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**FINAL
FEASIBILITY STUDY WORK PLAN
SOUTH MESA WQARF REGISTRY SITE
MESA AND GILBERT, ARIZONA
ADEQ TASK ASSIGNMENT EV11-0084**

Prepared for:

**Arizona Department of Environmental Quality
Waste Programs Division
Remedial Projects Unit
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Prepared by:

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AMEC Project No. 4972-11-2050.6.1

June 28, 2012

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

Attention: Ms. Danita Hardy
Project Manager, Remedial Projects Unit

**Re: Final Feasibility Study Work Plan
South Mesa WQARF Registry Site
ADEQ Task Assignment EV11-0084
AMEC Project No. 4972-11-2050.6.1**



Dear Ms. Hardy:

AMEC Environment and Infrastructure, Inc. (AMEC) is pleased to submit this *Feasibility Study Work Plan* (FS Work Plan) for the South Mesa WQARF Registry Site (SMWRS) located in Mesa and Gilbert, Arizona. The scope of work proposed in this work plan is based on the Remedial Objectives (ROs) that were developed for the SMWRS and the results of completed Early Response Actions (ERAs).

If you have any questions or comments regarding this report, please contact Mr. Jim Clarke at 602-733-6055.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Reviewed by:

James N. Clarke, PG
Senior Geologist
Arizona Registered Geologist #29374



Expires 9/30/13



EXPIRES 09/30/2012

Natalie Chrisman Lazarr, PE
Associate Engineer

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Figure 3 – FS Organizational Chart

ACRONYMS AND ABBREVIATIONS

A.A.C.	Arizona Administrative Code
ADEQ	Arizona Department of Environmental Quality
af	Acre-foot or Acre-feet
af/yr	Acre-feet/year
AMEC	AMEC Environment and Infrastructure, Inc.
AMI	Applied Metallics Inc.
A.R.S.	Arizona Revised Statutes
ASRAC	Arizona Superfund Response Action Contract
AWS	Assured Water Supply
bgs	below ground surface
C-2	Limited Commercial Zoning (Mesa), General Commercial Zoning (Gilbert)
°C	Degrees Celsius
CIP	Community Involvement Plan
COC(s)	Chemical(s) of Concern
COM	City of Mesa
EC	Electroconductivity
EDS	Electronic Data Submittal
EPA	United States Environmental Protection Agency
ERA(s)	Early Response Action(s)
FS	Feasibility Study
FSP	Field Sampling Plan
FSWP	Feasibility Study Work Plan
gpm	gallons per minute
HCl	Hydrochloric Acid
IAQ	Indoor Air Quality
IDW	Investigation Derived Waste
LAW	Law Engineering and Environmental Services, Inc.
LTSC	Long Term Storage Credits
MACTEC	MACTEC Engineering & Consulting, Inc.
MAU	Middle Alluvial Unit
ml	milliliter
ml/min	milliliters per minute
µg/L	Microgram per Liter
OSWER	Office of Solid Waste and Emergency Response
PCE	Tetrachloroethylene
QAPP	Quality Assurance Project Plan
R-3	Limited Multiple Residential Zoning (Mesa)
RAE	Remedial Alternatives Evaluation
RAS	Remedial Alternatives Screening
RI	Remedial Investigation
RO(s)	Remedial Objective(s)
SMWRS	South Mesa WQARF Registry Site
SRP	Salt River Project
SVE	Soil Vapor Extraction

ACRONYMS AND ABBREVIATIONS (cont.)

TCE	Trichloroethylene
TOG	Town of Gilbert
UAU	Upper Alluvial Unit
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WQARF	Water Quality Assurance Revolving Fund

1.0 INTRODUCTION

This Feasibility Study Work Plan (FSWP) presents the proposed scope of work to complete the Feasibility Study (FS) for the South Mesa Water Quality Assurance Revolving Fund (WQARF) Registry Site (SMWRS). The SMWRS is shown on Figure 1. This FSWP has been prepared in accordance with the following guidance documents:

- Paragraph B of Arizona Administrative Code (A.A.C.) R18-16-407 (March 29, 2002)
- Guidance for Conducting Remedial Investigations/Feasibility Studies under CERCLA, OSWER Directive 9355.3-01 dated October 1988.

1.1 Project Authorization

AMEC Environment and Infrastructure, Inc. (AMEC) has been retained by the Arizona Department of Environmental Quality (ADEQ) to perform an FS for the SMWRS. Prior to commencing with the FS and preparing the FS Report, A.A.C. R18-16-407(B) requires that an FSWP be prepared and submitted to ADEQ. Therefore, this FSWP has been prepared in accordance with the scope of work and terms and conditions of Arizona Superfund Response Action Contract (ASRAC) EV09-0100 between the ADEQ and AMEC, and ADEQ Task Assignment No. EV11-0084.

1.2 Work Plan Rationale

This FSWP develops the scope of work and procedures required to perform the FS and prepare and submit the FS Report.

The FS will be performed in accordance with A.A.C. R18-16-407, Arizona Revised Statutes (A.R.S.) §49-282.06, and A.R.S. §49-287.03(F). The objectives of the FS are provided as follows:

- In coordination with ADEQ, select a remedial strategy or combination of remedial strategies from the following: no action, monitoring, source control, controlled migration, physical containment, or plume remediation.
- Develop a reference remedy consisting of a combination of a remedial strategy (or strategies) and remedial measures.
- Develop alternative remedies consisting of a combination of a remedial strategy or strategies and remedial measures that will be compared to the reference remedy. According to A.A.C. R18-16-407 (E)(3), at least one of the alternative remedies must employ a remedial strategy or combination of strategies that is more aggressive than the reference remedy, and at least one of the alternative remedies must employ a remedial strategy or combination of strategies that is less aggressive than the reference remedy.
- Conduct a detailed review and evaluation of remedial measures using the best available scientific information concerning available remedial methods and technologies and the comparison criteria identified in A.R.S. §49-282.06 (C).

- Ensure that the reference remedy and the alternative remedies are capable of meeting the remedial objectives developed during the Remedial Investigation (RI).
- Ensure that the proposed remedy is consistent with criteria set forth in A.R.S. §49-282.06 (A), A.R.S. §49-282.06 (F), and A.A.C. R18-16-407(H)(3).
- Assist ADEQ with community involvement activities described in the Community Involvement Plan (CIP) for the Site.

2.0 REMEDIAL OBJECTIVES SUMMARY

The Draft Remedial Objectives Report prepared by ADEQ presents the ROs for the Site. The established ROs are used to develop the remedy for the site. The FS will evaluate specific remedial measures and strategies and will identify a reference remedy and at least two alternative remedies capable of meeting the ROs. The FS will also identify the proposed remedy and describe how it will meet the ROs. This subsection summarizes the ROs for the Site.

The ROs identified in the RO Report are based on the current and reasonably foreseeable uses of land and the current and reasonably foreseeable beneficial uses of waters of the State. ROs were not established for every use identified in the RO Report. The determination as to whether a use was addressed was based on information gathered during the public involvement process and whether the use is reasonably foreseeable.

2.1 Remedial Objectives for Land Use

The SMWRS is located in the City of Mesa (COM) and Town of Gilbert (TOG) and is bounded approximately by 10th Avenue to the north, Stapley Drive to the east, and the railroad south of Baseline Road to the south and west.

ADEQ established the following ROs for land use in the SMWRS area:

1. Protect against possible exposure to hazardous substances in surface and subsurface soils that could occur during future development of property based on applicable zoning regulations.
2. Protect against possible leaching of hazardous substances in surface and subsurface soils to the groundwater.
3. Protect against possible land restrictions required by applicable zoning regulations because of hazardous substances in surface and subsurface soils.

Based on the results of the RI, the ROs for land use have been achieved by the two on-site Early Response Actions (ERAs) that were performed at the former AMI facility. The operation of the soil vapor extraction (SVE) system at two locations of the former AMI facility removed contaminant mass from the soil, thus removing the source of contaminants to the groundwater. This has been confirmed by decreasing tetrachloroethylene (PCE) concentrations with time in the SMWRS monitoring wells. The ERAs have also likely removed the source of contaminants to indoor air in the existing 1545 N. McQueen Road building (see Figure 2). However, ADEQ

has requested additional indoor air quality (IAQ) sampling during the FS to confirm the results of the ERA. The IAQ sampling program is discussed in Section 3.0.

2.2 Remedial Objectives for Groundwater Use

ADEQ has established the following ROs for current and future groundwater use in the SMWRS:

- To protect the supply of groundwater for municipal use and for the associated recharge capacity that is threatened by contamination emanating from the SMWRS.
- To restore, replace or otherwise provide for groundwater supply lost due to contamination associated with the SMWRS. This action will be needed for as long as the need for the water exists, the resource remains available, and the contamination associated with the SMWRS prohibits or limits groundwater use.

2.2.2 Salt River Project (SRP) Groundwater Use

SRP currently owns six wells within the SMWRS boundaries. These wells are not pumped on a regular basis, and according to SRP, there are no anticipated changes in the pumping schedule. Based on this information, ROs are not needed for SRP groundwater use in the SMWRS.

2.2.3 Private Groundwater Use

Private property owners within the SMWRS may install an exempt domestic well (less than 35 gallons per minute [gpm]) on their property for personal use provided that the well is registered with ADWR. However, private property owners are connected to either the COM or TOG water system. Based on this information, ROs are not needed for private groundwater use.

2.2.4 Agricultural Groundwater Use

The valley population continues to increase rapidly, and agricultural lands have been converted into commercial, residential (housing), and recreational (parks, golf courses, etc) uses. As of February 2012, no agricultural or irrigation wells were identified in the SMWRS area. Based on this information, ROs are not needed for agricultural groundwater use.

3.0 FEASIBILITY STUDY TASKS

This section describes the tasks that will be conducted to develop the FS for the Site.

3.1 Project Planning And Support

The project planning and support tasks include communications with ADEQ, meetings, and budget tracking. During performance of the FS, AMEC will meet with ADEQ as necessary. It is anticipated that a majority of the contact will be by telephone or e-mail.

3.2 Community Involvement Activities

A CIP has been prepared for the SMWRS. The Community Advisory Board (CAB) has been established and meets on a regular basis. The Community Involvement Activities will be performed as requested in accordance with the CIP and A.A.C. R18-16-404.

3.3 FS Field Tasks

ADEQ has requested field sampling to support the FS. The field sampling will include collection of one round of groundwater samples and collection of an IAQ sample at the 1545 N. McQueen Road building. The FS field tasks are described in greater detail in Section 4.0.

3.4 Feasibility Study

Two ERAs have been performed at the SMWRS and have been completed at the request of ADEQ. For the purposes of this FS Work Plan, the final remedy for the site will address only groundwater. Therefore, the FS will be streamlined and the only document prepared will be the FS Report. The Remedial Alternatives Screening (RAS) Technical Memorandum and Remedial Alternatives Evaluation (RAE) Report will not be prepared as separate documents and the RAS and RAE will be discussed in the FS Report.

3.4.1 Remedial Alternatives Screening

RAS will be performed to document the selection process for the groundwater remedial alternatives that will be evaluated in the FS. AMEC will develop remedial alternatives by screening the following remedial strategies:

1. Plume remediation;
2. Physical containment;
3. Controlled migration;
4. Source control;
5. Monitoring; and,
6. No action alternative.

3.4.2 Remedial Alternatives Evaluation

A reference remedial alternative and at least two alternative remedies that are capable of meeting the remedial objectives will be selected. AMEC will conduct a detailed comparative evaluation of the reference remedy and alternative remedies selected. The objective for completion of the RAE is to maximize protection of human health and groundwater resources while meeting the ROs and minimizing overall cost of remediation.

In accordance with A.A.C. R18-16-407 (H) (2), the remedial alternative evaluation will be comprised of:

1. A demonstration that the remedial alternative will achieve the ROs.
2. An evaluation of consistency with the water management plans of affected water providers and the general land use plans of local governments with land use jurisdiction.
3. An evaluation of comparison criteria, including:
 - Practicability of the alternative, including its feasibility, short and long term effectiveness, and reliability;
 - Risk, including fate and transport of contaminants, assessment of current land and resource use, exposure pathways and duration of exposure, protection of health and biota during implementation of remedial action, and residual risk in aquifer at end of remediation;
 - Cost of remedial alternative, including capital, operating, maintenance, life cycle, and transactional costs;
 - Benefit of value of remediation, including lowered risk, reduction in concentration or volume, decreased liability, acceptance by public, aesthetics, enhancement of future uses, and improvement to local economics; and,
 - Discussion of comparison criteria in relation to each other.

On the basis of this evaluation, an alternative will be selected. The proposed remedy must meet the general requirements provided in A.R.S. §49-282.06 (A) as listed below:

- Assure the protection of public health and welfare and the environment;
- To the extent practicable, provide for the control, management, or cleanup of the hazardous substances so as to allow for the maximum beneficial use of the waters of the state; and,
- Be reasonable, necessary, cost effective, and technically feasible.

3.4.3 Feasibility Study Report

The FS Report will be prepared in compliance with A.A.C. R18-16-407 (I). The FS Report will describe the reasons for selection of the proposed remedy, including the following:

- How the proposed remedy will achieve the remedial objectives;
- How the comparison criteria were considered; and,
- How the proposed remedy meets the requirements of A.R.S. §49-282.06.

The FS Report will include the following components:

- Site background;
- Remedial objectives;
- Feasibility study objectives;
- Remedial strategies considered;
- Description of remedial alternatives considered (including remedial measures considered for each alternative);
- Description of remedial measures carried forward from RAS Phase to RAE Phase;
- Detailed evaluation of remedial alternatives (individual and comparative); and,
- Summary and conclusions (including recommended final remedy).

AMEC will submit two copies of the FS Report to ADEQ for review and comments. Upon receipt of comments from ADEQ, AMEC will incorporate ADEQ's comments into the Final FS Report. AMEC will submit two copies of the Final FS Report to ADEQ and two copies on compact disks.

4.0 FS FIELD TASKS

As indicated in Section 3.3, ADEQ has requested collection of groundwater and IAQ samples in support of the FS. This section discusses these activities.

4.1 Groundwater Monitoring

This section provides the plan for performance of one round of groundwater monitoring of the SMWRS monitoring well network in support of the FS.

4.1.1 Sampling and Data Quality Objectives

Groundwater monitoring has not been performed at the SMWRS since September/November 2008. Therefore, a groundwater monitoring event will be performed to confirm groundwater flow direction and the current nature and extent of groundwater impact. The collected data will be compared to data collected during previous sampling events and to the respective Arizona AWQS. Groundwater monitoring and sampling will be conducted in accordance with the following documents:

- *Groundwater Field Sampling Plan (FSP)* prepared by Law Engineering and Environmental Services, Inc. (LAW) and dated February 7, 2001 (LAW, 2001a).
- *Groundwater Quality Assurance Project Plan (QAPP)* prepared by LAW and dated February 7, 2001 (LAW, 2001b).
- *Final Early Response Action Work Plan* prepared by MACTEC and dated May 3, 2004 (MACTEC, 2004).

4.1.2 Groundwater Monitoring and Sampling Plan

The groundwater monitoring event will include the following:

- Monitoring the depth to water in wells MW-1S, MW-1D, MW-2D, MW-3S, MW-4S, MW-5S, MW-5D, MW-6D, MW-7D, MW-AM-8S, MW9-130, MW9-175, MW9-205, MW9-235, MW10-130, MW10-170, MW10-235, MW11-170, MW11-200, MW11-240, MW12-140, MW12-180, MW12-210, MW12-240, MW-14-130, MW-14-170, MW14-200, and MW14-230.
- Collecting groundwater samples from conventional monitoring wells MW-5D, MW-7D and MW-AM-8S and from BARCAD wells MW9-130, MW9-175, MW9-205, MW9-235, MW10-130, MW10-170, MW10-235, MW11-170, MW11-200, MW11-240, MW14-130, MW14-170, MW14-200, and MW14-230. A total of 19 samples, including two duplicate samples, will be collected. The groundwater samples will be analyzed for VOCs using Environmental Protection Agency (EPA) Method 8260B.

The SMWRS well locations are shown on Figures 1 and 2. Conventional wells MW-5D, MW-7D, and MW-AM-8S will be sampled using a submersible Grundfos Redi-Flo2 pump, which is an electrically operated submersible sampling pump constructed of stainless steel and Teflon construction. A Grundfos Redi-Flo2 pump will be lowered to the following previously established sampling depths: MW-5D (208 feet bgs); MW-7D (192 feet bgs); and, MW-AM-8S (157 feet bgs). A pump controller will be used to maintain a water flow rate of 0.5 to 1.0 gpm. The pump will be decontaminated prior to purging and after sampling of each well.

As with previous sampling events, AMEC will utilize the micropurging approach to purge and sample the conventional wells, which collects a representative depth-specific groundwater sample with minimal agitation and mixing. Micropurging requires a very slow flow rate, less than 1.0 gpm. In order to evaluate if formation water has been extracted, changes in the groundwater parameters pH, electroconductivity (EC), and temperature will be measured using a YSI Model 556 low flow purging system. The YSI 556 will be calibrated prior to being used for sampling. According to the QAPP, water quality is considered stable when consecutive pH, EC and temperature readings do not vary by more than 10 percent. During micropurging, these parameters typically stabilize after less than two gallons of water is removed, which reduces sampling time and the quantity of investigation derived waste (IDW) that is generated. After purging is completed, the sample flow rate is reduced to 200 to 300 millimeters per minute (ml/min) and the samples are collected in three (3) 40-milliliter (ml) volatile organic analysis (VOA) vials provided by the laboratory. The VOA vials are pre-preserved with hydrochloric acid (HCl) in accordance with the analytical method.

The BARCAD system consists of a microporous well screen that is equipped with a one-way valve. Water rises through the one-way valve, into the one-inch diameter polyvinyl chloride (PVC) casing, and to the piezometric surface for the particular monitoring interval. A dedicated one-quarter inch diameter Teflon[®] tube is installed in the casing to a depth approximately one foot above the top of the BARCAD. The BARCAD wells are small diameter and are essentially in contact with the formation. Therefore, after one well volume is purged, the water sample is

4.1.4 Data Management

Water levels and groundwater analytical data will be entered into the AMEC project spreadsheets and the Electronic Data Submittals (EDS) complying with the most recent ADEQ requirements will be prepared and submitted to ADEQ.

4.2 Indoor Air Quality Sampling

An IAQ sample will be collected from Suite 1 of the 1545 North McQueen Road building. The IAQ sample will be collected by placing a summa canister equipped with a flow regulator to collect a sample over 24 hours. The sample will be analyzed for VOCs by EPA Method TO-15. The sampling equipment should not be disturbed. Per request of the property owner, the sampler will be placed in the office on a normal working day and will be retrieved 24 hours after placement.

5.0 PROJECT MANAGEMENT

This section describes project management supporting preparation of the FS for the Site.

5.1 Project Team

An Organizational Chart presenting the Project Team is provided as Figure 3.

5.2 Communication Between ADEQ and AMEC

Ms. Danita Hardy is the current ADEQ Project Manager and Mr. James N. Clarke is the current AMEC Project Manager. Project planning and support is discussed in detail in Section 3.1. Communications, in the form of periodic status meetings, will be conducted primarily between the ADEQ Project Manager and the AMEC Project Manager. The periodic status meetings will be conducted primarily via e-mail or telephone. Periodic technical meetings may also be conducted to discuss the scope of work or results. During field activities, communications between ADEQ and AMEC may occur at least once daily. In the event that the AMEC Project Manager is unavailable, the alternate point of contact is Ms. Natalie Chrisman Lazarr, an AMEC Associate Engineer.

5.3 Coordination

AMEC will be responsible for the following:

- Coordinating and scheduling field activities.
- Procuring subcontractors and equipment necessary to complete the scope of work. This includes analytical laboratories, drilling contractors, and land surveyors.
- Updating site-specific Health and Safety Plans (as necessary).
- Maintaining site-specific FSPs and QAPPs (as necessary).
- Managing and overseeing subcontractors.
- Managing IDW.

7.0 REFERENCES

Arizona Administrative Code R18-16-406, R18-16-407, and R18-16-408

Arizona Revised Statutes §49-282, et. seq.

Law Engineering and Environmental Services, Inc (LAW), 2001a. *Groundwater Field Sampling Plan, South Mesa WQARF Registry Site, Mesa, Arizona, ADEQ Task Assignment 00-0094*, dated February 7, 2001

LAW, 2001b. *Groundwater Monitoring Quality Assurance Project Plan, South Mesa WQARF Registry Site, Mesa, Arizona, ADEQ Task Assignment 00-0094*, February 7, 2001

MACTEC, 2004. *Early Response Action Work Plan, South Mesa WQARF Registry Site, Mesa and Gilbert, Arizona, ADEQ Task Assignment 04-0101*, May 3, 2004

MACTEC, 2011. *Draft Remedial Investigation Report, South Mesa WQARF Registry Site, Mesa, Arizona*, March 28, 2011.

USEPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final*, EPA/540/G-89/004, OSWER Directive 9355.3-01, Office of Emergency and Remedial Response, Washington, D.C. 20460, October.