-cover material potentially available for use in the following locations:

- 195,000 cy from the primary stockpile on the WRD;
- 49,000 cy from a stockpile east of the underground area;
- 100,000 cy from the cover and stockpile in the northwest portion of the WRD area;
- 25,000 – 30,000 cy from the WRD perimeter road; and

- 30,000 – 35,000 cy from the TSF perimeter road.

As referenced above, multiple test pits were excavated as part of the geotechnical investigation in an attempt to locate additional accumulations of this gravel-cover material. While some accumulations of the gravel-cover material were present on the surface of the northwest portion of the WRD, test pits did not reveal any significant quantities within this northwest stockpile. Additional test pits were excavated in the lower bench of the WRD, which appears to be primarily constructed of alluvium. Some waste rock was identified within these areas, covered by alluvium, but no gravel-cover material was located.

Samples of potential cover material, waste rock, and several tailing samples were selected for laboratory analysis. In addition to the analyses of total and SPLP metals, discussed in Section 2.3, potential cover material samples were submitted to assess their agronomic properties. **Table 2-2.** below presents the agronomic analyses performed and the analytical methods used.

Table 2-2. Agronomic Analyses and Analytical Methods

Analysis	Method
Cation Exchange Capacity (CEC)	USDA No. 60 (19) 1
Calcium, soluble (Sat. Paste)	M6010B ICP
Magnesium, soluble (Sat. Paste)	M6010B ICP
Potassium, soluble (Sat. Paste)	M6010B ICP
Sodium, soluble (Sat. Paste)	M6010B ICP
Sodium Adsorption Ratio	Calculated
Carbon, total organic (TOC)	EPA 600/2-78-054 M3.2.14
Neutralization Potential as CaCO3	M600/2-78-054 1.3
Conductivity @25C	SM2510B
Organic Matter (Ignition @ 400C)	ASA No.9 29-2.2.4 Combustion/IR
pH, Saturated Paste	EPA 600/2-78-054 section 3.2.2
Solids, Percent	D2216-80
Phosphorus (AB-DTPA)	M365.1 – Automated Ascorbic Acid
Nitrate as N	M353.2 – Automated Cadmium Reduction

Results of the agronomic analyses are presented in **Appendix A1**. A summary of these analytical results is presented below.

Alluvium-Cover Material

Soil reactivity (pH) is alkaline and ranges from 8.5 to 8.8. NAG pH is 8.7 or non-acid generating. These materials are slightly saline with electrical conductivity (E.C.) ranging from 2.5 to 3.7 mmhos/cm. The organic matter (O.M.) content of these materials is below the method detection limit of 0.1 %. The materials are generally devoid of coarse rock fragments (particle diameter > 2 mm). These materials are sodic with sodium adsorption ratio (SAR) ranging from 25 to 38 and water-soluble calcium, magnesium and sodium ranging from 0.5 to 1.0, 0.3 to 0.6, and 20 to 33 meq/L, respectively. Sodic soils typically have low permeability to water and air, poor aggregation of soil particles, surface crusting and limited vegetation. The observed susceptibility of these materials to erosion is likely due to their sodicity. To address these issues, sodic soils are typically amended with one or more of the following: $CaSO_4$ (Gypsum); $MgSO_4$; K_2SO_4; CaCl; MgCl; H_2SO_4 (sulfuric acid); elemental sulfur; organic matter (e.g. compost, manure).

Gravel-Cover Material

Soil reactivity is circumneutral to alkaline with pH of 7.8 and 8.4. NAG pH is 8.5 or non-acid generating. These materials are non-saline with E.C. of 0.2 and 0.4 mmhos/cm. The O.M. content of these materials is 0.3 percent. These materials are non-sodic with SARs of 1.8 and 12 and low water-soluble calcium, magnesium and sodium. The coarse rock fragment content of these materials is approximately 50 to 60 % by volume and the rocks appear to be durable. The erodibility of these material is low to moderate. Relative to the alluvium-cover materials, the cover and diversity of vegetation growing on the gravel-cover materials is considerable higher.

2.5.2. Assessment of Existing Cover

Prior to conducting the assessment of cover material on-site, to be specified and utilized as part of this SIP, available aerial imagery and general information regarding surface facilities layout and previous reclamation activities were reviewed to develop a basic understanding of previously completed cover placement and reclamation activities, as well as potential sources of cover material.

2.5.2.1. Waste Rock Dump Cover Assessment

A field survey of the WRD was performed to evaluate the distribution of cover materials and exposed waste rock, potential cover material sources, erosion and deposition features, existing vegetation type and structure, as well as other characteristics. The WRD is essentially a complex of three dumps, or stockpiles. The northern one-fifth of the WRD is composed of two dumps (**Figure 6**). The Northeastern Alluvium Stockpile is composed primarily of alluvium and encompasses an area of approximately 84 acres. The Northwestern Mixed Stockpile is composed of a mixture of alluvium, mineralized waste rock, small stockpiles of gravel-cover material and areas which appear to have been deliberately covered with the gravel-cover material for reclamation purposes. This Northwestern Mixed Stockpile encompasses an area of approximately 81 acres. The southern four-fifths of the WRD is composed of assorted waste rock and encompasses an area of approximately 600 acres.

Following the initial field survey, a series of shallow test pits were excavated across the upper surface of the WRD (WRCA-TP-1 through WRCA-TP-29); locations of these test pits are presented on **Figures 5** and **6**. The characteristics of in-place cover material and waste rock exposed in each test pit and the surrounding vegetation was examined and documented. The profile characteristics identified and recorded at each test pit included: arrangement and depth of waste rock and cover materials (if present); “dry” color (Munsell Soil Color Charts – Gretag Macbeth 2000); coarse rock fragment percentage (by volume); expression and amount of effervescence to applied 10% hydrochloric acid solution; and other characteristics. At select test pit locations, samples of cover and waste-rock material were collected for laboratory analysis, as discussed in Section 2.5.1, above. Saturated paste pH testing of select samples was also performed on-site during the investigation.

The surface of the WRD appears to have largely been covered with various material types including alluvium, gravel cover and waste rock of unknown origin (that may be neutral or slightly acidic). The thickness of the cover varies from approximately 0.5 to 9.5 feet. Based on a combination of aerial photo analysis and field investigations, **Figure 6** was developed to identify the areas of the WRD that have not been covered. Acidic waste rock and sediments remain uncovered and present at the surface over approximately 135 acres of the top of the WRD.

Where gravel-cover material is present on the top of the WRD, vegetation diversity and vigor are relatively high and vegetation canopy cover is moderate. Where the cover materials of unknown origin and

composition are present, vegetation cover is relatively sparse to moderate and species diversity and vigor is moderate. Where acidic waste rock is present at the surface, vegetation is absent.

The east, south and west exterior slopes of the WRD are benched. Inter-bench slopes are typically quite steep (>50%), with slope lengths that vary, but generally on the order of 75 feet. While dimensions vary, bench width is generally 150 feet. The exterior slopes and benches of the WRD appear to have been covered with alluvium and gravel-cover material. In general, the integrity of the soil cover on the WRD benches and performance of vegetation is good. Copper staining and salt precipitation was observed in several areas on the reclaimed WRD benches, and in these areas, vegetation shows evidence of distress.

A series of test pits were also excavated within the road which is present around the perimeter of the upper surface of the WRD. This perimeter road appears to be constructed with gravel-cover material and these pits were excavated to determine the approximate depth of the gravel cover, and to determine if these roads could serve as a potential borrow location for suitable gravel cover. The depth of gravel-cover material in place along this road varied from approximately 2 to 6 feet, with depths increasing near the crest of the side slope embankments. From observations of conditions at these test pits, it appears that the roads may have been created during the placement of gravel-cover material on the upper side slopes of the WRD, resulting in very thick cover sections near the embankment crest as material was apparently dozer pushed over the crest and down the embankment face.

2.5.2.2. Tailing Storage Facility Cover Assessment

An assessment of the previously placed cover material on the TSF side slopes was conducted by visual observation and supplemented by a series of shallow test pits excavated into the slope cover at accessible locations on the east slope of the TSF (NEC-1 through NEC-4) and several along the north slope (NEC-5, NEC-6, and NWC-1). The locations of these test pits are presented on **Figure 5a**. Around the entire perimeter of the TSF, the upper embankment slopes appear to be covered with gravel-cover material, while the lower slopes appear to have been covered with alluvium material. In addition, the perimeter road around the embankment crest is constructed of gravel-cover material. In many areas the lowest bench and slope of the TSF appear to be constructed of alluvium, with no evidence of tailings present, although there are areas where tailings are present and exposed within this lowest bench and slope. The alluvium-cover material present on the lower embankment slopes generally appears to be on the order of 1 to 3 feet thick, with many very deep erosion gullies (up to 8 feet deep) present, resulting in the exposure and erosion of the underlying tailings. While some shallow erosion gullies are present in the upper slopes, which appear to be covered with gravel-cover material, no exposed tailing was observed, and the upper slope appears to be performing much better from an erosion control perspective. Windblown deposition of tailings is present on the upper slopes of the embankments.

A summary of general observations from the TSF cover assessment are presented below:

- The upper slope with existing gravel cover is performing well from an erosion control/vegetation perspective (better on north slope).
- The middle/lower slopes covered with alluvium have significant erosion; cover thickness appears to range from 1 - 3 feet.
- The lowest slope/bench in many areas appears to be constructed of alluvium fill; this may be a starter dam for the TSF.
- Areas of exposed tailings are present in lower bench (west, northwest, and southeast sides).
- Depths of gravel-cover material ranged from 32 to 72 inches along the northern end of the TSF.

The findings from the cover material investigation were utilized to form improvement plan decisions for the Site as discussed in Section 3.0.

2.6. Vegetation Evaluation

Tetra Tech conducted a vegetation evaluation at the Site that included inventorying ecological Site conditions, and the collection of vegetation data. These activities were performed in concert with the previously discussed sampling and analysis of mine waste, in-place mine waste cover materials, and potential sources of cover material, or plant growth media (PGM), within the mine property. Evidence of the type and extent of disturbance, landscape position and inferred soil-vegetation relationships were recorded as encountered throughout the mine property during the Site assessment. Photographs, field notes, measurements, and samples were taken to document the following: 1) Plant species observed on-Site; 2) Vegetation transects; 3) Condition of any ecological reference; 4) Changes in vegetation and soil erosion features associated with different cover materials, slope gradients and landscape positions; 5) In-place cover and potential PGM source material properties; and 6) Overall Site condition and layout. **Figure 7** depicts the location of mine features, vegetation sample plots, and transects.

The investigation of prevailing natural plant communities for the selection of an ecological reference began with an inventory and comparison of vegetation and soils within disturbed and undisturbed portions of the mine property. A 6-acre natural plant community located at the northcentral boundary of the mine property (to the north of Tank Hill) was selected as an appropriate ecological reference to support development of revegetation plans and function as a measure of comparison to assess whether reclaimed mine-related disturbance at the Sacaton Mine is successfully revegetated (**Figure 7**). Line intercept transects, and woody stem density plots were used to quantitatively describe the ecological reference. Five randomly oriented 2x50 meter sample plots were distributed equally within the ecological reference. In addition, three plots were located within a previously reclaimed portion of the WRD, also indicated on **Figure 7**. Woody stem density measurements were collected by counting the number of woody species stems within a 2x50 meter plot. Vegetation canopy cover was measured using the line-intercept method along 50 meter transects (Bureau of Land Management Tech Ref. 1734-4, 1999, pgs. 64-69), which were centered within the woody stem density plots.

A list of the plant species observed during the vegetation assessment was compiled and is presented in **Appendix D**. This list includes summaries of plant species attributes (e.g. soil pH tolerance, drought tolerance, minimum rooting depth), which were determined based on the field assessment team observations and information available in the United States Department of Agriculture PLANTS Database (http://plants.usda.gov). These attributes will be considered for development of the reclamation seed mixture for the Site. Photographs of vegetation conditions in both reference areas are also included in **Appendix D**.

2.6.1. Ecological Reference

The ecological reference (**Figure 7**) selected is a Sonora-Mojave creosotebush-white bursage desert scrub community located at the mine property's north-central boundary. The site does not show indicators of disturbance from past mining operations, either through surface disturbance or altered hydrology, and is contiguous with offsite native vegetation communities. The ecological reference has sandy soils overlain on a caliche layer of variable depths. Numerous small, northeast to southwest trending drainages dissect the area. Upland areas between drainages are dominated by creosote bush (*Larea tridentata*) and Sonoran sandmat (*Chamaesyce micromera*). Paloverde (*Parkinsonia florida*), velvet mesquite (*Prosopis velutina*), lotebush (*Ziziphus obtusifolia*), and triangle bursage (*Ambrosia deltoidea*), and occasional desert ironwood (*Olneya tesota*) are scattered along the drainageways. Drainages are common, continuous and occupy 10-15% of the area. Biotic crust pedestals (2- to 5-inches high) are common beneath creosote bushes. Soil-surface resistance to erosion is good under shrub canopies to moderate in interspaces due to crusts formed by raindrop impact and the subsequent migration/accumulation of fine soil particles on the surface.

The primary and ongoing stress within the ecological reference (and adjacent areas within the mine property) is livestock (cattle) grazing and drought.

Plant canopy cover and shrub density were measured along line transects and plots located within the ecological reference area. The plant species measured along these transects and plots are presented in **Table 2-3**. Photographs depicting the vegetation measured within the ecological reference are presented in **Appendix D** (Photographs 1 through 5) and a representative photograph of the ecological reference is provided in Photograph 6.

Table 2-3. Species Observed within Transects Located within the Ecological Reference

Common Name	Scientific Name
triangle bursage	*Ambrosia deltoides*
Sonoran sandmat	*Chamaesyce micromera*
Creosote	*Larea tridentata*
velvet mesquite	*Prosopis velutina*
lotebush	*Ziziphus obtusifolia*

2.6.2. WRD Reclaimed Area

The surface of the WRD is composed of various material types – alluvium, gravel and neutral or acidic waste rock. It appears that approximately 2 to 3 feet of gravelly material (gravel-cover material) was placed on the upper scarified surface of this portion of the WRD as a soil cover for reclamation and reseeded. The gravel soil cover material was likely mined from the open pit and is composed of Pinal Schist, which is a complex of metamorphic rocks including schist, metamorphosed granite and gneiss.

Plant density, canopy cover, vigor and species diversity of the existing vegetation varies considerably and is directly related to the composition (and depth) of surface material. Plant canopy cover ranges from approximately 0 to 20 %. Surfaces composed of acid waste rock are devoid of vegetation whereas surfaces composed of gravel material support the highest plant diversity, canopy cover, and vigor within mine-related disturbed areas on site.

Vegetation measurements were collected from three transects located on reclaimed portions of the west central top of the WRD. Plant canopy cover and shrub density were measured along line transects and in plots located on reclaimed portions of the west central top of the WRD. The plant species measured along these transects and plots are presented in **Table 2-4**. Photographs depicting the vegetation measured within reclaimed portions of the west central top of the WRD are presented in **Appendix D** (Photographs 7 through 9).

Table 2-4. Species Observed within Transects Located on Reclaimed Portions of the West Central Top of the WRD

Common Name	Scientific Name
four-wing saltbush	*Atriplex canescens*
desert saltbush	*Atriplex polycarpa*
whitemargin spurge	*Chamaesyce albomarginata*
Sonoran sandmat	*Chamaesyce micromera*
brittle spineflower	*Chorizanthe brevicornu*
fluffgrass	*Dasyochloa pulchella*
annual buckwheat	*Eriogonum species*
flatspine stickseed	*Hackelia species*
creosote bush	*Larrea tridentata*
southern goldenbush	*Isocoma pluriflora*
tamarisk	*Tamarix* sp.
four-wing saltbush	*Vulpia octoflora*

The dominant shrub observed growing on the WRD regardless of the composition (and depth) of surface material is Creosote (Larea tridentata). Four-wing saltbush (Atriplex canescens) and Desert saltbush (Artiplex polycarp) are co-dominant with Creosote on reclaimed areas of the WRD. Velvet mesquite and goldenbush (Isocoma sp.) are also common shrubs. Tamarisk (Tamarix sp.), an Arizona State noxious weed species, was infrequently observed on the WRD where saturated soils are present during the growing season, for example where overland flow is concentrated in depressions. Sonoran sandmat and several species of buckwheat (Eriogonum sp.) are the most common forbs. Six-weeks threeawn (Aristida adscencionis) and six-weeks fescue (Vulpia octoflora) are the common annual grasses. And the perennial grass fluffgrass (Dasyochloa pulchella) is scattered throughout many of the reclaimed areas.

Tetra Tech hypothesizes that plant above ground productivity, flowering and seed germination and plant establishment varies drastically from year to year based on the amount and timing of precipitation received; with plant productivity, flowering and seed germination and establishment ranging from nearly nothing during dry years to considerable during wet El Nino years.

2.6.3. Tailings Storage Facility

The reclamation performed previously on the side slopes of the TSF was qualitatively assessed. Where a gravel cover is present over tailing, vegetation is generally present. Where wind-deposited tailings are present over gravel-cover material, vegetation generally grows though the wind-deposited tailing. There is a greater density of creosote and perennial and annual grasses on the north-facing and previously sprinkler-irrigated east-facing revegetation test plots located on the side slopes of the TSF. Plant cover is very sparse on the south- and west-facing side slopes of the TSF. Revegetation test plots are present on the east-facing side slopes of the TSF. Plant cover, density and vigor is very poor within these test plots, with the exception of a few Eucalyptus trees (*Eucalyptus spp.*) and tamarisk, which are exotic and Arizona State noxious weeds, respectively. The plant species growing on the TSF are similar to those observed growing on the WRD and in the ecological reference areas, with the exception of Eucalyptus.

Impounded tailing without cover are devoid of vegetation. Where a gravel cover is present, creosote grows, but is the only species present and plant density is extremely sparse.

2.6.4. Summary of Findings

The assessment of vegetation located within the ecological reference, TSF and the reclaimed area located on top of the WRD revealed that these areas share vegetation characteristics. These areas are indicative of desert scrub community dominated by creosote bushes. The ecological reference has greater plant density and cover, while the reclaimed WRD area has greater plant diversity and the TSF has extremely limited plant cover and diversity with the exception of the north-facing and irrigated west-facing test plots located on the embankment slopes of the TSF.

In addition to the quantitative assessment of the two reference areas, qualitative assessments of vegetation conditions were made in other areas of the Site including the Alluvium Soil Storage Area. Level areas on the Alluvium Soil Storage Area contain the same species as the ecological reference, but with lower woody species density. Also observed atop the Alluvium Soil Storage Area were several shallow basins, apparently excavated intentionally to retain moisture and promote vegetation. Photographs of vegetative conditions of the Alluvium Soil Storage Area are included in **Appendix D** (Photographs 10 and 11). Generally, reclamation areas with non-acid forming soil substrate and mild to moderate slopes performed well, whereas areas with acid-forming soils or steep slopes performed poorly.

Cattle were observed grazing within several previously reclaimed areas. While grazing disturbance is consistent with the Project's ecological reference, it is likely having a disproportionately adverse effect on reclamation site development.

General findings from the vegetation evaluation are presented below:

- Sufficient information was gathered from the evaluation to develop revegetation/reclamation specifications;
- The vegetation is stressed by cattle grazing, limiting diversity and sustainability;
- Where a gravel cover is present on the TSF and WRD side slopes, vegetation is generally present; plant species are similar to those observed growing on the WRD and in the ecological reference areas;
- Gravel cover (present on upper WRD surface) contains higher plant canopy cover, density, vigor and less erosion than the alluvium;
- A preliminary review of agronomic analyses indicates more favorable results for gravel cover (lower Sodium Adsorption Ratio [SAR] and pH);
- Water harnessing features, similar to excavated basins on the Alluvium Soil Storage Area, should be incorporated to retain moisture and improve revegetation performance.

The findings from the vegetation evaluation were utilized to form improvement plan decisions for the Site as discussed in Section 3.0.

2.7. Impacted Soils Investigation

To evaluate the presence of impacted soils requiring remediation, Tetra Tech conducted a Site investigation that consisted of advancing 42 exploratory test pits and seven borings (locations shown in **Figures 5a and 5b**). Of the 42 test pits, 32 were in the Mill and Mechanical Area, seven were along the perimeter of the TSF, and three were in the UMWA. Three borings were advanced in the tank farm area, two boring in truck shop, and two borings near the reagent plant tanks.

Soil samples (63 total) were collected during the Site reconnaissance for analyses. The samples were collected from the Mill Area (23), the Mechanical Area (18), the sediment basins/channels (12), the

Administration Area (4), and the UMWA (6). Laboratory analytical results are presented in **Appendix A1**. The results from the laboratory analyses were compared to the following Arizona standards: 2007 SRLs; and 2017 Tier 1 Standards for Petroleum Products UST Program.

The impacted soils/sediments evaluation revealed the following conclusions:

- No major soil concentration exceedances of SRLs or Tier 1 Standards were identified;
- Copper was the only metal that exceeded residential SRLs (3,100 mg/kg) for mining-impacted stained soils; however, copper did not exceed non-residential standards (41,000 mg/kg);
- No organic constituents exceeded SRLs;
- No PCBs were detected in the UMWA Electrical Substation; and
- The TSF sediment pond exceeded residential SRLs for uranium and copper.

The UMWA detention pond sediments were analyzed for total chromium concentrations; however, SRLs are only established for chromium III and not total chromium. If the total chromium concentrations measured were all chromium III, they would be below non-residential SRLs for chromium III, but they would exceed the residential SRLs for chromium III.

The findings from the impacted soils evaluation for each specific area within the Site were utilized for the assessments and improvement plans presented in Section 3.0.

3. SITE IMPROVEMENT PLAN

Based on the investigation/studies completed by Tetra Tech as detailed in Section 2 of this report, a SIP has been prepared to meet project objectives as stated in the Introduction as follows:

- Mitigate Potential Human/Ecological Health Hazards;
- Mitigate Offsite Transport of Tailings/Waste Rock Sediments and Wind-Blown Dust; and
- Stabilize TSF, WRD, and UMWA.

Tetra Tech's general approach to achieve these objectives includes:

- Removing buildings/structures;
- Removing hazardous materials from the site;
- Regrading and placing gravel and/or alluvium-cover material on areas presenting potential human and/or ecological health hazards (including the TSF, WRD, and UMWA);
- Design/install covers for two shafts in UMWA;
- Improving stormwater drainage from the Site; and
- Restricting access to the Site. Site improvement tasks to be completed in support of this general approach for each specific area of the Site are presented in the following sections.

Current design drawings presenting the construction details for the SIP activities are presented in Appendix E. Additional details and notes may be added to these drawings prior to construction.

3.1. Site Buildings/Structures Demolition

As discussed in Section 1, the Trust proceeded with the first phase of a demolition program in 2018 at the direction of ADEQ. A bid package for the demolition of approximately 80% of above ground buildings and structures was developed and sent out to three bidders in March 2018. With the concurrence of ADEQ, the demolition work commenced at the Site on September 24, 2018 and was completed on December 28, 2018. The demolition/deconstruction tasks included: 1) Asbestos, PCB, and lead-based paint (LBP) removal; 2) Hazardous and non-hazardous waste removal 3) Building/structure demolition; and 4) Construction debris removal/recycling. The demolition contractor was required to bring all buildings/structures down to the existing grade or concrete slabs. Hence, the concrete slabs and pedestals for the buildings remain in place at the Site.

Phase 2 demolition activities, to be conducted concurrent with other SIP activities are described below in Section 3.1.2.

3.1.1. 2018 Phase 1 Demolition Tasks

The demolition of most buildings and structures at the Site was performed in the Fall of 2018. Environmental surveys were performed for all buildings and structures scheduled for demolition to help ensure that all ACM, PCBs and LBP materials were identified and abated prior to demolition activities.

Site Buildings/structures removed in 2018 included most buildings/structures at the Site (Figures 8a and 8b). Large concrete structures such as the Primary Crusher system and below ground structures, such as the ore bin and thickener tunnels, were not removed during the 2018 demolition activities. In addition, a few buildings/structures not removed during the 2018 demolition were retained for Site operation and future

Site improvements. Documentation of the 2018 demolition activities are provided in the demolition completion report (Tetra Tech, 2019).

3.1.2. 2019 Phase 2 Demolition Tasks

As discussed earlier in this section, the Phase 1 demolition activities only affected approximately 80% of Site buildings and structures. Buildings and structures that currently remain at the Site were not selected for early demolition because: 1) They continue to be utilized; 2) They were needed to support future SIP activities defined in this report; and/or 3) They will be demolished in combination with other SIP implementation activities. The buildings/structures remaining after the 2018 demolition are the following (**Figures 8a** and **8b**):

- Fresh Water Tank;
- Primary Crusher and Fine Crusher Structures;
- Ore Bin Tunnels;
- Middling and Concentrate Thickener Tunnels;
- Flow Pump Pit;
- Reclaimed Water Reservoir;
- Main Water Valve Shed;
- Main Office Building and Guard House;
- Core Shed and Field Warehouse; and
- APS Electric Substation.

The Fresh Water Tank is located on a man-made hill (Tank Hill) adjacent to the Mill/Mechanical Area and is currently used for water supply at the Site. The storage capacity and structural integrity of this tank is inadequate for SIP construction activities, so a new water storage facility will be established prior to construction activities. Tank Hill contains over 750,000 cy of alluvium material. As discussed earlier, this material has been tested and is appropriate for Site cover material. It will be used for cover material at the TSF and Mill/Mechanical Area because of its proximity to these areas and the lower costs to transport and place it versus the Alluvium Soil Storage Area location. Therefore, demolition of the Fresh Water Tank will be performed upon initiation of SIP activities.

The Primary Crusher and Fine Crusher Structures are located on an elevated area which is an extension to Tank Hill. Demolition of these structures will need to be performed prior to utilizing the alluvium material underlying these structures.

The former ore bin tunnels located beneath the intermediate and fine ore stockpiles will be removed during the planned SIP grading activities in the Mill/Mechanical Area. Residual ore on the surface of these areas will be removed and placed as fill and the underlying soil will be used for general fill or cover material.

Demolition of building/structures listed in bullets 4 through 7 will be performed prior to SIP grading activities in the Mill/Mechanical Area. Preference will be to remove these structures prior to mobilizing contractor(s) for the TSF and WRD grading and cover placement. The timing for removal of these structures will be in part dependent on the contractor SIP implementation schedule; however, preference will be to perform demolition of these structures 1-2 months prior to the start of SIP grading activities.

The Main Office Building and Guard House demolition will be dependent on the need to retain these structures for SIP contractor use. All ACM material in the Main Office Building was removed and sent off Site for disposal in 2018. Therefore, demolition of the building can be performed at any time prior to and/or during SIP implementation activities. The schedule for removal of these structures will be developed in conjunction with contractors.

The Core Shed and Field Warehouse are being used to store geologic core obtained during the mine operations. At the direction of the Trust, there are no current plans to demolish these buildings.

The APS Electric Substation is owned by Arizona Public Service and there are no current plans to remove the substation from the Site.

3.2. Construction Water Source

To support the construction activities defined later in this section, a reliable source of water will be required during construction for dust control and moisture conditioning of fill and cover soil placement. Water is available from the offsite well owned by the Trust. Currently water from the offsite well is pumped to a large (approximately 500,000 gallon) storage tank located atop Tank Hill. However, the physical condition of this tank is poor with corrosion holes in the steel walls limiting its effective capacity to less than 250,000 gallons. Similarly, the offsite wellfield has an approximately 150,000-gallon tank which is utilized in conjunction with a booster pump system to pump the water from the wellfield to the Site water storage tank. This tank is also in poor condition with corrosion holes in the tank sides that limit the capacity of this tank to approximately 50,000 gallons.

3.2.1. Water Usage/Needs

Tetra Tech has estimated that between 80,000 to 100,000 gallons of water per day will be required to support SIP activities. The majority of the water will be used for dust control during construction.

3.2.2. Water Storage Pond

Due to the limitations of the existing water supply infrastructure and the plan to use the alluvium material beneath the existing water storage tank on Tank Hill, the construction of a lined water-storage pond is proposed near the existing Tank Hill. A design for a water storage pond to be located on relatively flat ground immediately north of Tank Hill have been prepared and are presented on design sheet C-108 (**Appendix E)**. This pond will be constructed as a rectangular pond with approximate dimensions of 300 feet by 175 feet. Only modest earthmoving will be necessary to excavate this pond into existing ground and utilize the excavated material to create the pond perimeter embankments. With an area of 1.2 acres and a water storage depth of 6 feet the pond will provide approximately 1.8 million gallons (5.5 Acre-feet) of storage capacity, with a 1-foot freeboard. The height of the containment berm will be less than 6 feet above surrounding grade and the storage capacity will be less than 15 acre-feet, and therefore is not considered a jurisdictional dam per Arizona regulations.

This temporary water storage pond will be lined with a 40-mil textured HDPE liner, or similar equivalent geomembrane liner. As indicated on the preliminary drawings in **Appendix E**, the existing water supply line to the storage tank atop Tank Hill runs adjacent to this pond. Piping modifications will be made to direct water from the existing pipeline into the water-storage pond.

Following the completion of SIP construction, the liner will be removed, and the area regraded to pre-existing conditions.

3.3. Tailings Storage Facility

During mine operations, ore was processed in an on-site mill resulting in the generation of tailings that were about 50-percent solids. These tailings were placed within a 390-acre tailings impoundment located on the western boundary of the Site. Based on the results of the 2018 geotechnical investigation, tailing thicknesses in the TSF range from approximately 30 feet on the north end to 80 feet on the south end. Sulfide ore was processed in the flotation mill to recover copper. The resulting tailings were then thickened and subsequently transported by pipeline as a slurry and deposited in the TSF. Tailing solids settled out of solution, and any remaining water was decanted off and returned to the mill for reuse in processing. After mine operations ceased in 1984, the TSF embankments and outer surfaces were capped with varying thicknesses of either gravel-cover material or alluvium.

The SIP activities to be implemented at the TSF include:

- Perform erosion repairs to the gravel cover on the existing upper side slopes.
- Regrade lower slope(s) to 3H:1V and place a minimum of 2 feet of gravel cover on slopes.
  - Vegetate slopes for stabilization and erosion control.
- Construct features to retain and distribute stormwater across surface of TSF to help establish vegetation.
- Cover top surface of TSF with 1 foot of alluvium material and vegetate to reduce wind-blown tailings transport.
- Remove shallow impacted sediment in stormwater ponds adjacent to the TSF and transfer to the TSF to mitigate inhalation risks from impacted wind-blown sediments.
- Improve stormwater diversion channels.
- Expand the storage capacity of the southeast detention pond.
- Seal/plug the decant tower and cut it off at ground surface.

The activities summarized above are logically grouped and discussed in greater detail below.

3.3.1. Side Slope Grading

The existing TSF side slopes vary but are approximately between 1.5H:1V and 2H:1V. Generally, it is the opinion of Tetra Tech that the upper bench side slopes of the TSF perform well from an erosion control perspective. The north-facing aspect has been particularly resistant to erosion, likely due to the increased vegetation that has established on this shaded face. The middle and lower bench side slopes on the southern, eastern, and western aspects are covered with alluvium and are more susceptible to erosion during storm events. These lower side slopes are extensively eroded and in need of regrading. Based on the slope stability analysis, the Site improvement approach for slope stabilization is to regrade the lower alluvium covered slopes to a 3H:1V slope and to perform erosion repairs to the existing gravel cover on the upper slopes. Preliminary grading plans have been developed and are presented on design sheets C-101 and C-102 (**Appendix E)**.

The design results in approximately 45,000 cy of material being excavated and placed as fill and approximately 70,000 cy of excess cut. As indicated in the typical section included on design sheet C-102 (**Appendix E)**, the regrading of the lower slopes will generally be performed by excavating, or pushing, the upper bench down the slope and placing this material as fill near the toe of the existing slope. This fill placement work will be performed to allow the compaction of fill material, to 95% of the material's optimum density, in lifts not to exceed 12-inches from the bottom up and may require some excavation into the lower slopes to prepare level areas for fill placement. In some areas, the existing toe of the embankment may be

extended out beyond the existing toe. The excess cut material not required as fill to build the lower slopes to a 3H:1V slope will be transported to the upper surface of the TSF and placed as fill; used first to fill existing depressions present on the upper surface, then in thin lifts towards the central portion of the impoundment.

Technical specifications for the slope regrading and cover soil placement will be prepared prior to the execution of the work. These specifications will include instructions regarding the sequencing of the work, safety requirements, material placement and compaction specifications, moisture requirements, and requirements for quality control and quality assurance testing.

As slope regrading is completed, gravel-cover material will be placed over the regraded sections of the embankment, as described below.

3.3.2. TSF Soil Cover

To achieve the goals of the SIP program, cover material on the exterior side slopes of the TSF will consist of 2 feet of gravel-cover material to limit stormwater erosion and promote vegetation establishment. As referenced in Section 2.5, the perimeter road is constructed of gravel-cover material, and the regrading plans have been developed to utilize this material (approximately 30,000 cy available) as cover over the regraded side slopes to reduce the cost of hauling material from the WRD. The balance of required gravel-cover material (approximately 85,000 cy) will be hauled from the primary stockpile on the WRD (195,000 cy available). Placement of the gravel-cover material on the slopes will be performed in lifts to achieve greater compaction of the lower foot of the cover material. Compaction to 90% of the optimum density will be required of the lower lift, but the upper lift will be compacted only by tracking with placement equipment. The repair of erosion rills (greater than 6-inches in depth) in the existing gravel-cover material on the upper slope of the TSF embankments will be performed through selective regrading of these areas. Where necessary, additional gravel-cover material may be placed to fill these erosion features.

Soil cover on the upper surface of the TSF will consist of 1 foot of alluvium cover to prevent tailings erosion/migration by wind. Alluvium for the cover on the top surface of the TSF will be obtained from Tank Hill, just north of the Mill Area. Approximately 550,000 cubic yards of alluvium material will be required for the 1-foot cover on the 340 Acre top surface of the TSF. Compaction of the alluvium-cover material will not be required, other than that achieved through the trafficking of placement trucks and equipment. Roughening or light scarification of the tailing surface will be performed prior to the placement of the cover material.

To enhance soil-water storage and plant uptake and to improve vegetation performance, small, shallow water retention basins/depressions will be constructed in the TSF during cover soil placement. A typical detail for these water retention features is included on design sheet C-102 included in **Appendix E**. The basins will be randomly distributed over the top surface of the TSF following placement of cover materials. Basin dimensions will vary, but generally basins will be formed by building crescent-shaped berms up to several hundred feet long, to create basins up to one-foot deep. The basins will be constructed by placing additional fill to form the berms and shaping the depression in the placed cover material using dozers or motor graders. Other options to enhance soil water storage include pitting and gouging, and excavation of discontinuous furrows perpendicular to the prevailing winds from the northwest.

3.3.3. Stormwater Management

Based on site investigations performed by Tetra Tech in 2018 and summarized in Section 2.2, several existing stormwater control features around the TSF have been identified for improvement. Diversion and containment berms are breached in several locations and incapable of performing their respective functions. The stormwater detention ponds adjacent to the southeastern and southwestern footprint of the TSF contain sediment and the inlets to the ponds will require excavation and regrading to capture stormwater runoff from the TSF side slopes and catchment areas adjacent to the TSF. As part of the stormwater site investigation, low-maintenance, cost-effective options were evaluated for the stormwater control features in greatest need of repair.

For stormwater conveyance and impoundment design improvements, the TSF area was delineated to evaluate stormwater flow directions and tributary areas draining to select channels and impoundments. The Prescriptive hydrologic design approach from the 2004 *Arizona Mining Best Available Demonstrated Control Technology (BADCT) Guidance Manual* was referenced for design storm selection and conveyance structure sizing methodology. A design storm return period of 100-years was selected. Site drainage structures do not pose an imminent risk to human life, and, therefore, do not necessitate evaluation against the Probable Maximum Flood (PMF).

To evaluate TSF containment channels, design peak flows were calculated using the Arizona Department of Transportation's (ADOT's) Rational Method Tool. The respective drainage area characteristics were within the recommended tolerances for use of this tool, as outlined in the ADOT's *Highway Drainage Design Manual – Volume 2 – Hydrology*. A Custom Soil Resource Report was generated for the Site using the Natural Resources Conservation Service's (NRCS's) online Web Soil Survey tool. This provided information on Hydrologic Soil Groups used to estimate infiltration and runoff coefficients. The National Oceanic and Atmospheric Administration (NOAA) Atlas 14 online Precipitation Frequency Data Server (PFDS) was used to estimate precipitation.

The capacity of the existing stormwater detention ponds was evaluated against an estimated volume of runoff that could be expected from the design rainfall event. Stage-storage curves and capacities for the existing retention basins were generated using site topographic data in AutoCAD Civil3D. For a preliminary capacity check, *ADOT's Highway Drainage Design Manual – Volume 3 – Hydraulics* document provided an example calculation to generate a hydrograph for a basin that is analyzed using the Rational Method (Chapter 15, Appendix B-1). The volume of runoff was estimated for a 100-year, 24-hour rainfall event. To check the Rational Method calculations, a second set of runoff volume calculations were performed using the Curve Number Method. The most conservative results were selected for the design. **Table 3-1** summarizes the improvement plans for the existing stormwater control structures.

Table 3-1. Stormwater Control Features Improvements

Stormwater Control Feature	Corrective Action
North Diversion Channel	Repair downstream berm, regrade discharge west of TSF
North Containment Channel	Regrade
East Containment Channel	Regrade, expand separation berm
South Containment Channel	Regrade, expand separation berm, drain to Southwest Detention pond
West Containment Channel	Regrade, expand separation berm
Southeast Retention Pond	Remove sediment, regrade inlet
Southwest Detention pond	Remove sediment, regrade inlet

The existing conveyance channels appear to be adequately sized for the flow depths; however, scour and erosion are the prevailing issues causing deterioration. Erosion mitigation within the existing stormwater conveyance structures is a challenge. Riprap would provide significant erosion resistance, but it is not readily available on-site and the costs are anticipated to be prohibitive. Vegetation would not be sustained by the fine-grained sandy native soils. Geotextiles, tackifiers, and other stormwater control Best Management Practice (BMP) features, such as straw bales, wattles, etc. would require maintenance and are not robust, long-term solutions.

The existing channels are designed to concentrate stormwater at higher flow depths, which increases energy and scour potential. The most significant signs of erosion are due to scouring at channel inlets, outlets, and bends. Corrective actions to limit the scour potential in the channels are proposed. These include widening channel bottoms and relaxing the side slopes to minimize flow depth and scour potential. Given the site soil conditions and the tendency for low-lying areas (incised channels and impoundments) to fill with sediments, it is proposed that a wide diversion berm with moderate side slopes be installed to separate potential offsite run-on and on-site runoff. The channel bottoms on either side of the berm will be regraded wide enough to convey the resulting peak flows at a shallow enough depth to minimize scour potential. Containment berm improvements are proposed for the west, east, and south sides of the TSF. A limited amount of armoring is proposed to protect against scouring at select locations at channel inlets, outlets, or sections of berm where flow direction is being changed. Typical designs for armoring treatments will be included in the bid package, and may include riprap, gabion reno mattresses, geo-web or other designs, and final designs will be selected based on cost-effectiveness.

On-site stormwater will be contained by the proposed berms and directed into one of the stormwater detention ponds at the southwest and southeast corners of the TSF (design sheets C-103 and C-104; **Appendix E**). Sediments have deposited in both existing ponds, reducing storage capacity. Sediments will be removed from the southwest pond and the inlet channel transitions will be regraded. The southeast pond will be regraded and expanded to provide additional freeboard and sediment storage volume, and the inlet transition of the eastern containment channel will be regraded to flow directly into the pond. Sediment removed from these ponds will be placed on the upper surface of the TSF, prior to cover soil placement. Both ponds are intended to retain the runoff from the peak design storm and slowly release it back to into the natural hydrologic cycle by infiltration and evaporation. They will be a terminus for sediment-laden stormwater generated from the TSF and will require annual monitoring and long-term sediment removal maintenance.

3.3.4. Revegetation

The covered surface of the TSF and disturbed work areas, including constructed diversion berms and channels will be revegetated to provide erosion protection and facilitate re-establishment of natural habitat similar to the surrounding area. A reclamation seed mixture will be developed based on the plant species observed in ecological reference and reclaimed areas at the site and their attributes (**Appendix D**). Separate seed mixtures may be developed based on cover material properties as well. For example, based on the characterization of the alluvium-cover material presented in Section 2.5.1, species with greater tolerance to soil conditions caused by soil sodicity (i.e., high SAR values) will be selected. In addition to plant species observed on-Site, the plant species, listed below, that have been used effectively in reclaiming mine sites in Arizona and New Mexico will be selected for inclusion in the reclamation seed mixture for the site, if the seed is commercially available and not cost prohibitive:

- Species of acacia (*Acacia spp.*);
- Species of gramagrass (*Bouteloua spp*.);
- Species of threeawn (*Aristida spp*.); and
- Species of dropseed (*Sporobolus spp*.)

The final selection of revegetation seed mix and soil amendments will be made based on input from qualified reclamation contractors using the following criteria:

- Native to Sonora-Mojave Desert scrub communities;
- Demonstrated erosion control capacity;
- Commercial availability;
- Ability to contribute to wildlife habitat; and
- Cost.

3.4. Waste Rock Dump

The primary concerns or risks associated with the WRD include exposed waste rock due to slope erosion (inhalation, ingestion, and ecological risk), offsite transport of sediments via stormwater runoff (inhalation, ingestion, and ecological risk), and potential exposure to fine sediments and acid drainage in local ponded areas without surface cover (ecological risk). This section describes the SIP activities to address these issues.

The SIP activities to be conducted at the WRD include the following primary elements:

- Regrade and cover exposed waste rock areas, not previously reclaimed, in the northern portions of the WRD;
- Complete the cover placement on the upper surface of the WRD and maintain the grading which directs drainage to the center of the stockpile;
- Stabilize / grade to mitigate side-slope erosion, where erosion has resulted in the exposure of waste rock; and
- Excavate and remove waste rock piles, in areas of the reclaimed benches where evidence of leaching or mineral salt precipitation has been observed.

In addition, the following action will also be considered, but may be dependent of the availability of Trust funds following the completion of the higher priority item stated above:

- Place additional cover material in areas of the reclaimed benches where evidence of leaching or mineral salt precipitation has been observed.

The activities summarized above are logically grouped and discussed in greater detail below.

3.4.1. Grading and Stabilization

As discussed in Section 2.5.2.1, the surface of the WRD has largely been covered and revegetated, with the exception of the areas identified on Figure 6. The existing cover is presumed to have been placed by ASARCO, as part of their post operation reclamation efforts, although no specific documentation is available. Approximately 175 acres of the upper relatively flat surface of the WRD remains uncovered. Included in the uncovered 175 acres are two areas of exposed and unreclaimed waste rock. The first area is an area on the middle bench in the western side of the WRD, just south of the northwest stockpile, and identified by Tetra Tech as the ‘Bowl Area’ below. The second area is a section of northeasterly facing side slope of the upper bench that has not previously been covered. This area identified by Tetra Tech below as the ‘Northern WRD Rock Quarry Area’ is the location of what appears to be a former rock crushing operation, and an area of disturbed waste rock reportedly used to salvage large rock for landscaping purposes. These areas will be graded and covered as described below. In addition, the discrete ore pile located at the northern end of the WRD will be relocated and incorporated into the Bowl Area prior to covering.

Bowl Area

The Bowl Area refers to a low-lying area internal of the WRD of uncovered waste rock just south of the northwest WRD stockpile and, as illustrated on Figure 6 and design sheet C-112 (**Appendix E**), consists of an island of waste rock atop the middle bench that has created a sort of canyon to the east of this island. Fill from the excavated ore stockpile will first be placed as fill in the low-lying areas to the east and south of the island. As indicated on the cross-section on design sheet C-112, the upper surface of the exposed waste rock island will also be excavated, or lowered, with this material also being placed as fill. Following this waste rock fill placement, the remainder of the regrading would be performed, focusing primarily on regarding the southern slope of the northwest stockpile area. Tetra Tech has concluded that there is sufficient suitable cover material available within this area to create a 2-foot cover over the exposed waste rock and ore stockpile fill. Regraded slopes steeper than 5H:1V will be covered with gravel-cover material. The grading and cover material placement will follow the same general procedures and approach specification developed for the TSF.

Northern WRD Rock Quarry Area

As referenced above, the uncovered section of the northeasterly facing side slope of the upper bench of the WRD will be regraded and covered. This northern portion of the WRD contains what appears to be a former crushing operation, where waste rock has been excavated from the face of the slope and crushed, and a longer sloping area where decorative rocks for landscaping may have been removed. The SIP activity for this northern area is to regrade side slopes to 4H:1V to 5H:1V, as indicated on design sheet C-113 (**Appendix E**). This flatter slope was selected for this area to create a more balanced cut-to-fill solution; regrading the area to a steeper slope, such as 3H:1V, would require import fill. Following regrading, 2 feet of gravel-cover material will be placed over the regraded slope area and 1-foot of alluvium cover will be placed on the relatively flat upper surface. Berms or grading away from the crest will be used to prevent run-off from flowing off the top surface down the embankment slopes. Gravel-cover material will be hauled from the stockpile on top of the WRD, or from minor regrading of the northeast corner of the northwest stockpile area of the WRD, as shown on design sheet C-111 (**Appendix E**). Alluvium-cover material will be excavated from the upper surface of the Northeast Alluvium Stockpile (see **Figure 6** and design sheet C-110; **Appendix E**).

Ore Pile

A stockpile of highly mineralized rock, identified by Tetra Tech as a low-grade ore pile, is located on the northern end of WRD (**Figure 6** and drawing sheet C-111; **Appendix E**). The ore pile is approximately 77,000 cy and is isolated from the main WRD storage area. Based on visual observation, this ore pile contains highly mineralized rock that is uncovered with evidence of erosion. Because this ore pile presents potential exposure and erosion issues, the ore pile will be excavated and hauled to the Bowl Area. As indicated on the design drawings included in **Appendix E**, the Bowl Area will be filled and regraded to slope to the west and covered with clean alluvium and/or gravel-cover material.

Side Slopes

Tetra Tech believes that the WRD eastern, western and southern side slopes are stable and resistant to erosion, except for some localized areas along the western side slopes where deep erosional gullies have developed. The WRD side slopes are similar to the existing slopes of the TSF with approximately a 2H:1V slope. Gravel-cover material was previously placed by ASARCO over the majority of the upper side slopes (above the lower and middle benches), although there is a section of the upper slope on the west side of the WRD that is covered with alluvium. Given that Tetra Tech believes that the existing covered side slopes appear to be stable and moderately resistant to erosion, Tetra Tech proposes to leave these side slopes at their existing grades. A reduction of the side slope grades to a 3H:1V would reduce erosion; however, it

would not prevent the long-term development of erosional gullies and would require the movement of a significant amount of material. Select areas with significant side-slope erosion will be repaired by backfilling the gullies with gravel-cover material and an attempt will be made to redirect a portion of the runoff away from the repaired areas. Selection of gullies to be repaired will be a field decision by the oversight engineer and contractor and may be deferred pending the completion of higher priority tasks.

WRD Benches

Based on a limited number of test pits excavated in the lower bench by Tetra Tech in 2018, most of the lower bench appears to be constructed with alluvium material, or at least have an outer shell of alluvium. While there are some significant erosion features within this lower slope, the gullies and rills that have developed do not appear to have exposed waste rock. Given this condition, no erosion repairs are contemplated for the lower slope, although some discrete grading will be performed to direct run-off away from the erosion gullies, to mitigate further erosion.

The WRD middle bench contains approximately ten or more relatively small weathered waste rock piles (5-15 cy each) that were placed on the southern and western benches. The source of these waste rock piles is unknown, but the large boulders may have been segregated during the original bench grading and cover placement. These stockpiles will be excavated and transported to the Bowl Area and covered.

Isolated green stained areas (copper and mineral salt impacts) have been observed in select areas along the middle bench. A number of these stained areas are associated with the waste rock stockpiles discussed above. Additional alluvium-cover material will be placed on top of these stained areas. An approximately 1-foot thick cover will be placed over these select areas to prevent potential exposure and transport of these material. The procedures for placing cover material over these stained areas will be the same as the surface cover placement on the upper surface of the WRD. No revegetation is planned for these isolated, supplementary cover areas, as it is expected that vegetation will eventually come into these areas naturally over a period of several years.

Northeastern Alluvium Stockpile and Northwestern Mixed Stockpile

Two predominantly alluvium material stockpiles are located immediately at the north end of the WRD footprint (**Figure 6**). Because the investigation of these stockpiles revealed that they primarily contain, or are covered with, clean soil material, no specific site improvement actions are proposed for these areas. Cover material for placement on the currently uncovered areas on the upper surface of the WRD (See Section 3.4.2) will be excavated from the Northeast Alluvium Stockpile. Through this excavation, the top surface of Northeast Alluvium Stockpile will be reshaped to minimize runoff and on-going erosion of the side slopes. As indicated on design sheet C-110 (**Appendix E**), material removal has been designed to create closed basins on the upper surface of the pile and create drainage pathways to the center and away from the perimeter of the pile.

3.4.2. Upper Surface Soil Cover

Tetra Tech conducted a WRD cover assessment that was focused on evaluating the presence and thickness of the existing cover on the upper WRD surface. The WRD cover assessment revealed that the majority of the WRD has been previously covered at thicknesses up to 3 feet (see **Figure 6**). The gravel-cover material has been used effectively on the upper surface and majority of side slopes, although the surface of the WRD is not entirely covered.

To mitigate sediment transport, wind-blown dust, and ecological risks from the exposed areas of waste rock and acid water ponding on the upper surface of the WRD (approximately 120 of the 175 acres), the areas

of exposed waste rock, as indicated on design sheet C-114 (**Appendix E**), will be covered with 1 foot of alluvium-cover material from the Northeast Alluvium Stockpile and revegetated.

3.4.3. Stormwater Management

Based on the pedestrian survey of the site, Tetra Tech believes that the drainage conditions around the WRD are relatively stable. There do not appear to be any significant diversion channels or containment channels constructed around the WRD. A diversion channel exists along the northern toe of the WRD, collecting runoff from the UMWA. A channel and partial berm are present along the eastern WRD boundary, diverting potential offsite run-on south and away from the WRD.

Based on these observations, no stormwater or surface water management features are planned around the WRD as part of the SIP. The regrading repairs, discussed above, will also address the minor WRD runoff concerns along the northern slope.

3.4.4. Revegetation

Following placement of cover material over the regraded Bowl Area, the Quarry Area, and the upper surface of the WRD, these areas will be revegetated with the same reclamation seed mixture described above in Section 3.3.4.

3.5. Underground Mine Workings Area

The primary concerns or risks associated with the UMWA include the risk of falling into the main shaft and ventilation shaft openings (human health risk) and potential exposure to impacted process water sediments. The SIP activities for addressing these risks are presented below:

- Design reinforced concrete caps/plugs for the main shaft and ventilation shaft;
- Backfill/regrade the explosive magazine/blasting cap area; and
- Backfill/regrade the process water pond.

These SIP elements are discussed in further detail in the following sections.

3.5.1. Shaft Safety Closure

The main production shaft at the Sacaton Mine is a 20-foot diameter shaft advanced to a depth of approximately 1,800 feet, and the ventilation shaft is reportedly 14-feet in diameter to an approximate depth of 1,070 feet. Both shafts are currently covered with welded steel plate, that provide sufficient protection of these shafts while there remains a site security presence. To provide more permanent safety closures for these shafts, reinforced concrete covers over both shafts are planned. Reinforced concrete slab covers will be designed and installed at the main shaft and ventilation shaft openings, although the installation of pre-cast panels is also an option.

The design of the shaft covers will involve the placement of steel beams across the opening, bearing on the concrete slab surrounding the shafts. These beams will be topped with corrugated steel floor decking and designed to support the wet weight of the concrete. The construction of the shaft covers may be simplified if there are structurally sound steel cross members already present within the shaft; in this case the corrugated steel floor decking can be placed directly on top of the existing shaft infrastructure. If support beams are set on top of the surrounding concrete slab, a concrete curb wall will need to be formed and poured to completely seal the areas around the shaft covers. To complete the detailed design, an additional site inspection will be necessary to remove the steel cover plates to determine what, if any, structural

members are present within the shaft, and to inspect the condition of the concrete surrounding the shafts. Tetra Tech will develop the final designs in conjunction with the contractor selected for the cover construction.

Design of the reinforced concrete shaft covers will be performed based upon methodology and requirements presented in the Building Code Requirements for Structural Concrete of the American Concrete Institute (ACI 318-02 and 318R-02). The following criteria will be utilized for design of the shaft covers:

- Concrete Compressive Strength (minimum 28-day) = 4,000 pounds per square inch (psi);
- Steel Reinforcement (new deformed bars) Tensile Yield Strength = 60,000 psi;
- A sulfate resistant Type I-II Portland Cement mixture will be utilized;
- Unit weight of reinforced concrete = 150 pounds per cubic foot (pcf);
- No backfill will be placed over the slabs and therefore no dead load will be incorporated into the design;
- Maximum live load over uncovered shafts = 250 pounds per square foot (psf) including impact; and
- Maximum allowable bearing capacity of seating areas = 5 tons per square foot (tsf) for concrete and 2 tsf for compacted granular soil.

The shaft covers will be level and static loads will be assumed uniform with no eccentricity. Surface preparation and/or repair of the seating areas at the top of some shafts may be required to provide seats with adequate bearing capacity for the shaft covers.

Installation of a heavy-duty safety net system, or other safety tie-off system will be required for the construction of the steel support and formwork for the shaft covers.

3.5.2. UMWA Regrading

The former explosives storage area, an excavated depression to the west of the fenced UMWA yard and north of the WRD will be re-graded by pushing in the berms surrounding the area. The proposed grading plan presented on preliminary drawing sheet C-110 (**Appendix E**) utilizes the available material from the surrounding berms and leaves a shallow depression. This area will be used as a sediment detention pond, by directing run-off from the northwest corner of the Northeast Alluvium Stockpile to this area.

As discussed in Section 2.7, sediment samples from the small detention pond area outside the fence at the southwest corner of the UMWA indicated total chromium concentration in excess of the chromium III residential screening level. To mitigate potential risk associated with these sediments, this small former process pond will be filled with approximately 1,500 cubic yards of clean fill material, either from the berms surrounding the explosives storage area or alluvium from the Northeast Alluvium Stockpile.

3.5.3. Revegetation

The only revegetation activities anticipated in the UMWA will be the seeding of the backfilled detention pond outside the southwest corner of the UMWA fenced area. The cover surface will be prepared, and a reclamation seed mixture will be developed using the approaches and criteria identified in Section 3.3.4.

3.6. Mill/Mechanical Area

The primary concerns or risks associated with the Mill/Mechanical Area include impacted soils (inhalation, ingestions, and ecological risk), offsite transport of sediments via stormwater runoff (inhalation, ingestion, and ecological risk), and remaining building structures (human health risk). The SIP activities to mitigate these risks are presented below:

- Remove residual ore and impacted soil material from the primary, intermediate, and fine ore stockpiles (3 to 4 feet) and place the material a minimum of 2 feet below grade in the designated fill area over the Concentrator Building and Tailings Thickener areas;
- Cover impacted soil areas with minimum of 2 feet of cover material;
- Backfill and regrade the wet mill area;
- Utilize alluvium beneath the fine ore bin, primary ore pile and Tank Hill for cover material in the wet mill area; and
- Revegetate regraded areas in locations with greatest concern for erosion and sediment transport.

The Site activities itemized above for the Mill/Mechanical Area are discussed in more detail below.

3.6.1. Impacted Soils

Tetra Tech conducted Site investigations in 2018 that consisted of advancing 42 exploratory test pits and seven borings in May 2018 (locations shown in **Figures 5A and 5B**). The investigation target areas of the Site where stained soils were previously noted, or areas where impacts could potentially be present, such as the Tank Farm, Truck Shop/Warehouse sumps, Reagent Plant, and ore stockpile/processing areas. A total of 63 potentially impacted soil samples were collected during the 2018 investigation for analyses (**Appendix A1**). The results of this investigation demonstrated that metals and/or organics were detected in most of these areas; however, impacts were all below non-residential AZ SLRs and Tier 1 cleanup standards. Only a few samples exceeded Arizona residential standards. The areas where impacted soil samples were identified are discussed below.

Ore Stockpile/Processing Areas

The most widespread areas of impacts were the areas of the Site used to stockpile and process ore (**Figure 8a**). These areas are green-stained and tended to exceed residential standards for one metal, copper. Areas that exceeded the residential standard for copper included: 1) Primary and Fine Crusher System areas; Ore stockpile area to north of Concentrator Building and select roads and railroad areas near these facilities.

The approach to address the ore stockpile areas for the Primary and Intermediate Ore Stockpiles is to excavate the top 3 to 4 feet of impacted material and utilize the material as backfill in the Tailings Thickener area. Clean soil material underlying the impacted soils will be utilized as cover material to be placed in the thickener and concentrator areas as indicated on design sheet C-107 (**Appendix E**).

The fine ore stockpile area to the north of the Concentrator Building has extensive green stained soils over this entire surface. The top 3 to 4 feet of this storage area will be excavated and placed as backfill in the Middling and Concentrate Thickener area. A minimum of 2 feet of clean soil cover will be placed over the entire thickener area as part of the final grading in this area as indicated on design sheet C-106 (**Appendix E**).

The railroad adjacent to the Concentrator Building has extensive green-staining impacts along an approximately 800- to 1,000-foot length of track. Impacts along the railroad track will remain in place and will be covered with a minimum of 2 feet of clean soil.

Roads and Miscellaneous Areas

Green-stained soils have been identified at select areas in the Mill/Mechanical area and along haul roads near the WRD (**Figure 8a**). Impacted soils in these areas will be excavated and transported to the TSF, the WRD, or they will be covered in place with a minimum of 2 feet of clean soil.

Tank Farm

Petroleum stained soils were observed in test pits and borings within the Tank Farm footprint; however, none of the samples from these stained soils exceeded Arizona Tier 1 standards. Therefore, these soils will be left in place and no further action is planned for this area.

3.6.2. Grading and Cover Plan

A preliminary grading design for the mill area is presented in **Appendix E**. As generally described above, work in the mill area will begin with the excavation and removal of residual ore or impacted soil material from the former ore stockpile areas. This material will be placed as fill to create a mound over the mill/concentrator building and extended over the tailings thickener area as indicated on design sheets C-105 through C-107. All potentially impacted soil, based on visual observation, will be placed at least 2 feet below final grade. Following this initial excavation and removal, additional material will be removed from the primary and intermediate ore stockpiles, to the lines and grades indicated on preliminary design sheet C-107. Based on analytical results of soil samples from the test pits in these areas, Tetra Tech believes this material to be clean alluvium material and will be used as grading fill to meet the proposed subgrades and as cover material.

3.6.3. Stormwater Management

No stormwater or surface water management features are proposed around the Mill and Mechanical Areas. The regrading plans around the Concentrator Building and Thickener Areas will divert stormwater around the area and will not concentrate flows in any specific locations that would require further stormwater control.

3.6.4. Revegetation

The cover surface will be prepared, and a reclamation seed mixture will be developed using the approaches and criteria identified in Section 3.3.4.

3.7. Mine Pit

The primary concerns or risks associated with the mine pit include stormwater runoff into the pit (pit wall stability, groundwater sink) and falling into the mine pit (human health risk). The SIP activities to address these risks are presented below:

- Implement additional stormwater management controls to prevent stormwater runoff into the pit; and
- Repair and relocate up to 10 % of the security fencing around the pit to mitigate trespassing risk.

3.7.1. Stormwater Management

The mine pit perimeter road forms the northern catchment basin boundary around the mine pit, diverting offsite run-on to the west. Potential run-on from the east is diverted by the Alluvium Soil Storage Area. A small catchment area on the north and northwest sides of the mine pit, between the perimeter road and the mine pit rim, sheds runoff into the mine pit. Resulting erosion is forming gullies that are head cutting outward toward the perimeter fence. Gullies have undermined the perimeter fence in several areas on the north and west sides of the pit. Tetra Tech evaluated potential stormwater control features to mitigate erosion, such as a diversion channel or berm. Construction of a diversion ditch to intercept and concentrate runoff from a larger area will be implemented to help mitigate on-going erosion issues in this area. Long-term maintenance of this diversion ditch will be needed to prevent damage to the berms due to potential large storm events.

3.7.2. Access Restrictions

One of the primary concerns of erosion around the mine pit perimeter is damage to the perimeter fence and perimeter road. In lieu of immediate erosion control measures, Tetra Tech proposes to repair and/or relocate up to 10 %, 1,000 linear feet, of mine pit perimeter fencing back from the perimeter and away from existing erosion features that are undercutting and compromising the integrity of the existing fence. The perimeter road will be shifted and relocated between the mine pit rim and perimeter road in areas with significant erosion and undercutting. Tetra Tech's field engineer will work with the contractor to field locate areas were the fence and road need to be relocated and repaired.

3.8. Alluvium Soil Storage Area

No major concerns or risks are associated with the Alluvium Soil Storage Area located to the northeast of the open pit, although a minor concern is the transport of sediments via stormwater runoff. The Alluvium Soil Storage Area is not being proposed as a source of cover material and no significant pathways for the offsite transport of sediment has been identified. Tetra Tech believes that the regrading of side slopes or repair of existing erosion gullies is not necessary to meet SIP objectives.

3.8.1. Stormwater Management

A diversion channel exists around the northern and eastern sides of the Alluvium Soil Storage Area, diverting potential offsite run-on to the south and west. The channels appeared to be in acceptable working condition. A long-term O&M plan will be developed at the completion of the SIP implementation to address stormwater management issues.

3.8.2. Revegetation

Revegetation of the Alluvium Soil Storage Area is not needed, since there are no significant risks associated with the sediment transport from this area.

4. SITE IMPROVEMENT PLAN ESTIMATED COSTS

A summary of estimated costs for SIP tasks at each area of the Site are presented in **Table 4-1**. The estimated total cost to implement all recommended tasks is $14,593,200. The opinion of probable costs is based on preliminary contractor pricing, preliminary project designs, recent similar projects, and published values in construction estimating references. Final project costs will be obtained upon approval of the SIP, development of final drawings and specifications, and completion of contractor bidding. The Water Storage Pond costs are inclusive of pond construction, pipeline work, retrofitting/repairing existing wellfield tank, automation of pumping system, and labor for operating the water system. This cost estimate is contingent on successful repair/rehabilitation of the wellfield tank.

Table 4-1. Opinion of Probable Costs

Item	Quantity	Units	Unit Cost*	Extended Cost
Demolition				
Admin Buildings and Misc Other Structures	1	LS	$226,000	$226,000
			Total Estimated Demolition Costs	**$226,000**
Mobilization and General Site Setup				
Mobilization/demobilization	5% of Total Construction Costs	LS	$506,291.50	$506,292
General site stormwater controls	1	LS	$50,000	$50,000
Construction water storage pond[1]	1	LS	$287,000	$287,000
			Total Mobilization and Site Setup Costs	**$843,292**
Tailings Storage Facility				
Erosion Rill Repairs (TSF and WRD)	1	LS	$100,000	$100,000
Regrade (cut/fill) on lower sideslopes	45,000	CY	$3.80	$171,000
Haul excess sideslope cut to top surface of TSF	70,000	CY	$3.50	$245,000
2 ft gravel cover on regraded lower side slopes (material from TSF Perimeter Road)	30,000	CY	$3.30	$99,000
2 ft gravel cover on regraded lower side slopes (material from WRD Stockpile)	85,000	CY	$9.00	$765,000
1 ft alluvium cover on TSF top surface (fill from Tank Hill stockpile)	550,000	CY	$5.90	$3,245,000
Revegetate sideslopes	60	acres	$2,150	$129,000
Revegetate surface cover	340	acres	$1,890	$642,600
Rehab stormwater ponds and diversion channels	1	LS	$250,000	$250,000
			Total Estimated Tailings Storage Facility Costs	**$5,646,600**

Item	Quantity	Units	Unit Cost*	Extended Cost
Waste Rock Dump				
Regrade (cut/fill) Quarry Area	94,000	CY	$1.90	$178,600
Remove Ore Stockpile; fill WRD-Bowl	80,000	CY	$5.40	$432,000
Regrade WRD Bowl (cut/fill)	200,000	CY	$1.90	$380,000
2 ft cover over regraded Quarry Area slopes; Bowl Areas > 5:1	40,000	CY	$8.60	$344,000
1 ft alluvium cover over exposed areas of WRD upper surface (fill from top surface of NE WRD)	220,000	CY	$6.50	$1,430,000
Regrade berms around Explosives Storage Area to create detention pond	17,000	CY	$2.50	$42,500
Revegetate surface cover	175	acres	$1,890	$330,750
			Total Estimated Waste Rock Dump Costs	**$3,137,850**
Mill/Mechanical Area				
Stormwater Controls and General Mill/Mechanical Area Grading	1	LS	$100,000	$100,000
Cover Concentrator/Mill/Thickener Area (material from ore stockpile areas) (assumes slabs left in place)	125,000	CY	$3.80	$475,000
Revegetation	40	acres	$1,890	$75,600
			Total Estimated Mill/Mechanical Area Costs	**$650,600**
Underground Mine Working Area (UMWA)				
UMWA Shaft Covers/Plugs	1	LS	$215,000	$215,000
UMWA Grading	1	LS	$50,000	$50,000
			Total Estimated UWMA Costs	**$265,000**
Other				
Pit Fence	1,000	LF	$67.50	$67,500
Road Realignment	5,600	CY	$3.80	$21,280
			Total Other Cost	**$88,780**
			Total Direct Cost	**$10,858,122**
Design/Construction Administration				
Final Design / Bidding / Permitting	*2%*	of Total Project Cost**	$217,162.43	$217,162
Construction Management	*10%*	of Total Project Cost**	$1,085,812.15	$1,085,812
			Subtotal (rounded to nearest $1,000)	**$12,161,000**
			Contingency (20%)* **	**$2,432,200**
			Total Estimated Costs	**$14,593,200**

* Costs based on preliminary contractor pricing are inclusive of 7.5% Tetra Tech markup
** Percent of project is for reference only, actual costs will be T&M
*** A 20% contingency has been added consistent with Trust direction and utilization of these dollars can only be done with previous Trust approval

NOTES:

Opinion of probable costs developed from preliminary contractor pricing, recent similar projects, and published values in construction estimating references. Final project costs will be based on Trust and ADEQ concurrence of scope, development of final drawings and specifications, and completion of contractor bidding.

1) Water Storage Pond costs inclusive of pond construction, pipeline work, retrofitting/repairing existing wellfield tank, automation of pumping system, and labor for operating the water system. Cost estimate contingent on successful repair/rehabilitation of wellfield tank.

2) Electricity costs are outside the scope of this proposal

5. IMPLEMENTATION SCHEDULE

The estimated schedule for the SIP implementation tasks is presented in **Figure 9**. The actual schedule will be dependent on: 1) Scope and budget approvals; 2) Contractor availability; and 3) Contractor proposed schedule. Tetra Tech anticipates that the SIP construction tasks detailed in this SIP report will require approximately 12 to 18 months to complete. A revised schedule will be developed for implementation of the SIP tasks in conjunction with the selected contractor(s) when the design drawings are issued for construction.

6. REFERENCES

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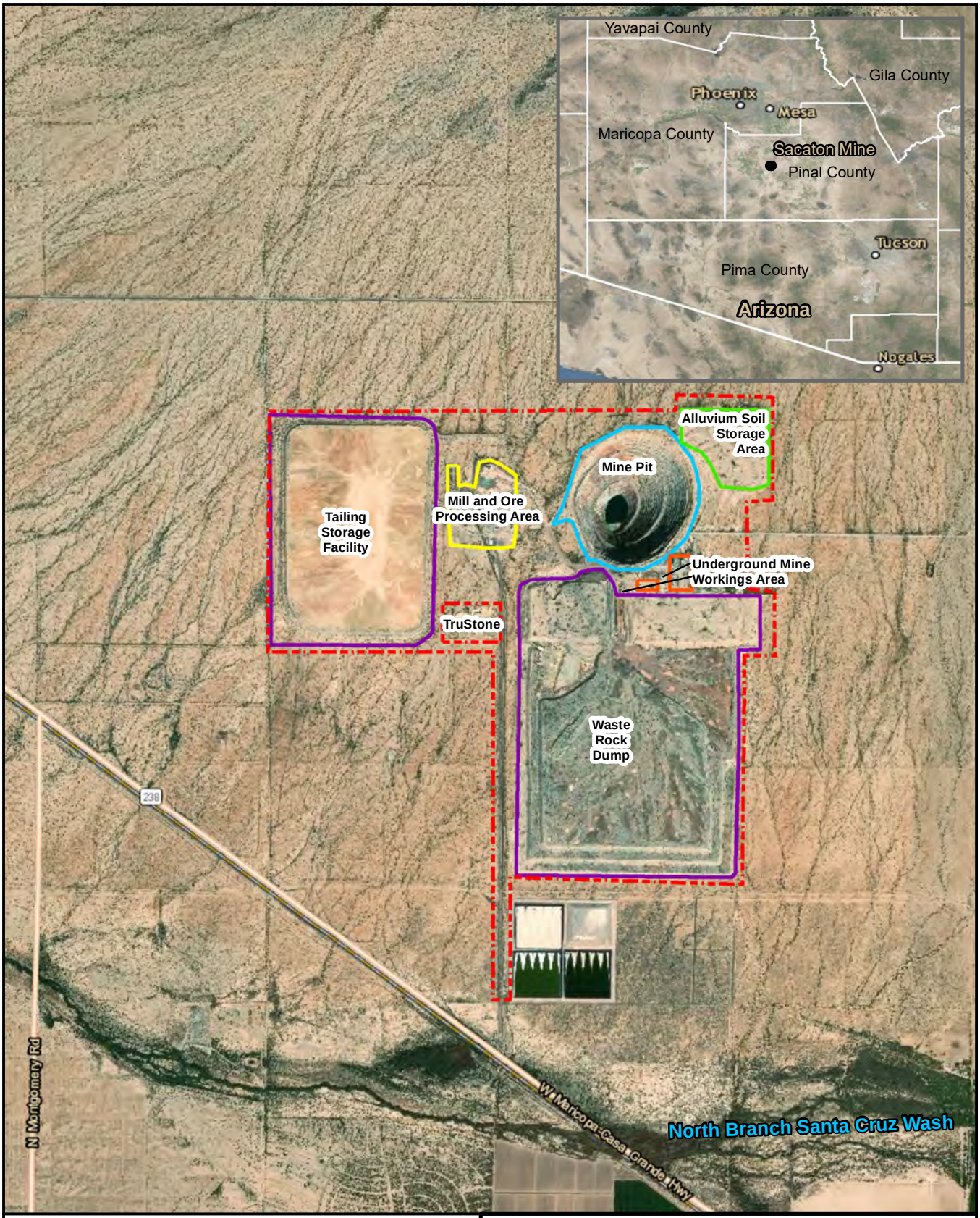
FIGURES



Legend

Property Boundary

N

0 0.8

Miles

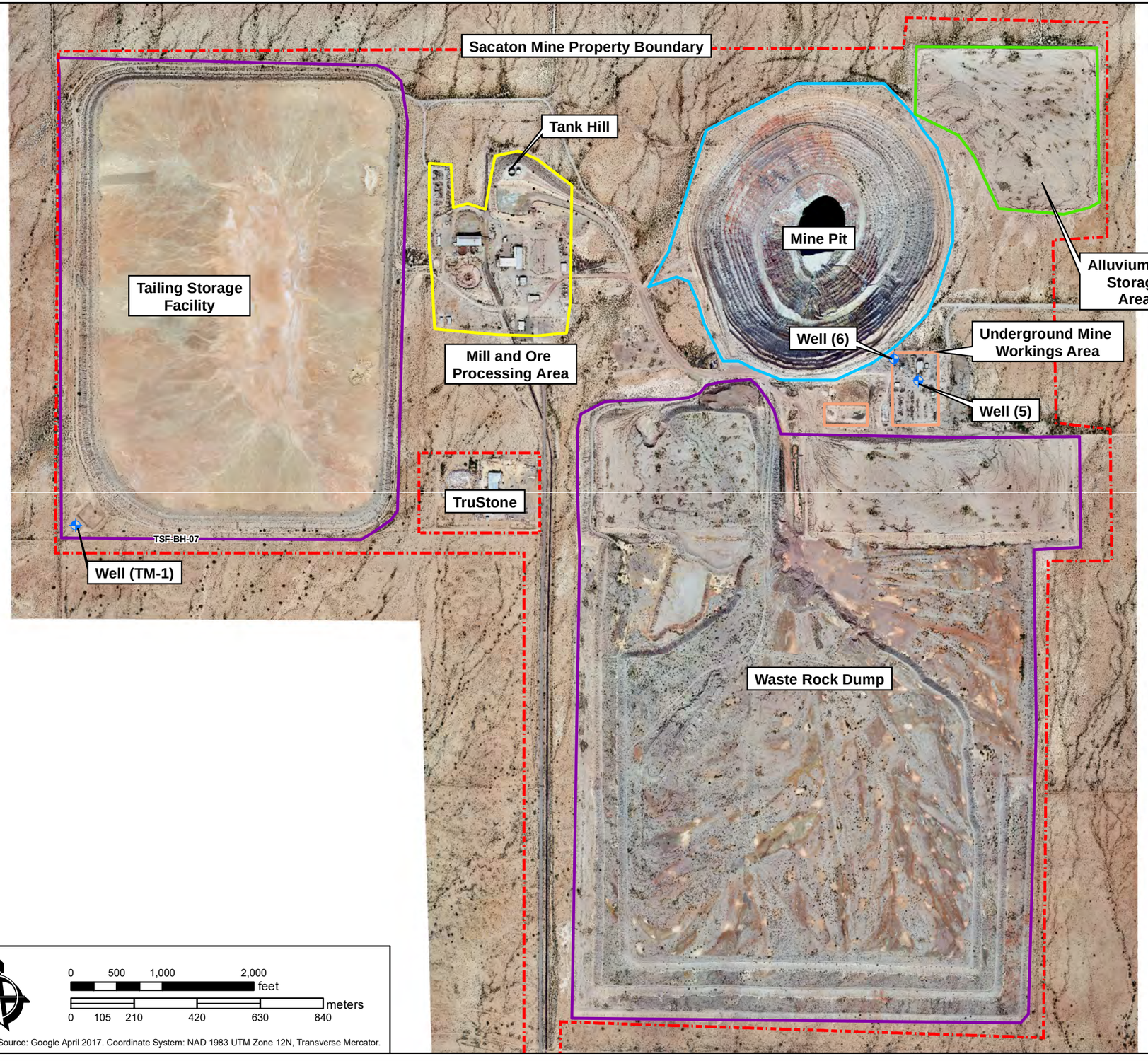
TITLE: Site Overview

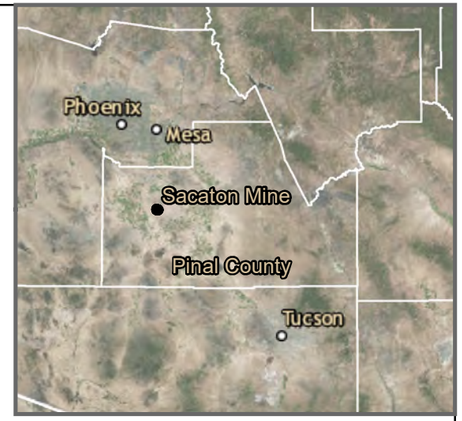
LOCATION: Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE
DRAFTED	MRB, MRI
PROJECT#	117-321059-2018
DATE	2/4/2019

FIGURE 1





T:\Asarco Sacaton Mine\GIS\Figure 2_Mine Site Features.mxd February 2019 mitch.isaacson

TITLE:

Sacaton Mine Site Features

LOCATION:

Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE	FIGURE
DRAFTED	MRB,MRI	2
PROJECT#	117-321059-2018	
DATE	2/4/2019	

Sacaton Mountains

West Catchment

Central Catchment

East Catchment

Maricopa Casa Grande Highway

North Branch of Santa Cruz Wash

Legend

- Artificial Path
- Canal Ditch
- Ephemeral Stream/River
- Intermittent Stream/River
- Perennial Stream/River
- Central Catchment
- East Catchment
- West Catchment
- Property Boundary

N

0 1,250 2,500 5,000 feet

0 250 500 1,000 1,500 2,000 meters

Drainage Features Source: USGS National Hydrography Dataset (NHD) GIS database, updated 7/9/2018.
Imagery Source: Google April 2017. Coordinate System: NAD 1983 UTM Zone 12N, Transverse Mercator.

I:\Asarco Sacaton Mine\GIS\SurfaceWater.mxd February 2019: mitch.isaacson

TITLE:

Upland Drainage Catchments

LOCATION:

Sacaton Mine, Pinal County, Arizona

TETRA TECH

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DRAFTED	MRB, MRI
PROJECT#	117-321059-2018
DATE	02/04/2019

FIGURE

3

ALLUVIUM SOIL STORAGE AREA

UNDERGROUND MINE WORKINGS AREA

PIT

WASTE ROCK DUMP

TO NORTH BRANCH OF SANTA CRUZ WASH

NORTH HAUL ROAD/ PIT PERIMETER ROAD

INTERSECTION OF NORTH HAUL ROAD AND PIT PERIMETER ROAD

MARICOPA CASA GRANDE HIGHWAY

MILL AREA

TRUSTONE

TO NORTH BRANCH OF SANTA CRUZ WASH

NORTH HAUL ROAD

TAILINGS STORAGE FACILITY

LEGEND

- PROPERTY BOUNDARY
- NORTH HAUL ROAD
- SITE DRAINAGE DIRECTION
- NON-CONTACT STORMWATER
- POTENTIAL PATHWAYS FOR CONTACT STORMWATER

N

0 300' 600' 1200'

SCALE: 1" = 600'

CONTOUR INTERVAL = 10'

Bar Measures 1 inch

TETRA TECH
www.tetratech.com
350 Indiana Street, Suite 500
Golden, Colorado 80401
PHONE: 303-217-5000 FAX: 303-217-5705

MARK	DATE	DESCRIPTION	BY

LE PETOMANE, INC.
SACATON MINE
CASA GRANDE, ARIZONA

SITE DRAINAGE FEATURES

Project No.:	117-321061-2019
Designed By:	DLL
Drawn By:	SEF
Checked By:	KRA

Figure
4

2/4/2019 11:27 AM - O:\T-Z\TGOLDEN\117-321061-2019 - SACATON MS 2019 ACTIVITIES\CAD\SHEETFILES\SIP FIGURES\F-04-SITE DRAINAGE FEATURES.DWG
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Sacaton Mine Property Boundary
Water Tanks
Mine Pit
Alluvium Soil Storage Area
Tailing Storage Facility
Mill and Ore Processing Area
Well (6)
Underground Mine Workings Area
Well (5)
Well (TM-1)
TruStone
Waste Rock Dump
Phoenix
Mesa
Sacaton Mine
Pinal County
Tucson
NWC-1
NEC-6
NEC-5
TSF-BH-09
NEC-4
TSF-TP-01
NEC-1
TSF-TP-02
NEC-2
NEC-3
TSF-TP-03
TSF-TP-04
WT-BH-01
POP-TP-03
FOB-TP-01
LS-TP-1
LS-Pile
IOP-TP-01
FOB-TP-02
RP-TP-1
IOP-TP-02
AL-TP-3
RP-B-2
AL-TP-2
TS-TP-3
SP-3
AL-TP-1
TS-TR-1
SP-2
SP-1
PRL-TP-40
RP-TP-2
TF-TP-3
TS-TP-2
TF-B-2
CS-TP
TF-B-1
FW-TP
TF-B-3
TF-TP-2
CH-TP-2
CH-TP-1
TDA-PCW-02
TDA-PCW-03
TDA-PCW-01
TDA-SP-W
TSF-BH-08
TDA-SEC
TDA-SP-E-BERM
TSF-BH-07
TDA-SP-E
ALL-TP-31
ALL-TP-33
ALL-TP-32
ALL-TP-34
ALL-TP-37
ALL-BH-02
ALL-TP-35
ALL-TP-36
ALL-TP-38
UMWA-Trans
SETTL-TP-39
UMWA-TP-1
WRD-TP-06
WRD-TP-15
WRD-TP-05
WRD-TP-14
WRD-TP-13
WRD-TP-18
BH-06
WRD-TP-17
BH-05
WRD-TP-12
BH-04
BH-03
WRD-TP-16
WRD-TP-11
WRD-TP-09
WRD-TP-08
WRD-TP-10
WRD-TP-19
WRD-TP-20
ROCK-01
ROCK-02
ROCK-03
WRCA-TP-19
WRCA-TP-15B
WRCA-TP-16
WRCA-TP-20
WRCA-TP-01
WRCA-TP-27
WRCA-TP-02
WRD-TP-21
WRCA-TP-03
WRCA-TP-04
WRCA-TP-05
WRCA-TP-06
WR-CREST-1
WRCA-TP-12
WRCA-TP-21
WRD-TP-26
WRCA-TP-15A
WRD-TP-23
WRD-TP-25
WRD-TP-22
WRCA-TP-18
WRCA-TP-11
WRCA-TP-14
WRCA-TP-13
WRCA-TP-22
WRCA-TP-26
WRCA-TP-28
WRCA-TP-08
WRCA-TP-10
WRCA-TP-17
WR-CREST-2
WRCA-TP-29
WR-CREST-5
WRCA-TP-07
WRCA-TP-09
WRD-TP-30
WR-CREST-3
WRCA-TP-23
WRCA-TP-25
WR-CREST-4
WRD-TP-27
WRCA-TP-24
WRD-TP-29
WRD-TP-28

Legend

- Existing Well
- Boring
- Geotech/Geochem Test Pit
- Impacted Soils/Sediment Test Pit
- Cover Assessment Test Pit

0 550 1,100 2,200 feet
0 105 210 420 630 840 meters

Imagery Source: Google April 2017. Coordinate System: NAD 1983 UTM Zone 12N, Transverse Mercator.

T:\Asarco Sacaton Mine\GIS\Figure 5. Exploratory Boring and Test Pit Locations.mxd February 2019 mitch.isaacson

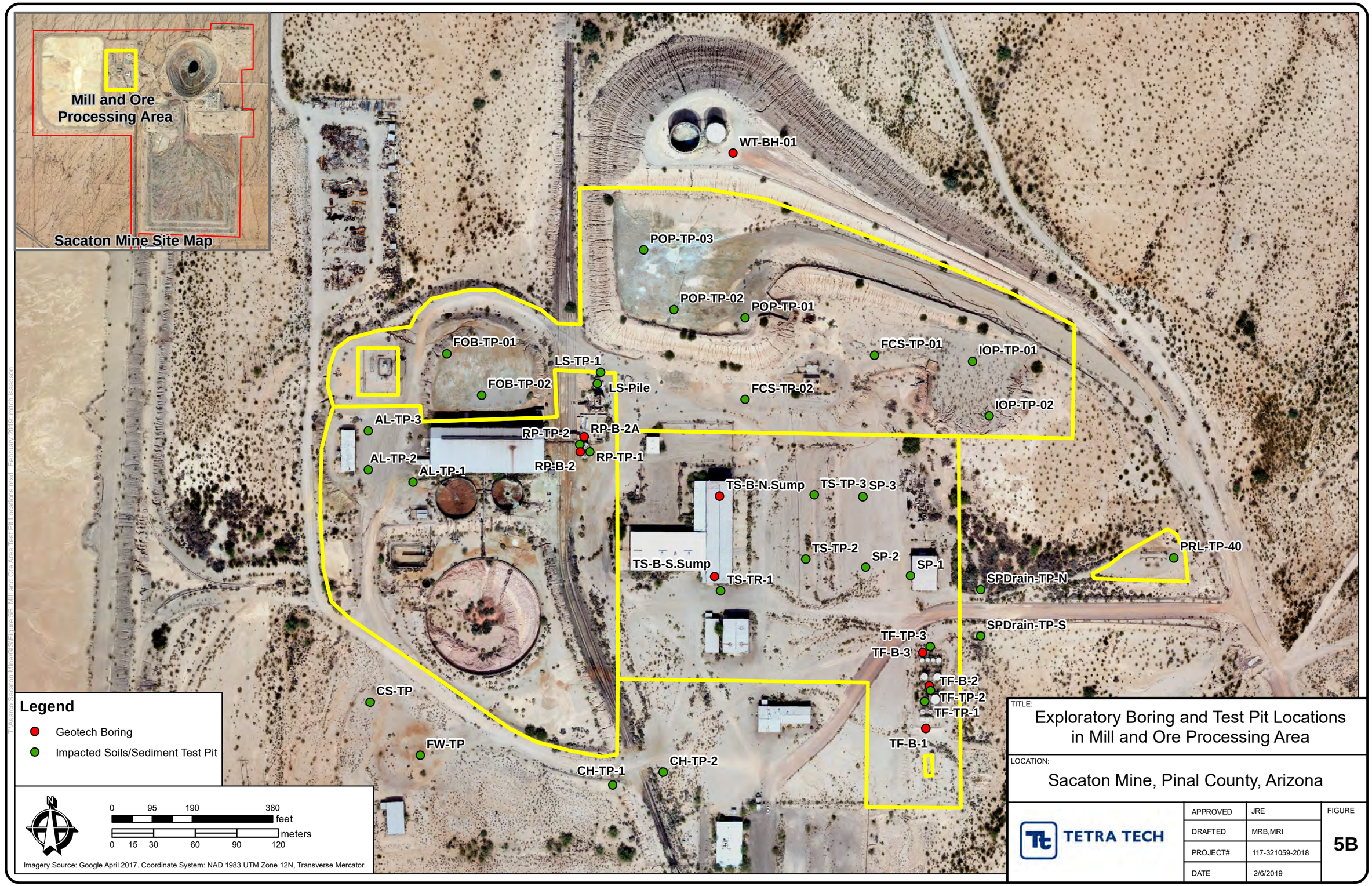
TITLE:
Exploratory Boring and Test Pit Locations

LOCATION:
Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE
DRAFTED	MRB,MRI
PROJECT#	117-321059-2018
DATE	2/4/2019

FIGURE
5A



TITLE:

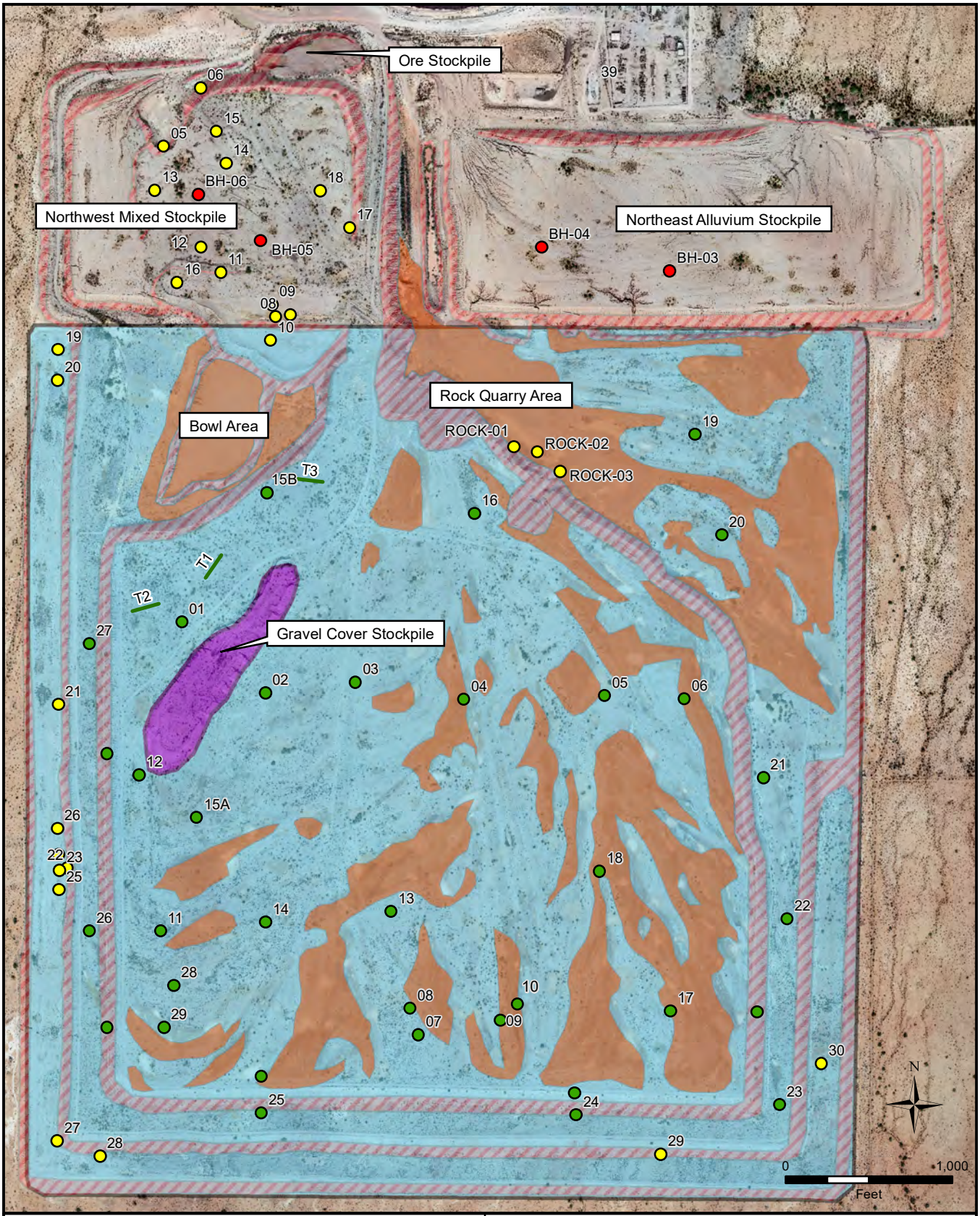
Exploratory Boring and Test Pit Locations in Mill and Ore Processing Area

LOCATION:

Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE	FIGURE
DRAFTED	MRB,MRI	5B
PROJECT#	117-321059-2018	
DATE	2/6/2019	



Legend

- Geotech Boring
- Geotech Excavator Test Pit
- WRCA Test Pit*
- Reclaimed WRD Transect
- Interbench/Steep Slopes
- Uncovered Areas (Exposed Waste Rock)
- Covered Waste Rock Areas
- Gravel Cover Material

*WRCA - Waste Rock Cover Assessment

TITLE: Waste Rock Cover Assessment

LOCATION: Sacaton Mine, Pinal County, Arizona

TETRA TECH

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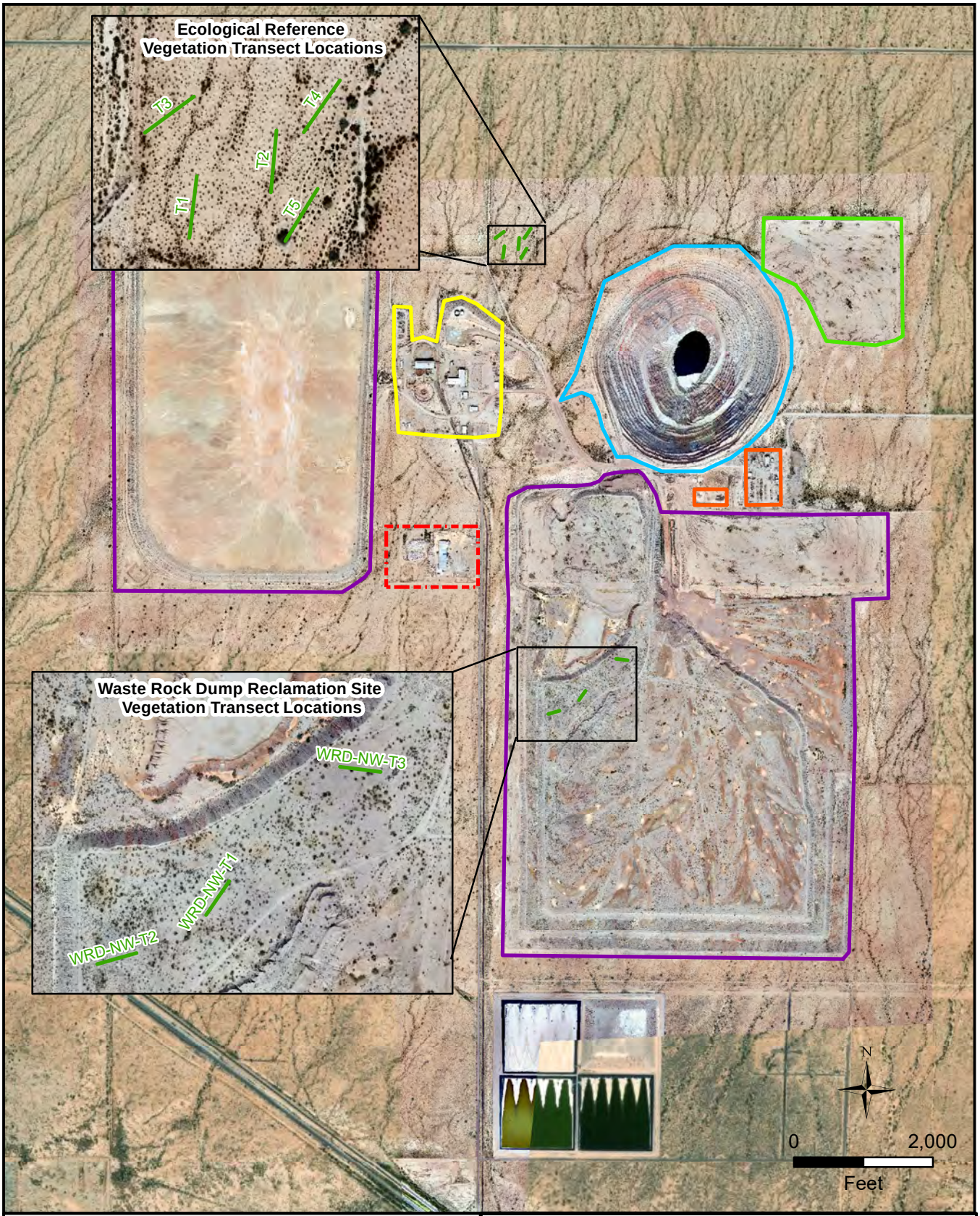
DRAFTED	MRB, MRI
PROJECT#	117-321059-2018
DATE	02/04/2019

FIGURE 6



Legend

- Vegetation Transect Lines
- Underground Mine Workings Area
- Alluvium Soil Storage Area
- Mill and Ore Processing Area
- Mine Pit
- TSF & WRD
- TruStone

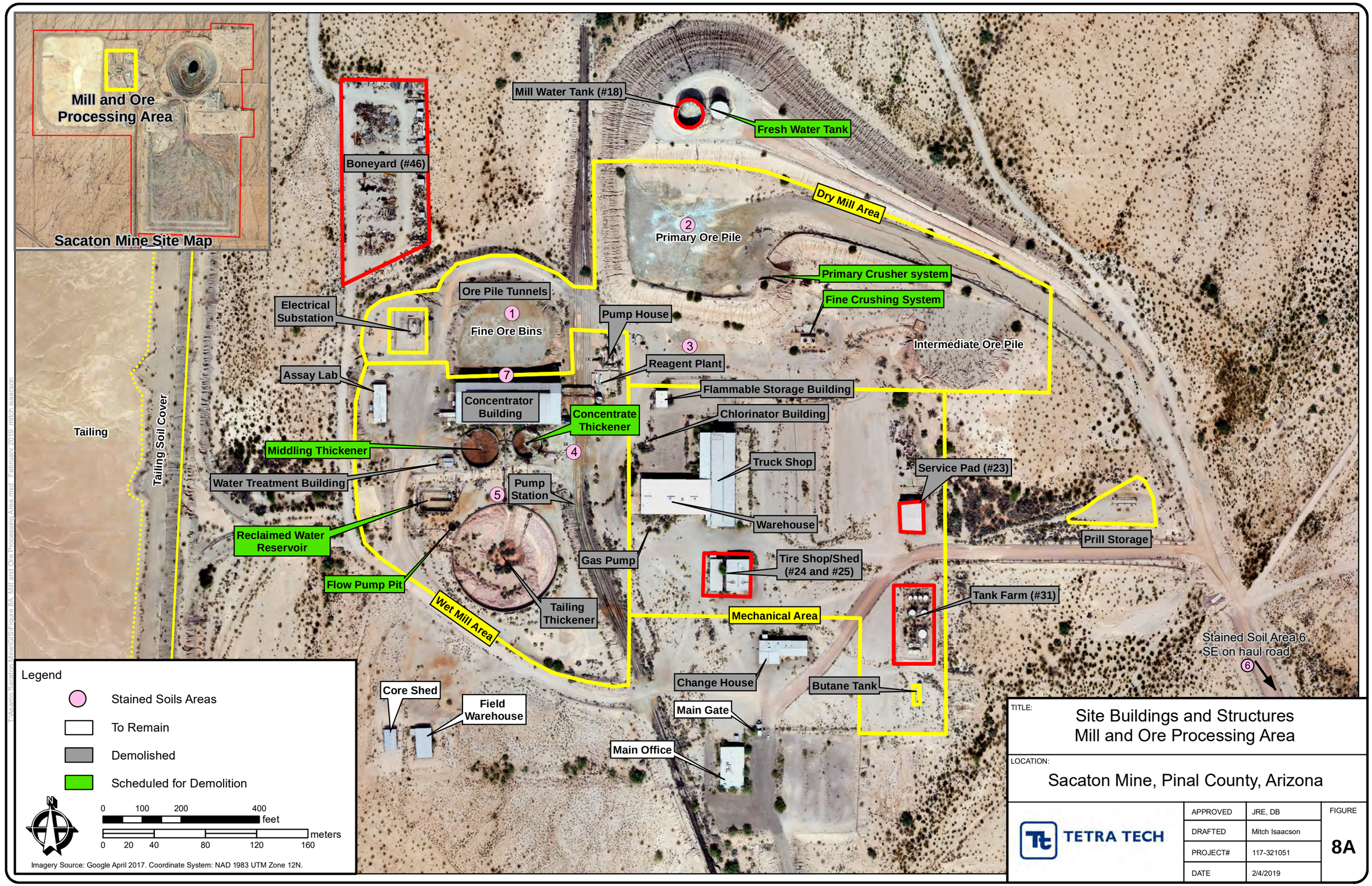
TITLE: Vegetation Sample Plots and Transects

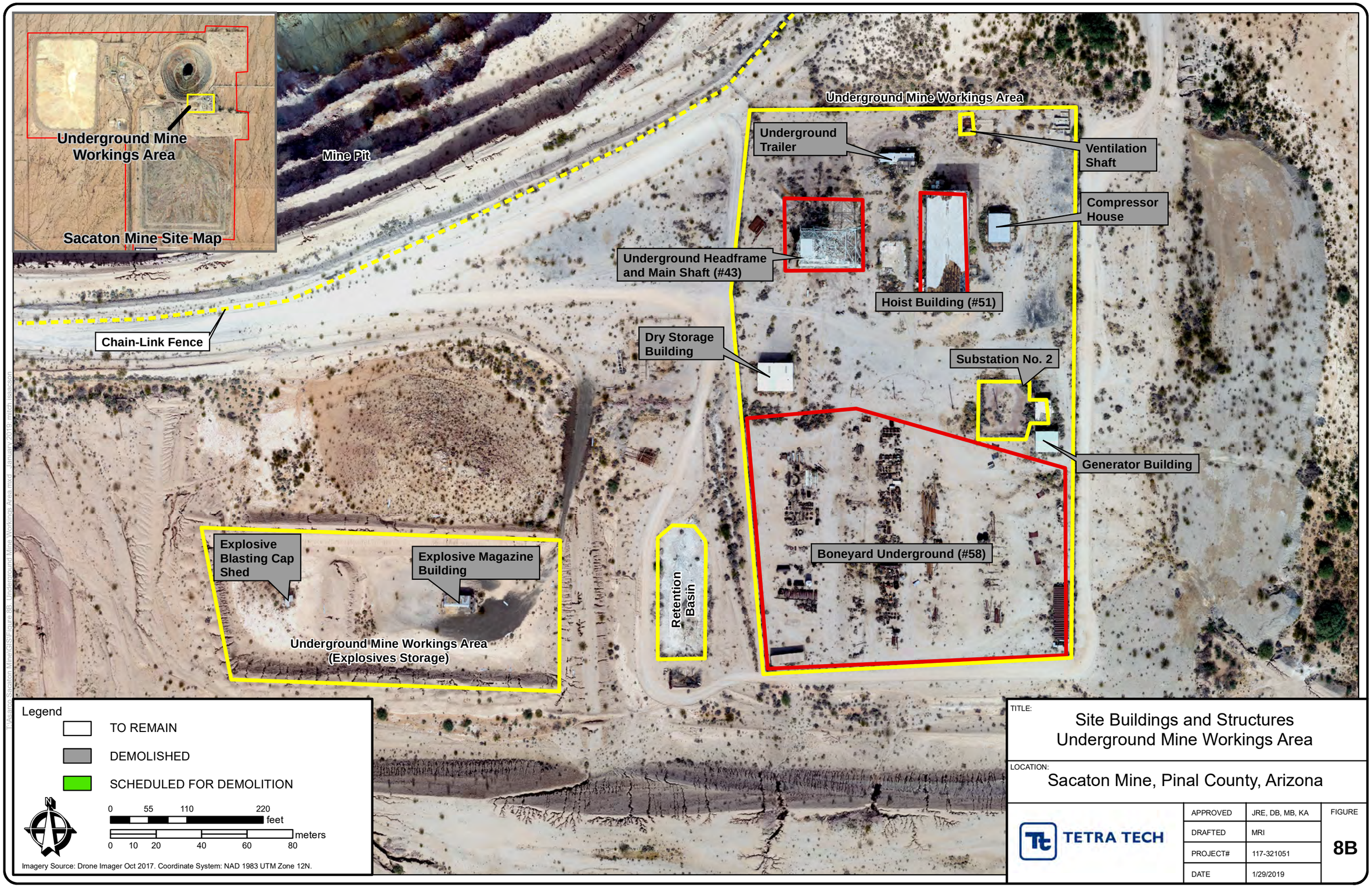
LOCATION: Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE
DRAFTED	MRB, MRI
PROJECT#	117-321059-2018
DATE	02/04/2019

FIGURE 7


Mill and Ore Processing Area
Sacaton Mine Site Map
Boneyard (#46)
Mill Water Tank (#18)
Fresh Water Tank
Dry Mill Area
2
Primary Ore Pile
Primary Crusher system
Fine Crushing System
Intermediate Ore Pile
3
Ore Pile Tunnels
1
Fine Ore Bins
Electrical Substation
Pump House
Reagent Plant
Assay Lab
7
Concentrator Building
Concentrate Thickener
Flammable Storage Building
Chlorinator Building
Tailing
Tailing Soil Cover
Middling Thickener
4
Truck Shop
Service Pad (#23)
Water Treatment Building
Pump Station
5
Warehouse
Reclaimed Water Reservoir
Gas Pump
Tire Shop/Shed (#24 and #25)
Prill Storage
Flow Pump Pit
Wet Mill Area
Tailing Thickener
Tank Farm (#31)
Mechanical Area
Stained Soil Area 6 SE on haul road
6
Change House
Butane Tank
Core Shed
Field Warehouse
Main Gate
Main Office
Legend
Stained Soils Areas
To Remain
Demolished
Scheduled for Demolition
N
0 100 200 400 feet
0 20 40 80 120 160 meters
Imagery Source: Google April 2017. Coordinate System: NAD 1983 UTM Zone 12N.
TITLE:
Site Buildings and Structures
Mill and Ore Processing Area
LOCATION:
Sacaton Mine, Pinal County, Arizona
TETRA TECH
APPROVED JRE, DB
DRAFTED Mitch Isaacson
PROJECT# 117-321051
DATE 2/4/2019
FIGURE
8A
I:\Sacaton Sacaton Mine\GIS\Figure 8A_Mill and Ore Processing Area.mxd February 2019 mitch.isaacson



Legend

- TO REMAIN
- DEMOLISHED
- SCHEDULED FOR DEMOLITION

0 55 110 220 feet

0 10 20 40 60 80 meters

Imagery Source: Drone Imager Oct 2017. Coordinate System: NAD 1983 UTM Zone 12N.

T:\Sacaton Sacaton Mine\GIS\Figure 8B_Underground Mine Workings Area.mxd January 2019 mitch.isaacson

TITLE:

Site Buildings and Structures Underground Mine Workings Area

LOCATION:

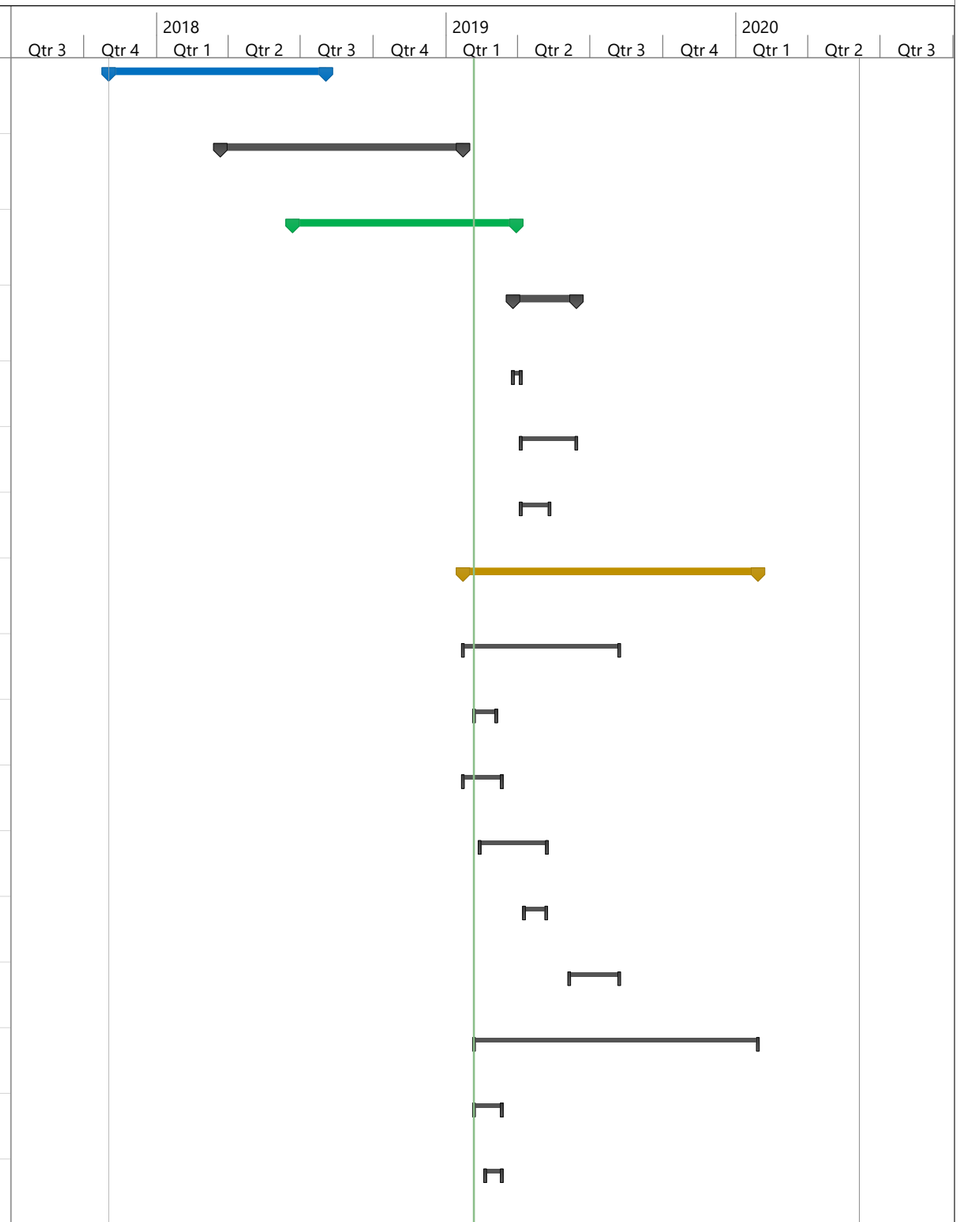
Sacaton Mine, Pinal County, Arizona

TETRA TECH

APPROVED	JRE, DB, MB, KA	FIGURE
DRAFTED	MRI	8B
PROJECT#	117-321051	
DATE	1/29/2019	

Figure 9. Sacaton Mine SIP Implementation Schedule

ID	Task Name	Duration	Start	Finish
1	**Data Collection/Analysis Activities (Pre-SIP)**	196 days	Wed 11/1/17	Thu 8/2/18
101	**2018 Demolition Site Building/Structures**	218 days?	Wed 3/21/18	Tue 1/22/19
196	**Site Improvement Plan (SIP)**	202 days	Thu 6/21/18	Fri 3/29/19
217	**Pre-SIP Site Activities**	58 days	Tue 3/26/19	Thu 6/13/19
218	Budget 2019 Demolition/Wellfield Repairs	8 days	Tue 3/26/19	Fri 4/5/19
225	2019 Demolition	50 days	Fri 4/5/19	Thu 6/13/19
232	Wellfield Repairs/Automation	26 days	Fri 4/5/19	Fri 5/10/19
236	**SIP Task Implementation**	266 days?	Tue 1/22/19	Tue 1/28/20
237	Task 1 -- Underground Main Shaft and Ventilation Shaft Sealing	141 days	Tue 1/22/19	Tue 8/6/19
238	Budget Pre-Shaft Sealing Activities	20 days	Tue 2/5/19	Tue 3/5/19
244	Design and Specifications	35 days	Tue 1/22/19	Mon 3/11/19
247	Contracting	61 days	Tue 2/12/19	Wed 5/8/19
253	Budget Shaft Sealing	20 days	Tue 4/9/19	Tue 5/7/19
259	Implement Shaft Sealing	45 days	Wed 6/5/19	Tue 8/6/19
262	Task 2 -- TSF, WRD, Impacted Soils, Regrading, Soil Cover, Reveg	256 days	Tue 2/5/19	Tue 1/28/20
263	Budget Pre-Construction Activities	25 days	Tue 2/5/19	Tue 3/12/19
269	Design and Specifications	15 days	Tue 2/19/19	Mon 3/11/19

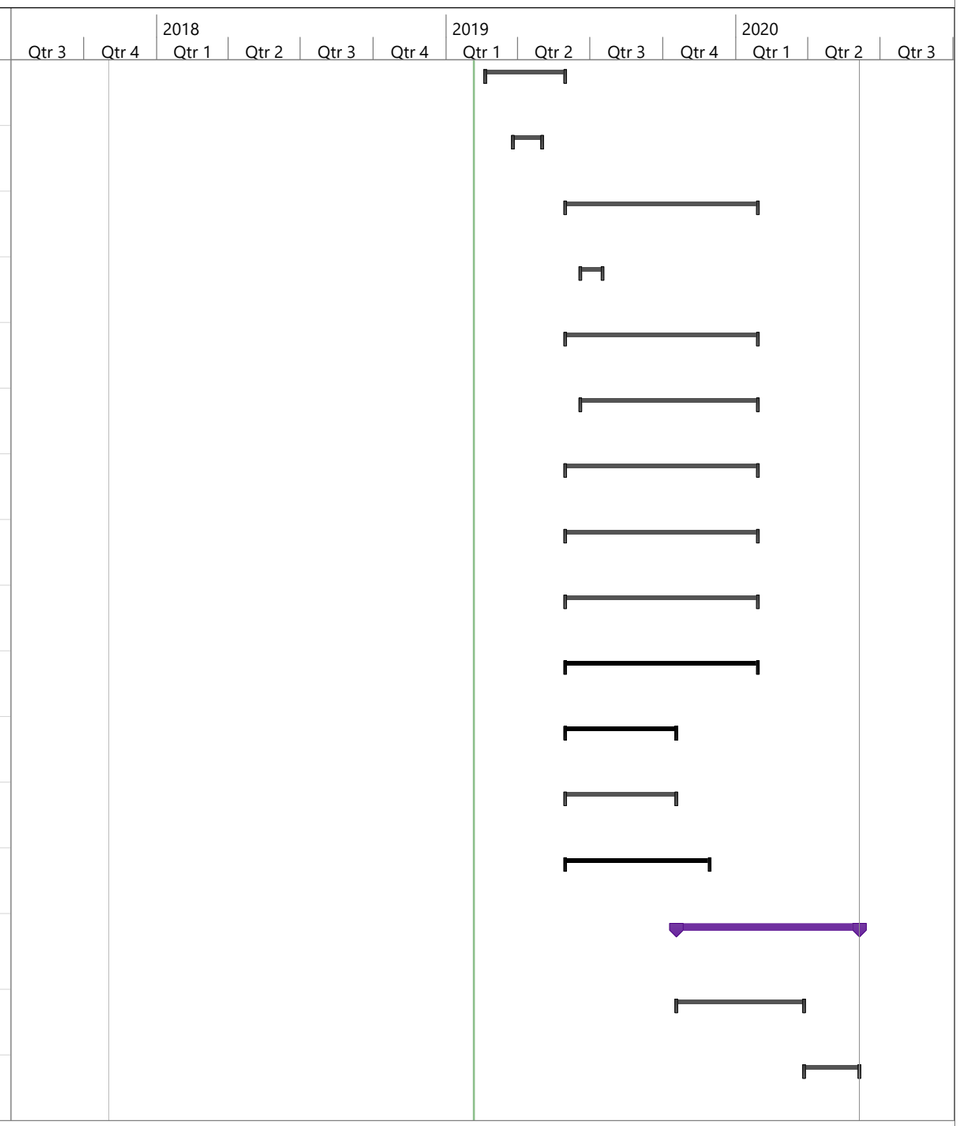


Project: Sacaton Mine Closure
Date: Tue 2/5/19

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

Figure 9. Sacaton Mine SIP Implementation Schedule

ID	Task Name	Duration	Start	Finish
274	**Contractor Selection/Award**	**73 days**	**Tue 2/19/19**	**Thu 5/30/19**
281	**Budget TSF, WRD, Grading, Soil Cover, Reveg**	**27 days**	**Tue 3/26/19**	**Thu 5/2/19**
289	**Tailing Storage Facility TSF)**	**173 days**	**Fri 5/31/19**	**Tue 1/28/20**
305	**Impacted Soils Removal and/or Cover**	**20 days**	**Wed 6/19/19**	**Tue 7/16/19**
310	**Waste Rock Dump**	**173 days**	**Fri 5/31/19**	**Tue 1/28/20**
314	**Alluvium Waste Area**	**160 days**	**Wed 6/19/19**	**Tue 1/28/20**
317	**Dry Mill Area**	**173 days**	**Fri 5/31/19**	**Tue 1/28/20**
322	**Wet Mill Area**	**173 days**	**Fri 5/31/19**	**Tue 1/28/20**
326	**Mechanical Area**	**173 days**	**Fri 5/31/19**	**Tue 1/28/20**
330	**Administrative Area**			
334	**Roads / Parking Areas**			
338	**Task 3 -- Diversion Ditches and Stormwater Ponds**	**100 days?**	**Fri 5/31/19**	**Thu 10/17/19**
341	**Task 4 -- Open Pit Mine Security Fencing**			
347	**Final SIP Implementation Report and DEUR Application**	**165 days**	**Fri 10/18/19**	**Thu 6/4/20**
348	**Task 1 -- Final SIP Implementation Report**	**115 days**	**Fri 10/18/19**	**Fri 3/27/20**
357	**Task 2 -- DEUR Application Open Pit**	**50 days**	**Fri 3/27/20**	**Thu 6/4/20**



Project: Sacaton Mine Closure
Date: Tue 2/5/19

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

APPENDIX A1:
Laboratory Analytical Results

Sacaton Mine
Site Investigation

TABLE A-1: Stormwater Sediment Samples Analytical Results

Sample ID	TDA-PCW-01A	TDA-PCW-01B	TDA-PCW-02	TDA-PCW-03	TDA-SEDPOND-E@0.5FT	TDA-SEDPOND-E@3FT	TDA-SEDPOND-W@0.5FT	TDA-SEDPOND-W@3.5FT	TDA-SEDPOND-W@6FT	TDA-SEDPOND-E BERM@0.5FT	TDA-SEC@0.5FT	TDA-SEC@3FT	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID	L44556-29	L44556-30	L44556-01	L44556-02	L44556-38	L44556-39	L44556-40	L44556-41	L44556-42	L44556-43	L44556-44	L44556-45	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	
Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	Carcinogen	Non-Carcinogen				NOTES
PARAMETER	**UNITS**																	
General / Agronomic																		
Cation Exchange Capacity (CEC)	meq/100g																	
Calcium, soluble (Sat. Paste)	meq/L																	
Magnesium, soluble (Sat. Paste)	meq/L																	
Potassium, soluble (Sat. Paste)	meq/L																	
Sodium, soluble (Sat. Paste)	meq/L																	
Sodium Adsorption Ratio																		
Carbon, total organic (TOC)	%																	
Neutralization Potential as CaCO3	%																	
Conductivity@25C	mmhos/cm																	
Organic Matter (Ignition@ 400)	%																	
Net Acid Generation Procedure	units	7.1	6.8	6.4	4.1	8	10.8	9	8.8	9.1	7.9	5.6	10.4						
pH, Saturated Paste	units	8.1	6.2	8.7	5	7.2	7.9	7.5	7.8	8.2	8.1	8.1	6.4						
Solids, Percent	%	99.5	96.5	99.3	99	98.6	94.9	98.7	90.5	90.4	99.1	99.3	92						
Total Metals																		
Aluminum, total (3050)	mg/Kg	4940	9560	6250	8570	17000	11900	19100	12600	10000	13300	12200	18900		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	1.7	2.1	1.4	3.5	3.4	3.6	3.6	3.7	3.6	2.6	2.4	4.7	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	39.2	64.6	43.1	119	133	110	142	87.1	109	76	105	141		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.31	0.45	0.32	0.48	1.41	0.44	1.12	5.17	3.07	0.55	0.84	0.75		*150*	*1,900*			
Boron, total (3050)	mg/Kg	2 B	4 B	3 B	4 B	8	6	7	4 B	5	6	5	11		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.28 B	0.29 B	0.25 B	0.16 B	0.67	0.36	0.61	2.21	1.4	0.37	0.37	0.47		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	2280	1420	2680	6570	8230	60200	6640	26400	32200	2500	1980	22900						
Chromium, total (3050)	mg/Kg	7.6	9.5	4.8	10.5	16.3	11.8	17.8	11	10.2	13	12.4	17.1	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	89	334	28	286	2290	45	1310	10600	236	396	876	16		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	16900	12900	8000	25800	27800	11300	24100	8970	10900	14000	18300	15200						
Lead, total (3050)	mg/Kg	5.38	6.19	4.75	7.31	11.1	6.54	11.4	6.52	6.3	7.23	8.16	9.63		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	1380	2510	1660	1790	4580	5570	6010	3500	4530	3920	3340	6830						
Manganese, total (3050)	mg/Kg	209	205	182	69.1	382	203	320	952	1330	228	218	282		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.48 U	2.97 B	1.66 B	2.68 B	7.62 B	4.52 B	11.40	1.44 U	1.61 U	6.07 B	7.91 B	6.60 B		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	2 B	4 B	2 U	30	30	2 U	15	2 U	2 U	2 B	19	2 U		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	4	7.7	3 B	5.4	23.1	7.9	17.9	53.8	53.3	10.6	12.7	12.2		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	220	210	210	450	540	420	540	260	380	170	400	260		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	1120	2270	1410	4840	5680	2580	5770	2070	2130	3250	4100	4190						
Selenium, total (3050)	mg/Kg	3 U	3 U	3 U	3 U	2.92	0.22	1.7	1.2	0.5	0.31	1.5	0.15		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1 U	1 U	1 U	1 U	0.5	0.03 U	0.33	0.03 B	0.03 U	0.07 B	0.27	0.04 B		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	150	160	320	210	540	230	320	110	160	150	280	1410						
Thallium, total (3050)	mg/Kg	0.05 U	0.09 B	0.07 B	0.19 B	0.23 B	0.11 B	0.23 B	0.12 B	0.1 B	0.12 B	0.15 B	0.18 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	1.29	1.87	1.14	1.89	6.37	1.12	3.73	26.3	2.3	1.15	3.47	0.52		*16*	*200*			
Vanadium, total (3050)	mg/Kg	41.2	26.4	17.9	19.1	26.5	28.5	31.5	28.2	30.8	28	22.3	36.2		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	16	26	17	29	72	28	65	189	257	35	43	41		*23,000*	*310,000*			
SPLP Metals																		
Aluminum (1312)	mg/L	0.304	0.075	0.198	0.708	0.019	0.009	0.081	0.092	0.021	0.095	0.137	0.044						
Antimony (1312)	mg/L	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U						
Arsenic (1312)	mg/L	0.0008 B	0.0002 U	0.0006 B	0.0002 U	0.00025 U	0.0008 B	0.0005 B	0.0002 U	0.0007 B	0.002	0.0002 U	0.0055						
Barium (1312)	mg/L	0.0046	0.0156	0.0063	0.0009 B	0.0008 B	0.0268	0.0032	0.0526	0.0364	0.0097	0.003	0.0061						
Beryllium (1312)	mg/L	0.00005 U	0.00011 B	0.00005 U	0.00013 B	0.00005 U	0.00005 U	0.00005 U	0.00005 B	0.00005 U	0.00005 U	0.00005 U	0.00005 U						
Boron (1312)	mg/L	0.0099	0.0035	0.0055	0.0061	0.0136	0.0081	0.0089	0.0046	0.0037	0.0136	0.0094	0.065						
Cadmium (1312)	mg/L	0.0001 U	0.0001 B	0.0001 U	0.0001 B	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Calcium (1312)	mg/L	6.3	3.9	5.7	249	211	35.5	22.1	14.3	8.8	6.9	10.7	6.3						
Chromium (1312)	mg/L	0.0005 U	0.0005 U	0.0005 U	0.0006 B	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U						
Copper (1312)	mg/L	0.0063	0.17	0.0026	0.287	0.024	0.0017 B	0.032	0.0089	0.0014 B	0.0251	0.0734	0.0033						
Iron (1312)	mg/L	0.04 B	0.02 U	0.03 B	0.02 U	0.02 U	0.02 U	0.05	0.02 U	0.02 U	0.02 B	0.16	0.02 U						
Lead (1312)	mg/L	0.0001 U	0.0001 B	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0004 B	0.0001 B	0.0001 U						
Magnesium (1312)	mg/L	0.4 B	0.6 B	0.4 B	0.6 B	13.6	8.3	1.8	1.3	1	0.8 B	1.6	1.7						
Manganese (1312)	mg/L	0.0015 B	0.0583	0.0014 B	0.0312	0.0169	0.0004 U	0.0034	0.0004 U	0.0038	0.001 B	0.066	0.0004 U						
Mercury (1312)	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U						
Molybdenum (1312)	mg/L	0.0019 B	0.0005 U	0.0026 B	0.0005 U	0.0143	0.0034	0.0145	0.0051	0.0009 B	0.0023 B	0.007	0.0005 U						
Nickel (1312)	mg/L	0.0006 U	0.0035	0.0006 U	0.0022 B	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0202	0.0024 B	0.0024 B						
Phosphorus (1312)	mg/L	0.3 B	0.1 U	0.2 B	0.3 B	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U						
Potassium (1312)	mg/L	1	0.8 B	1.3	0.8 B	1.9	0.2 B	2.7	0.9 B	0.3 B	1.6	2.1	0.2 U						
Selenium (1312)	mg/L	0.0003	0.0001 U	0.0002 B	0.0012	0.0009	0.0009	0.0022	0.0001 B	0.0013	0.0007	0.0005	0.0003						
Silver (1312)	mg/L	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U						
Sodium (1312)	mg/L	0.4 B	0.2 U	0.6 B	0.2 B	2.6	3.5	0.7 B	0.3 B	0.8 B	0.6 B	0.4 B	51.8						
Thallium (1312)	mg/L	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Uranium (1312)	mg/L	0.0005	0.0001 U	0.0001 B	0.0007	0.0059	0.0008	0.0023	0.0001 U	0.0018	0.0006	0.0002 B	0.0001 U						
Vanadium (1312)	mg/L	0.0038	0.0002 U	0.0036	0.0002 U	0.0003 B	0.0082	0.0015	0.0002 U	0.0055	0.0099	0.001	0.033						
Zinc (1312)	mg/L	0.002 U	0.014	0.002 U	0.015	0.003 B	0.002 B	0.002 B	0.005	0.003 B	0.026	0.006	0.01 B						

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

Sacaton Mine
Site Investigation

TABLE A-2: Tailings Samples Analytical Results

		Tailings			Underlying Soil				Tailings		Underlying Soil		ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Sample ID		TSF-TP-C01	TSF-TP-C02	TSF-TP-C03	TOP-BH-08@85FT	TOP-BH-08@90FT	TOP-BH-08@95FT	TOP-BH-08@100FT	TOP-BH-09@25.2FT	TOP-BH-09@35FT	TOP-BH-09@45FT	TOP-BH-09@70FT	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Lab ID		L-44451-11 / L44551-12	L-44451-13 / L44551-14	L-44451-15	L44634-01	L44634-02	L44634-03	L44634-04	L44634-05	L44634-06	L44634-07	L44634-08	Carcinogen	Non-Carcinogen				
Sample Date		5/14/2018	5/14/2018	5/14/2018	5/24/2018	5/24/2018	5/24/2018	5/24/2018	5/24/2018	5/25/2018	5/25/2018	5/25/2018						
PARAMETER	**UNITS**																	
General / Agronomic																		
Cation Exchange Capacity (CEC)	meq/100g	4.94	5.65															
Calcium, soluble (Sat. Paste)	meq/L	20.1	19.8		3.34	3.55	1.89	0.755	11.1	3.88	0.394	0.185						
Magnesium, soluble (Sat. Paste)	meq/L	509	70.7		2.29	3.01	2.14	0.814	6.21	3.03	0.632	0.218						
Potassium, soluble (Sat. Paste)	meq/L	0.5114 U	0.105 B															
Sodium, soluble (Sat. Paste)	meq/L	0.87 U	0.18 B		5.05	6.28	9.09	9.75	3.39	4.85	12.2	15.2						
Sodium Adsorption Ratio			0.03		3	3.5	6.4	11	1.2	2.6	17	34						
Carbon, total organic (TOC)	%	0.1 U	0.1 U															
Neutralization Potential as CaCO3	%	0.1 U	0.1 U															
Conductivity@25C	mmhos/cm	25.1	6.98		1.09	1.3	1.39	1.23	1.83	1.19	1.33	1.51						
Organic Matter (Ignition@ 400)	%				0.4 B	0.6 B	0.7 B	0.5 B	0.3 B	0.7 B	0.6 B	0.3 U						
Net Acid Generation Procedure	units	3.3	3.9	3.2														
pH, Saturated Paste	units	3.3	3.3	3.7	8.3	8.2	8.5	8.7	8.2	8.2	8.9	9.2						
Solids, Percent	%	96	91.5	90.9	92.6	90.9	88.4	85.3	97	91.2	92.1	94.3						
Total Metals																		
Aluminum, total (3050)	mg/Kg	16500	11100	9980	9280	10200	10300	10400	7940	10600	10400	10600		76,000	920,000			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U		31	410			
Arsenic, total (3050)	mg/Kg	1.2	1.3	1.5	3.8	4.2	4.8	6.2	1.7 B	6.8	5.3	2.9	10	10	10	10	290	
Barium, total (3050)	mg/Kg	160	173	137	100	105	82.5	185	72	134	114	148		15,000	170,000	15,000		
Beryllium, total (3050)	mg/Kg	2.8	0.79	0.89	0.4 B	0.4 B	0.4 B	0.4 B	0.3 B	0.4 B	0.4 B	0.3 B		150	1,900			
Boron, total (3050)	mg/Kg	7	3 B	3 B	4 B	5	6	6	3 B	4 B	8	11		16,000	200,000			
Cadmium, total (3050)	mg/Kg	0.49	0.13 B	0.13 B	0.3 B	0.3 B	0.3 B	0.3 B	0.2 B	0.3 B	0.3 B	0.3 B		39	510	39	29	
Calcium, total (3050)	mg/Kg	4200	1670	2110	23400	82800	66900	40900	6100	79700	35400	17300						
Chromium, total (3050)	mg/Kg	10.8	13.6	11.7	11	12	13	15	8	11	11	9	30		65	120,000		SRL (Cr III), Tier 1 (Cr VI)
Copper, total (3050)	mg/Kg	1400	412	524	12	8	7	10	6	7	7	7		3,100	41,000			
Iron, total (3050)	mg/Kg	17800	21200	20700	13000	11000	12600	13200	15300	13300	15900	19600						
Lead, total (3050)	mg/Kg	3.96	5.7	6.48	6.1	6.2	5.6	6.2	4	5.5	5	4.1		400	800	400	290	
Magnesium, total (3050)	mg/Kg	7370	4280	3900	4640	4950	5680	5140	2960	6150	6520	5710						
Manganese, total (3050)	mg/Kg	860	195	185	217	162	168	218	243	198	288	362		3,300	32,000			
Mercury by Direct Combustion AA	ng/g	1.35 U	1.32 U	1.36 U	1.96 B	1.54 U	1.55 U	1.61 U	1.96 B	1.61 U	1.47 U	1.54 U		23,000	310,000	23,000	12,000	Standards Presented in ng/g
Molybdenum, total (3050)	mg/Kg	10	14	28	1 B	1 B	1 U	1 U	1 U	1 U	1 U	1 U		390	5,100			
Nickel, total (3050)	mg/Kg	64.7	18	18.1	9	6	5.5	6	3.9 B	6	5.2	4.7		1,600	20,000			
Phosphorus, total (3050)	mg/Kg	410	440	390	400	420	430	430	350	480	620	530		1.6	20			N/A: SRL is for Phosphorous (white)
Potassium, total (3050)	mg/Kg	4610	5670	5200	1830	2060	1750	1800	1730	1880	2240	2440						
Selenium, total (3050)	mg/Kg	1 U	U	1 B	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 B	0.2 U		390	5,100	390	290	
Silver, total (3050)	mg/Kg	0.26	0.35	0.41	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	U	0.1 U		390	5,100	390		
Sodium, total (3050)	mg/Kg	1050	170	340	360	370	490	660	230	330	850	1200						
Thallium, total (3050)	mg/Kg	0.12 B	0.15 B	0.15 B	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	U	0.2 U		5.2	67			
Uranium, total (3050)	mg/Kg	5.43	2.34	2.24	0.7 B	0.8 B	1	0.9 B	0.6 B	0.8 B	1.1	1.3		16	200			
Vanadium, total (3050)	mg/Kg	18.3	21.6	21.4	34.7	30.2	41.8	45.2	35.7	47.6	47	50.9		78	1,000			
Zinc, total (3050)	mg/Kg	135	40	42	28	20	20	23	21	24	25	33		23,000	310,000			
SPLP Metals																		
Aluminum (1312)	mg/L	136	20.2	29														
Antimony (1312)	mg/L	0.0004 U	0.0004 U	0.0004 U														
Arsenic (1312)	mg/L	0.0012	0.0002 U	0.0002 U														
Barium (1312)	mg/L	0.0008 B	0.0046	0.0055														
Beryllium (1312)	mg/L	0.0472	0.00691	0.0125														
Boron (1312)	mg/L	0.1 B	0.03 U	0.03 U														
Cadmium (1312)	mg/L	0.0153	0.0018	0.0031														
Calcium (1312)	mg/L	182	57.6	73.5														
Chromium (1312)	mg/L	0.0108	0.0013 B	0.0044														
Copper (1312)	mg/L	52.1	6.54	14.2														
Iron (1312)	mg/L	0.7	0.06	0.25														
Lead (1312)	mg/L	0.0001 U	0.0001 U	0.0001 U														
Magnesium (1312)	mg/L	287	41.4	50.1														
Manganese (1312)	mg/L	35.4	5.33	6.05														
Mercury (1312)	mg/L	0.0002 U	0.0002 U	0.0002 U														
Molybdenum (1312)	mg/L	0.0005 U	0.0005 U	0.0005 U														
Nickel (1312)	mg/L	2.52	0.437	0.532														
Phosphorus (1312)	mg/L	1 U	0.1 U	0.1 U														
Potassium (1312)	mg/L	2 U	0.4 B	0.7 B														
Selenium (1312)	mg/L	0.0118	0.0016	0.0015														

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TABLE A-2: Tailings Samples Analytical Results

		Tailings			Underlying Soil				Tailings		Underlying Soil		ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Sample ID		TSF-TP-C01	TSF-TP-C02	TSF-TP-C03	TOP-BH-08@85FT	TOP-BH-08@90FT	TOP-BH-08@95FT	TOP-BH-08@100FT	TOP-BH-09@25.2FT	TOP-BH-09@35FT	TOP-BH-09@45FT	TOP-BH-09@70FT	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Lab ID		L-44451-11 / L44551-12	L-44451-13 / L44551-14	L-44451-15	L44634-01	L44634-02	L44634-03	L44634-04	L44634-05	L44634-06	L44634-07	L44634-08	Carcinogen	Non-Carcinogen				
Sample Date		5/14/2018	5/14/2018	5/14/2018	5/24/2018	5/24/2018	5/24/2018	5/24/2018	5/24/2018	5/25/2018	5/25/2018	5/25/2018						
Silver (1312)	mg/L	0.00005 U	0.00005 U	0.00006 B														
Sodium (1312)	mg/L	2 U	0.2 U	0.7 B														
Thallium (1312)	mg/L	0.0001 U	0.0001 U	0.0001 U														
Uranium (1312)	mg/L	0.156	0.01	0.0274														
Vanadium (1312)	mg/L	0.0002 U	0.0002 U	0.0002 U														
Zinc (1312)	mg/L	5.61	0.882	1.21														

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

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TABLE A-3: Waste Rock Samples Analytical Results

		Potential Cover Material/Cover Material							Waste Rock					ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Sample ID		WRD-TP-13	WRD-TP-16	WRD-TP-17	WRCA-TP-01	WRCA-TP-07B	WRCA-TP-12	WRCA-TP-24	WRD-TP-27	WRD-TP-30	WRCA-TP-04	WRCA-TP-08	WRCA-TP-20	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Lab ID(s)		L44556-23 / L44556-24	L44556-25 / L44556-26	L44556-27 / L44556-28	L-44451-21 / L44451-22	L-44451-24 / L44451-25	L-44451-26 / L44451-27	L-44451-28 / L44451-29	L-44451-01	L-44451-02	L-44451-20	L-44451-19	L-44451-23	Carcinogen	Non-Carcinogen				
Sample Date		5/15/2018	5/15/2018	5/15/2018	5/15/2018	5/16/2018	5/16/2018	5/15/2018	5/16/2018	5/16/2018	5/15/2018	5/15/2018	5/16/2018						
PARAMETER	**UNITS**																		
General / Agronomic																			
Cation Exchange Capacity (CEC)	meq/100g	6.45	5.81	5.26	7.83	2.92	8.41	6.23											
Calcium, soluble (Sat. Paste)	meq/L	0.343	0.48	0.141	0.104	7.32	0.66	3.84											
Magnesium, soluble (Sat. Paste)	meq/L	0.219	0.155	0.073 B	0.078 B	0.973	0.111	3.39											
Potassium, soluble (Sat. Paste)	meq/L	0.0411	0.0492	0.0281	0.0332	0.231	0.0797	0.105											
Sodium, soluble (Sat. Paste)	meq/L	20.8	10.5	6.39	3.77	5.76	1.1	7.39											
Sodium Adsorption Ratio		39	19	20	12	2.8	1.8	3.9											
Carbon, total organic (TOC)	%	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U											
Neutralization Potential as CaCO3	%	8.6	5.1	5.4	1.9	0.4 B	1.5	1.9											
Conductivity@25C	mmhos/cm	2.49	1.29	0.74	0.411	1.37	0.218	1.44											
Organic Matter (Ignition@ 400)	%	0.4 B	0.3 U	0.3 U			0.3 U	0.3 U											
Net Acid Generation Procedure	units				8.5	5.5													
pH, Saturated Paste	units	8.9	8.7	8.9	9	7.5	8.5	8.2	7.6	7.5									
Solids, Percent	%	96.6	98.9	98	97.3	99.2	98.2	96.7											
Total Metals																			
Aluminum, total (3050)	mg/Kg	11000	7990	6410	6570	5690	7300	6310	10300	8050	6010	4960	14300		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	3.9	2.5	3.8	1.4	1	1.4	2.7	2.1	2	1.3	1.2	1.7	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	142	63	84	23.5	61.9	31.1	35	68.7	98.4	62.9	47.5	238		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.34	0.99	0.94	1.04	0.47	0.98	1.15	0.81	0.59	0.53	0.43	0.94		*150*	*1,900*			
Boron, total (3050)	mg/Kg	11	5	10 B	3 B	3 B	3 B	4 B	6	4 B	3 B	3 B	9		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.36	0.48	0.49	0.55	0.16 B	0.43	0.54	0.36	0.23 B	0.18 B	0.17 B	0.31		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	20500	10500	15000	5390	920	4250	6300	3800	1430	1570	910	6940						
Chromium, total (3050)	mg/Kg	9.4	7.6	3.9	4.6	2	5.8	3.9	6.3	5.8	6.1	2.9	47.7	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	15	34	43	32	1400	23	186	1210	337	992	1160	1750		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	16300	9680	10200	8060	12100	9010	10100	20300	16900	20700	13900	26400						
Lead, total (3050)	mg/Kg	4.76	9.29	9.99	13.1	15.3	10.9	13.5	10.8	8.03	4.76	9.4	42.4		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	6060	3400	3000	2370	880	3010	2600	2630	1430	1400	830	8210						
Manganese, total (3050)	mg/Kg	333	314	280	370	83.4	329	336	259	118	119	102	653		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.82 UH	1.85 UH	1.50 UH	1.34 U	1.64 U	1.71 U	1.89 U	1.33 U	1.33 U	1.33 U	1.89 B	1.37 U		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	0.4 B	1.2	1.2	2 U	120	0.9 B	2.4	72	162	106	153	38		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	6.1	6.4	4 U	4.8	1.8 B	6.6	6 B	3.5 B	3 B	3.9 B	1.8 B	32		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	530	340	270 B	240	210	260	250 B	320	300	270	180	460		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	2500	1560	1300	1240	3310	1930	1500	3370	3400	2890	2610	3860						
Selenium, total (3050)	mg/Kg	3 U	3 U	3 U	1 U	1 B	1 U	1 U	2.76	5.21	4	4	1 U		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1 U	1 U	1 U	0.03 U	0.25	0.03 U	0.03 U	0.29	0.07 B	1.12	1.28	0.25		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	1270	530	600	370	250	220	500	730	360	360	150	640						
Thallium, total (3050)	mg/Kg	0.13 B	0.09 B	0.08 B	0.06 B	0.05 U	0.09 B	0.06 B	0.09 B	0.07 B	0.06 B	0.05 B	0.22 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	1.3	2.64	2.66	3.53	13.5	3.36	3.73	3.26	3.48	4.53	3.66	5.1		*16*	*200*			
Vanadium, total (3050)	mg/Kg	44	22.1	21.6	10.7	6.8	11.1	14.8	19.5	10.9	10.8	6.5	49.5		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	33	28	28 B	31	14	36	34	28	31	19	13	52		*23,000*	*310,000*			
SPLP Metals																			
Aluminum (1312)	mg/L				0.308	0.037			0.217	0.106	0.013	0.056	0.067						
Antimony (1312)	mg/L				0.0004 U	0.0004 U			0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U						
Arsenic (1312)	mg/L				0.0002 B	0.0002 U			0.0007 B	0.0005 B	0.0002 U	0.0002 U	0.0006 B						
Barium (1312)	mg/L				0.0024 B	0.0036			0.0078	0.001 B	0.0112	0.0026 B	0.0148						
Beryllium (1312)	mg/L				0.00005 U	0.00005 U			0.00005 U	0.00005 U	0.00006 B	0.00005 U	0.00005 U						
Boron (1312)	mg/L				0.015	0.0115			0.028	0.0174	0.0132	0.0126	0.026						
Cadmium (1312)	mg/L				0.0001 U	0.0001 U			0.0001 U	0.0001 U	0.0004 B	0.0001 U	0.0001 U						
Calcium (1312)	mg/L				2.3	9.8			4.5	0.1 U	33.2	6.2	2.7						
Chromium (1312)	mg/L				0.0005 U	0.0005 U			0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U						
Copper (1312)	mg/L				0.0019 B	0.0075			0.011	0.006	0.392	0.0689	0.009 B						
Iron (1312)	mg/L				0.09	0.02 U			0.08	0.15	0.02 U	0.03 B	0.05						
Lead (1312)	mg/L				0.0001 B	0.0001 U			0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Magnesium (1312)	mg/L				0.3 B	0.6 B			0.7 B	0.2 U	3	0.7 B	0.4 B						
Manganese (1312)	mg/L				0.0029	0.0032			0.0009 B	0.0004 U	0.426	0.0125	0.0004 U						
Mercury (1312)	mg/L				0.0002 U	0.0002 U			0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U						
Molybdenum (1312)	mg/L				0.0024 B	0.0337			0.04	0.0357	0.0047	0.0782	0.0187						

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TABLE A-3: Waste Rock Samples
Analytical Results

	Sample ID	WRD-TP-13	WRD-TP-16	WRD-TP-17	WRCA-TP-01	WRCA-TP-07B	WRCA-TP-12	WRCA-TP-24	WRD-TP-27	WRD-TP-30	WRCA-TP-04	WRCA-TP-08	WRCA-TP-20	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID(s)	L44556-23 / L44556-24	L44556-25 / L44556-26	L44556-27 / L44556-28	L-44451-21 / L44451-22	L-44451-24 / L44451-25	L-44451-26 / L44451-27	L-44451-28 / L44451-29	L-44451-01	L-44451-02	L-44451-20	L-44451-19	L-44451-23	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/15/2018	5/15/2018	5/15/2018	5/15/2018	5/16/2018	5/16/2018	5/15/2018	5/16/2018	5/16/2018	5/15/2018	5/15/2018	5/16/2018	Carcinogen	Non-Carcinogen				
Nickel (1312)	mg/L				0.0006 U	0.0006 U			0.0006 U	0.0006 U	0.0082	0.0006 U	0.0006 U						
Phosphorus (1312)	mg/L				0.1 U	0.1 U													
Potassium (1312)	mg/L				1.3	3.5			2.2	0.6 B	4.1	4.2	3.2						
Selenium (1312)	mg/L				0.0001 B	0.0023			0.009	0.0009	0.0041	0.0043	0.0015						
Silver (1312)	mg/L				0.00005 U	0.00005 U			0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U						
Sodium (1312)	mg/L				10.9	6.9			26.1	6.9	12.6	5.3	18.6						
Thallium (1312)	mg/L				0.0001 U	0.0001 U			0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Uranium (1312)	mg/L				0.0012	0.0015			0.0001 U	0.0001 U	0.0002 B	0.0003 B	0.0004 B						
Vanadium (1312)	mg/L				0.0015	0.0004 B			0.0029	0.0012	0.0002 U	0.0002 B	0.0084						
Zinc (1312)	mg/L				0.002 U	0.002 U			0.002 U	0.002 U	0.036	0.002 U	0.002 U						
Acid Base Accounting (ABA)																			
Acid Generation Potential (calc on Sulfur total)	t CaCO3/Kt								13.4	8.44	15.6	9.06	6.88						
Acid Neutralization Potential (calc)	t CaCO3/Kt								9	3	3	3	21						
Acid-Base Potential (calc on Sulfur total)	t CaCO3/Kt								-4.4	-5.4	-12.6	-6.1	14.1						
Net Acid Generation Procedure	units								7.9	5.9	3.7	6.5	8.6						
Neutralization Potential as CaCO3	%								0.9	0.3 B	0.3 B	0.3 B	2.1						
pH (pH, (1312))	units								9.4	8.7	6.8	7.9	9.5						
pH measured at (pH, (1312))	C								20.6	20.7	20.5	20.6	20.2						
pH, Saturated Paste	units								7.6	7.5	6.1	7.3	8.1						
Solids, Percent	%								97	98.1	96.2	98.2	96.2						
Sulfur HCl Residue	%								0.35	0.22	0.44	0.22	0.19						
Sulfur HNO3 Residue	%								0.22	0.2	0.19	0.15	0.12						
Sulfur Organic Residual	%								0.22	0.2	0.19	0.15	0.12						
Sulfur Pyritic Sulfide	%								0.13	0.02 B	0.25	0.07 B	0.07 B						
Sulfur Sulfate	%								0.08 B	0.05 B	0.06 B	0.07 B	0.03 B						
Sulfur Total	%								0.43	0.27	0.5	0.29	0.22						
Total Sulfur minus Sulfate	%								0.35	0.22	0.44	0.22	0.19						

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

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TABLE A-4: Alluvium Soil Storage Area Samples Analytical Results

	Sample ID	ALL-TP-31	ALL-TP-32	ALL-TP-33	ALL-TP-35	ALL-TP-38	*ARIZONA SRLs (mg/kg)*			*ARIZONA TIER 1 Cleanup Standards*		
	Lab ID(s)	L44556-13 / L44556-14	L44556-21 / L44556-22	L44556-15 / L44556-16	L44556-17 / L44556-18	L44556-19 / L44556-20	*Residential*		*Non-Residential*	*Soil Remediation Levels 2007 Residential (mg/Kg)*	*Groundwater Protection Level (GPL) (mg/Kg)*	*NOTES*
	Sample Date	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/17/2018	*Carcinogen*	*Non-Carcinogen*				
PARAMETER	**UNITS**											
General / Agronomic												
Cation Exchange Capacity (CEC)	meq/100g	5.76	5.88	5.65	6.67	6.57						
Calcium, soluble (Sat. Paste)	meq/L	0.89	0.708	0.53	1.01	0.517						
Magnesium, soluble (Sat. Paste)	meq/L	0.37	0.226	0.326	0.639	0.261						
Potassium, soluble (Sat. Paste)	meq/L	0.0561	0.0712	0.051	0.0674	0.0485						
Sodium, soluble (Sat. Paste)	meq/L	19.8	26.1	23.6	33.1	19.9						
Sodium Adsorption Ratio		25	38	36	36	32						
Carbon, total organic (TOC)	%	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U						
Neutralization Potential as CaCO3	%	11.5	11.5	7.6	8.5	7						
Conductivity@25C	mmhos/cm	2.45	3	2.77	3.73	2.46						
Organic Matter (Ignition@ 400)	%	0 U		0.3 U	0.3 U	0.4 B						
Net Acid Generation Procedure	units		8.7									
pH, Saturated Paste	units	8.5	8.6	8.8	8.6	8.8						
Solids, Percent	%	96.9	96.6	94.6	96.5	96.6						
Total Metals												
Aluminum, total (3050)	mg/Kg	10000	9990	10900	10900	11200		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	4.1	5.9	3.6	3.7	3.4	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	133	156	146	151	142		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.36	0.29	0.37	0.4	0.36		*150*	*1,900*			
Boron, total (3050)	mg/Kg	8	15	13	15	11		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.32	0.27 B	0.35	0.37	0.36		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	32500	39100	27300	26200	21000						
Chromium, total (3050)	mg/Kg	9.3	6.4	9.9	10	10	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	18	373	83	30	18		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	14300	16800	15700	16200	16000						
Lead, total (3050)	mg/Kg	5.23	4.26	5.07	5.1	5.87		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	5550	3750	5940	5910	6060						
Manganese, total (3050)	mg/Kg	255	152	311	301	318		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.53 U	1.45 U	1.56 U	1.46 U	1.65 U		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	0.5 B	97	3.5	1.2	0.6 B		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	5.8	3.9 B	6.5	6.7	6.6		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	500	350	510	490	520		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	2110	2420	2490	2340	2520						
Selenium, total (3050)	mg/Kg	3 U	3 U	3 U	3 U	3 U		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1 U	1 U	1 U	1 U	1 U		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	960	1380	1460	1360	1350						
Thallium, total (3050)	mg/Kg	0.11 B	0.08 B	0.13 B	0.14 B	0.13 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	1.01	2.23	1.38	1.28	1.17		*16*	*200*			
Vanadium, total (3050)	mg/Kg	41.8	34	41.9	42.9	43		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	26	16	31	31	32		*23,000*	*310,000*			

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TABLE A-4: Alluvium Soil Storage Area Samples Analytical Results

		Sample ID	ALL-TP-31	ALL-TP-32	ALL-TP-33	ALL-TP-35	ALL-TP-38	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		NOTES
		Lab ID(s)	L44556-13 / L44556-14	L44556-21 / L44556-22	L44556-15 / L44556-16	L44556-17 / L44556-18	L44556-19 / L44556-20	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	
		Sample Date	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/17/2018	Carcinogen	Non-Carcinogen				
SPLP Metals													
Aluminum (1312)	mg/L			0.075									
Antimony (1312)	mg/L			0.0004 U									
Arsenic (1312)	mg/L			0.0044									
Barium (1312)	mg/L			0.0079									
Beryllium (1312)	mg/L			0.00005 U									
Boron (1312)	mg/L			0.215									
Cadmium (1312)	mg/L			0.0001 U									
Calcium (1312)	mg/L			1.1									
Chromium (1312)	mg/L			0.0005 U									
Copper (1312)	mg/L			0.001 B									
Iron (1312)	mg/L			0.02 U									
Lead (1312)	mg/L			0.0001 U									
Magnesium (1312)	mg/L			0.2 U									
Manganese (1312)	mg/L			0.0004 U									
Mercury (1312)	mg/L			0.0002 U									
Molybdenum (1312)	mg/L			0.03									
Nickel (1312)	mg/L			0.0006 U									
Phosphorus (1312)	mg/L			0.2 B									
Potassium (1312)	mg/L			0.8 B									
Selenium (1312)	mg/L			0.0008									
Silver (1312)	mg/L			0.00005 U									
Sodium (1312)	mg/L			49.1									
Thallium (1312)	mg/L			0.0001 U									
Uranium (1312)	mg/L			0.0006									
Vanadium (1312)	mg/L			0.0412									
Zinc (1312)	mg/L			0.002 U									

NOTES:

* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.

** Indicates Saturation in Soil

Analytical Lab Qualifier Notes:

B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.

J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

L = Target analyte response was below the laboratory defined negative threshold.

O = Analyte concentration is estimated due to result exceeding calibration range.

U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

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TABLE A-5: Acid Base Accounting Test Summary

Lab ID	Sample ID	Description	Paste pH	Total Sulfur (wt. %)	Sulfate Sulfur (wt. %)	Sulfide Sulfur (wt. %)	Sulfur Organic (wt. %)	Net Acid Generation Procedure (NAG pH)	Acid Generating Potential (AP) (t $CaCO_3$/kt)	Neutralization Potential (NP) (t $CaCO_3$/kt)	Net Neutralizing Potential (NNP = NP - AP) (t $CaCO_3$/kt)	Neutralization Potential Ratio (NPR = NP/AP)
L44451-01	WRD-TP-27	Wast Rock, lower bench, SW corner	7.6	0.43	0.08	0.13	0.22	7.9	13.40	9.0	*-4.4*	*0.7*
L44451-02	WRD-TP-30	Waste Rock, lower bench, east side	7.5	0.27	0.05	0.02	0.20	5.9	8.44	3.0	*-5*	*0.4*
L44451-16	ROCK-01	Potential riprap source; WRD Crushing Area	5.7	2.59	0.19	0.52	1.88	5.6	80.90	0.0	*-81*	*0.0*
L44451-17	ROCK-02	Potential riprap source; WRD Crushing Area	5.7	0.14	0.08	<0.01	0.06	6.2	4.38	2.0	*-2.38*	*0.5*
L44451-18	ROCK-03	Potential riprap source; WRD Crushing Area	5.2	1.25	0.22	0.96	0.07	*2.7*	39.10	4.0	*-35*	*0.1*
L44451-19	WRCA-TP-08	Waste Rock from upper surface; beneath 21" cover	7.3	0.29	0.07	0.07	0.15	6.5	9.06	3.0	*-6*	*0.3*
L44451-20	WRCA-TP-04	Waste Rock from upper surface @ surface	6.1	0.50	0.06	0.25	0.19	*3.7*	15.60	3.0	*-13*	*0.2*
L44451-23	WRCA-TP-20	Waste Rock at surface middle bench NE corner	8.1	0.22	0.03	0.07	0.12	8.6	6.88	21.0	14	3.1

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TABLE A-6: Dry Mill Soil Sample Analytical Results

	Sample ID	POP-TP-C01	POP-TP-C02	FOB-TP-C01	FOB-TP-C02	FCS-TP-C01	FCS-TP-C02	IOP-TP-C01	IOP-TP-C02	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID	L-44451-03	L-44451-04	L-44451-05	L-44451-06	L-44451-07	L-44451-08	L-44451-09	L-44451-10	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	Carcinogen	Non-Carcinogen				
PARAMETER	UNITS														
General / Agronomic															
Cation Exchange Capacity (CEC)	meq/100g														
Calcium, soluble (Sat. Paste)	meq/L	20.8	1.18	20.9	1.18	25.1	0.535	1.67	0.814						
Magnesium, soluble (Sat. Paste)	meq/L	33.7	1.16	81.2	1.16	10.1	0.512	0.408	0.789						
Potassium, soluble (Sat. Paste)	meq/L														
Sodium, soluble (Sat. Paste)	meq/L	6.91	20.3	10.1	20.3	33.9	20.3	1.79	21.6						
Sodium Adsorption Ratio		1.3	11	1.4	19	8.1	28	1.8	24						
Carbon, total organic (TOC)	%														
Neutralization Potential as CaCO3	%														
Conductivity@25C	mmhos/cm	8.95	4.29	11.4	2.44	5.88	2.31	0.43	2.44						
Organic Matter (Ignition@ 400)	%	0.3 U	0.3 U	0.4 B	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U						
Net Acid Generation Procedure	units														
pH, Saturated Paste	units	4.3	8.1	3.9	8.5	8.1	8.8	8.2	8.7						
Solids, Percent	%	97.9	92.8	96.1	92.3	98	95.8	99.2	94.8						
Total Metals															
Aluminum, total (3050)	mg/Kg	8740	8690	8320	8950	9050	9640	6840	8820		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	1.7	3.5	1.2	3.8	3.8	3.2	1.6	4.3	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	113	107	178	130	149	146	28.6	126		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.74	0.33	0.65	0.34	0.39	0.36	1.38	0.33		*150*	*1,900*			
Boron, total (3050)	mg/Kg	3 B	6	5	11	7	15	3 B	8		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.4	0.23 B	0.25 B	0.26 B	0.28 B	0.27 B	0.51	0.25 B		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	3540	43800	850	27300	26600	25300	4750	38400						
Chromium, total (3050)	mg/Kg	10	8.5	11.2	8.5	8.8	9.7	5.1	8.6	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	10300	259	2320	30	613	11	66	13		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	28300	12300	23200	12600	15100	13700	9010	12800						
Lead, total (3050)	mg/Kg	6.35	5.12	7.95	5.05	8.76	5.2	13.4	5.11		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	3600	4710	3160	5160	4870	6160	2510	5180						
Manganese, total (3050)	mg/Kg	142	184	84.1	215	212	235	334	206		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.82 B	1.32 U	1.36 U	3.79 B	1.94 B	1.34 U	1.33 U	1.33 U		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	99.4	2.4	126	0.8 B	10.1	0.4 B	1.9	0.4 B		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	14.9	5.3	10.1	5.2	6.7	5.9	5.7	5.7		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	390	420	370	450	490	480	240	490		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	4490	1910	4490	2100	2540	2510	1460	2060						
Selenium, total (3050)	mg/Kg	5.61	U	3	1 U	1 U	1 U	1 U	1 U		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1.23	0.07 B	0.84	0.03 U	0.19	0.03 U	0.04 B	0.03 U		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	640	860	610	1210	790	1380	160	1030						
Thallium, total (3050)	mg/Kg	0.18 B	0.08 B	0.19 B	0.09 B	0.1 B	0.1 B	0.08 B	0.08 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	4.67	0.79	2.97	0.95	1.12	1.28	4.02	0.93		*16*	*200*			
Vanadium, total (3050)	mg/Kg	19.2	33.4	20.4	35	33.1	34.4	12.4	34.4		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	53	22	33	25	35	28	36	25		*23,000*	*310,000*			

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TABLE A-6: Dry Mill Soil Sample Analytical Results

Sample ID	POP-TP-C01	POP-TP-C02	FOB-TP-C01	FOB-TP-C02	FCS-TP-C01	FCS-TP-C02	IOP-TP-C01	IOP-TP-C02	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID	L-44451-03	L-44451-04	L-44451-05	L-44451-06	L-44451-07	L-44451-08	L-44451-09	L-44451-10	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Sample Date	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	5/18/2018	Carcinogen	Non-Carcinogen				

NOTES:

* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.

** Indicates Saturation in Soil

Analytical Lab Qualifier Notes:

B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.

J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

L = Target analyte response was below the laboratory defined negative threshold.

O = Analyte concentration is estimated due to result exceeding calibration range.

U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

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TABLE A-7: Wet Mill Soil
Sample Analytical Results

	Sample ID	AL-TP-1@4FT	AL-TP-1@12FT	AL-TP-2&3@0.5FT	AL-TP-2&3@2FT	LS-TP-1@10FT	LS-PILE	RP-TP-1@10FT	RP-TP-1@12FT	RP-TP-2@6FT	RP-TP-2@15FT	RP-B-2A@5'	RP-B-2A@8'	RP-B-2A@25'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID(s)	L-44555-01	L-44555-02	L44556-31	L44556-32	L-44555-03	L44556-37	L-44555-04	L-44555-05	L-44555-06	L-44555-07	L44633-01/ L45546-01	L44633-02 / L45546-02	L44633-03 / L45546-03	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/31/2018	5/31/2018	5/31/2018	Carcinogen	Non-Carcinogen				
PARAMETER	**UNITS**																			
General / Agronomic																				
Cation Exchange Capacity (CEC)	meq/100g																			
Calcium, soluble (Sat. Paste)	meq/L			15.1	1.11		37.1													
Magnesium, soluble (Sat. Paste)	meq/L			6.07	1.25		0.01645 U													
Potassium, soluble (Sat. Paste)	meq/L																			
Sodium, soluble (Sat. Paste)	meq/L			38.7	26.7		0.407													
Sodium Adsorption Ratio				12	25		0.09													
Carbon, total organic (TOC)	%																			
Neutralization Potential as CaCO3	%																			
Conductivity@25C	mmhos/cm			5.33	2.98		5.89													
Organic Matter (Ignition@ 400)	%			0.3 B	0.5 B		1.6													
Net Acid Generation Procedure	units																			
pH, Saturated Paste	units			8.2	8.7		12.5													
Solids, Percent	%			98.5	93		97.9					90.4	89	92.5						
Total Metals																				
Aluminum, total (3050)	mg/Kg			8860	9670		4610									76,000	920,000			
Antimony, total (3050)	mg/Kg			0.2 U	0.2 U		0.3 B									31	410			
Arsenic, total (3050)	mg/Kg			3.5	4.7		5.9					4 U	4 B	6 B	10	10	10	10	290	
Barium, total (3050)	mg/Kg			138	124		1140					148	134	437		15,000	170,000	15,000		
Beryllium, total (3050)	mg/Kg			0.51	0.33		0.18									150	1,900			
Boron, total (3050)	mg/Kg			15	13		10									16,000	200,000			
Cadmium, total (3050)	mg/Kg			0.54	0.31		0.49					0.5 U	0.5 U	0.5 U		39	510	39	29	
Calcium, total (3050)	mg/Kg			18500	38600		360000													
Chromium, total (3050)	mg/Kg			10.2	9.6		17.2					11	10	9	30		65	120,000		SRL (Cr III), Tier 1 (Cr VI)
Copper, total (3050)	mg/Kg			1450	20		169									3,100	41,000			
Iron, total (3050)	mg/Kg			14500	13600		7070													
Lead, total (3050)	mg/Kg			9.41	5.86		46					11 B	7 B	6 B		400	800	400	290	
Magnesium, total (3050)	mg/Kg			4160	5140		3400													
Manganese, total (3050)	mg/Kg			268	201		165									3,300	32,000			
Mercury by Direct Combustion AA	ng/g			3.00 B	1.67 U		1.65 U					1.79 BH	1.46 UH	1.65 UH		23,000	310,000	23,000	12,000	Standards Presented in ng/g
Molybdenum, total (3050)	mg/Kg			14.4	0.7 B		8.6									390	5,100			
Nickel, total (3050)	mg/Kg			7.9	6		14									1,600	20,000			
Phosphorus, total (3050)	mg/Kg			420	480		150									1.6	20			N/A: SRL is for Phosphorous (white)
Potassium, total (3050)	mg/Kg			2220	2010		360													
Selenium, total (3050)	mg/Kg			1.2	0.28		0.24					5 U	5 U	5 U		390	5,100	390	290	
Silver, total (3050)	mg/Kg			0.4	0.04 B		0.08 B					1 U	1 U	1 U		390	5,100	390		
Sodium, total (3050)	mg/Kg			930	1160		240													
Thallium, total (3050)	mg/Kg			0.12 B	0.1 B		0.05 U									5.2	67			
Uranium, total (3050)	mg/Kg			2.36	1.01		1.3									16	200			
Vanadium, total (3050)	mg/Kg			29.3	40.1		22.7									78	1,000			
Zinc, total (3050)	mg/Kg			44	29		18									23,000	310,000			
Impacted Soil															==========	NOTE: SRLs and Tier 1 Standards Presented in ug/Kg		==========		
Benzene	ug/Kg	1 U	1 U			1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U	650		1,400	650	700	
Ethylbenzene	ug/Kg	1 U	1 U			1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U		400,000*	400,000*	400,000	82,000**	
m p Xylene	ug/Kg	2 U	2 U			2 U		2 U	2 U	2 U	2 U	10	12	2 U		270,000	420,000*	270,000	31,000**	Xylenes (total)
o Xylene	ug/Kg	1 U	1 U			1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U		270,000	420,000*			
Toluene	ug/Kg	1 U	1 U			1 U		1 U	1 U	1 U	1 U	1 U	1 U	1 U	170		5,400			
TPH C10 to C28	mg/Kg	6.67 U	6.67 U			6.67 U		6.67 U	6.67 U	90 J	20 U	70 J	6.67 U	6.67 U						
TVH C6 to C10	mg/Kg	0.05 U	0.05 U			0.05 U		0.05 U	0.05 U	0.07	0.05 U	0.67	1.93	0.05 U						
VOCs																				
1,1,1,2-Tetrachloroethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	3,200		73,000			
1,1,1-Trichloroethane	ug/Kg	10 U	10 U			10 U		10 U	10 U	10 U	10 U	50 U	10 U	10 U		1,200,000*	1,200,000*			
1,1,2,2-Tetrachloroethane	ug/Kg	3 U	3 U			3 U		3 U	3 U	3 U	3 U	20 U	3 U	3 U	420		9,300			
1,1,2-Trichloroethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	740		16,000			
1,1-Dichloroethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		510,000	1,700,000*			
1,1-Dichloroethene (DCE)	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		120,000	410,000			
1,1-Dichloropropene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
1,2,3-Trichlorobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
1,2,3-Trichloropropane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	5		110			
1,2,4-Trichlorobenzene	ug/Kg	3 U	3 U			3 U		3 U	3 U	3 U	3 U	20 U	3 U	3 U		62,000	220,000			
1,2,4-Trimethylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		52,000	170,000	52,000		
1,2-Dibromo-3-chloropropane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	530	1,500	6,500			
1,2-Dibromoethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	29		630	290		
1,2-Dichlorobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		600,000*	600,000*			
1,2-Dichloroethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	280			2,800	230	
1,2-Dichloropropane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	340		7,400			
1,3,5-Trimethylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		21,000	70,000	21,000		
1,3-Dichlorobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		530,000	600,000*			
1,3-Dichloropropane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		100,000	360,000			
1,4-Dichlorobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		610,000	6,200,000			

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TABLE A-7: Wet Mill Soil
Sample Analytical Results

Sample ID		AL-TP-1@4FT	AL-TP-1@12FT	AL-TP-2&3@0.5FT	AL-TP-2&3@2FT	LS-TP-1@10FT	LS-PILE	RP-TP-1@10FT	RP-TP-1@12FT	RP-TP-2@6FT	RP-TP-2@15FT	RP-B-2A@5'	RP-B-2A@8'	RP-B-2A@25'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID(s)		L-44555-01	L-44555-02	L44556-31	L44556-32	L-44555-03	L44556-37	L-44555-04	L-44555-05	L-44555-06	L-44555-07	L44633-01/ L45546-01	L44633-02 / L45546-02	L44633-03 / L45546-03	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Sample Date		5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/31/2018	5/31/2018	5/31/2018	Carcinogen	Non-Carcinogen				
2,2-Dichloropropane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
2-Butanone (MEK)	ug/Kg	10 U	10 U			10 U		10 U	10 U	10 U	10 U	50 U	10 U	10 U				23,000,000		
2-Chloroethyl vinyl ether	ug/Kg	5 U	5 U			5 U		5 U	5 U	5 U	5 U	30 U	5 U	5 U						
2-Chlorotoluene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
2-Hexanone	ug/Kg	10 U	10 U			10 U		10 U	10 U	10 U	10 U	50 U	10 U	10 U						
2-Methylnaphthalene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U						
4-Chlorotoluene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
4-Isopropyltoluene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
4-Methyl-2-Pentanone (MIBK)	ug/Kg	10 U	10 U			10 U		10 U	10 U	110	10 U	3400	9700	10 U				5,300,000		
Acenaphthene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		3,700,000	29,000,000	3,700,000		
Acenaphthylene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U						
Acetone	ug/Kg	10 U	10 U			10 U		10 U	10 U	250	10 U	250	700	10 U		14,000,000	54,000,000			
Acrylonitrile	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	210		4,900			
Anthracene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		22,000,000	240,000,000	22,000,000		
Benzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	650		1,400	650	700	
Benzo(a)anthracene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	690		21,000	6,900		for "Benz[a]anthracene"
Benzo(a)pyrene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	69		2,100	690		
Benzo(b)fluoranthene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	6,900		21,000	6,900		
Benzo(g,h,i)perylene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U						
Benzo(k)fluoranthene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	6,900		210,000	69,000		
Bromobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		28,000	92,000			
Bromochloromethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
Bromodichloromethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	830		18,000			
Bromoform	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	69,000		2,200,000			
Bromomethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		3,900	13,000			
Carbon Disulfide	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		360,000	720,000*	360,000	360,000	
Carbon Tetrachloride	ug/Kg	10 U	10 U			10 U		10 U	10 U	10 U	10 U	50 U	10 U	10 U	250	2,200	5,500			
Chlorobenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		150,000	530,000			
Chloroethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	3,000		65,000			
Chloroform	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	940		20,000			
Chloromethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		48,000	160,000			
Chrysene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	68,000		2,000,000	680,000		
cis-1,2-Dichloroethene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
cis-1,3-Dichloropropene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
Dibenzo(a,h)anthracene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	69		2,100	690		
Dibromochloromethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	1,100		26,000			
Dibromomethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
Dichlorodifluoromethane	ug/Kg	5 U	5 U			5 U		5 U	5 U	5 U	5 U	30 U	5 U	5 U		94,000	310,000			
Ethylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		400,000*	400,000*	400,000	82,000**	
Fluoranthene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		2,300,000	22,000,000	2,300,000		
Fluorene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		2,700,000	26,000,000	2,700,000		
Hexachlorobutadiene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	7,000	18,000	180,000			
Indeno(1,2,3-cd)pyrene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U	690		21,000	6,900		
Isopropylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		92,000*	92,000*	92,000		
m p Xylene	ug/Kg	10 U	10 U			10 U		10 U	10 U	10 U	10 U	50 U	10 U	10 U		270,000	420,000*			
Methyl Tert Butyl Ether	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	32,000		710,000	320,000		
Methylene Chloride	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	9,300		210,000			
Naphthalene	ug/Kg	3 U	3 U			3 U		3 U	3 U	3 U	3 U	20 U	3 U	3 U		56,000	190,000	56,000		
Naphthalene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		56,000	190,000	56,000		
n-Butylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		240,000*	240,000*	240,000		
n-Propylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		240,000*	240,000*	240,000		
o Xylene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		270,000	420,000*			
Phenanthrene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U						
Pyrene	ug/Kg	100 U	100 U			100 U		100 U	100 U	100 U	100 U	1000 U	100 U	100 U		2,300,000	29,000,000	2,300,000		
sec-Butylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		220,000*	220,000*	220,000		
Styrene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		1,500,000*	1,500,000*			
tert-Butylbenzene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		390,000*	390,000*	220,000		
Tetrachloroethene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
Toluene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		650,000*	650,000*	650,000	159,000**	
trans-1,2-Dichloroethene	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U						
trans-1,3-Dichloropropene	ug/Kg	3 U	3 U			3 U		3 U	3 U	3 U	3 U	20 U	3 U	3 U						
Trichloroethene	ug/Kg	5 U	5 U			5 U		5 U	5 U	5 U	5 U	30 U	5 U	5 U						
Trichlorofluoromethane	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		390,000	1,300,000			
Vinyl Acetate	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U		430,000	1,400,000			
Vinyl Chloride	ug/Kg	4 U	4 U			4 U		4 U	4 U	4 U	4 U	20 U	4 U	4 U	85		750			

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

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TABLE A-7: Wet Mill Soil Sample Analytical Results

Sample ID	AL-TP-1@4FT	AL-TP-1@12FT	AL-TP-2&3@0.5FT	AL-TP-2&3@2FT	LS-TP-1@10FT	LS-PILE	RP-TP-1@10FT	RP-TP-1@12FT	RP-TP-2@6FT	RP-TP-2@15FT	RP-B-2A@5'	RP-B-2A@8'	RP-B-2A@25'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID(s)	L-44555-01	L-44555-02	L44556-31	L44556-32	L-44555-03	L44556-37	L-44555-04	L-44555-05	L-44555-06	L-44555-07	L44633-01/ L45546-01	L44633-02 / L45546-02	L44633-03 / L45546-03	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Sample Date	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/31/2018	5/31/2018	5/31/2018	Carcinogen	Non-Carcinogen				

L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

Tier 1 Analytes; Not Analyzed in Soil Samples

1,3-Butadiene	*0.58*
Cyclohexane	*140*
Cyclohexanone	*310,000*
Dicyclopentadiene	*0.54*
n-Hexane	*110*
Methylcyclohexane	*230*
Tetraethyl lead	*0.0061*

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TABLE A-8: Mechanical Area Soil Sample Analytical Results

	Sample ID	TF-TP-1@6FT	TF-TP-1@11FT	TF-TP-2@8FT	TF-TP-2@12FT	TF-TP-3@12FT	SP DRAIN-TP-N@7FT	SP DRAIN-TP-S@2FT	TS-TP-1@6FT	TS-TP-2@4FT	TS-TP-3@6FT	TS-TP-3@11FT	SP-TP-1@10FT	SP-TP-2+3@0.5FT	SP-TP-2+3@2FT	TF-B-3@40'	TF-B-3@50'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID(s)	L-44450-01 / L45546-06	L-44450-02 / L45546-07	L-44450-03 / L45546-08	L-44450-04 / L45546-09	L-44450-05 / L45546-10	L-44450-06 / L45546-11	L-44450-07 / L45546-12	L-44450-08 / L45546-13	L-44450-09 / L45546-14	L-44450-10 / L45546-15	L-44450-11 / L45546-16	L-44450-12 / L45546-17	L-44450-13	L-44450-14	L44633-04 / L45546-04	L44633-05 / L45546-05	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/18/2018	5/18/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/29/2018	5/29/2018	Carcinogen	Non-Carcinogen				
PARAMETER	**UNITS**																						
General / Agronomic																							
Cation Exchange Capacity (CEC)	meq/100g																						
Calcium, soluble (Sat. Paste)	meq/L													2.82	0.601								
Magnesium, soluble (Sat. Paste)	meq/L													1.74	0.566								
Potassium, soluble (Sat. Paste)	meq/L																						
Sodium, soluble (Sat. Paste)	meq/L													39.1	19.8								
Sodium Adsorption Ratio														26									
Carbon, total organic (TOC)	%																						
Neutralization Potential as CaCO3	%																						
Conductivity@25C	mmhos/cm													4.47	2.21								
Organic Matter (Ignition@ 400)	%													.3 U	.3 U								
Net Acid Generation Procedure	units																						
pH, Saturated Paste	units													8.6	9								
Solids, Percent	%	85.1	93.4	89.9	81	93.4	94.2	71.5	92.9	95.5	94.8	95.4	97.4	97.4	95.6	93	95.3						
Total Metals																							
Aluminum, total (3050)	mg/Kg													9150	9090				*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg													0.2 U	0.2 U				*31*	*410*			
Arsenic, total (3050)	mg/Kg	4 B	4 U	5 B	4 U	5 B	4 U	7 B	5 B	5 B	4 U	5 B	4 U	4.5	4.2	4 U	5 B	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	109	130	126	113	108	167	171	124	105	125	108	94.6	140	107	204	136		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg													0.36	0.34				*150*	*1,900*			
Boron, total (3050)	mg/Kg													11	8				*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.4 B	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.28 B	0.26 B	0.5 U	0.5 U		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg													30200	33700								
Chromium, total (3050)	mg/Kg	8	9	10	10	10	10	18	10	9	10	8	9	10.3	9.2	12	10	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg													116	10				*3,100*	*41,000*			
Iron, total (3050)	mg/Kg													14200	13300								
Lead, total (3050)	mg/Kg	6 B	6 B	7 B	7 B	6 B	6 B	50	7 B	6 B	6 B	5 B	5 B	5.67	5.14	6 B	6 B		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg													5600	5680								
Manganese, total (3050)	mg/Kg													236	212				*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.63 UH	1.78 UH	1.65 UH	1.57 UH	2.60 BH	1.55 UH	19.10 H	1.45 UH	1.74 UH	1.39 UH	1.55 UH	2.71 BH	1.40 U	1.38 U	1.89 UH	1.65 UH		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg													2.5	0.4 B				*390*	*5,100*			
Nickel, total (3050)	mg/Kg													6	5.1				*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg													470	470				*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg													2340	2110								
Selenium, total (3050)	mg/Kg	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.27	0.19	5 U	5 U		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.06 B	0.03 U	1 U	1 U		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg													1490	1200								
Thallium, total (3050)	mg/Kg													0.11 B	0.1 B				*5.2*	*67*			
Uranium, total (3050)	mg/Kg													1.09	0.98				*16*	*200*			
Vanadium, total (3050)	mg/Kg													39.8	39.8				*78*	*1,000*			
Zinc, total (3050)	mg/Kg													29	24				*23,000*	*310,000*			
Impacted Soil																		*========== NOTE: SRLs and Tier 1 Standards Presented in ug/Kg ==========*					
Benzene	ug/Kg	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U			5	1 U	*650*		*1,400*	*650*	*700*	
Ethylbenzene	ug/Kg	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U			30	1		*400,000**	*400,000**	*400,000*	*82,000***	
m p Xylene	ug/Kg	2 U	2 U	2 U	10 U	30	2 U	2 U	2 U	2 U	2 U	2 U	4 U			90	2 U		*270,000*	*420,000**	*270,000*	*31,000***	*Xylenes (total)*
o Xylene	ug/Kg	1 U	1 U	1 U	5 U	17	1 U	1 U	1 U	1 U	1 U	1 U	2 U			27	1 U		*270,000*	*420,000**			
Toluene	ug/Kg	1 U	1 U	1 U	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U			104	1 U	*170*		*5,400*			
TPH C10 to C28	mg/Kg	2560	20 U	3220	33.3 U	11200	6.67 U	760	14 J	1210	437	14 J	7 J				30 J						
TVH C6 to C10	mg/Kg	0.05 U	0.05 U	0.05 U	0.3 U	5.7	0.05 U	0.07	0.05 U	0.05 U	0.05 U	0.05 U	0.1 U			7.2	0.05 U						
VOCs																							
1,1,1,2-Tetrachloroethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*3,200*		*73,000*			
1,1,1-Trichloroethane	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			500 U	50 U		*1,200,000**	*1,200,000**			
1,1,2,2-Tetrachloroethane	ug/Kg	3 U	3 U	3 U	3 U	20 U	3 U	6 U	3 U	3 U	3 U	3 U	3 U			200 U	20 U	*420*		*9,300*			
1,1,2-Trichloroethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*740*		*16,000*			
1,1-Dichloroethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*510,000*	*1,700,000**			
1,1-Dichloroethene (DCE)	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*120,000*	*410,000*			
1,1-Dichloropropene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
1,2,3-Trichlorobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
1,2,3-Trichloropropane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*5*		*110*			
1,2,4-Trichlorobenzene	ug/Kg	3 U	3 U	3 U	3 U	20 U	3 U	6 U	3 U	3 U	3 U	3 U	3 U			200 U	20 U		*62,000*	*220,000*			
1,2,4-Trimethylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*52,000*	*170,000*	*52,000*		
1,2-Dibromo-3-chloropropane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*530*	*1,500*	*6,500*			
1,2-Dibromoethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*29*		*630*	*290*		
1,2-Dichlorobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*600,000**	*600,000**			
1,2-Dichloroethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*280*			*2,800*	*230*	
1,2-Dichloropropane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*340*		*7,400*			
1,3,5-Trimethylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 J	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*21,000*	*70,000*	*21,000*		
1,3-Dichlorobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*530,000*	*600,000**			
1,3-Dichloropropane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*100,000*	*360,000*			
1,4-Dichlorobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*610,000*	*6,200,000*			

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TABLE A-8: Mechanical Area Soil Sample Analytical Results

Sample ID		TF-TP-1@6FT	TF-TP-1@11FT	TF-TP-2@8FT	TF-TP-2@12FT	TF-TP-3@12FT	SP DRAIN-TP-N@7FT	SP DRAIN-TP-S@2FT	TS-TP-1@6FT	TS-TP-2@4FT	TS-TP-3@6FT	TS-TP-3@11FT	SP-TP-1@10FT	SP-TP-2+3@0.5FT	SP-TP-2+3@2FT	TF-B-3@40'	TF-B-3@50'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID(s)		L-44450-01 / L45546-06	L-44450-02 / L45546-07	L-44450-03 / L45546-08	L-44450-04 / L45546-09	L-44450-05 / L45546-10	L-44450-06 / L45546-11	L-44450-07 / L45546-12	L-44450-08 / L45546-13	L-44450-09 / L45546-14	L-44450-10 / L45546-15	L-44450-11 / L45546-16	L-44450-12 / L45546-17	L-44450-13	L-44450-14	L44633-04 / L45546-04	L44633-05 / L45546-05	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Sample Date		5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/18/2018	5/18/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/29/2018	5/29/2018	Carcinogen	Non-Carcinogen				
2,2-Dichloropropane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
2-Butanone (MEK)	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			800 J	50 U				*23,000,000*		
2-Chloroethyl vinyl ether	ug/Kg	5 U	5 U	5 U	5 U	30 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U			300 U	30 U						
2-Chlorotoluene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
2-Hexanone	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			1800	50 U						
2-Methylnaphthalene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U						
4-Chlorotoluene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
4-Isopropyltoluene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
4-Methyl-2-Pentanone (MIBK)	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			500 U	50 U				*5,300,000*		
Acenaphthene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*3,700,000*	*29,000,000*	*3,700,000*		
Acenaphthylene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U						
Acetone	ug/Kg	10 U	10 U	10 U	10 U	70 J	10 J	20 U	10 U	10 U	10 U	10 U	10 U			1800	50 U		*14,000,000*	*54,000,000*			
Acrylonitrile	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*210*		*4,900*			
Anthracene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*22,000,000*	*240,000,000*	*22,000,000*		
Benzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*650*		*1,400*	*650*	*700*	
Benzo(a)anthracene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*690*		*21,000*	*6,900*		*for "Benz[a]anthracene"*
Benzo(a)pyrene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*69*		*2,100*	*690*		
Benzo(b)fluoranthene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*6,900*		*21,000*	*6,900*		
Benzo(g,h,i)perylene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U						
Benzo(k)fluoranthene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*6,900*		*210,000*	*69,000*		
Bromobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*28,000*	*92,000*			
Bromochloromethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
Bromodichloromethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*830*		*18,000*			
Bromoform	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*69,000*		*2,200,000*			
Bromomethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*3,900*	*13,000*			
Carbon Disulfide	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*360,000*	*720,000**	*360,000*	*360,000*	
Carbon Tetrachloride	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			500 U	50 U	*250*	*2,200*	*5,500*			
Chlorobenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*150,000*	*530,000*			
Chloroethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*3,000*		*65,000*			
Chloroform	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*940*		*20,000*			
Chloromethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*48,000*	*160,000*			
Chrysene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*68,000*		*2,000,000*	*680,000*		
cis-1,2-Dichloroethene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
cis-1,3-Dichloropropene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
Dibenzo(a,h)anthracene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*69*		*2,100*	*690*		
Dibromochloromethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*1,100*		*26,000*			
Dibromomethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
Dichlorodifluoromethane	ug/Kg	5 U	5 U	5 U	5 U	30 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U			300 U	30 U		*94,000*	*310,000*			
Ethylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*400,000**	*400,000**	*400,000*	*82,000***	
Fluoranthene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*2,300,000*	*22,000,000*	*2,300,000*		
Fluorene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*2,700,000*	*26,000,000*	*2,700,000*		
Hexachlorobutadiene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*7,000*	*18,000*	*180,000*			
Indeno(1,2,3-cd)pyrene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U	*690*		*21,000*	*6,900*		
Isopropylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*92,000**	*92,000**	*92,000*		
m p Xylene	ug/Kg	10 U	10 U	10 U	10 U	50 U	10 U	20 U	10 U	10 U	10 U	10 U	10 U			500 U	50 U		*270,000*	*420,000**			
Methyl Tert Butyl Ether	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*32,000*		*710,000*	*320,000*		
Methylene Chloride	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*9,300*		*210,000*			
Naphthalene	ug/Kg	3 J	3 U	3 U	3 U	70	3 U	6 U	3 U	3 U	3 U	3 U	3 U			400 J	20 U		*56,000*	*190,000*	*56,000*		
Naphthalene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*56,000*	*190,000*	*56,000*		
n-Butylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*240,000**	*240,000**	*240,000*		
n-Propylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*240,000**	*240,000**	*240,000*		
o Xylene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*270,000*	*420,000**			
Phenanthrene	ug/Kg	500 J	100 U	1000 J	100 U	300 U	100 U	1000 U	100 U	300 J	900 J	100 U	100 U			3000 U	100 U						
Pyrene	ug/Kg	300 U	100 U	500 U	100 U	300 U	100 U	1000 U	100 U	100 U	500 U	100 U	100 U			3000 U	100 U		*2,300,000*	*29,000,000*	*2,300,000*		
sec-Butylbenzene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*220,000**	*220,000**	*220,000*		
Styrene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*1,500,000**	*1,500,000**			
tert-Butylbenzene	ug/Kg	4 U	4 U	4 U	4 U	60	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*390,000**	*390,000**	*220,000*		
Tetrachloroethene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
Toluene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*650,000**	*650,000**	*650,000*	*159,000***	
trans-1,2-Dichloroethene	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U						
trans-1,3-Dichloropropene	ug/Kg	3 U	3 U	3 U	3 U	20 U	3 U	6 U	3 U	3 U	3 U	3 U	3 U			200 U	20 U						
Trichloroethene	ug/Kg	5 U	5 U	5 U	5 U	30 U	5 U	10 U	5 U	5 U	5 U	5 U	5 U			300 U	30 U						
Trichlorofluoromethane	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*390,000*	*1,300,000*			
Vinyl Acetate	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U		*430,000*	*1,400,000*			
Vinyl Chloride	ug/Kg	4 U	4 U	4 U	4 U	20 U	4 U	8 U	4 U	4 U	4 U	4 U	4 U			200 U	20 U	*85*		*750*			

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

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TABLE A-8: Mechanical Area Soil Sample Analytical Results

Sample ID	TF-TP-1@6FT	TF-TP-1@11FT	TF-TP-2@8FT	TF-TP-2@12FT	TF-TP-3@12FT	SP DRAIN-TP-N@7FT	SP DRAIN-TP-S@2FT	TS-TP-1@6FT	TS-TP-2@4FT	TS-TP-3@6FT	TS-TP-3@11FT	SP-TP-1@10FT	SP-TP-2+3@0.5FT	SP-TP-2+3@2FT	TF-B-3@40'	TF-B-3@50'	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
Lab ID(s)	L-44450-01 / L45546-06	L-44450-02 / L45546-07	L-44450-03 / L45546-08	L-44450-04 / L45546-09	L-44450-05 / L45546-10	L-44450-06 / L45546-11	L-44450-07 / L45546-12	L-44450-08 / L45546-13	L-44450-09 / L45546-14	L-44450-10 / L45546-15	L-44450-11 / L45546-16	L-44450-12 / L45546-17	L-44450-13	L-44450-14	L44633-04 / L45546-04	L44633-05 / L45546-05	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
Sample Date	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/17/2018	5/18/2018	5/18/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/21/2018	5/29/2018	5/29/2018	Carcinogen	Non-Carcinogen				

L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

Tier 1 Analytes; Not Analyzed in Soil Samples

1,3-Butadiene	*0.58*
Cyclohexane	*140*
Cyclohexanone	*310,000*
Dicyclopentadiene	*0.54*
n-Hexane	*110*
Methylcyclohexane	*230*
Tetraethyl lead	*0.0061*

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TABLE A-9: Administrative Area
Soil Sample Analytical Results

	Sample ID	CS&FW-TP@0.5FT	CS&FW-TP@2FT	CH-TP-1&2@0.5FT	CH-TP-1&2@2FT	PRL-TP-40A	PRL-TP-40B	*ARIZONA SRLs (mg/kg)*			*ARIZONA TIER 1 Cleanup Standards*		
	Lab ID	L44556-33	L44556-34	L44556-35	L44556-36	L44556-03	L44556-04	*Residential*		*Non-Residential*	*Soil Remediation Levels 2007 Residential (mg/Kg)*	*Groundwater Protection Level (GPL) (mg/Kg)*	*NOTES*
	Sample Date	5/22/2018	5/22/2018	5/22/2018	5/22/2018	5/18/2018	5/18/2018	*Carcinogen*	*Non-Carcinogen*				
PARAMETER	**UNITS**												
General / Agronomic													
Cation Exchange Capacity (CEC)	meq/100g												
Calcium, soluble (Sat. Paste)	meq/L	21.8	4.32	23.9	1.06	88.3	15						
Magnesium, soluble (Sat. Paste)	meq/L	11.5	1.97	14.3	1.37	7.44	4.81						
Potassium, soluble (Sat. Paste)	meq/L												
Sodium, soluble (Sat. Paste)	meq/L	2.24	5.32	9.79	20.1	13.8	10.8						
Sodium Adsorption Ratio		0.55	3	2.2	18	2	3.4						
Carbon, total organic (TOC)	%												
Neutralization Potential as CaCO3	%												
Conductivity@25C	mmhos/cm	2.95	1.15	3.56	2.23	11.2	3.39						
Organic Matter (Ignition@ 400)	%	0.4 B	0.5 B	0.4 B	0.5 B	0.6 B	0.4 B						
Net Acid Generation Procedure	units												
pH, Saturated Paste	units	5.4	8.1	7.5	8.7	8	8						
Solids, Percent	%	98.2	95.4	98.4	94.5	99.2	95.8						
Total Metals													
Aluminum, total (3050)	mg/Kg	10700	11600	8250	9760	8420	12200		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	1.9	2.7	3.3	4.2	2.8	2.5	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	75.9	91.4	98.9	117	87.2	95.5		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.38	0.4	0.44	0.32	0.58	0.45		*150*	*1,900*			
Boron, total (3050)	mg/Kg	5	6	5	12	9	5		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.3	0.36	0.33	0.29 B	0.43	0.33		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	2170	20800	23000	44200	8730	15000						
Chromium, total (3050)	mg/Kg	10.3	11.4	8.4	8.9	7.2	11.6	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	932	13	3210	15	281	12		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	15400	13400	15200	13000	12600	14600						
Lead, total (3050)	mg/Kg	6.14	6.15	8.37	4.9	9.38	6.3		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	3360	4390	3590	5510	3450	4390						
Manganese, total (3050)	mg/Kg	187	265	174	203	282	225		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	2.57 B	3.63 B	1.93 U	3.08 B	2.83 B	4.67 B		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	11.7	U	45.6	0.6 B	8	0.3 U		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	7.3	7.1	6.7	5.2	5.4	7.3		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	240	430	390	450	360	340		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	2700	2740	2630	1890	1790	2320						
Selenium, total (3050)	mg/Kg	0.65	0.21	2.21	0.29	3 U	3 U		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	0.23	0.03 B	0.65	0.03 U	1 U	1 U		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	150	350	300	940	470	480						
Thallium, total (3050)	mg/Kg	0.1 B	0.12 B	0.12 B	0.09 B	0.1 B	0.11 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	0.81	0.6	1.99	1.04	2.22	0.67		*16*	*200*			
Vanadium, total (3050)	mg/Kg	28.6	30.8	25.8	37.3	27.5	34.5		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	31	29	48	25	33	26		*23,000*	*310,000*			

NOTES:

* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.

** Indicates Saturation in Soil

Analytical Lab Qualifier Notes:

B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.

J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

L = Target analyte response was below the laboratory defined negative threshold.

O = Analyte concentration is estimated due to result exceeding calibration range.

U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

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TABLE A-10: UMWA Transformer Area Soil Sample Analytical Results

	Sample ID	UMWA-TP-1@4FT	UMWA-TP-1@4FT	UMWA-TP-1@11.5	UMWA-TRANSFORMER	UMWA-SP-1A	UMWA-SP-1B	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID(s)	L-44555-08	L-44555-09	L-44555-10 / L44555-11	L-44555-12 / L44555-13	L44556-05	L44556-06	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/17/2018	5/17/2018	Carcinogen	Non-Carcinogen				
PARAMETER	**UNITS**												
Total Metals													
Aluminum, total (3050)	mg/Kg					16000	22100		76,000	920,000			
Antimony, total (3050)	mg/Kg					0.3 B	0.2 U		31	410			
Arsenic, total (3050)	mg/Kg					19.4	19.4	10	10	10	10	290	
Barium, total (3050)	mg/Kg					91.7	265		15,000	170,000	15,000		
Beryllium, total (3050)	mg/Kg					0.77	0.64		150	1,900			
Boron, total (3050)	mg/Kg					37	26		16,000	200,000			
Cadmium, total (3050)	mg/Kg					2.07	1.2		39	510	39	29	
Calcium, total (3050)	mg/Kg					264000	85500						
Chromium, total (3050)	mg/Kg					60.7	63.5	30		65	120,000		for Chromium III
Copper, total (3050)	mg/Kg					50	102		3,100	41,000			
Iron, total (3050)	mg/Kg					15000	26000						
Lead, total (3050)	mg/Kg					32.8	36.6		400	800	400	290	
Magnesium, total (3050)	mg/Kg					16700	13900						
Manganese, total (3050)	mg/Kg					631	965		3,300	32,000			
Mercury by Direct Combustion AA	ng/g					4.85 B	4.68 B		23,000	310,000	23,000	12,000	Standards Presented in ng/g
Molybdenum, total (3050)	mg/Kg					12.3	4.6		390	5,100			
Nickel, total (3050)	mg/Kg					18.2	30.3		1,600	20,000			
Phosphorus, total (3050)	mg/Kg					390	990		1.6	20			
Potassium, total (3050)	mg/Kg					1880	9070						
Selenium, total (3050)	mg/Kg					3 U	3 U		390	5,100	390	290	
Silver, total (3050)	mg/Kg					1 U	1 U		390	5,100	390		
Sodium, total (3050)	mg/Kg					2450	2810						
Thallium, total (3050)	mg/Kg					0.07 B	0.46		5.2	67			
Uranium, total (3050)	mg/Kg					2.88	2.3		16	200			
Vanadium, total (3050)	mg/Kg					29.2	54.7		78	1,000			
Zinc, total (3050)	mg/Kg					62	105		23,000	310,000			
Impacted Soil								========== NOTE: SRLs and Tier 1 Standards Presented in ug/Kg ==========					
Benzene	ug/Kg	1 U		1 U	1 U			650		1,400	650	700	
Ethylbenzene	ug/Kg	1 U		1 U	1 U				400,000*	400,000*	400,000	82,000**	
m p Xylene	ug/Kg	2 U		2 U	2 U				270,000	420,000*	270,000	31,000**	Xylenes (total)
o Xylene	ug/Kg	1 U		1 U	1 U				270,000	420,000*			
Toluene	ug/Kg	1 U		1 U	1 U			170		5,400			
TPH C10 to C28	mg/Kg	20 U		9 J	66.7 U								
TVH C6 to C10	mg/Kg	0.05 U		0.05 U	0.05 U								
VOCs													
1,1,1,2-Tetrachloroethane	ug/Kg	4 U		4 U	4 U			3,200		73,000			
1,1,1-Trichloroethane	ug/Kg	10 U		10 U	10 U				1,200,000*	1,200,000*			
1,1,2,2-Tetrachloroethane	ug/Kg	3 U		3 U	3 U			420		9,300			
1,1,2-Trichloroethane	ug/Kg	4 U		4 U	4 U			740		16,000			
1,1-Dichloroethane	ug/Kg	4 U		4 U	4 U				510,000	1,700,000*			
1,1-Dichloroethene (DCE)	ug/Kg	4 U		4 U	4 U				120,000	410,000			
1,1-Dichloropropene	ug/Kg	4 U		4 U	4 U								
1,2,3-Trichlorobenzene	ug/Kg	4 U		4 U	4 U								
1,2,3-Trichloropropane	ug/Kg	4 U		4 U	4 U			5		110			

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TABLE A-10: UMWA Transformer Area Soil Sample Analytical Results

		Sample ID	UMWA-TP-1@4FT	UMWA-TP-1@4FT	UMWA-TP-1@11.5	UMWA-TRANSFORMER	UMWA-SP-1A	UMWA-SP-1B	*ARIZONA SRLs (mg/kg)*			*ARIZONA TIER 1 Cleanup Standards*		
		Lab ID(s)	L-44555-08	L-44555-09	L-44555-10 / L44555-11	L-44555-12 / L44555-13	L44556-05	L44556-06	*Residential*		*Non-Residential*	*Soil Remediation Levels 2007 Residential (mg/Kg)*	*Groundwater Protection Level (GPL) (mg/Kg)*	*NOTES*
		Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/17/2018	5/17/2018	*Carcinogen*	*Non-Carcinogen*				
1,2,4-Trichlorobenzene	ug/Kg		3 U		3 U	3 U				62,000	220,000			
1,2,4-Trimethylbenzene	ug/Kg		4 U		4 U	4 U				52,000	170,000	52,000		
1,2-Dibromo-3-chloropropane	ug/Kg		4 U		4 U	4 U			530	1,500	6,500			
1,2-Dibromoethane	ug/Kg		4 U		4 U	4 U			29		630	290		
1,2-Dichlorobenzene	ug/Kg		4 U		4 U	4 U				600,000*	600,000*			
1,2-Dichloroethane	ug/Kg		4 U		4 U	4 U			280			2,800	230	
1,2-Dichloropropane	ug/Kg		4 U		4 U	4 U			340		7,400			
1,3,5-Trimethylbenzene	ug/Kg		4 U		4 U	4 U				21,000	70,000	21,000		
1,3-Dichlorobenzene	ug/Kg		4 U		4 U	4 U				530,000	600,000*			
1,3-Dichloropropane	ug/Kg		4 U		4 U	4 U				100,000	360,000			
1,4-Dichlorobenzene	ug/Kg		4 U		4 U	4 U				610,000	6,200,000			
2,2-Dichloropropane	ug/Kg		4 U		4 U	4 U								
2-Butanone (MEK)	ug/Kg		10 U		10 U	10 U						23,000,000		
2-Chloroethyl vinyl ether	ug/Kg		5 U		5 U	5 U								
2-Chlorotoluene	ug/Kg		4 U		4 U	4 U								
2-Hexanone	ug/Kg		10 U		10 U	10 U								
2-Methylnaphthalene	ug/Kg		100 U		100 U	1000 U								
4-Chlorotoluene	ug/Kg		4 U		4 U	4 U								
4-Isopropyltoluene	ug/Kg		4 U		4 U	4 U								
4-Methyl-2-Pentanone (MIBK)	ug/Kg		10 U		10 U	10 U						5,300,000		
Acenaphthene	ug/Kg		100 U		100 U	1000 U				3,700,000	29,000,000	3,700,000		
Acenaphthylene	ug/Kg		100 U		100 U	1000 U								
Acetone	ug/Kg		10 U		10 U	100				14,000,000	54,000,000			
Acrylonitrile	ug/Kg		4 U		4 U	4 U			210		4,900			
Anthracene	ug/Kg		100 U		100 U	1000 U				22,000,000	240,000,000	22,000,000		
Benzene	ug/Kg		4 U		4 U	4 U			650		1,400	650	700	
Benzo(a)anthracene	ug/Kg		100 U		100 U	1000 U			690		21,000	6,900		for "Benz[a]anthracene"
Benzo(a)pyrene	ug/Kg		100 U		100 U	1000 U			69		2,100	690		
Benzo(b)fluoranthene	ug/Kg		100 U		100 U	1000 U			6,900		21,000	6,900		
Benzo(g,h,i)perylene	ug/Kg		100 U		100 U	1000 U								
Benzo(k)fluoranthene	ug/Kg		100 U		100 U	1000 U			6,900		210,000	69,000		
Bromobenzene	ug/Kg		4 U		4 U	4 U				28,000	92,000			
Bromochloromethane	ug/Kg		4 U		4 U	4 U								
Bromodichloromethane	ug/Kg		4 U		4 U	4 U			830		18,000			
Bromoform	ug/Kg		4 U		4 U	4 U			69,000		2,200,000			
Bromomethane	ug/Kg		4 U		4 U	4 U				3,900	13,000			
Carbon Disulfide	ug/Kg		4 U		4 U	4 U				360,000	720,000*	360,000	360,000	
Carbon Tetrachloride	ug/Kg		10 U		10 U	10 U			250	2,200	5,500			
Chlorobenzene	ug/Kg		4 U		4 U	4 U				150,000	530,000			
Chloroethane	ug/Kg		4 U		4 U	4 U			3,000		65,000			
Chloroform	ug/Kg		4 U		4 U	4 U			940		20,000			
Chloromethane	ug/Kg		4 U		4 U	4 U				48,000	160,000			
Chrysene	ug/Kg		100 U		100 U	1000 U			68,000		2,000,000	680,000		
cis-1,2-Dichloroethene	ug/Kg		4 U		4 U	4 U								
cis-1,3-Dichloropropene	ug/Kg		4 U		4 U	4 U								
Dibenzo(a,h)anthracene	ug/Kg		100 U		100 U	1000 U			69		2,100	690		
Dibromochloromethane	ug/Kg		4 U		4 U	4 U			1,100		26,000			

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TABLE A-10: UMWA Transformer Area Soil Sample Analytical Results

		Sample ID	UMWA-TP-1@4FT	UMWA-TP-1@4FT	UMWA-TP-1@11.5	UMWA-TRANSFORMER	UMWA-SP-1A	UMWA-SP-1B	*ARIZONA SRLs (mg/kg)*			*ARIZONA TIER 1 Cleanup Standards*		
		Lab ID(s)	L-44555-08	L-44555-09	L-44555-10 / L44555-11	L-44555-12 / L44555-13	L44556-05	L44556-06	*Residential*		*Non-Residential*	*Soil Remediation Levels 2007 Residential (mg/Kg)*	*Groundwater Protection Level (GPL) (mg/Kg)*	*NOTES*
		Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/17/2018	5/17/2018	*Carcinogen*	*Non-Carcinogen*				
Dibromomethane	ug/Kg		4 U		4 U	4 U								
Dichlorodifluoromethane	ug/Kg		5 U		5 U	5 U				*94,000*	*310,000*			
Ethylbenzene	ug/Kg		4 U		4 U	4 U				*400,000**	*400,000**	*400,000*	*82,000***	
Fluoranthene	ug/Kg		100 U		100 U	1000 U				*2,300,000*	*22,000,000*	*2,300,000*		
Fluorene	ug/Kg		100 U		100 U	1000 U				*2,700,000*	*26,000,000*	*2,700,000*		
Hexachlorobutadiene	ug/Kg		4 U		4 U	4 U			*7,000*	*18,000*	*180,000*			
Indeno(1,2,3-cd)pyrene	ug/Kg		100 U		100 U	1000 U			*690*		*21,000*	*6,900*		
Isopropylbenzene	ug/Kg		4 U		4 U	4 U				*92,000**	*92,000**	*92,000*		
m p Xylene	ug/Kg		10 U		10 U	10 U				*270,000*	*420,000**			
Methyl Tert Butyl Ether	ug/Kg		4 U		4 U	4 U			*32,000*		*710,000*	*320,000*		
Methylene Chloride	ug/Kg		4 U		4 U	260			*9,300*		*210,000*			
Naphthalene	ug/Kg		3 U		3 U	3 U				*56,000*	*190,000*	*56,000*		
Naphthalene	ug/Kg		100 U		100 U	1000 U				*56,000*	*190,000*	*56,000*		
n-Butylbenzene	ug/Kg		4 U		4 U	4 U				*240,000**	*240,000**	*240,000*		
n-Propylbenzene	ug/Kg		4 U		4 U	4 U				*240,000**	*240,000**	*240,000*		
o Xylene	ug/Kg		4 U		4 U	4 U				*270,000*	*420,000**			
Phenanthrene	ug/Kg		100 U		100 U	1000 U								
Pyrene	ug/Kg		100 U		100 U	1000 U				*2,300,000*	*29,000,000*	*2,300,000*		
sec-Butylbenzene	ug/Kg		4 U		4 U	4 U				*220,000**	*220,000**	*220,000*		
Styrene	ug/Kg		4 U		4 U	4 U				*1,500,000**	*1,500,000**			
tert-Butylbenzene	ug/Kg		4 U		4 U	4 U				*390,000**	*390,000**	*220,000*		
Tetrachloroethene	ug/Kg		4 U		4 U	4 U								
Toluene	ug/Kg		4 U		4 U	4 U				*650,000**	*650,000**	*650,000*	*159,000***	
trans-1,2-Dichloroethene	ug/Kg		4 U		4 U	4 U								
trans-1,3-Dichloropropene	ug/Kg		3 U		3 U	3 U								
Trichloroethene	ug/Kg		5 U		5 U	5 U								
Trichlorofluoromethane	ug/Kg		4 U		4 U	4 U				*390,000*	*1,300,000*			
Vinyl Acetate	ug/Kg		4 U		4 U	4 U				*430,000*	*1,400,000*			
Vinyl Chloride	ug/Kg		4 U		4 U	4 U			*85*		*750*			
PCBs														
Aroclor 1016 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1221 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1232 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1242 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1248 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1254 Signal 1	ug/Kg			67 U	67 U	67 U								
Aroclor 1260 Signal 1	ug/Kg			67 U	67 U	67 U								

NOTES:
* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.
** Indicates Saturation in Soil
Analytical Lab Qualifier Notes:
B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.
J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.
L = Target analyte response was below the laboratory defined negative threshold.
O = Analyte concentration is estimated due to result exceeding calibration range.
U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

TABLE A-10: UMWA Transformer Area Soil Sample Analytical Results

Sample ID	UMWA-TP-1@4FT	UMWA-TP-1@4FT	UMWA-TP-1@11.5	UMWA-TRANSFORMER	UMWA-SP-1A	UMWA-SP-1B	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		NOTES
Lab ID(s)	L-44555-08	L-44555-09	L-44555-10 / L44555-11	L-44555-12 / L44555-13	L44556-05	L44556-06	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	
Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/17/2018	5/17/2018	Carcinogen	Non-Carcinogen				
Tier 1 Analytes; Not Analyzed in Soil Samples												
1,3-Butadiene										*0.58*		
Cyclohexane										*140*		
Cyclohexanone										*310,000*		
Dicyclopentadiene										*0.54*		
n-Hexane										*110*		
Methylcyclohexane										*230*		
Tetraethyl lead										*0.0061*		

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TABLE A-11: Sediment Pond Soil Sample Analytical Results

	Sample ID	TDA-PCW-01A	TDA-PCW-01B	TDA-PCW-02	TDA-PCW-03	TDA-SEDPOND-E@0.5FT	TDA-SEDPOND-E@3FT	TDA-SEDPOND-W@0.5FT	TDA-SEDPOND-W@3.5FT	TDA-SEDPOND-W@6FT	TDA-SEDPOND-E BERM@0.5FT	TDA-SEC@0.5FT	TDA-SEC@3FT	ARIZONA SRLs (mg/kg)			ARIZONA TIER 1 Cleanup Standards		
	Lab ID	L44556-29	L44556-30	L44556-01	L44556-02	L44556-38	L44556-39	L44556-40	L44556-41	L44556-42	L44556-43	L44556-44	L44556-45	Residential		Non-Residential	Soil Remediation Levels 2007 Residential (mg/Kg)	Groundwater Protection Level (GPL) (mg/Kg)	NOTES
	Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	Carcinogen	Non-Carcinogen				
PARAMETER	**UNITS**																		
General / Agronomic																			
Cation Exchange Capacity (CEC)	meq/100g																		
Calcium, soluble (Sat. Paste)	meq/L																		
Magnesium, soluble (Sat. Paste)	meq/L																		
Potassium, soluble (Sat. Paste)	meq/L																		
Sodium, soluble (Sat. Paste)	meq/L																		
Sodium Adsorption Ratio																			
Carbon, total organic (TOC)	%																		
Neutralization Potential as CaCO3	%																		
Conductivity@25C	mmhos/cm																		
Organic Matter (Ignition@ 400)	%																		
Net Acid Generation Procedure	units	7.1	6.8	6.4	4.1	8	10.8	9	8.8	9.1	7.9	5.6	10.4						
pH, Saturated Paste	units	8.1	6.2	8.7	5	7.2	7.9	7.5	7.8	8.2	8.1	8.1	6.4						
Solids, Percent	%	99.5	96.5	99.3	99	98.6	94.9	98.7	90.5	90.4	99.1	99.3	92						
Total Metals																			
Aluminum, total (3050)	mg/Kg	4940	9560	6250	8570	17000	11900	19100	12600	10000	13300	12200	18900		*76,000*	*920,000*			
Antimony, total (3050)	mg/Kg	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U		*31*	*410*			
Arsenic, total (3050)	mg/Kg	1.7	2.1	1.4	3.5	3.4	3.6	3.6	3.7	3.6	2.6	2.4	4.7	*10*	*10*	*10*	*10*	*290*	
Barium, total (3050)	mg/Kg	39.2	64.6	43.1	119	133	110	142	87.1	109	76	105	141		*15,000*	*170,000*	*15,000*		
Beryllium, total (3050)	mg/Kg	0.31	0.45	0.32	0.48	1.41	0.44	1.12	5.17	3.07	0.55	0.84	0.75		*150*	*1,900*			
Boron, total (3050)	mg/Kg	2 B	4 B	3 B	4 B	8	6	7	4 B	5	6	5	11		*16,000*	*200,000*			
Cadmium, total (3050)	mg/Kg	0.28 B	0.29 B	0.25 B	0.16 B	0.67	0.36	0.61	2.21	1.4	0.37	0.37	0.47		*39*	*510*	*39*	*29*	
Calcium, total (3050)	mg/Kg	2280	1420	2680	6570	8230	60200	6640	26400	32200	2500	1980	22900						
Chromium, total (3050)	mg/Kg	7.6	9.5	4.8	10.5	16.3	11.8	17.8	11	10.2	13	12.4	17.1	*30*		*65*	*120,000*		*SRL (Cr III), Tier 1 (Cr VI)*
Copper, total (3050)	mg/Kg	89	334	28	286	2290	45	1310	10600	236	396	876	16		*3,100*	*41,000*			
Iron, total (3050)	mg/Kg	16900	12900	8000	25800	27800	11300	24100	8970	10900	14000	18300	15200						
Lead, total (3050)	mg/Kg	5.38	6.19	4.75	7.31	11.1	6.54	11.4	6.52	6.3	7.23	8.16	9.63		*400*	*800*	*400*	*290*	
Magnesium, total (3050)	mg/Kg	1380	2510	1660	1790	4580	5570	6010	3500	4530	3920	3340	6830						
Manganese, total (3050)	mg/Kg	209	205	182	69.1	382	203	320	952	1330	228	218	282		*3,300*	*32,000*			
Mercury by Direct Combustion AA	ng/g	1.48 U	2.97 B	1.66 B	2.68 B	7.62 B	4.52 B	11.40	1.44 U	1.61 U	6.07 B	7.91 B	6.60 B		*23,000*	*310,000*	*23,000*	*12,000*	*Standards Presented in ng/g*
Molybdenum, total (3050)	mg/Kg	2 B	4 B	2 U	30	30	2 U	15	2 U	2 U	2 B	19	2 U		*390*	*5,100*			
Nickel, total (3050)	mg/Kg	4	7.7	3 B	5.4	23.1	7.9	17.9	53.8	53.3	10.6	12.7	12.2		*1,600*	*20,000*			
Phosphorus, total (3050)	mg/Kg	220	210	210	450	540	420	540	260	380	170	400	260		*1.6*	*20*			*N/A: SRL is for Phosphorous (white)*
Potassium, total (3050)	mg/Kg	1120	2270	1410	4840	5680	2580	5770	2070	2130	3250	4100	4190						
Selenium, total (3050)	mg/Kg	3 U	3 U	3 U	3 U	2.92	0.22	1.7	1.2	0.5	0.31	1.5	0.15		*390*	*5,100*	*390*	*290*	
Silver, total (3050)	mg/Kg	1 U	1 U	1 U	1 U	0.5	0.03 U	0.33	0.03 B	0.03 U	0.07 B	0.27	0.04 B		*390*	*5,100*	*390*		
Sodium, total (3050)	mg/Kg	150	160	320	210	540	230	320	110	160	150	280	1410						
Thallium, total (3050)	mg/Kg	0.05 U	0.09 B	0.07 B	0.19 B	0.23 B	0.11 B	0.23 B	0.12 B	0.1 B	0.12 B	0.15 B	0.18 B		*5.2*	*67*			
Uranium, total (3050)	mg/Kg	1.29	1.87	1.14	1.89	6.37	1.12	3.73	26.3	2.3	1.15	3.47	0.52		*16*	*200*			
Vanadium, total (3050)	mg/Kg	41.2	26.4	17.9	19.1	26.5	28.5	31.5	28.2	30.8	28	22.3	36.2		*78*	*1,000*			
Zinc, total (3050)	mg/Kg	16	26	17	29	72	28	65	189	257	35	43	41		*23,000*	*310,000*			
SPLP Metals																			
Aluminum (1312)	mg/L	0.304	0.075	0.198	0.708	0.019	0.009	0.081	0.092	0.021	0.095	0.137	0.044						
Antimony (1312)	mg/L	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U	0.0004 U						
Arsenic (1312)	mg/L	0.0008 B	0.0002 U	0.0006 B	0.0002 U	0.00025 U	0.0008 B	0.0005 B	0.0002 U	0.0007 B	0.002	0.0002 U	0.0055						
Barium (1312)	mg/L	0.0046	0.0156	0.0063	0.0009 B	0.0008 B	0.0268	0.0032	0.0526	0.0364	0.0097	0.003	0.0061						
Beryllium (1312)	mg/L	0.00005 U	0.00011 B	0.00005 U	0.00013 B	0.00005 U	0.00005 U	0.00005 U	0.00005 B	0.00005 U	0.00005 U	0.00005 U	0.00005 U						
Boron (1312)	mg/L	0.0099	0.0035	0.0055	0.0061	0.0136	0.0081	0.0089	0.0046	0.0037	0.0136	0.0094	0.065						
Cadmium (1312)	mg/L	0.0001 U	0.0001 B	0.0001 U	0.0001 B	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Calcium (1312)	mg/L	6.3	3.9	5.7	249	211	35.5	22.1	14.3	8.8	6.9	10.7	6.3						
Chromium (1312)	mg/L	0.0005 U	0.0005 U	0.0005 U	0.0006 B	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U						
Copper (1312)	mg/L	0.0063	0.17	0.0026	0.287	0.024	0.0017 B	0.032	0.0089	0.0014 B	0.0251	0.0734	0.0033						
Iron (1312)	mg/L	0.04 B	0.02 U	0.03 B	0.02 U	0.02 U	0.02 U	0.05	0.02 U	0.02 U	0.02 B	0.16	0.02 U						
Lead (1312)	mg/L	0.0001 U	0.0001 B	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0004 B	0.0001 B	0.0001 U						
Magnesium (1312)	mg/L	0.4 B	0.6 B	0.4 B	0.6 B	13.6	8.3	1.8	1.3	1	0.8 B	1.6	1.7						
Manganese (1312)	mg/L	0.0015 B	0.0583	0.0014 B	0.0312	0.0169	0.0004 U	0.0034	0.0004 U	0.0038	0.001 B	0.066	0.0004 U						
Mercury (1312)	mg/L	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U						
Molybdenum (1312)	mg/L	0.0019 B	0.0005 U	0.0026 B	0.0005 U	0.0143	0.0034	0.0145	0.0051	0.0009 B	0.0023 B	0.007	0.0005 U						
Nickel (1312)	mg/L	0.0006 U	0.0035	0.0006 U	0.0022 B	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0006 U	0.0202	0.0024 B	0.0024 B						
Phosphorus (1312)	mg/L	0.3 B	0.1 U	0.2 B	0.3 B	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U						
Potassium (1312)	mg/L	1	0.8 B	1.3	0.8 B	1.9	0.2 B	2.7	0.9 B	0.3 B	1.6	2.1	0.2 U						
Selenium (1312)	mg/L	0.0003	0.0001 U	0.0002 B	0.0012	0.0009	0.0009	0.0022	0.0001 B	0.0013	0.0007	0.0005	0.0003						
Silver (1312)	mg/L	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U	0.00005 U						
Sodium (1312)	mg/L	0.4 B	0.2 U	0.6 B	0.2 B	2.6	3.5	0.7 B	0.3 B	0.8 B	0.6 B	0.4 B	51.8						
Thallium (1312)	mg/L	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U						
Uranium (1312)	mg/L	0.0005	0.0001 U	0.0001 B	0.0007	0.0059	0.0008	0.0023	0.0001 U	0.0018	0.0006	0.0002 B	0.0001 U						
Vanadium (1312)	mg/L	0.0038	0.0002 U	0.0036	0.0002 U	0.0003 B	0.0082	0.0015	0.0002 U	0.0055	0.0099	0.001	0.033						
Zinc (1312)	mg/L	0.002 U	0.014	0.002 U	0.015	0.003 B	0.002 B	0.002 B	0.005	0.003 B	0.026	0.006	0.01 B						

Sacaton Mine
Site Investigation

TABLE A-11: Sediment Pond Soil Sample Analytical Results

Sample ID	TDA-PCW-01A	TDA-PCW-01B	TDA-PCW-02	TDA-PCW-03	TDA-SEDPOND-E@0.5FT	TDA-SEDPOND-E@3FT	TDA-SEDPOND-W@0.5FT	TDA-SEDPOND-W@3.5FT	TDA-SEDPOND-W@6FT	TDA-SEDPOND-E BERM@0.5FT	TDA-SEC@0.5FT	TDA-SEC@3FT	*ARIZONA SRLs (mg/kg)*			*ARIZONA TIER 1 Cleanup Standards*		
Lab ID	L44556-29	L44556-30	L44556-01	L44556-02	L44556-38	L44556-39	L44556-40	L44556-41	L44556-42	L44556-43	L44556-44	L44556-45	*Residential*		*Non-Residential*	*Soil Remediation Levels 2007 Residential (mg/Kg)*	*Groundwater Protection Level (GPL) (mg/Kg)*	*NOTES*
Sample Date	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	*Carcinogen*	*Non-Carcinogen*				

NOTES:

* Indicates SRL is based on the chemical-specific saturation level in soil for volatile organic chemicals only.

** Indicates Saturation in Soil

Analytical Lab Qualifier Notes:

B = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

H = Analysis exceeded method hold time; pH is a field test with an immediate hold time.

J = Analyte concentration detected at a value between MDL and PQL; the associated value is an estimated quantity.

L = Target analyte response was below the laboratory defined negative threshold.

O = Analyte concentration is estimated due to result exceeding calibration range.

U = The material was analyzed for, but was not detected above the level of the associated value; the associated value is either the sample quantitation limit or the sample detection limit.

APPENDIX A2:
Geotechnical Laboratory Test Results

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 117-321059-2018 **PROJECT NAME** Sacaton Mine

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	Falling Head Permeability (cm/s)	
ALL-BH-02	5/22/2018	32.959049	-111.809021		5 - 6.5										5								
ALL-BH-02	5/22/2018	32.959049	-111.809021		10 - 11.5	SM	NV	NP		76.3	47.1	25.9											
ALL-BH-02	5/22/2018	32.959049	-111.809021		11.5 - 13																		
ALL-BH-02	5/22/2018	32.959049	-111.809021		15 - 16.5										5								
ALL-BH-02	5/22/2018	32.959049	-111.809021		20 - 21.5																		
ALL-BH-02	5/22/2018	32.959049	-111.809021		25 - 26.5	SC	30	13		84.9	63.3	37.9	114						2.77			3.97E-06	
ALL-BH-02	5/22/2018	32.959049	-111.809021		30 - 31.5	SC	36	19	-0.316	91.5	64.7	39.3			11								
ALL-BH-02	5/22/2018	32.959049	-111.809021		35 - 36.5																		
ALL-BH-02	5/22/2018	32.959049	-111.809021		40 - 41.5										5								
ALL-TP-31	5/17/2018	32.960335	-111.811462		0 - 0.5																		
ALL-TP-31	5/17/2018	32.960335	-111.811462		4 - 6																		
ALL-TP-31	5/17/2018	32.960335	-111.811462		6 - 6.5																		
ALL-TP-33	5/17/2018	32.960003	-111.807648		4 - 7																		
ALL-TP-36	5/17/2018	32.957470	-111.807449		6 - 6.5																		
ALL-TP-37	5/17/2018	32.959122	-111.810051		5 - 6.5	SC	29	13	-1.000	84.7	53.5	31		127.2	3	10							
ALL-TP-38	5/17/2018	32.957191	-111.809814		7.5 - 8.5																		
Stockpile					0.5 - 1	SM	NV	NP		49.5	27.9	11.5		132.8	1	7.5							
TSF-BH-07	5/24/2018	32.945435	-111.840561		0 - 1.1																		
TSF-BH-07	5/24/2018	32.945435	-111.840561		5 - 6.3										2								
TSF-BH-07	5/24/2018	32.945435	-111.840561		10 - 10																		
TSF-BH-07	5/24/2018	32.945435	-111.840561		10.5 - 11.8	SC	28	13	-0.846	98.2	84.2	30.8	105		4		30.9	0.149					
TSF-BH-07	5/24/2018	32.945435	-111.840561		15 - 15.6										6								
TSF-BH-07	5/24/2018	32.945435	-111.840561		20 - 21.5										4								
TSF-BH-07	5/24/2018	32.945435	-111.840561		25 - 26.5	SC	33	15		95.1	74.8	35	87				34.2	0.035					
TSF-BH-07	5/24/2018	32.945435	-111.840561		30 - 30.4										7								
TSF-BH-07	5/24/2018	32.945435	-111.840561		35 - 35.6																		
TSF-BH-07	5/24/2018	32.945435	-111.840561		40 - 41.5	SC	40	19	-0.789	95.2	75	41.6			6								
TSF-BH-07	5/24/2018	32.945435	-111.840561		45 - 45.7																		

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 117-321059-2018 **PROJECT NAME** Sacaton Mine

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	Falling Head Permeability (cm/s)	
TSF-BH-07	5/24/2018	32.945435	-111.840561		50 - 50.6										4								
TSF-BH-07	5/24/2018	32.945435	-111.840561		55 - 55.6																		
TSF-BH-07	5/24/2018	32.945435	-111.840561		60 - 60.8										4								
TSF-BH-08	5/24/2018	32.946518	-111.839851		5 - 6.2										7								
TSF-BH-08	5/24/2018	32.946518	-111.839851		10 - 11.3										4								
TSF-BH-08	5/24/2018	32.946518	-111.839851		20 - 21.5										8								
TSF-BH-08	5/24/2018	32.946518	-111.839851		30 - 32	CL-ML	19	4	-1.500	94.1	93.3	54.1			9								
TSF-BH-08	5/24/2018	32.946518	-111.839851		32 - 33.3																		
TSF-BH-08	5/24/2018	32.946518	-111.839851		40 - 41	SM	NV	NP			98.7	44.2	90		7		32.4	0.604				3.10E-06	
TSF-BH-08	5/24/2018	32.946518	-111.839851		50 - 51.5										13								
TSF-BH-08	5/24/2018	32.946518	-111.839851		60 - 61.5	CL-ML	18	4	2.250	100	99.5	52.6	109		23						0.05	1.39E-05	
TSF-BH-08	5/24/2018	32.946518	-111.839851		70 - 71.2										14								
TSF-BH-08	5/24/2018	32.946518	-111.839851		80 - 81.5										8								
TSF-BH-08	5/24/2018	32.946518	-111.839851		85 - 86.3										6								
TSF-BH-08	5/24/2018	32.946518	-111.839851		90 - 91.5	SC	30	16		93.4	82	42.4	103				30.3	0.942					
TSF-BH-08	5/24/2018	32.946518	-111.839851		95 - 96.3										13								
TSF-BH-08	5/24/2018	32.946518	-111.839851		100 - 101.3										11								
TSF-BH-09	5/25/2018	32.958961	-111.832085		5 - 7	SM	NV	NP		93.1	90.3	22.1			5								
TSF-BH-09	5/25/2018	32.958961	-111.832085		7 - 8.5																		
TSF-BH-09	5/25/2018	32.958961	-111.832085		10 - 11.5	SM	NV	NP		99.4	97.3	36.6	105		5		30	0.899					
TSF-BH-09	5/25/2018	32.958961	-111.832085		15 - 17	SM	NV	NP		99.9	99.5	47.9	98		16				1.25				
TSF-BH-09	5/25/2018	32.958961	-111.832085		17 - 18.5																		
TSF-BH-09	5/25/2018	32.958961	-111.832085		20 - 21.5										8								
TSF-BH-09	5/25/2018	32.958961	-111.832085		25 - 26.5																		
TSF-BH-09	5/25/2018	32.958961	-111.832085		30 - 31.5										10								
TSF-BH-09	5/25/2018	32.958961	-111.832085		35 - 36.5																		
TSF-BH-09	5/25/2018	32.958961	-111.832085		40 - 41.5										7								
TSF-BH-09	5/25/2018	32.958961	-111.832085		45 - 46.5	SC	49	25		89	62.8	36.2											

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 117-321059-2018 **PROJECT NAME** Sacaton Mine

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	Falling Head Permeability (cm/s)	
TSF-BH-09	5/25/2018	32.958961	-111.832085		50 - 51.5										6								
TSF-BH-09	5/25/2018	32.958961	-111.832085		60 - 61.5																		
TSF-BH-09	5/25/2018	32.958961	-111.832085		70 - 71.5										6								
TSF-TP-01	5/14/2018	32.958660	-111.832382		0 - 0.3																		
TSF-TP-01	5/14/2018	32.958660	-111.832382		5 - 5.5																		
TSF-TP-01	5/14/2018	32.958660	-111.832382		8 - 8.5																		
TSF-TP-01	5/14/2018	32.958660	-111.832382		11.5 - 12																		
TSF-TP-01	5/14/2018	32.958660	-111.832382		15 - 15.5	SM	21	2	-6.000	62.6	36.7	15.6		113.1	7	12.9							
TSF-TP-02	5/14/2018	32.957867	-111.832855		0 - 0.5																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		0.5 - 0.8																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		1.2 - 1.5																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		3 - 3.3																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		5 - 5.3																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		6 - 7																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		9 - 9.5																		
TSF-TP-02	5/14/2018	32.957867	-111.832855		9.5 - 10																		
TSF-TP-03	5/14/2018	32.956367	-111.833931		0 - 0.3																		
TSF-TP-03	5/14/2018	32.956367	-111.833931		0.3 - 1.4																		
TSF-TP-03	5/14/2018	32.956367	-111.833931		2 - 2.3																		
TSF-TP-03	5/14/2018	32.956367	-111.833931		18 - 20																		
WRD-BH-03	5/22/2018	32.946560	-111.812561		0 - 1.5																		
WRD-BH-03	5/22/2018	32.946560	-111.812561		5 - 6.5										4								
WRD-BH-03	5/22/2018	32.946560	-111.812561		10 - 11.5																		
WRD-BH-03	5/22/2018	32.946560	-111.812561		15 - 16.5										21								
WRD-BH-03	5/22/2018	32.946560	-111.812561		20 - 22	SC	34	17	-0.765	82.7	52.6	29.9	104		4		33.6	1.06				4.37E-05	
WRD-BH-03	5/22/2018	32.946560	-111.812561		22 - 23.5										4								
WRD-BH-03	5/22/2018	32.946560	-111.812561		30 - 31.5										4								
WRD-BH-03	5/22/2018	32.946560	-111.812561		40 - 41.5										5								

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 117-321059-2018 **PROJECT NAME** Sacaton Mine

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	Falling Head Permeability (cm/s)	
WRD-BH-03	5/22/2018	32.946560	-111.812561		50 - 51.5	SC	30	14	-0.714	91.2	65.4	38.3			6								
WRD-BH-04	5/23/2018	32.946934	-111.815071		0 - 1.5																		
WRD-BH-04	5/23/2018	32.946934	-111.815071		5 - 6.5										4								
WRD-BH-04	5/23/2018	32.946934	-111.815071		10 - 11.5										5								
WRD-BH-04	5/23/2018	32.946934	-111.815071		15 - 16.5	SC	40	21	-0.667	86.4	54.7	30.6	102		5		44.8	0					
WRD-BH-04	5/23/2018	32.946934	-111.815071		16.5 - 18																		
WRD-BH-04	5/23/2018	32.946934	-111.815071		20 - 40	SC	30	15		90.6	59.5	37		124.1		10.2							
WRD-BH-04	5/23/2018	32.946934	-111.815071		25 - 26.5	SC	34	16	-0.813	90.2	61.6	35.5			5								
WRD-BH-04	5/23/2018	32.946934	-111.815071		30 - 31.5										6								
WRD-BH-04	5/23/2018	32.946934	-111.815071		40 - 41.5										5								
WRD-BH-04	5/23/2018	32.946934	-111.815071		50 - 51.5										7								
WRD-BH-05	5/23/2018	32.947010	-111.820564		0 - 1.5																		
WRD-BH-05	5/23/2018	32.947010	-111.820564		10 - 11.5										3								
WRD-BH-05	5/23/2018	32.947010	-111.820564		20 - 21.5										3								
WRD-BH-05	5/23/2018	32.947010	-111.820564		25 - 26.5	SC	31	13		67.5	37.2	17.8	108										
WRD-BH-05	5/23/2018	32.947010	-111.820564		30 - 31.5										5								
WRD-BH-05	5/23/2018	32.947010	-111.820564		35 - 36.5																		
WRD-BH-05	5/23/2018	32.947010	-111.820564		40 - 41.5										5								
WRD-BH-05	5/23/2018	32.947010	-111.820564		50 - 51.5	SC	28	9	-1.667	75.7	43.5	22.9	110		4		36.2	1.364					
WRD-BH-05	5/23/2018	32.947010	-111.820564		60 - 61.5										5								
WRD-BH-06	5/23/2018	32.947762	-111.821785		0 - 1.5																		
WRD-BH-06	5/23/2018	32.947762	-111.821785		10 - 11.5										3								
WRD-BH-06	5/23/2018	32.947762	-111.821785		15 - 30	SC	32	16		68.9	39.6	22.1											
WRD-BH-06	5/23/2018	32.947762	-111.821785		20 - 21.5										3								
WRD-BH-06	5/23/2018	32.947762	-111.821785		25 - 26.5																		
WRD-BH-06	5/23/2018	32.947762	-111.821785		30 - 31.5	SC	29	13	-1.000	68.2	42.8	22.7			3								
WRD-BH-06	5/23/2018	32.947762	-111.821785		35 - 36.5																		
WRD-BH-06	5/23/2018	32.947762	-111.821785		40 - 41.5										4								

TETRA TECH

SUMMARY OF LABORATORY RESULTS

PROJECT NUMBER 117-321059-2018 **PROJECT NAME** Sacaton Mine

Boring Number	Date Drilled	Latitude	Longitude	Elevation (feet)	Depth (feet)	Soil Class (USCS)	LL (%)	PI (%)	Liquidity Index	10 Mesh (%)	40 Mesh (%)	200 Mesh (%)	In-Place Density (pcf)	Maximum Dry Density (pcf)	Percent Natural Moisture	Percent Optimum Moisture	Friction Angle (degrees)	Cohesion (ksf)	Unconfined Compressive Strength (ksf)	Splitting Tensile Strength (psi)	Cc	Falling Head Permeability (cm/s)	
WRD-BH-06	5/23/2018	32.947762	-111.821785		50 - 51.5	SC	30	16	-0.625	85.9	54	32.3			4								
WRD-BH-06	5/23/2018	32.947762	-111.821785		60 - 61.5										4								
WRD-TP-12	5/15/2018	32.946892	-111.821724		3.5 - 7	SC	30	13	-1.231	81.5	49.4	24.7		126.4	1	10							
WRD-TP-15	5/15/2018	32.948803	-111.821442		1.5 - 3	ML	NV	NP			99.8	77.4			1								
WRD-TP-16	5/15/2018	32.946312	-111.822189		6 - 9.5	SC-SM	25	7		68.9	43.9	20.6											
WRD-TP-19	5/16/2018	32.945187	-111.824509		5 - 8																		
WRD-TP-22	5/16/2018	32.936646	-111.824249		1 - 4	SP-SM	NV	NP		43.9	20.8	6.5											
WT-BH-01	5/21/2018	32.956593	-111.827087		0 - 1	SC	29	13	-1.077	94.1	73.6	37.2			2								
WT-BH-01	5/21/2018	32.956593	-111.827087		5 - 6.5										5								
WT-BH-01	5/21/2018	32.956593	-111.827087		10 - 11.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		15 - 16.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		20 - 22	SC	31	13	-0.923	87.1	59.9	28.3			6								
WT-BH-01	5/21/2018	32.956593	-111.827087		22 - 23.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		25 - 26.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		30 - 31										7								
WT-BH-01	5/21/2018	32.956593	-111.827087		35 - 36.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		40 - 41.5										8								
WT-BH-01	5/21/2018	32.956593	-111.827087		45 - 46.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		50 - 52	SC	39	23	-0.087	97.3	78.8	42.7			14								
WT-BH-01	5/21/2018	32.956593	-111.827087		52 - 53.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		55 - 56.5										7								
WT-BH-01	5/21/2018	32.956593	-111.827087		60 - 62																		
WT-BH-01	5/21/2018	32.956593	-111.827087		65 - 66.5										10								
WT-BH-01	5/21/2018	32.956593	-111.827087		70 - 71.5																		
WT-BH-01	5/21/2018	32.956593	-111.827087		75 - 77																		
WT-BH-01	5/21/2018	32.956593	-111.827087		80 - 82										12								

APPENDIX B:
Boring Investigation Logs

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Figure No. 1B

LOG OF BORING

Boring WT-BH-01

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.956593 **Coordinates** E: -111.827087
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/21/18	**Date Finished:** 5/21/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0			100		27 - 43		Clayey SAND with gravel (SC), medium dense to very dense, dry to moist, red to tan, interbedded layers of Clayey SAND and Sandy Lean CLAY.		2	29	16	37		
5			100		14 - 26 - 27				5					
10			60		14 - 19 - 22									
15			100		7 - 6 - 6									
20			100						6	31	18	28		
			80		11 - 11 - 14									
25			67		6 - 10 - 14									
30			100		18 - 27				7					
35			73		7 - 8 - 10									
40			73		6 - 7 - 15				8					
45			80		6 - 6 - 8									
50			100						14	39	16	43		
			73		5 - 10 - 9									
55									7					

Water Level Observations		Remarks:
▽ During Drilling: Not Recorded	▼ After Drilling: Not Recorded	
▽ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

TT LOG OF BORING - MDT REVISED 2009+.GDT - 7/27/18 11:31 - N:\GEOTECH\REPORTS\REPORT 2018\SACATON MINE\LAB LOG\117-321059-2018 - SACATON MINE_UPDATED.GPJ

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Figure No. 1B

LOG OF BORING

Boring WT-BH-01

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.956593 **Coordinates** E: -111.827087
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/21/18	**Date Finished:** 5/21/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60			80		8 - 10 - 12									
			45		10 - 11 - 12									
65			73		12 - 20 - 18				10					
70			73		11 - 17 - 15									
75			65		12 - 23 - 19									
80			100		18 - 27			82.0	12					

Boring Depth: 82.0 ft, *Elevation:*

Water Level Observations		Remarks:
During Drilling: Not Recorded	After Drilling: Not Recorded	
After Drilling: Not Recorded		

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Figure No. 2B

LOG OF BORING

Boring ALL-BH-02

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.959049 **Coordinates** E: -111.809021
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/21/18	**Date Finished:** 5/22/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
5			60		8 - 9 - 9		FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular, fill placed with layers grading from Silty SAND to Clayey SAND.		5					
10			75							NV	NP	26		
			80		10 - 15 - 13									
15			60		4 - 6 - 7				5					
20			60		4 - 9 - 12									
25			100		9 - 10 - 11					30	17	38	114	UCS= 2.77 ksf
30			67		8 - 10 - 10				11	36	17	39		
35			40		14 - 22 - 21									
40			73		5 - 6 - 11			41.5	5					

Boring Depth: 41.5 ft, *Elevation:*

Water Level Observations		Remarks:
After Drilling: Not Recorded	During Drilling: Not Recorded	
	After Drilling: Not Recorded	

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Figure No. 3B

LOG OF BORING

Boring WRD-BH-03

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.94656 **Coordinates** E: -111.812561
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/22/18	**Date Finished:** 5/22/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0			87		3 - 6 - 9		(CL), Dry Blocky sections of soil, easily broken.	1.0						
5			38		7 - 11 - 13		FILL, Clayey SAND with gravel (SC), medium dense to dense, dry to slightly moist, red to tan/brown, medium grained, angular, low plasticity, mostly homogenius.		4					
10			61		5 - 5 - 10									
15			39		10 - 16 - 28				21					
20			100						4	34	17	30	104	Friction Angle= 33.6 degrees Cohesion= 1.06 ksf
25			100		7 - 7 - 9				4					
30			44		8 - 10 - 11				4					
35														
40			44		9 - 11 - 13				5					
45														
50			100		14 - 14 - 14			51.5	6	30	16	38		

Boring Depth: 51.5 ft, *Elevation:*

Water Level Observations		Remarks:
During Drilling: Not Recorded	After Drilling: Not Recorded	
After Drilling: Not Recorded		

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Figure No. 4B

LOG OF BORING

Boring WRD-BH-04

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.946934 **Coordinates** E: -111.815071
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/23/18	**Date Finished:** 5/23/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0			67		6 - 8 - 12		FILL, Clayey SAND (SC), medium dense to very dense, dry to slightly moist, red to tan/brown, medium grained, low plasticity.							
5			53		5 - 7 - 10				4					
10			86		6 - 7 - 7				5					
15			83						5	40	19	31	102	Friction Angle= 44.8 degrees Cohesion= 0 ksf
			50		12 - 12 - 12									
20										30	15	37		
25			100		6 - 11 - 15				5	34	18	36		
30			50		7 - 8 - 11				6					
35														
40			73		8 - 13 - 11				5					
45														
50			38		40 - 50/0.4ft			51.5	7					

Boring Depth: 51.5 ft, *Elevation:*

Water Level Observations		Remarks:
During Drilling: Not Recorded	After Drilling: Not Recorded	
After Drilling: Not Recorded		

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Figure No. 5B

LOG OF BORING

Boring WRD-BH-05

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.94701 **Coordinates** E: -111.820564
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/23/18	**Date Finished:** 5/23/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0			53		11 - 14 - 12		FILL, Clayey SAND with gravel (SC), loose to dense, dry to moist, gray to red, medium to coarse grained, low plasticity.							
5														
10			40		16 - 22 - 23				3					
15														
20			60		3 - 4 - 3				3					
25			100		3 - 10 - 17					31	18	18	108	
30			67		3 - 3 - 5				5					
35			80		6 - 4 - 4									
40			80		5 - 7 - 6				5					
45														
50			100		7 - 7 - 8				4	28	19	23		
55														

Water Level Observations		Remarks:
▽ During Drilling: Not Recorded	▼ After Drilling: Not Recorded	
▽ After Drilling: Not Recorded	▼ After Drilling: Not Recorded	

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Figure No. 5B

LOG OF BORING

Boring WRD-BH-05

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.94701 **Coordinates** E: -111.820564
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/23/18	**Date Finished:** 5/23/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60			100		10 - 11 - 17			61.5	5					

Boring Depth: 61.5 ft, *Elevation:*

Water Level Observations		Remarks:
During Drilling: Not Recorded	After Drilling: Not Recorded	
After Drilling: Not Recorded		

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Figure No. 6B

LOG OF BORING

Boring WRD-BH-06

TETRA TECH

Project: Sacaton MS	**Rig:** CME-75 **Hammer:** Auto	**Boring Location Coordinates** N: 32.947762 E: -111.821785	
Project Number: 117-321059-2018	**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84	**Top of Boring Elevation:**
Date Started: 5/23/18 / **Date Finished:** 5/23/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings	
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland	**Location:**		

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
0			67		10 - 14 - 16		FILL, Clayey SAND with gravel (SC), very loose to dense, dry to moist, gray to red.							
10									3					
			80		2 - 2 - 1									
15										32	16	22		
20									3					
			67		3 - 4 - 4									
25			40		4 - 4 - 8									
30									3	29	16	32		
			100		4 - 6 - 5									
35			60		3 - 5 - 4									
40									4					
			67		10 - 12 - 14									
45														
50									4	30	14	32		
			53		15 - 12 - 17									
55														

Water Level Observations		Remarks:
After Drilling: Not Recorded	During Drilling: Not Recorded After Drilling: Not Recorded	

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Figure No. 6B

LOG OF BORING

Boring WRD-BH-06

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.947762 **Coordinates** E: -111.821785
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/23/18	**Date Finished:** 5/23/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) *Elev. (ft)*	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) *Elev. (ft)*	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60		☒	60		15 - 17 - 20			61.5	4					

Boring Depth: 61.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Drilling: Not Recorded	▽ After Drilling: Not Recorded	
▼ After Drilling: Not Recorded		

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Figure No. 7B

LOG OF BORING

Boring TSF-BH-07

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.945435 **Coordinates** E: -111.840561
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/24/18	**Date Finished:** 5/24/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
5			73		3 - 8 - 17		Clayey SAND (SC), medium dense to dense, dry to slightly moist, red to gray, medium to coarse grained, low plasticity.		2					
			87		7 - 6 - 6									
10			0					10.5	4	28	15	31	105	Friction Angle= 30.9 degrees Cohesion= 0.149 ksf
			87		17 - 30 - 50/1.4ft		Clayey SAND (SC), very dense, dry to slightly moist, red to white, medium to coarse grained, subangular, low plasticity, scattered gravels. Interbedded layers of Clayey SAND and Sandy Lean CLAY with angular gravels, with visible lenses in some areas and varied gradation in sand and gravels..							
15			40		18 - 50/1.0ft				6					
20			100		21 - 24 - 27				4					
25			100		16 - 31 - 50/1.4ft					33	18	35	87	Friction Angle= 34.2 degrees Cohesion= 0.035 ksf
30			27		15 - 50/0.9ft				7					
35			58		35 - 50/0.9ft									
40			100		28 - 50/0.9ft				6	40	21	42		
45			47		21 - 21 - 36									
50			40		50/0.5ft				4					
55														

Water Level Observations

- During Drilling: Not Recorded
- After Drilling: Not Recorded
- After Drilling: Not Recorded

Remarks:

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Figure No. 7B

LOG OF BORING

Boring TSF-BH-07

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.945435 **Coordinates** E: -111.840561
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/24/18	**Date Finished:** 5/24/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60			40		50/0.4ft									
			53		29 - 47 - 50			61.5	4					

Boring Depth: 61.5 ft, *Elevation:*

Water Level Observations		
After Drilling: Not Recorded	During Drilling: Not Recorded	Remarks:
	After Drilling: Not Recorded	

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Figure No. 8B

LOG OF BORING

Boring TSF-BH-08

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.946518 **Coordinates** E: -111.839851
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/24/18	**Date Finished:** 5/24/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), dry, gray to tan/brown, medium to coarse grained, angular, non plastic, Fractured Angular fill placed as cover layer.	0.3						
5			80		7 - 5 - 6		FILL, Sandy, Silty CLAY (CL-ML), medium stiff to hard, dry to moist, gray to red, fine to medium grained, low plasticity, Tailings were placed as slurry and present as discontinous depositional layers grading from Sandy Silty CLAY to Silty SAND.		7					
10			87		3 - 3 - 5				4					
15														
20			100		4 - 4 - 8				8					
25														
30			100						9	19	15	54		
35			87		4 - 4 - 5									
40			66		3 - 4 - 6				7	NV	NP	44	90	Friction Angle= 32.4 degrees Cohesion= 0.604 ksf
45														
50			100		2 - 5 - 6				13					
55														

Water Level Observations		Remarks:
▽ During Drilling: 61.0 ft	▽ After Drilling: Not Recorded	
▼ After Drilling: Not Recorded		

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Figure No. 8B

LOG OF BORING

Boring TSF-BH-08

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.946518 **Coordinates** E: -111.839851
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/24/18	**Date Finished:** 5/24/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60			100		8 - 9 - 16				23	18	14	53	109	
65														
70			87		2 - 3 - 5				14					
75														
80			80		10 - 12 - 13				8					
							Clayey SAND with gravel (SC), medium dense to dense, moist to very moist, reddish brown, fine to medium grained, calcium diorite deposits, white mottling.	83.0						
85			87		7 - 14 - 15				6					
90			100		10 - 17 - 25									
95			87		13 - 16 - 21				13					
100			87		13 - 20 - 24			101.5	11					

Boring Depth: 101.5 ft, *Elevation:*

Water Level Observations		Remarks:
During Drilling: 61.0 ft	After Drilling: Not Recorded	
After Drilling: Not Recorded		

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Figure No. 9B

LOG OF BORING

Boring TSF-BH-09

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.958961 **Coordinates** E: -111.832085
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/25/18	**Date Finished:** 5/25/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), dry, gray to tan/brown, medium to coarse grained, angular, Fractured Angular fill placed as cover layer.	0.6						
5			71				FILL, Silty SAND (SM), loose to very dense, dry to moist, gray to red, fine to medium grained, Tailings were placed as slurry and present as discontinous depositional layers grading from Silty SAND to Clayey SAND.		5	NV	NP	22		
			100		4 - 4 - 4									
10			87		4 - 7 - 3				5	NV	NP	37	105	Friction Angle= 30 degrees Cohesion= 0.899 ksf
15			100						16	NV	NP	48	98	UCS= 1.25 ksf
			94		3 - 3 - 3									
20			100		2 - 1 - 5				8					
25			100		4 - 3 - 5									
30			39		9 - 9 - 10				10					
35			100		8 - 13 - 13									
40			67		10 - 10 - 11			41.0	7					
45			100		19 - 26 - 27		Clayey SAND with gravel (SC), medium dense to very dense, moist to very moist, reddish brown, fine to medium grained, calcium diorite deposits, white mottling.			49	24	36		
50			100		12 - 13 - 20				6					
55														

Water Level Observations		Remarks:
▽ During Drilling: Not Recorded	▽ After Drilling: Not Recorded	
▼ After Drilling: Not Recorded		

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Figure No. 9B

LOG OF BORING

Boring TSF-BH-09

TETRA TECH

Project: Sacaton MS		**Rig:** CME-75 **Hammer:** Auto	**Boring Location** N: 32.958961 **Coordinates** E: -111.832085
Project Number: 117-321059-2018		**Boring Diameter:** 6 in	**System:** Decimal Degrees **Datum:** WGS84 — **Top of Boring Elevation:**
Date Started: 5/25/18	**Date Finished:** 5/25/18	**Drilling Fluid:** None	**Abandonment Method:** Backfilled with Cuttings
Driller: Geomechanics Southwest, Inc. **Logger:** Sarah Garland		**Location:**	

Depth (ft) / Elev. (ft)	Operation	Sample Type	Recovery (%)	RQD (%)	Blow Count	Lithology	Material Description	Depth (ft) / Elev. (ft)	MC (%)	LL	PL	-200 (%)	DD	Remarks and Other Tests
60														
			100		12 - 12 - 16									
65														
70									6					
			100		17 - 15 - 20			71.5						

Boring Depth: 71.5 ft, *Elevation:*

Water Level Observations		
During Drilling: Not Recorded	After Drilling: Not Recorded	Remarks:
After Drilling: Not Recorded		

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Figure No. 10B

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LOG OF TEST PIT

Test Pit TSF-TP-01

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9586601257324 E: -111.832382202148	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/14/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY with gravel (CL), moist to dry, yellow to red, fine to medium grained, medium plasticity, Tailings placed as slurry.		
							FILL, Clayey SAND (SC), moist, red to brown, fine grained.	6.5 6.7	No reaction to HCL
10							FILL, Silty SAND (SM), dry to moist, yellow to red, fine to medium grained, Tailings placed as slurry and present as discontinous depositional layers grading from Silty SAND to Clayey SAND.		
15		7	21	19	16			15.5	

Boring Depth: 15.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded		

Figure No. 11B

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LOG OF TEST PIT

Test Pit TSF-TP-02

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9578666687012 E: -111.832855224609	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/14/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY (CL), dry to moist, yellow to red, fine to medium grained, medium plasticity, Tailings placed as slurry.		
							Clayey SAND (SC), red to brown.	6.5 6.8	
10							FILL, Silty SAND (SM), dry to moist, yellow to red, fine to medium grained, low plasticity, Tailings placed as slurry and present as discontinous depositional layers grading from Silty SAND to Clayey SAND.	14.0	

Boring Depth: 14.0 ft, *Elevation:*

Water Level Observations		Remarks:
▼ After Excavation: Not Recorded	▽ During Excavation: Not Recorded	
	▼ After Excavation: Not Recorded	

Figure No. 12B

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LOG OF TEST PIT

Test Pit TSF-TP-03

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9563674926758 E: -111.833930969238	
Project Number: 117-321059-2018	**Dimensions:** 5' x 14'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/14/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Sandy Lean CLAY (CL), dry, yellow to red, Blocky Sun-baked layer.	0.5	
5							FILL, Sandy Lean CLAY (CL), slightly moist to moist, red to brown, Tailings deposited as slurry, defined layering, varied in color and gradation, layers grading from Silty SAND to Clayey SAND to Sandy Lean CLAY.		
10									
15									
20								20.5	

Boring Depth: 20.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 13B

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LOG OF TEST PIT

Test Pit TSF-TP-04

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9549369812012 E: -111.83519744873	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/14/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
0							FILL, Sandy Lean CLAY with crusted, dry, yellow to red, Blocky Sun-baked layer.	0.5	
5							FILL, Sandy Lean CLAY, slightly moist to moist, red to brown, Tailings deposited as slurry, defined layering, varied in color and gradation, layers grading from Silty SAND to Clayey SAND to Sandy Lean CLAY.		
10									
15								15.0	

Boring Depth: 15.0 ft, *Elevation:*

Water Level Observations		
During Excavation: Not Recorded		Remarks:
After Excavation: Not Recorded	**After Excavation:** Not Recorded	

Figure No. 14B

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LOG OF TEST PIT

Test Pit WRD-TP-05

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9485549926758 E: -111.822471618652	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/14/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), stiff to very stiff, dry to slightly moist, red to tan/brown, medium grained, angular, low plasticity, Well-graded sand, and angular fractured Gravels up to 7 +/-.	1.0	
10								10.0	

Boring Depth: 10.0 ft, *Elevation:*

Water Level Observations		Remarks:
▼ After Excavation: Not Recorded	▽ During Excavation: Not Recorded	
	▼ After Excavation: Not Recorded	

Figure No. 15B

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LOG OF TEST PIT

Test Pit WRD-TP-06

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.949520111084 E: -111.821762084961	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/14/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), medium dense to dense, dry to slightly moist, gray to white, medium to coarse grained, angular, non plastic, Fractured angular gravels, well-graded. Holds slope steeper than 1.8:1 (H:V) with some but not significant erosion..	6.0	

Boring Depth: 4.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ **After Excavation:** Not Recorded	▽ **During Excavation:** Not Recorded	
	▼ **After Excavation:** Not Recorded	

Figure No. 16B

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LOG OF TEST PIT

Test Pit WRD-TP-07

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9457550048828 E: -111.820259094238	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							(CL), Dry Blocky sections of soil, easily broken.	1.0	
							FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, Alluvial soils placed as fill.	2.3	
5							FILL, Clayey GRAVEL with sand (GC), loose to medium dense, slightly moist, red to brown, coarse grained, angular to subangular, Alluvial soils placed as fill, Well-graded sand, and angular fractures Gravels up to 7 +/-.	8.0	

Boring Depth: 8.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 17B

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LOG OF TEST PIT

Test Pit WRD-TP-08

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9457550048828 E: -111.820236206055	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, Alluvial soils placed as fill.	1.0 7.0	

Boring Depth: 7.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ After **Excavation:** Not Recorded	▽ During **Excavation:** Not Recorded	
	▼ After **Excavation:** Not Recorded	

Figure No. 18B

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LOG OF TEST PIT

Test Pit WRD-TP-09

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9459571838379 E: -111.820327758789	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18 / **Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings		
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.	1.0 7.0	

Boring Depth: 7.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 19B

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LOG OF TEST PIT

Test Pit WRD-TP-10

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.945369720459 E: -111.820350646973	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.	1.2 7.0	

Boring Depth: 7.0 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	During Excavation: Not Recorded	
	After Excavation: Not Recorded	

Figure No. 20B

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LOG OF TEST PIT

Test Pit WRD-TP-11

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9464836120605 E: -111.821334838867	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							(CL), Dry Blocky sections of soil, easily broken.	1.5	
5							FILL, Clayey SAND with gravel (SC), Alluvium, dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.		
10								12.0	

Boring Depth: 12.0 ft, *Elevation:*

Water Level Observations		Remarks:
During Excavation: Not Recorded	**After Excavation:** Not Recorded	
After Excavation: Not Recorded		

Figure No. 21B

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LOG OF TEST PIT

Test Pit WRD-TP-12

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.946891784668 E: -111.821723937988	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5		1	30	17	27		(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.	1.0 9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	During Excavation: Not Recorded	
	After Excavation: Not Recorded	

Figure No. 22B

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LOG OF TEST PIT

Test Pit WRD-TP-13

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.947826385498 E: -111.822639465332	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.	1.0 9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

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Figure No. 23B

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LOG OF TEST PIT

Test Pit WRD-TP-14

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9482765197754 E: -111.821250915527	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken.	1.8	
							FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.	9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ **After Excavation:** Not Recorded	▽ **During Excavation:** Not Recorded	
	▼ **After Excavation:** Not Recorded	

Figure No. 24B

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LOG OF TEST PIT

Test Pit WRD-TP-15

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.948802947998 E: -111.821441650391	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5		1	NV	NP	77		FILL, Clayey GRAVEL with sand (GC), dense, dry, gray, coarse grained, angular, non plastic, Fractured gravels varied in size between 2 to 12.	5.5	

Boring Depth: 5.5 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

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Figure No. 25B

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LOG OF TEST PIT

Test Pit WRD-TP-16

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9463119506836 E: -111.822189331055	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5			25	18	21		(CL), Dry Blocky sections of soil, easily broken. FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, Alluvial soils placed as fill.	1.3	
10							FILL, Silty, Clayey SAND with gravel (SC-SM), slightly moist, yellow to tan/brown, medium grained, angular, Alluvial soils placed as fill.	6.0	
15								15.0	

Boring Depth: 15.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 26B

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LOG OF TEST PIT

Test Pit WRD-TP-17

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9472351074219 E: -111.818824768066	
Project Number: 117-321059-2018	**Dimensions:** 5' x 14'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							(CL), Dry Blocky sections of soil, easily broken.	1.5	
10							FILL, Clayey SAND with gravel (SC), dry to slightly moist, yellow to tan/brown, medium grained, angular, low plasticity, Alluvial soils placed as fill.		
15								18.0	

Boring Depth: 18.0 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	**During Excavation:** Not Recorded	
	After Excavation: Not Recorded	

Figure No. 27B

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LOG OF TEST PIT

Test Pit WRD-TP-18

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9478378295898 E: -111.819404602051	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/15/18	**Date Finished:** 5/15/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
0							FILL, Clayey SAND with gravel (SC), Dry Blocky sections of soil, easily broken.	1.0	
							FILL, Sandy Lean CLAY with gravel (CL), dry to slightly moist, yellow to tan/brown, medium grained, angular, Alluvial soils placed as fill.	2.5	
5							FILL, Clayey SAND with gravel (SC), Alluvial soils placed as fill.		
10									
15								15.0	

Boring Depth: 15.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

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Figure No. 28B

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LOG OF TEST PIT

Test Pit WRD-TP-19

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9451866149902 E: -111.824508666992	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY with gravel (CL), dry to slightly moist, red to gray, fine to coarse grained, medium plasticity, Sun-crusted blocky soil, easily broken.	1.3 2.5	
							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained, Horizontal depostion.	8.0	
							Clayey SAND with gravel (SC), Fractured gravels occasionally encountered, becomes more moist and darker red with depth.		

Boring Depth: 8.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 29B

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LOG OF TEST PIT

Test Pit WRD-TP-20

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9446830749512 E: -111.824508666992	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	2.1	
5							FILL, Clayey SAND (SC), slightly moist to moist, gray to tan/brown, coarse grained.	5.8	
							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained.		
10								10.0	

Boring Depth: 10.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ **After Excavation:** Not Recorded	▽ **During Excavation:** Not Recorded	
	▼ **After Excavation:** Not Recorded	

Figure No. 30B

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LOG OF TEST PIT

Test Pit WRD-TP-21

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.939338684082 E: -111.824447631836	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), slightly moist, red to gray, fine to coarse grained.	0.3 1.4	
5							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	4.2	
							FILL, Clayey SAND (SC), slightly moist to moist, gray to tan/brown, coarse grained.		
10							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained.	12.0	

Boring Depth: 12.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded		

Figure No. 31B

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LOG OF TEST PIT

Test Pit WRD-TP-22

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9366455078125 E: -111.824249267578	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18 **Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings		
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
			NV	NP	7		FILL, Poorly-Graded SAND with silt and gravel (SP-SM), slightly moist to moist, gray to tan/brown, fine to medium grained.	4.0	

Boring Depth: 4.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 32B

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LOG OF TEST PIT

Test Pit WRD-TP-23

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9366035461426 E: -111.824401855469	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Clayey SAND with gravel (SC), slightly moist, red to gray, fine to coarse grained.	2.0	
5							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	3.0	
							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	6.5	

Boring Depth: 6.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded		

Figure No. 33B

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LOG OF TEST PIT

Test Pit WRD-TP-24

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9368591308594 E: -111.824424743652	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Clayey SAND with gravel (SC), slightly moist, red to gray, fine to coarse grained.	2.2	
5							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	5.6	

Boring Depth: 5.0 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 34B

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LOG OF TEST PIT

Test Pit WRD-TP-25

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9362907409668 E: -111.824401855469	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Clayey SAND with gravel (SC), slightly moist, red to gray, fine to coarse grained.	2.0	
5							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	5.6	

Boring Depth: 5.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ After Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 35B

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LOG OF TEST PIT

Test Pit WRD-TP-26

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9372901916504 E: -111.824447631836	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Clayey SAND with gravel (SC), slightly moist, red to gray, fine to coarse grained.	1.0	
							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	6.5	

Boring Depth: 6.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ During Excavation: Not Recorded	▽ During Excavation: Not Recorded	
▼ After Excavation: Not Recorded	▼ After Excavation: Not Recorded	

Figure No. 36B

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LOG OF TEST PIT

Test Pit WRD-TP-27

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9321403503418 E: -111.824401855469	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	0.3	
							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained.	9.5	

Boring Depth: 9.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ After **Excavation:** Not Recorded	▽ During **Excavation:** Not Recorded	
	▼ After **Excavation:** Not Recorded	

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Figure No. 37B

2525 Palmer Street, Suite 2
Missoula, MT 59808
Phone: (406)543-3045
Fax: (406)543-3088

LOG OF TEST PIT

Test Pit WRD-TP-28

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9318923950195 E: -111.82356262207	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
							FILL, Clayey GRAVEL with sand (GC), slightly moist to moist, gray to tan/brown, coarse grained.	3.5	

Boring Depth: 3.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ After **Excavation:** Not Recorded	▽ During **Excavation:** Not Recorded	
	▼ After **Excavation:** Not Recorded	

Figure No. 38B

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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit WRD-TP-29

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.931999206543 E: -111.812599182129	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	2.3	
							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained.	9.5	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	**During Excavation:** Not Recorded	
	After Excavation: Not Recorded	

Figure No. 39B

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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit WRD-TP-30

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9335136413574 E: -111.809471130371	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/16/18	**Date Finished:** 5/16/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Sandy Lean CLAY (CL), slightly moist, red to gray, fine to coarse grained.	2.0	
							FILL, Clayey SAND with gravel (SC), slightly moist to moist, gray to tan/brown, coarse grained.	8.5	

Boring Depth: 8.5 ft, *Elevation:*

Water Level Observations		Remarks:
▼ After **Excavation:** Not Recorded	▽ During **Excavation:** Not Recorded	
	▼ After **Excavation:** Not Recorded	

Figure No. 40B

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LOG OF TEST PIT

Test Pit ALL-TP-31

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.960334777832 E: -111.811462402344	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.		
10								12.5	

Boring Depth: 12.5 ft, *Elevation:*

Water Level Observations		Remarks:
▽ **After Excavation:** Not Recorded	▽ **During Excavation:** Not Recorded	
	▼ **After Excavation:** Not Recorded	

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Figure No. 41B

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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit ALL-TP-32

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9599075317383 E: -111.808547973633	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	7.5	

Boring Depth: 7.5 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	**During Excavation:** Not Recorded	
	After Excavation: Not Recorded	

Figure No. 42B

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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit ALL-TP-33

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9600028991699 E: -111.807647705078	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.		
10								10.5	

Boring Depth: 10.5 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

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Figure No. 43B

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Phone: (406)543-3045
Fax: (406)543-3088

LOG OF TEST PIT

Test Pit ALL-TP-34

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9594230651855 E: -111.808715820313	
Project Number: 117-321059-2018	**Dimensions:** 5' x 9.5'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	7.5	

Boring Depth: 7.5 ft, *Elevation:*

Water Level Observations		Remarks:
During Excavation: Not Recorded	After Excavation: Not Recorded	
After Excavation: Not Recorded		

Figure No. 44B

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LOG OF TEST PIT

Test Pit ALL-TP-35

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9574699401855 E: -111.80744934082	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
During Excavation: Not Recorded	**After Excavation:** Not Recorded	
After Excavation: Not Recorded		

Figure No. 45B

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LOG OF TEST PIT

Test Pit ALL-TP-36

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9574699401855 E: -111.80744934082	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

Figure No. 46B

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LOG OF TEST PIT

Test Pit ALL-TP-37

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9591217041016 E: -111.810050964355	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5		3	29	16	31		FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	9.0	

Boring Depth: 9.0 ft, *Elevation:*

Water Level Observations		Remarks:
After Excavation: Not Recorded	**During Excavation:** Not Recorded	
	After Excavation: Not Recorded	

Figure No. 47B

2525 Palmer Street, Suite 2
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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit ALL-TP-38

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9571914672852 E: -111.809814453125	
Project Number: 117-321059-2018	**Dimensions:** 5' x 11'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							FILL, Clayey SAND with gravel (SC), loose to medium dense, dry to slightly moist, gray, medium to coarse grained, angular to subangular.	8.7	

Boring Depth: 8.7 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

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Figure No. 49B

2525 Palmer Street, Suite 2
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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit PRL-TP-40

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.954231262207 E: -111.820579528809	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/18/18	**Date Finished:** 5/18/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							Clayey SAND (SC), medium dense to dense, dry to slightly moist, red to gray, fine to coarse grained, low plasticity.	5.2	

Boring Depth: 5.2 ft, *Elevation:*

Water Level Observations		Remarks:
After **Excavation:** Not Recorded	During **Excavation:** Not Recorded	
	After **Excavation:** Not Recorded	

Figure No. 48B

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Fax: (406)543-3088

LOG OF TEST PIT

Test Pit SETTL-TP-39

TETRA TECH

Project: Sacaton MS	**Rig:** Hitachi 200	**Test Pit Location Coordinates** N: 32.9497032165527 E: -111.814079284668	
Project Number: 117-321059-2018	**Dimensions:** 5' x 8'	**System:** Decimal Degrees **Datum:** WGS84	**Top of Excavation Elevation:**
Date Started: 5/17/18	**Date Finished:** 5/17/18	**Abandonment Method:** Backfilled with Cuttings	
Driller: Environmental Response, Inc. **Logger:** Sarah Garland	**Comments:**		

Depth (ft) Elev. (ft)	Sample Type	MC (%)	LL	PL	-200 (%)	Lithology	Material Description	Depth (ft) Elev. (ft)	Remarks and Other Tests
5							SILT (ML), very loose, dry, white, fine grained, Material is light, friable Alum that was used within a settling pond. There was a two-inch layer of dried foam on the top..	5.8	

Boring Depth: 5.8 ft, *Elevation:*

Water Level Observations		Remarks:
During Excavation: Not Recorded	After Excavation: Not Recorded	
After Excavation: Not Recorded		

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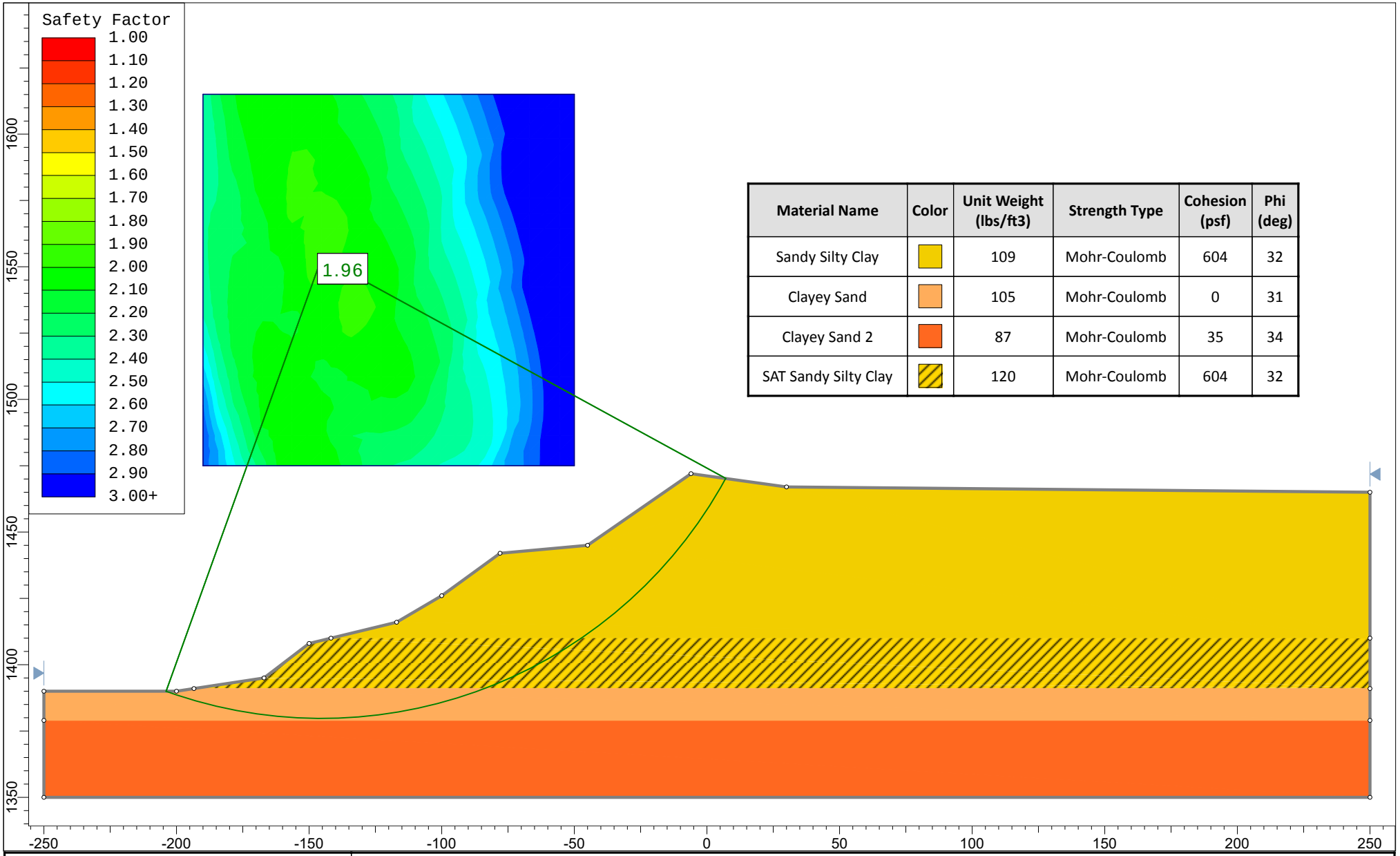
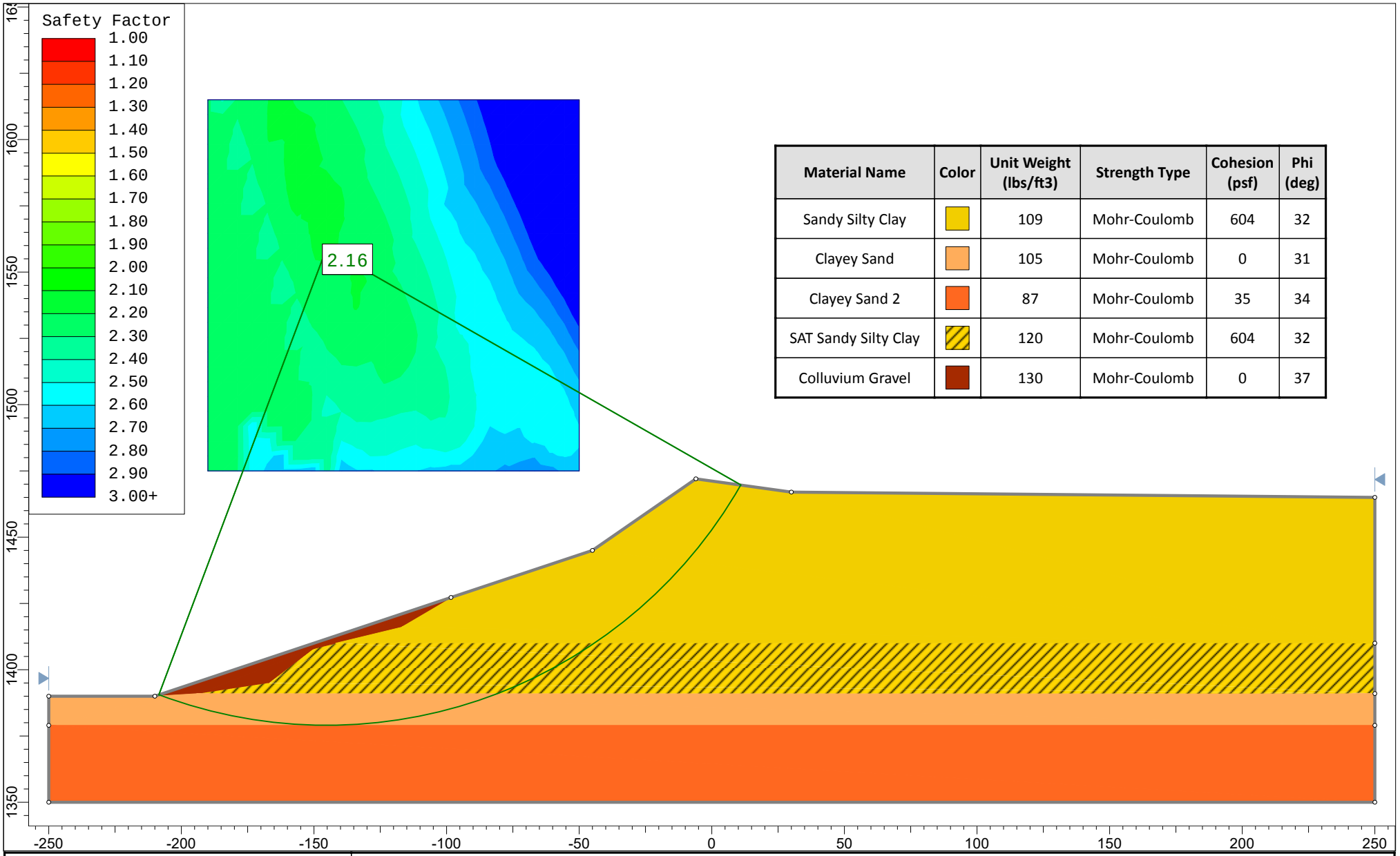
APPENDIX C:
Slope Stability Analysis Cross Sections



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sandy Silty Clay		109	Mohr-Coulomb	604	32
Clayey Sand		105	Mohr-Coulomb	0	31
Clayey Sand 2		87	Mohr-Coulomb	35	34
SAT Sandy Silty Clay		120	Mohr-Coulomb	604	32

SLIDEINTERPRET 7.013

Project	Sacaton Mine - # 117-321059-2018 - Slide Model		
Analysis Description	TSF Existing Slope - Sta. 69+00, Section 8		
Drawn By	JD	Scale 1:600	Company Tetra Tech
Date	7/27/2018		File Name Existing Slope Sect 8 Sta 69+00.slim

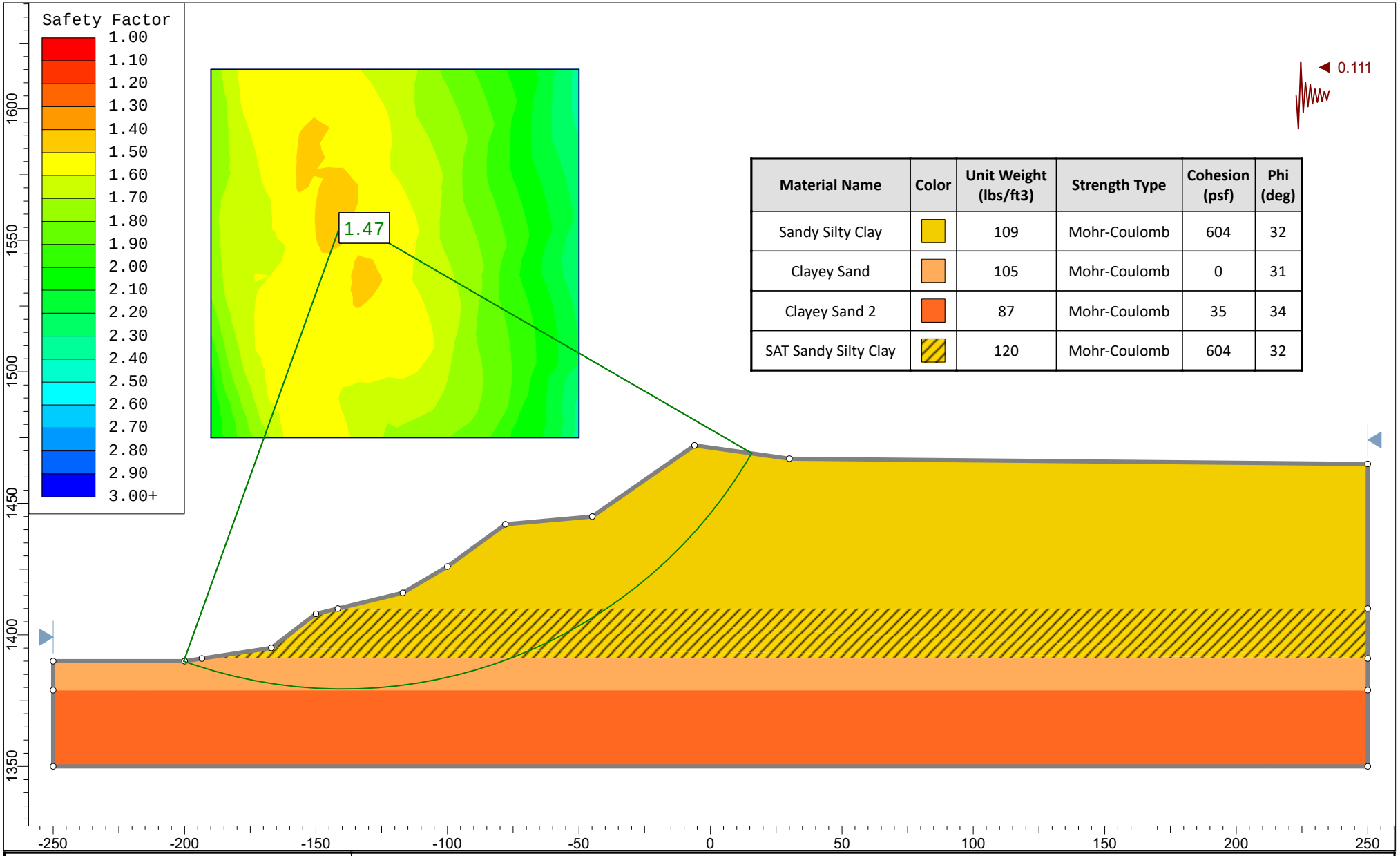


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sandy Silty Clay		109	Mohr-Coulomb	604	32
Clayey Sand		105	Mohr-Coulomb	0	31
Clayey Sand 2		87	Mohr-Coulomb	35	34
SAT Sandy Silty Clay		120	Mohr-Coulomb	604	32
Colluvium Gravel		130	Mohr-Coulomb	0	37

rocscience

SLIDEINTERPRET 7.013

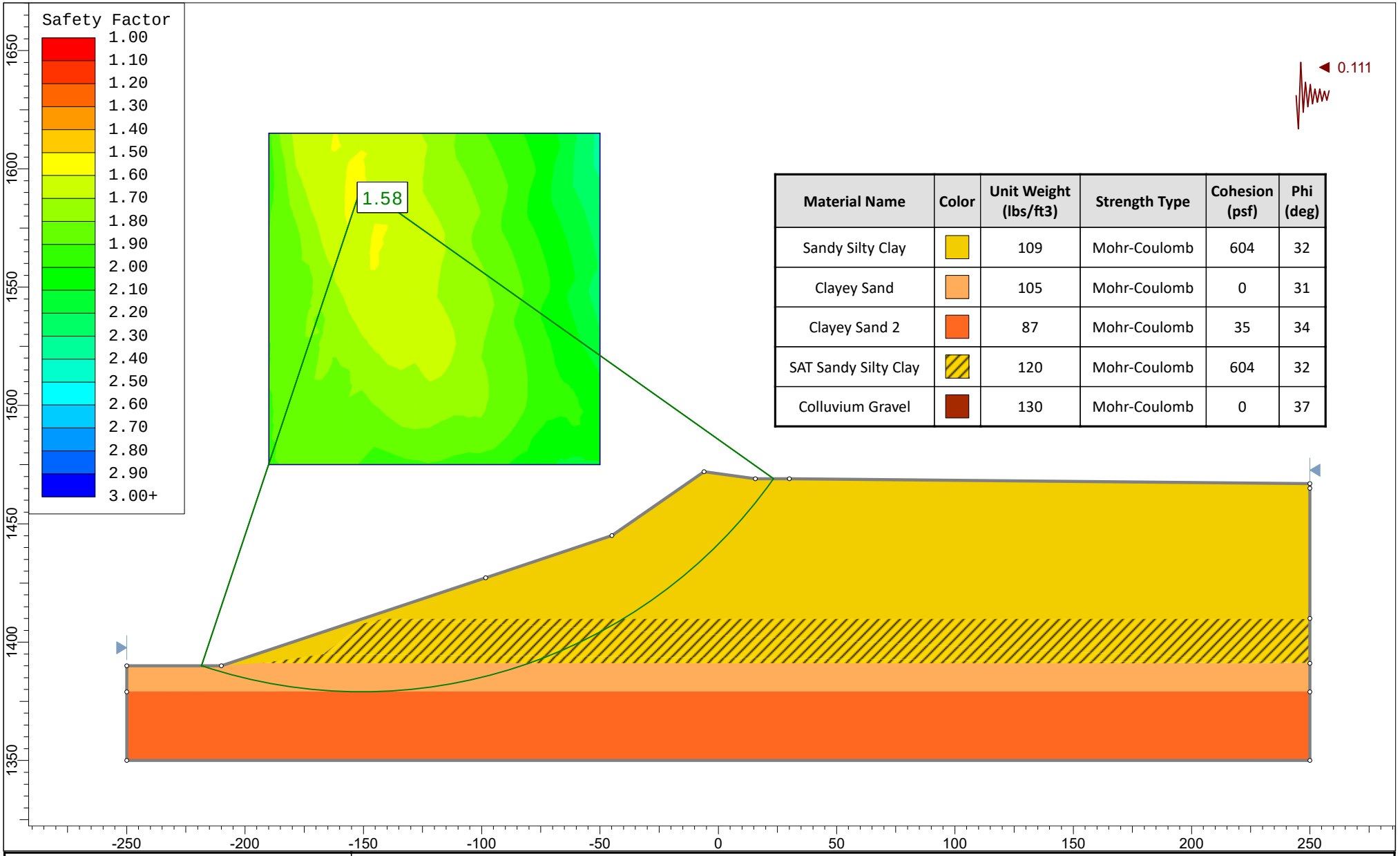
Project	Sacaton Mine - # 117-321059-2018 - Slide Model		
Analysis Description	TSF Proposed Slope - Sta. 69+00, Section 8		
Drawn By	JD	Scale 1:600	Company Tetra Tech
Date	7/27/2018		File Name Prop Slope Sect 8 Sta 69+00.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sandy Silty Clay		109	Mohr-Coulomb	604	32
Clayey Sand		105	Mohr-Coulomb	0	31
Clayey Sand 2		87	Mohr-Coulomb	35	34
SAT Sandy Silty Clay		120	Mohr-Coulomb	604	32

SLIDEINTERPRET 8.016

Project	Sacaton Mine - # 117-321059-2018 - Slide Model			Figure - 1D
Analysis Description	TSF Existing Slope - Sta. 69+00, Section 8			
Drawn By	JD	Scale	1:605	Company: Tetra Tech
Date	7/27/2018			File Name: Existing Slope Sect 8 Sta 69+00.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Sandy Silty Clay		109	Mohr-Coulomb	604	32
Clayey Sand		105	Mohr-Coulomb	0	31
Clayey Sand 2		87	Mohr-Coulomb	35	34
SAT Sandy Silty Clay		120	Mohr-Coulomb	604	32
Colluvium Gravel		130	Mohr-Coulomb	0	37

SLIDEINTERPRET 8.016

Project	Sacaton Mine - # 117-321059-2018 - Slide Model		Figure - 2D
Analysis Description	TSF Proposed Slope - Sta. 69+00, Section 8		
Drawn By	JD	Scale 1:673	Company Tetra Tech
Date	7/27/2018		File Name Prop Slope Sect 8 Sta 69+00.slim

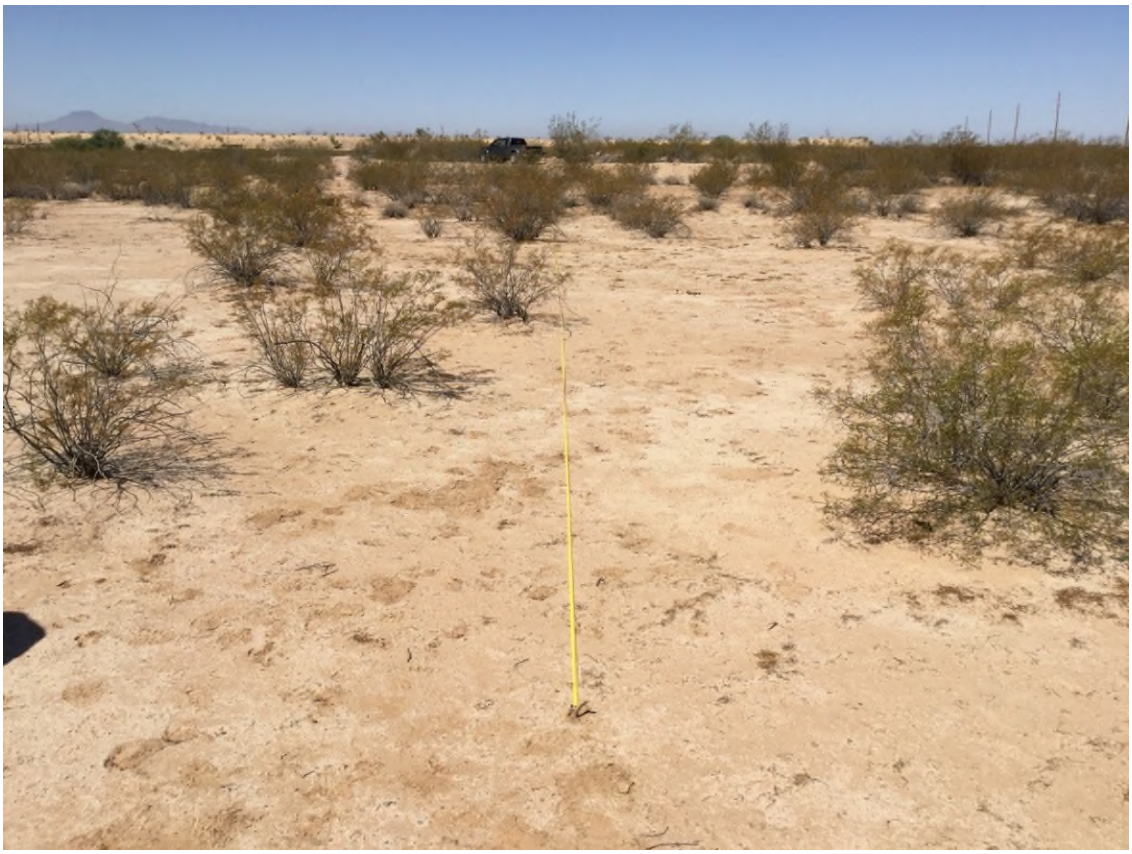
APPENDIX D:
Vegetation Evaluation Reference Information

Sacaton Mine - Plant Species Observed within Reclaimed and Disturbed Areas and their Attributes

Life Form	Common Name	Latin name	Adapted to Coarse Textured Soil	Adapted to Fine Textured Soil	Drought Tolerance	pH Tolerance Range	Precip Min (in)	Precip Max (in)	Min Root Depth (in)	Salt Tolerance	Grazer Palatability	Season	Growth/ Roots	Reproduction	seeds/lbs	Notes
Grasses																
	six-weeks threeawn	*Aristida adscensionis*	Yes	No	High	5.5-7.5	2	15	12	High	low	Cool(C3)	Annual	seeds	140,000	May have an allelopathic effect on Rhizobium spp. (Murthy et al., 1977) Aristida adscensionis is a pioneering species that easily colonizes bare ground, waste and disturbed lands. It was found useful for the stabilization of sand-dunes in India and Senegal (Burkill, 1985).
	six-weeks fescue	*Vulpia octoflora*	Yes	No	High	6.6-8.6	6	16	18	High	low	Cool(C3)	Annual	seeds	1,065,780	Has ability to grow in low moisture areas and shallow soils with erratic precipitation .
	fluffgrass	*Dasyochloa pulchella*	Yes	No	High	7.0-8.7	7	19	12	High	low	Warm(C4)	Bunch	seeds		Commercial availability of seed is rare.
Forbs																
	whitemargin spurge	*Chamaesyce albomarginata*										Warm(C4)				
	Arizona phacelia	*Phacelia arizonica*										Cool(C3)				
	desert globemallow	*Sphaeralcea ambiqua*	Yes	Yes	High	7.5 - 8.5	5	15	12	Medium	Low	Cool(C3)	Multiple Stem	seed	450,000	Commercial availability of seed is rare.
	bristly fiddleneck	*Amsinckia tessellata*										Cool(C3)				
	pincushion flower	*Chaenactis fremontii*										Cool(C3)				
	Sonoran sandmat	*Chamaesyce micromera*										Warm(C4)				
	brittle spineflower	*Chorizanthe brevicornu*										Cool(C3)				
	flatcrown buckwheat	*Eriogonum deflexum*										Cool(C3)				
	flatspine stickseed	*Lappula occidentalis*										Cool(C3)				
Shrubs																
	desert broom	*Baccharis sarathroides*	Yes	Yes	High	7.0 - 8.5	2	10	12	Medium	Low	Cool(C3)	Multiple		900,000	
	velvet mesquite	*Prosopis velutina*										Cool(C3)				
	tamarisk	*Tamarix sp.*										Cool(C3)				
	triangle bursage	*Ambrosia deltoides*										Cool(C3)				
	white bursage	*Ambrosia dumosa*	Yes	No	High	7.0 - 8.5	4	11	12	Medium	Low	Cool(C3)	Single		78,821	
	desert saltbush	*Atriplex polycarpa*	Yes	No	High	7.5 - 9	3	12	10	High	Low	Warm(C4)	Multiple		490,000	
	fourwing slatbush	*Atriplex canescens*	Yes	Yes	High	6.5 - 9.5	5	18	20	High	Medium	Warm(C4)	Multiple		44,203	
	crucifiction thorn	*Castela emoryi*										Cool(C3)				
	Mormon tea	*Ephedra viridis*	Yes	No	High	7.0 - 8	6	12	10	High	Low	Cool(C3)	Multiple		23,545	
	southern goldenbush	*Isocoma pluriflora*										Cool(C3)				
	creosote bush	*Larrea tridentata*	Yes	Yes	High	7.0 - 8.5	4	35	8	Medium	Low	Cool(C3)	Multiple		198,075	
	lotebush	*Ziziphus obtusifolia*										Cool(C3)				
	brittlebush	*Encelia farinosa*	Yes	Yes	High	7.0 - 8.5	5	10	12	None	Low	Cool(C3)	Single		35,000	
	snakeweed	*Gutierrezia sarothrae*	Yes	Yes	High	6.0 - 8.0	7	30	16	Low	Low	Cool(C3)	Single		225,000	
Trees																
	ironwood	*Olneya tesota*	Yes	Yes	High	6.8 - 8.6	3	20	12	Low	Low	Cool(C3)	Multiple		2,000	
	blue paloverde	*Parkinsonia florida*										Cool(C3)				
	yellow paloverde	*Parkinsonia microphylla*										Cool(C3)				
Succulents												Cool(C3)				
	jumping cholla	*Cylindropuntia fulgida*										Cool(C3)				
	Engelmann's hedgehog	*Echinocereus engelmannii*										Cool(C3)				

[1] Attibute information obtain from USDA PLANTS Database (http://plants.usda.gov)

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona



Description:	Ecological Reference: Transect 1

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Ecological Reference: Transect 2

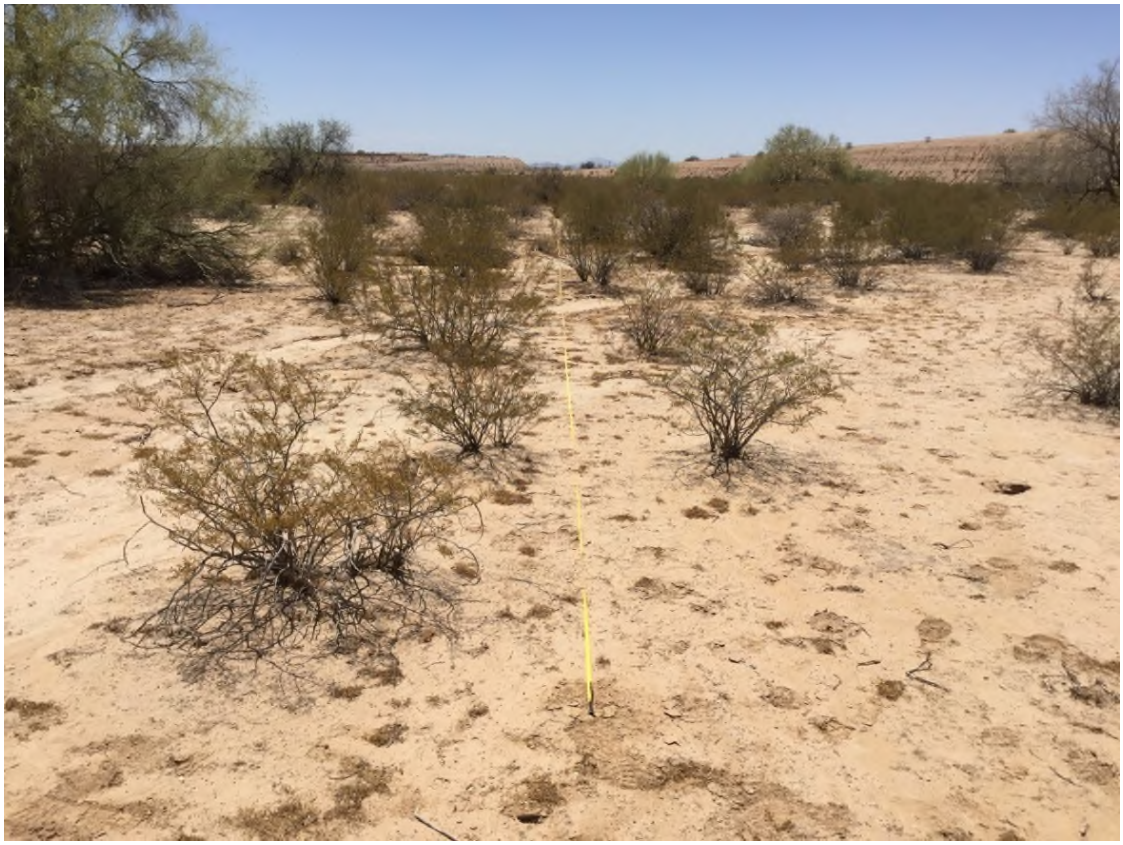
VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Ecological Reference: Transect 3

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Ecological Reference: Transect 4

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona



Description:	Ecological Reference: Transect 5

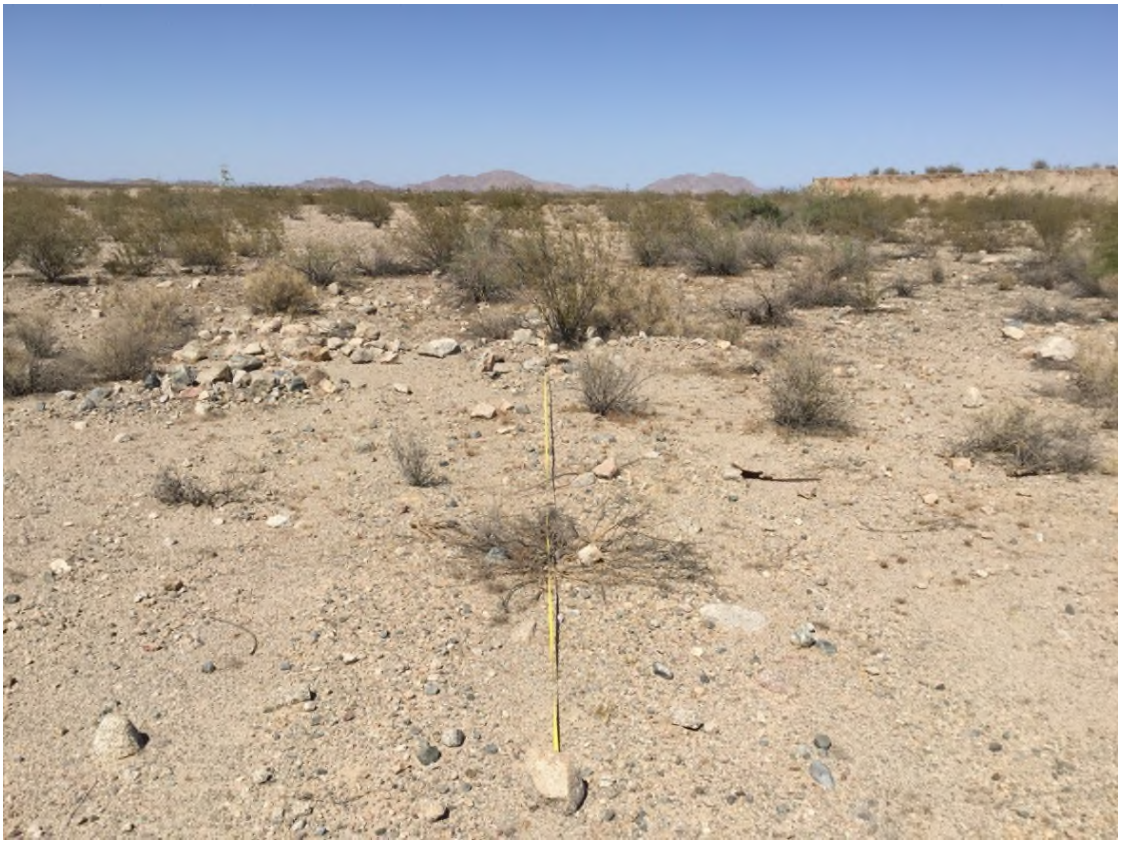
VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Ecological Reference from Sacaton Mine Water Tanks

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

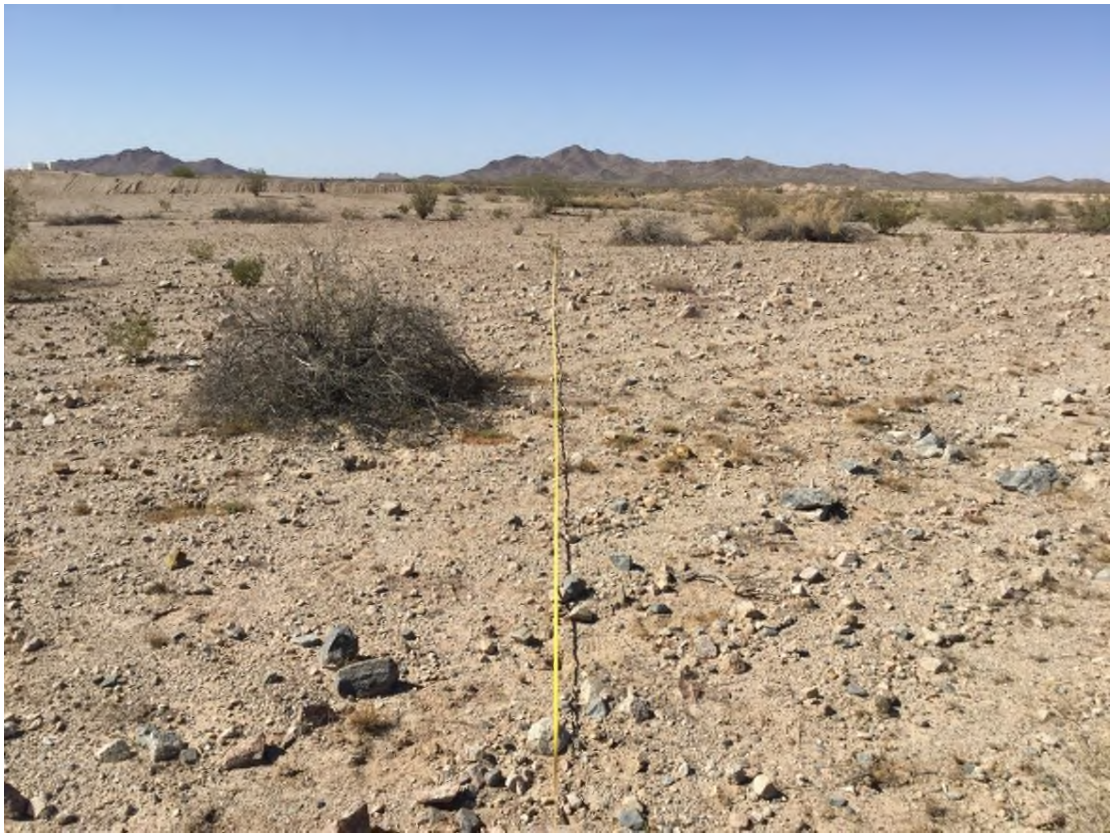
Description:	Reclaimed portions of the west central top of the WRD: Transect 1

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona



Description:	Reclaimed portions of the west central top of the WRD top: Transect 2

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona



Description:	Reclaimed portions of the west central top of the WRD: Transect 3.

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Representative vegetation on top of the Alluvium Soil Storage Area.

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Description:	Vegetation within moisture retention basins on top of the Alluvium Soil Storage Area.

VEGETATION ASSESSMENT PHOTOGRAPHIC LOG			
Site Name:	Sacaton Mine	**Location:**	Pinal County, Arizona

Photograph Number 12

APPENDIX E:
Preliminary SIP Design Drawings

SACATON MINE
SITE IMPROVEMENT PLAN
PINAL COUNTY, ARIZONA

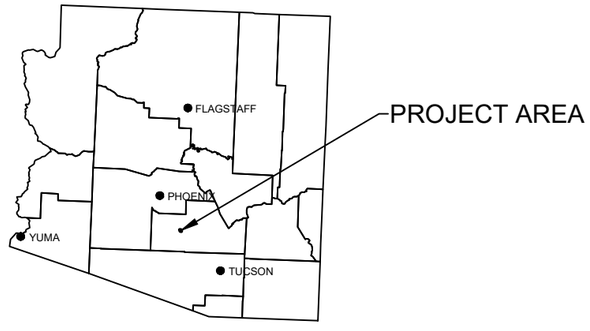
MARCH 2019

PREPARED FOR:

ASARCO MULTI-STATE ENVIRONMENTAL CUSTODIAL TRUST

SITE PHYSICAL ADDRESS:
22580 WEST MARICOPA / CASA GRANDE HIGHWAY
CASA GRANDE, ARIZONA 85222

SHEET INDEX



FOR REVIEW
NOT FOR CONSTRUCTION

PREPARED BY:

TETRA TECH

350 Indiana Street, Suite 500, Golden, Colorado 80401 (303) 217-5700

EASTERN TSF CONTAINMENT BERM SEE DETAIL 1 C-102

IMPROVED SOUTHEST STORMWATER DETENTION POND

C-103

TSF PERIMETER ROAD GRAVEL SALVAGE

FILL DEPRESSION

TSF LOWER SLOPES REGRADING. GRADE FROM UPPER BENCH TO TOE OF SLOPE OR TO 3:1 GRADE, WHICHEVER IS SHALLOWER. COVER WITH MIN. 2.0-FT GRAVEL

FILL DEPRESSION

C-102

SOUTHERN TSF CONTAINMENT BERM SEE DETAIL 1 C-102

DECANT TOWER (INTAKE PORTS PLUGGED)

INSTALL SURFACE WATER RETENTION BASIN/DEPRESSIONS AS DIRECTED BY ENGINEER (TYP). SEE DETAIL 3 C-102

IMPROVED SOUTHWEST STORMWATER DETENTION POND

C-104

WESTERN TSF CONTAINMENT BERM SEE DETAIL 1 C-102

EXISTING FENCE LINE / PROPERTY BOUNDARY

SCALE: 1" = 200'
CONTOUR INTERVAL = 5'

0 100 200 400

LEGEND

- 1440 PROPOSED CONTOUR (MAJR/MINR)
- 1440 EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE

Bar Measures 1 inch

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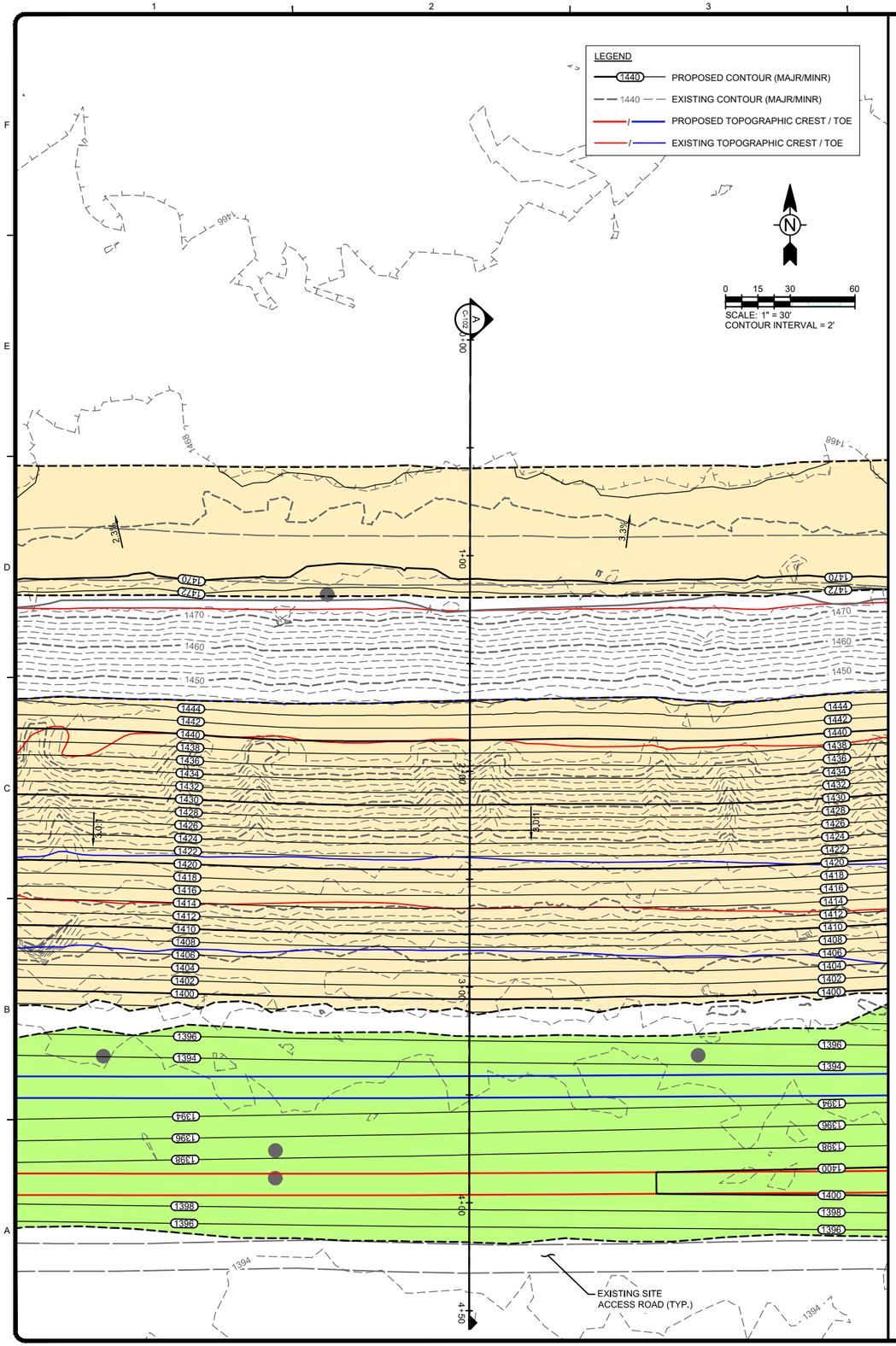
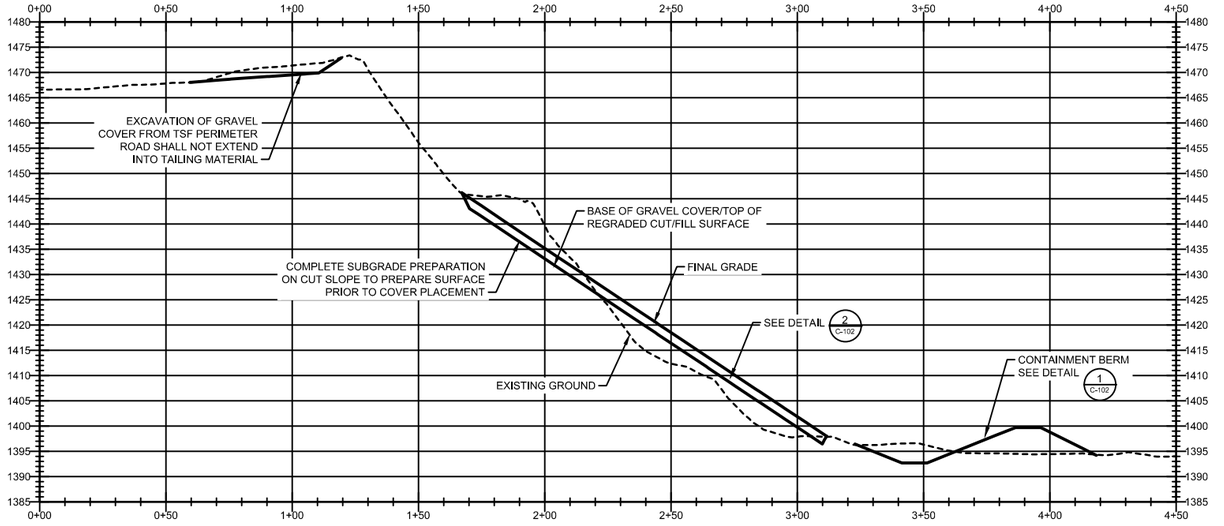
TAILINGS STORAGE FACILITY AREA OVERVIEW

Project No.:	117-321061-2019
Designed By:	DLL
Drawn By:	SEF
Checked By:	

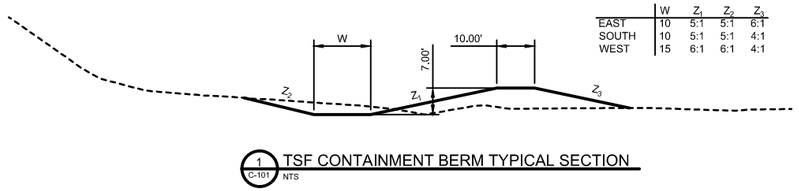
C-101

3/11/2019 11:06 AM - O:\T-Z\TTGOLDEN\117-321061-2019 - SACATON MS 2019 ACTIVITIES\CAD\SHEETFILES\C-101-SACATON TSF AREA OVERVIEW.DWG



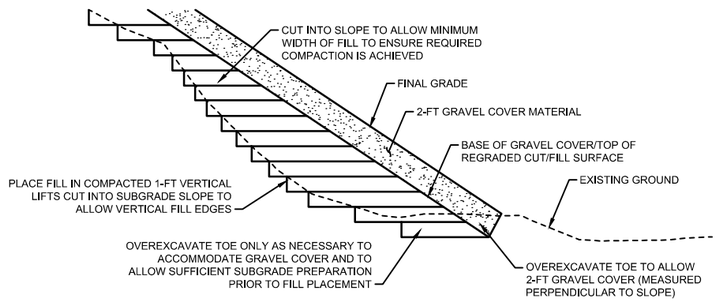


A C-102 TAILINGS STORAGE FACILITY COVER TYPICAL SECTION
SCALE: 1" = 30' H / 1" = 15' V

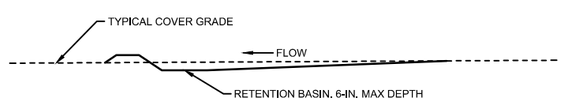


	W	Z_1	Z_2	Z_3
EAST	10	5:1	5:1	6:1
SOUTH	10	5:1	5:1	4:1
WEST	15	6:1	6:1	4:1

1 C-101 TSF CONTAINMENT BERM TYPICAL SECTION
NTS



2 C-102 TSF FILL AND COVER DETAIL
NTS



3 C-101 TSF RETENTION BASIN DETAIL
NTS

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TAILINGS STORAGE FACILITY AREA COVER TYPICAL PLAN AND SECTION

Project No.:	117-321061-2019
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C-102

Bar Measures 1 inch

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LEGEND

- 1440 PROPOSED CONTOUR (MAJR/MINR)
- 1440 EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE
- PROPOSED DRAINAGE PATH
- EPHEMERAL DRAINAGE CHANNEL
- BERM/POND GRADING
- POND STORAGE

N

0 15 30 60

SCALE: 1" = 30'
CONTOUR INTERVAL = 2'

PROPOSED EAST CONTAINMENT BERM SEE DETAIL 1/C-102

EPHEMERAL DRAINAGE CHANNEL (TYP.)

SOUTHEAST DETENTION POND

EL:1400.0

4.0:1

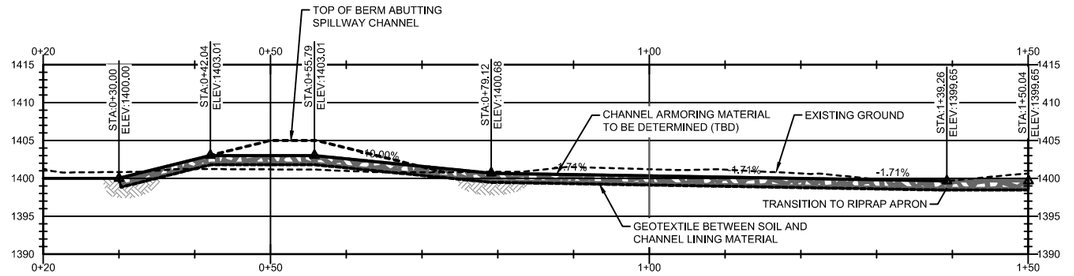
6' TOP WIDTH

PROPOSED OVERFLOW SPILLWAY

DRAINS TO SOUTHWEST DETENTION POND

PROPOSED SOUTH CONTAINMENT BERM SEE DETAIL 1/C-102

EXISTING SITE ACCESS ROAD (TYP.)



B C-103 SOUTHEAST POND OUTLET PROFILE
1" = 10'

C C-103 SOUTHEAST POND OUTLET TYPICAL SECTION
NTS

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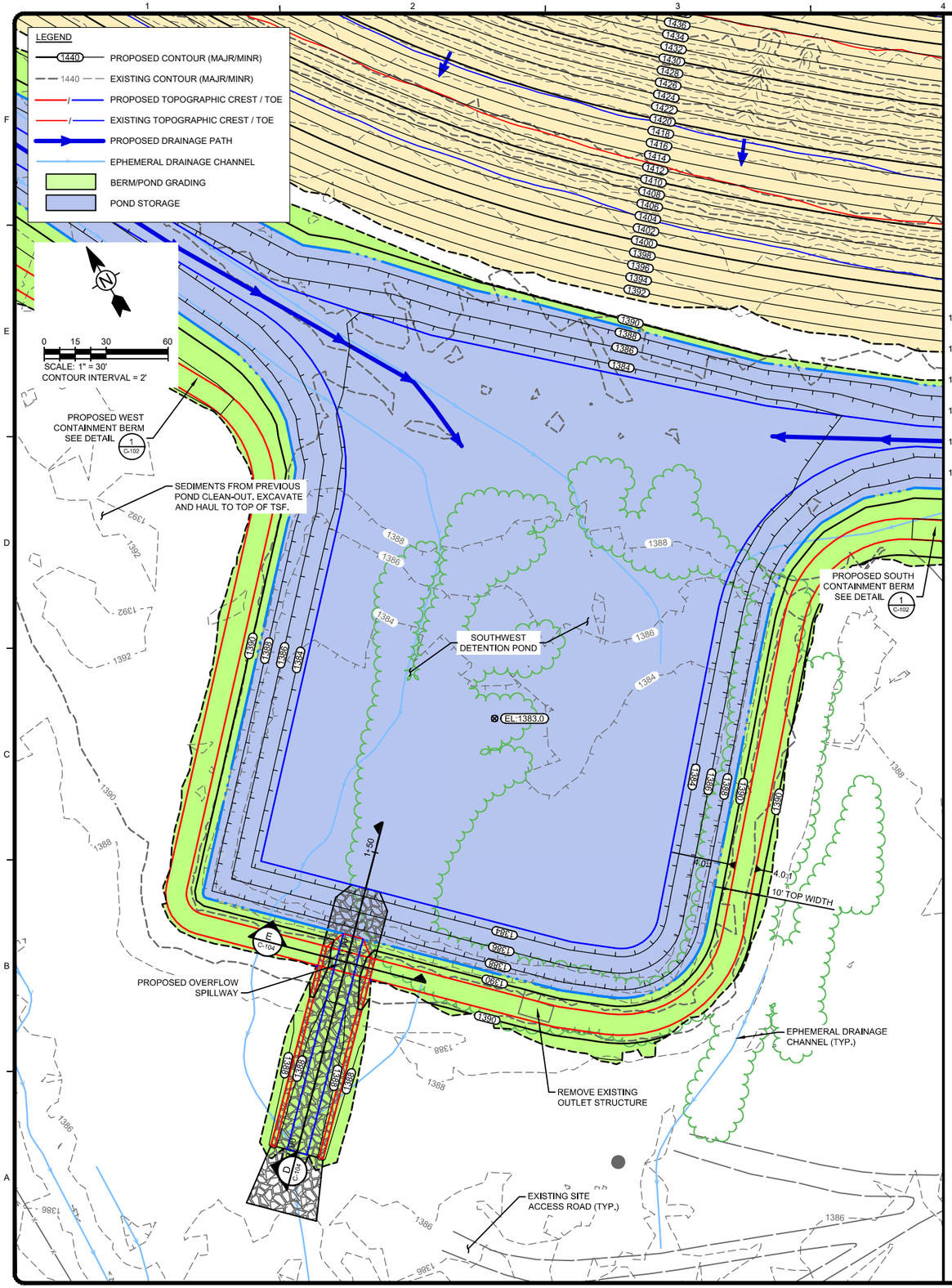
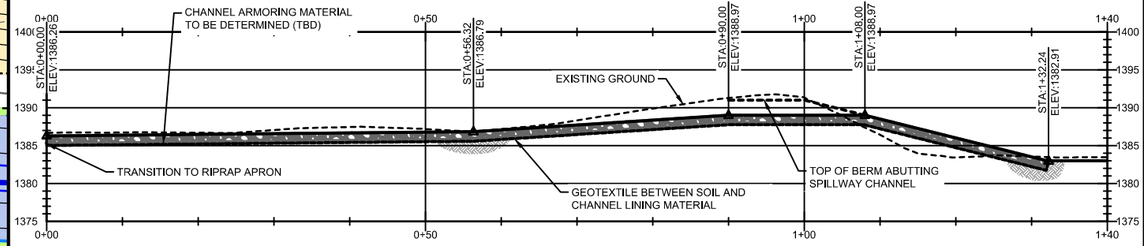
TAILINGS STORAGE FACILITY SOUTHEAST DETENTION POND PLAN AND SECTIONS

Project No.:	117-321061-2019
Designed By:	DLL
Drawn By:	SEF
Checked By:	

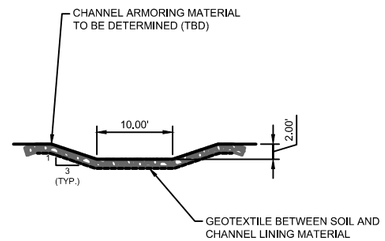
C-103

Bar Measures 1 inch





D C-104 SOUTHWEST POND OUTLET PROFILE
1" = 10'



E C-104 SOUTHWEST POND OUTLET TYPICAL SECTION
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TAILINGS STORAGE FACILITY SOUTHWEST DETENTION POND PLAN AND SECTIONS

Project No.: 117-321061-2019
Designed By: DLL
Drawn By: SEF
Checked By:

C-104

Bar Measures 1 inch

3/11/2019 11:09 AM - O:\T-Z\TTGOLDEN\117-321061-2019 - SACATON MS 2019 ACTIVITIES\CAD\SHEETFILES\C-102-104-SACATON TSF SHEETS.DWG

C-108

C-107

C-106

LINED WATER STORAGE POND

PRIMARY ORE STOCKPILE

FINE ORE STOCKPILE

CONCENTRATOR BUILDING

TAILING THICKENER

WET MILL AREA

DRY MILL AREA

PRIMARY CRUSHER FOUNDATIONS

INTERMEDIATE ORE STOCKPILE

SECONDARY CRUSHER FOUNDATIONS

WHAREHOUSE / TRUCK SHOP

MECHANICAL AREA

CHANGE HOUSE

LEGEND

- PROPOSED CONTOUR (MAJR/MINR)
- EXISTING CONTOUR (MAJR/MINR)
- LIMITS OF EARTHWORK DISTURBANCE
- EXISTING DRAINAGE

SCALE: 1" = 120'
CONTOUR INTERVAL = 5'

Bar Measures 1 inch

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MILL AREA OVERVIEW

Project No.:	117-321061-2019
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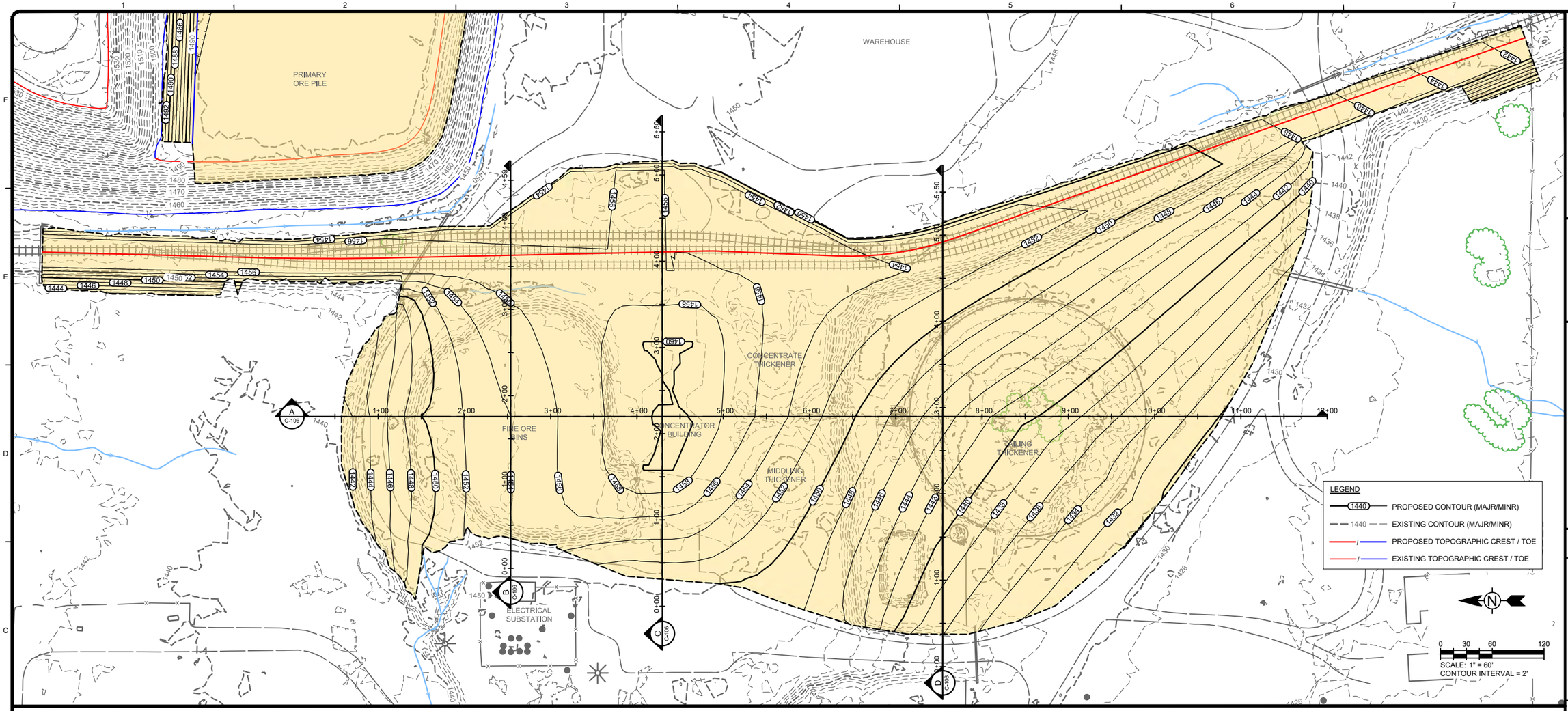
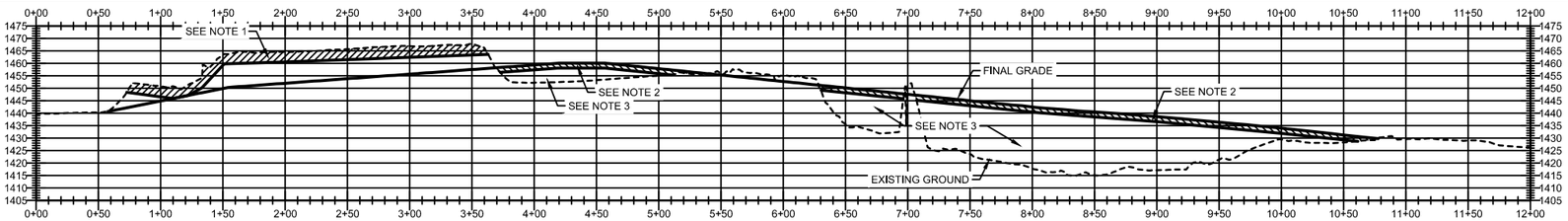
C-105

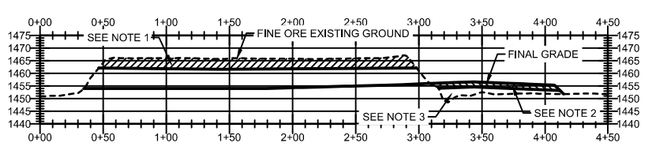




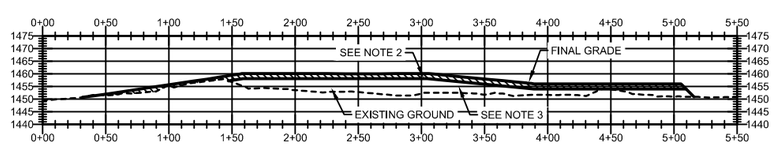
A C-106 WET MILL SECTION
SCALE: 1" = 60' H / 1" = 30' V

NOTES:

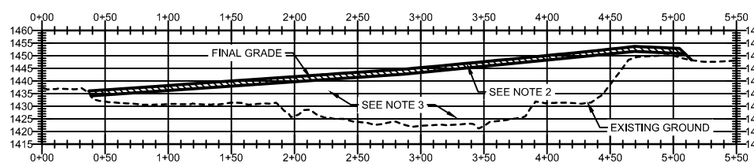
1. TOP 4-FT OF ORE PILE IS ORE MATERIAL TO BE PLACED IN BOTTOM OF FILL AREA.
2. TOP 2-FT (MIN.) TO BE ALLUVIUM COVER MATERIAL.
3. ORE MATERIAL TO BE PLACED AT BASE OF FILL AREA.



B C-106 WET MILL SECTION
SCALE: 1" = 60' H / 1" = 30' V



C C-106 WET MILL SECTION
SCALE: 1" = 60' H / 1" = 30' V



D C-106 WET MILL SECTION
SCALE: 1" = 60' H / 1" = 30' V

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WET MILL AREA COVER PLAN AND SECTIONS

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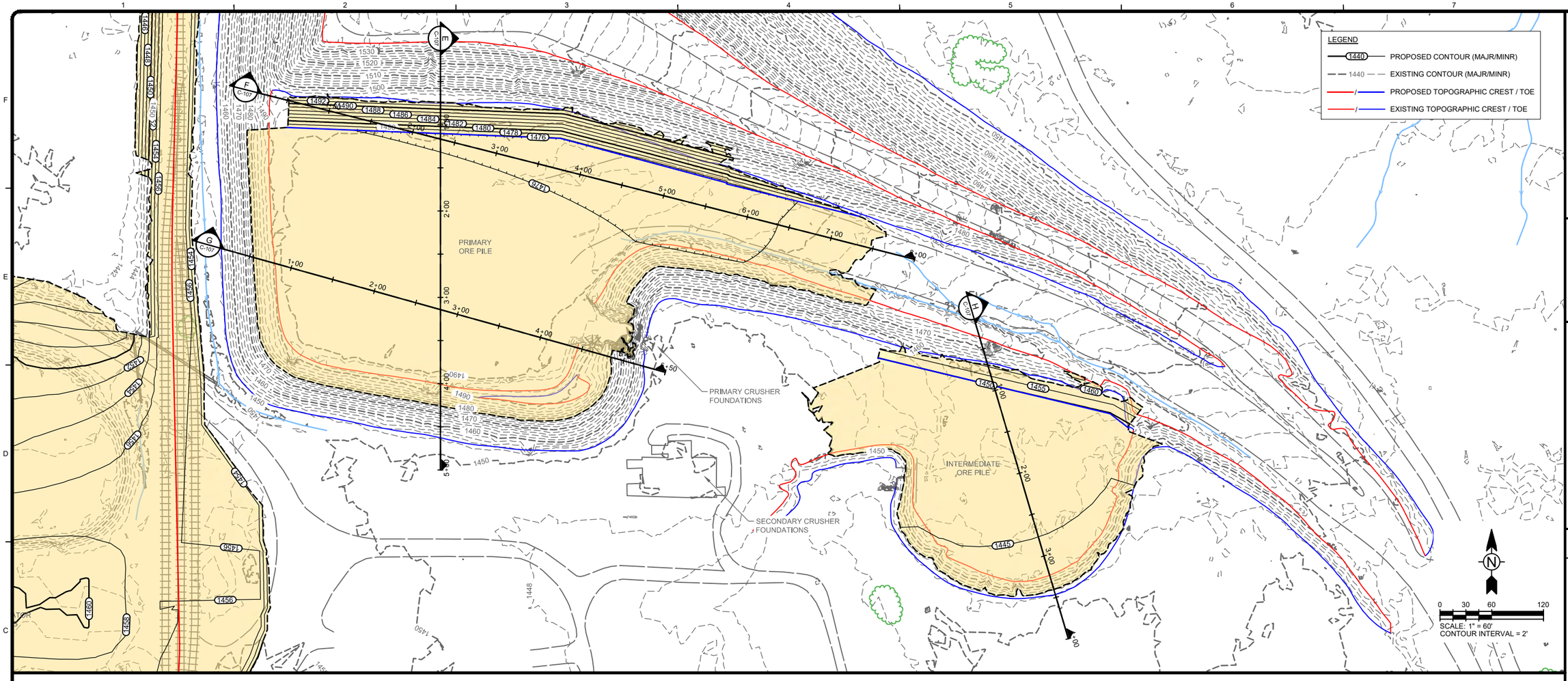
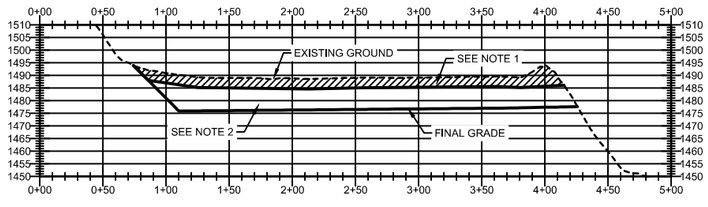
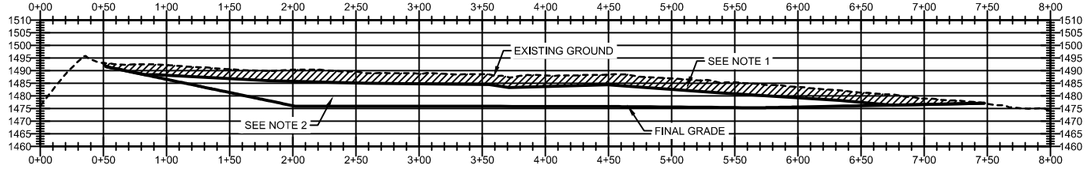
C-106

Bar Measures 1 inch

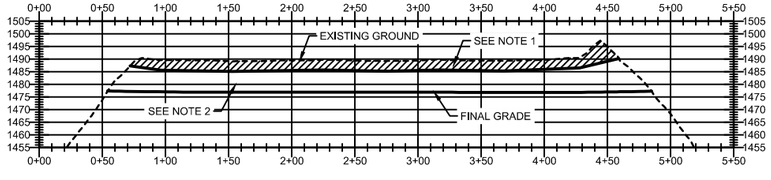




E C-107 PRIMARY ORE PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V



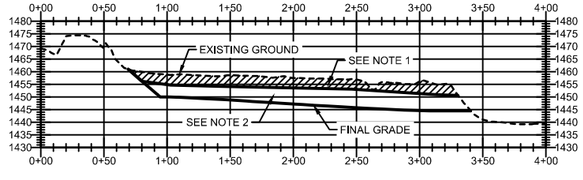
F C-107 PRIMARY ORE PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V



G C-107 PRIMARY ORE PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V

NOTES:

1. TOP 4-FT OF ORE PILE IS ORE MATERIAL TO BE PLACED IN BOTTOM OF FILL AREA.
2. MATERIAL BELOW APPROX. 4-FT BGS IS ANTICIPATED TO BE ALLUVIUM MATERIAL TO BE PLACED AS COVER OVER ORE FILL MATERIAL.



H C-107 INTERMEDIATE ORE PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V

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DRY MILL AREA COVER PLAN AND SECTIONS

Project No.:	117-321061-2019
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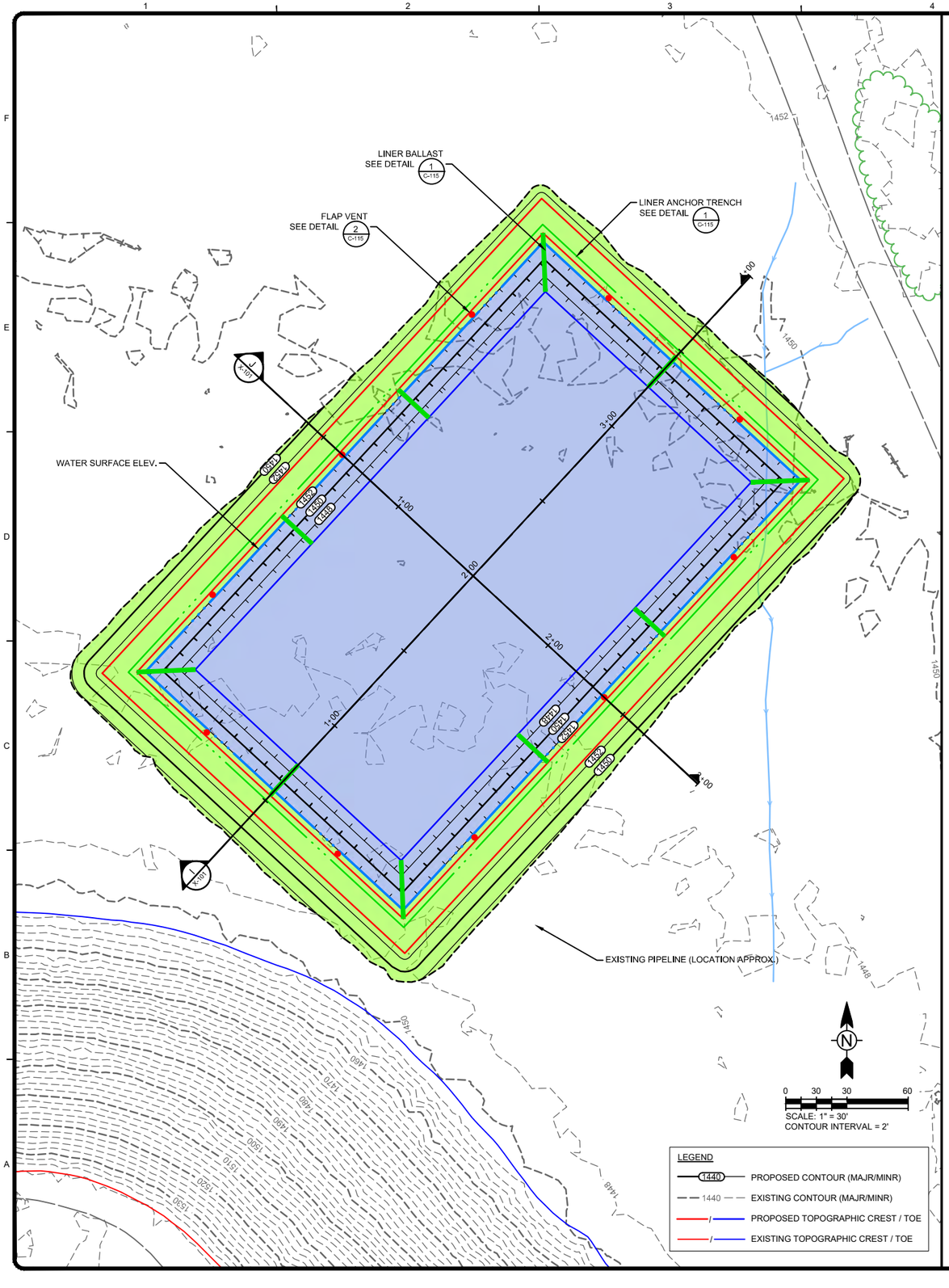
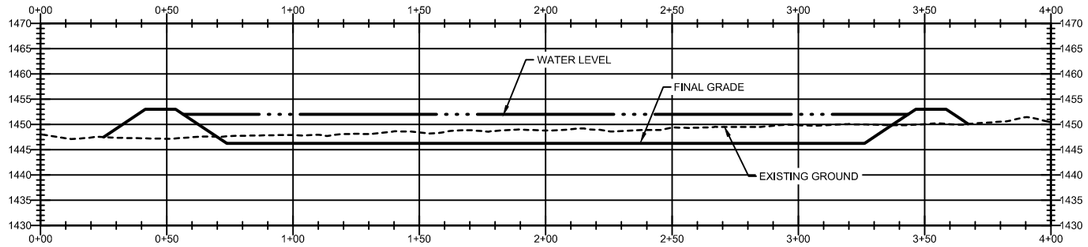
Drawn By:	SEF
Checked By:	

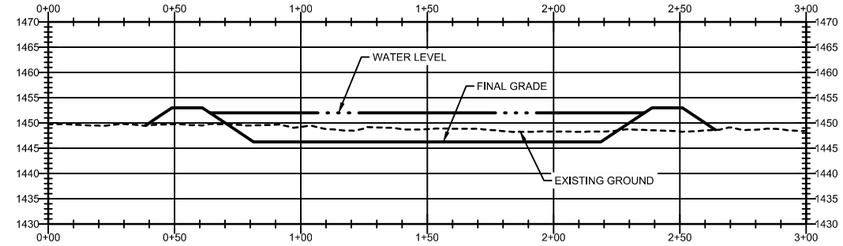
C-107

Bar Measures 1 inch





I C-108 WATER STORAGE POND SECTION
SCALE: 1" = 60' H / 1" = 30' V



J C-108 WATER STORAGE POND SECTION
SCALE: 1" = 60' H / 1" = 30' V

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SACATON MINE
CASA GRANDE, ARIZONA

LINED WATER STORAGE POND PLAN AND SECTIONS

Project No.:	117-321061-2019
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Drawn By:	SEF
Checked By:	

C-108

Bar Measures 1 inch

C-111

C-110

C-113

C-112

NORTHWEST WASTE ROCK DUMP

EXPLOSIVES STORAGE AREA

NORTH WASTE ROCK DUMP

BOWL AREA

WRD QUARRY AREA

SCALE: 1" = 200'
CONTOUR INTERVAL = 5'

0 100 200 400

LEGEND

- PROPOSED CONTOUR (MAJR/MINR)
- EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE
- EXISTING DRAINAGE

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ASARCO MULTI-STATE ENVIRONMENTAL CUSTODIAL TRUST

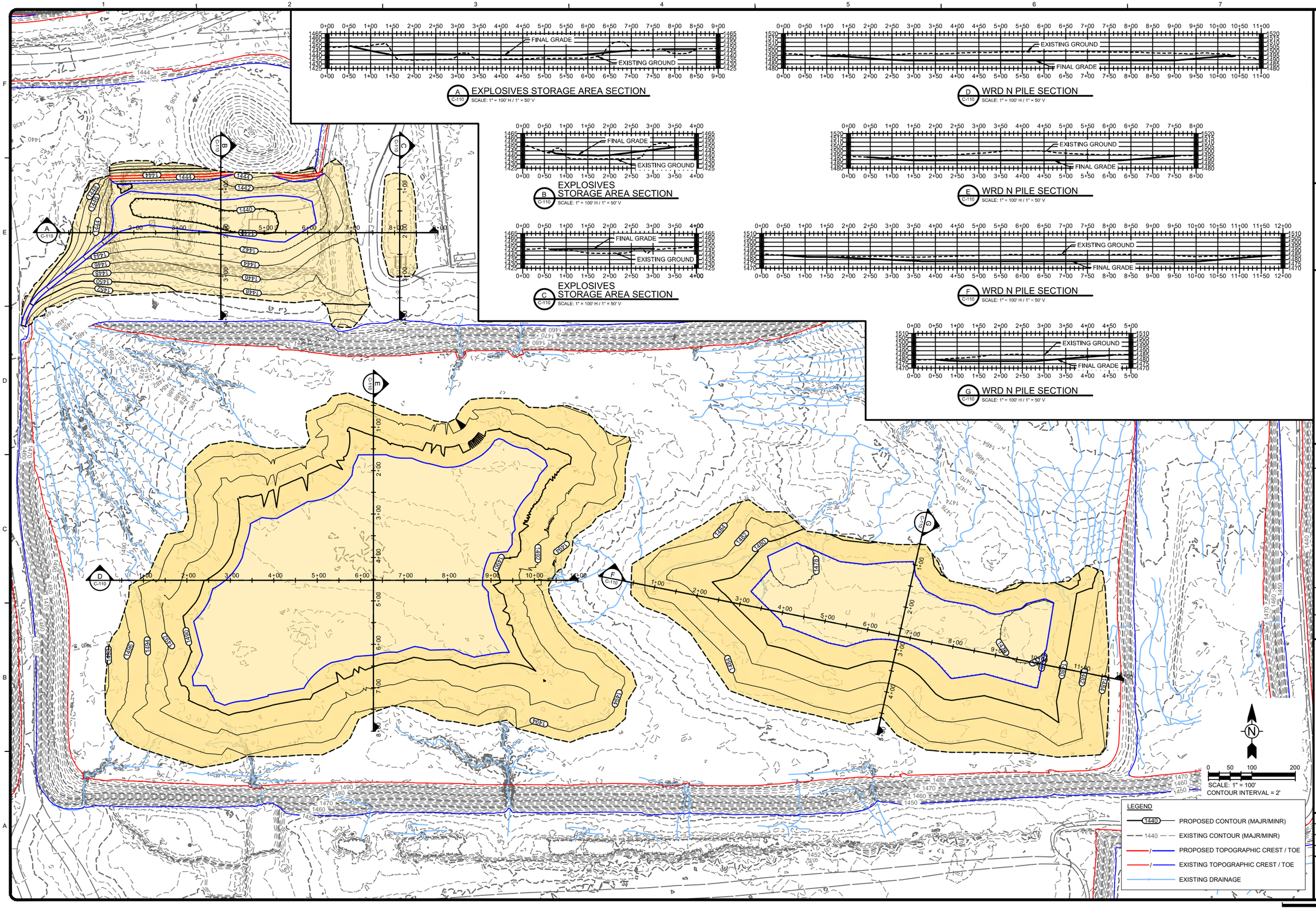
SACATON MINE
CASA GRANDE, ARIZONA

WASTE ROCK DUMP AREA OVERVIEW

Project No.:	117-321061-2019
Designed By:	DLL
Drawn By:	SEF
Checked By:	

C-109

Bar Measures 1 inch



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NORTH WASTE ROCK DUMP AND EXPLOSIVES STORAGE COVER PLAN AND SECTIONS

Project No.:	117-321061-2019
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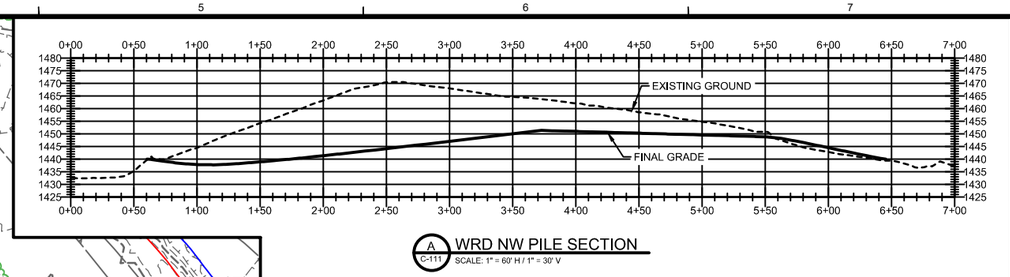
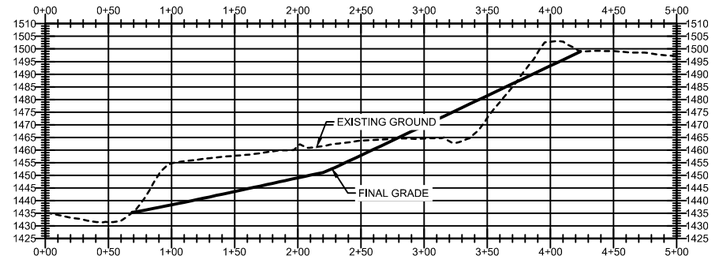
Checked By:	

C-110

Bar Measures 1 inch



A C-111 WRD NW PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V



A C-111 WRD NW PILE SECTION
SCALE: 1" = 60' H / 1" = 30' V

SCALE: 1" = 60'
CONTOUR INTERVAL = 2'

LEGEND
- PROPOSED CONTOUR (MAJR/MINR)
- EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE
- EXISTING DRAINAGE

Bar Measures 1 inch

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NORTHWEST WASTE ROCK DUMP COVER PLAN AND SECTIONS

Project No.:	117-321061-2019
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C-111

PLACE 2-FT GRAVEL COVER MATERIAL OVER AREA WITH SLOPE STEEPER THAN 5:1

B C-112

A C-112

0 40 80 160
SCALE: 1" = 80'
CONTOUR INTERVAL = 2'

LEGEND

- 1440 PROPOSED CONTOUR (MAJR/MINR)
- 1440 EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE
- EXISTING DRAINAGE

OVEREXCAVATE WASTE ROCK 2-FT IN THIS AREA AND COVER WITH CLEAN FILL FROM REGRADED SOUTH SLOPE OF NORTHWEST STOCKPILE

FINAL GRADE

EXISTING GROUND

A C-112 WRD BOWL SECTION
SCALE: 1" = 80' H / 1" = 40' V

EXISTING GROUND

FINAL GRADE

B C-112 WRD BOWL SECTION
SCALE: 1" = 80' H / 1" = 40' V

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WASTE ROCK DUMP BOWL AREA COVER PLAN AND SECTIONS

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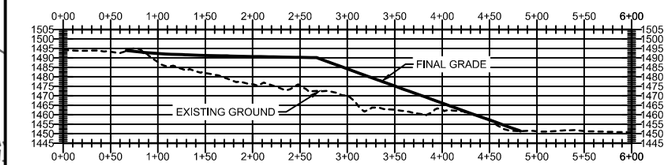
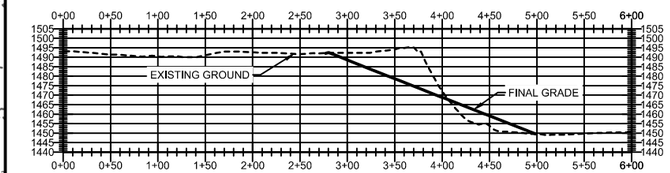
C-112

Bar Measures 1 inch

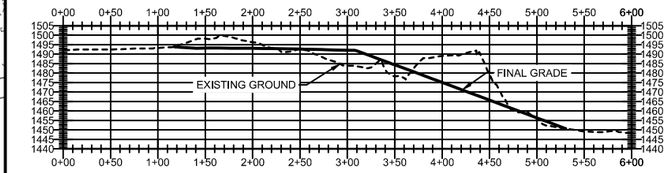
CONTOURS SHOWN ARE SUBRRADE ORE REGRADED WASTE ROCK FINAL GRADES. PLACE 2-FT OF GRAVEL COVER MATERIAL OVERS SLOPES AND 1-FT OF ALLUVIUM COVER ON UPPER FLAT SURFACES.



A C-113 WRD QUARRY SECTION
SCALE: 1" = 80' H / 1" = 40' V



B C-113 WRD QUARRY SECTION
SCALE: 1" = 80' H / 1" = 40' V



C C-113 WRD QUARRY SECTION
SCALE: 1" = 80' H / 1" = 40' V

LEGEND
- PROPOSED CONTOUR (MAJR/MINR)
- EXISTING CONTOUR (MAJR/MINR)
- PROPOSED TOPOGRAPHIC CREST / TOE
- EXISTING TOPOGRAPHIC CREST / TOE
- EXISTING DRAINAGE

SCALE: 1" = 80'
CONTOUR INTERVAL = 2'

Bar Measures 1 inch

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WASTE ROCK DUMP QUARRY AREA COVER PLAN AND SECTIONS

Project No.:	117-321061-2019
Designed By:	DLL
Drawn By:	SEF
Checked By:	

C-113

NORTH WASTE ROCK DUMP

EXPLOSIVES STORAGE AREA

WRD QUARRY AREA

SOUTH WASTE ROCK DUMP

NORTHWEST WASTE ROCK DUMP

BOWL AREA

PLACE 1-FT ALLUVIUM COVER (ALL ALLUVIUM COVER AREAS)

SCALE: 1" = 250'
CONTOUR INTERVAL = 2'

0 125 250 500

LEGEND

- 1440 PROPOSED CONTOUR (MAJR/MINR)
- 1440 EXISTING CONTOUR (MAJR/MINR)
- LIMITS OF REGRADING EARTHWORK
- LIMITS OF ALLUVIUM COVER

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WASTE ROCK DUMP ALLUVIUM COVER AREAS

Project No.:	117-321061-2019
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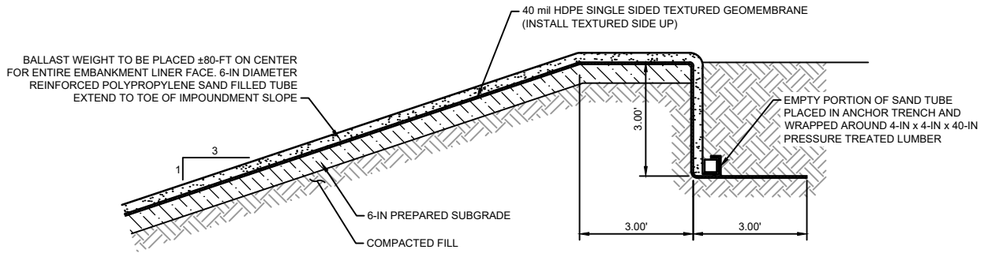
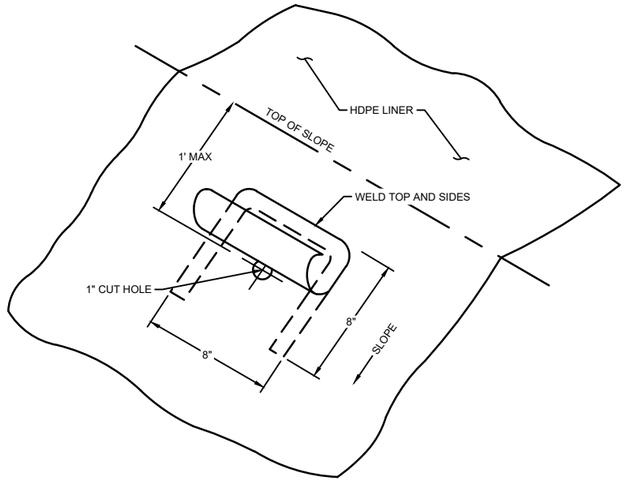
C-114

Bar Measures 1 inch



1 C-108 TYPICAL ANCHOR TRENCH AND BALLAST DETAIL
NOT TO SCALE



2 C-108 PRIMARY GEOMEMBRANE FLAP VENT
NOT TO SCALE

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DETAILS

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C-115

Bar Measures 1 inch

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