STATE OF NEVADA

PUBLIC UTILITIES COMMISSION OF NEVADA

1150 E. William Street
Carson City, Nevada 89701-3109

No. 40204

RECEIPT

Received from

Date 6/21/2011

LIONEL SAWYER & COLLINS
50 W LIBERTY STE 1100
RENO, NV 89501

AMOUNT $ 200.00

TWO HUNDRED ---------- and 00/100 Dollars

	Cash	Check	Money Order	Draft
How Paid	☐	502424		

Type of Receipt	Filing Fee	TDD	Copy Service	UEC	Mill or CMRS	Other
	☑	☐	☐	☐	☐	☐
GL	3717		3818	3% to 3305 97% to LIHEA cc: Welfare	3920-3315 1038-3315	

Invoice#:

Memo

NEW FILING

Received by CMU

Business Process Copy

SUNRISE ENGINEERING

June 21, 2011

Ms. Breanne Potter
Assistant Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, Nevada 89701-3109

RE: UEPA Filing - Spring Creek Utilities Co.

Dear Ms. Potter:

Spring Creek Utilities Co. (SCUC) hereby files with the Public Utilities Commission of Nevada the enclosed Application for a permit under the Utility Environmental Protection Act. This permit is being requested in connection with the proposed construction of an arsenic treatment facility at Well 3 in the Tract 200 Subdivision of the SCUC service territory.

If you have any questions regarding this filing, please contact me at 801-523-0100 or kbrown@sunrise-eng.com.

Sincerely,
SUNRISE ENGINEERING, INC.

Kevin W. Brown
Principal Engineer

cc: Jennifer Carr, NDEP Bureau of Safe Drinking Water

Enclosures

12227 SOUTH BUSINESS PARK DR, STE 220 • DRAPER, UTAH 84020 • TEL 801.523.0100 • 888.523.2221 • FAX 801.523.0990 *www.sunrise-eng.com*

PUBLIC UTILITIES COMMISSION OF NEVADA
DRAFT NOTICE
(Applications, Tariff Filings, Complaints, and Petitions)

Pursuant to Nevada Administrative Code ("NAC") 703.162, the Commission requires that a draft notice be included with all applications, tariff filings, complaints and petitions. Please complete and include **ONE COPY** of this form with your filing. (Completion of this form may require the use of more than one page.)

A title that generally describes the relief requested (see NAC 703.160(4)(a)):

Application of Spring Creek Utilities Co. for a permit under the Utility Environmental Protection Act to construct a wellhead coagulation / filtration arsenic treatment facility at Well No. 3 in the 200 Tract.

The name of the applicant, complainant, petitioner or the name of the agent for the applicant, complainant or petitioner (see NAC 703.160(4)(b)):

Applicant: Spring Creek Utilities Co.

Counsel: William J. McKean
Douglas A. Cannon

A brief description of the purpose of the filing or proceeding, including, without limitation, a clear and concise introductory statement that summarizes the relief requested or the type of proceedings scheduled **AND** the effect of the relief or proceeding upon consumers (see NAC 703.160(4)(c)):

Spring Creek Utilities Co. (the "Company") is submitting, pursuant to the Nevada Utility Environmental Protection Act ("UEPA"), an application to the Public Utilities Commission of Nevada (the "Commission") for authority to construct a coagulation/filtration arsenic treatment facility which will be housed in two approximately 350 square-foot structures. The structures will house pre-treatment equipment, coagulation / filtration treatment equipment, associated piping, plumbing, and monitoring components. A 25,000 gallon backwash tank and sludge container will be adjacent to the treatment facilities. In addition, the Company will be installing approximately 150 feet of 8-inch piping and associated valves and other plumbing components in order to connect the treatment facility to existing water infrastructure. Security fencing will also be provided. The project will be located in Spring Creek, Nevada adjacent to the Company's existing well number 3. This project is being undertaken to bring the existing water system into compliance with the arsenic maximum contaminant level as established by the U.S. Environmental Protection Agency. The arsenic treatment facility will provide treated water to the Company's system users in Tract 200 in Spring Creek, Nevada.

A statement indicating whether a consumer session is required to be held pursuant to Nevada Revised Statute ("NRS") 704.069(1)[1]:

A consumer session will not be required

If the draft notice pertains to a tariff filing, please include the tariff number **AND** the section number(s) or schedule number(s) being revised.

N/A

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[1] NRS 704.069 states in pertinent part:

1. The Commission shall conduct a consumer session to solicit comments from the public in any matter pending before the Commission pursuant to NRS 704.061 to 704.110 inclusive, in which:
(a) A public utility has filed a general rate application, an application to recover the increased cost of purchased fuel, purchased power, or natural gas purchased for resale or an application to clear its deferred accounts; and
(b) The changes proposed in the application will result in an increase in annual gross operating revenue, as certified by the applicant, in an amount that will exceed $50,000 or 10 percent of the applicant's annual gross operating revenue, whichever is less.

Utilities, Inc.

June 21, 2011

Chairperson Alaina Burtenshaw
Public Utilities Commission of Nevada
9075 West Diablo Drive, Suite 250
Las Vegas, NV 89148

Re: Spring Creek Utilities Co. UEPA Filings pertaining to the arsenic remediation project.

Dear Madame Chairperson,

Please find enclosed Spring Creek Utility Company's (SCUC) UEPA filings pertaining to the arsenic remediation project. We would like to take this opportunity to express our appreciation to the PUCN and its Staff for the guidance provided SCUC in its efforts to resolve the water quality issues for the customers residing in Tract 200 in Spring Creek. Since the 2009 IRP proceeding SCUC has had numerous delays and setbacks attempting to implement the approved action plan. Each hurdle appears to have added a degree of complexity in the minds of concerned individuals and observers. However, we strive to stay focused on our goal to provide compliant water quality, as quickly as possible, and at the least cost to the customers.

As we reflect on where we are today in this process, we unexpectedly find ourselves with renewed hope. The setbacks experienced while moving the 2009 IRP action plan forward have created a window of opportunity for SCUC, the PUCN, its Staff, and more importantly our rate payers which will result in a better and more economical solution to obtain improved water quality for the residents of Tract 200. Immediately following the Commission's Order in Docket 10-11033 denying the Oakmont Storage Tank UEPA for reasons stated in the Order (the first of 5 UEPAs submitted for the water supply alternative in the 2009 IRP Action Plan), SCUC began a detailed reevaluation of its alternatives and initiated an Amended 2009 IRP application process for its Action Plan going forward. *The following is a summary of this re-evaluation process.*

On May 3, 2011 SCUC began setting up interviews with experts in the field of arsenic remediate. Meetings and discussions were held with 8 engineering firms and equipment vendors. All of the engineers contacted pointed to the same treatment option except one, and concluded that it is the least costly and most effective alternative available at this time. SCUC also met with representatives from NDEP and the PUCN Staff to evaluate all possible courses of action to ensure a complete and thorough process could be developed to expedite a resolution to the water quality issues. Additionally, SCUC representatives contacted local government agencies to solidify strong lines of two-way, open communication for the remainder of this project. Internal meetings were held with SCUC representatives for reporting and monitoring of the information being shared by consultants and the regulatory agencies. In-house company experts from across the country were called in to evaluate the

engineering alternative treatment techniques which were being discussed with SCUC management. Every effort was made to validate the findings and conclusions that were being revealed and formulated.

For what appeared to be a significant setback for the customers in Spring Creek, SCUC is now pleased to report that a viable and economical treatment option has been fully evaluated and is currently before the PUCN as an amendment to the 2009 IRP Action Plan. This amendment's primary focus is to provide for the construction of treatment facilities at each individual well site, instead of new source water wells. SCUC, and its parent corporation Utilities, Inc., are confident that the new remediation alternative will stand up to the necessary vetting that will take place in the IRP proceeding and standby ready to begin construction on the treatment components on the Tract 200 wells as soon as the PUCN grants the required UEPA permits for this project.

Again, SCUC greatly appreciates the regulatory oversight and guidance that you provide and are more than willing to answer any questions regarding this matter. It is our hope that this process can move forward as expeditiously as possible to resolve the arsenic issues and improve water quality to the Spring Creek customers.

Sincerely,

Wendy S.W. Barnett

Wendy S.W. Barnett
Regional Director

Cc: Lisa Sparrow, President and CEO, Utilities, Inc.
John Hoy, Vice President and COO, Utilities, Inc.
Rick Durham, Regional Vice President, Utilities, Inc.

PUBLIC UTILITIES COMMISISON OF NEVADA

UTILITY ENVIRONMENTAL PROTECTION ACT PERMIT APPLICATION

Spring Creek Utilities Co.
Arsenic Removal Facility at Well #3

Prepared for:

Spring Creek Utilities Co.
285 Spring Creek Parkway
Spring Creek, Nevada 89815-5840

Prepared by:

Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

June 21, 2011

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PUBLIC UTILITIES COMMISSION OF NEVADA

UTILITY ENVIRONMENTAL PROTECTION ACT PERMIT APPLICATION

Spring Creek Utilities Co.
Arsenic Removal Facility at Well #3

I INTRODUCTION

I.1 Background

Spring Creek Utilities Co. owns and operates two independent public water systems: Spring Creek Mobile Home Section (Tract 200, NV5027) and Spring Creek Housing Section (Tracts 100, 300, and 400, NV0036) for the community of Spring Creek located approximately 10 miles southeast of Elko, Nevada.

The water system for the Mobile Home Section (Tract 200, NV5027) is serviced by three wells:

Well #1 - 350 gallons per minute (gpm),
Well #3 - 750 gpm, and
Well #11 - 800 gpm.

Each of the wells produces groundwater with arsenic concentrations above 0.02 parts per million (ppm) or milligrams per liter (mg/l).

There are four water storage tanks:

Twin Tank A - 250,000-gallons,
Twin Tank B - 500,000-gallons,
High Zone Tank - 500,000-gallons, and
Karval Tank - 1,000,000-gallons.

The water system for the Housing Section (Tracts 100, 300 and 400, NV0036) is serviced by nine wells:

Well #4 - 730 gpm,
Well #5 - 750 gpm,
Well #7 - 150 to 450 gpm,
Well #8 - 500 gpm,
Well #9 - 600 gpm,
Well #10 - 380 gpm,
Well #12 - 550 gpm,
Well #14 - 230 gpm, and
Well #101 - 1,200 gpm.

There are six water storage tanks and one hydropneumatic tank with a total storage capacity of 3,042,000 gallons. The arsenic concentration of groundwater derived from the nine wells, when mixed, is below 0.01 mg/l and only Wells #4 and #10 at times produces water with arsenic concentrations of 0.012 and 0.013 mg/l, respectively. Spring Creek Utilities Co. has been approved by the Nevada Division of Environmental Protection to blend the well waters and utilize an alternative monitoring program to maintain compliance with the new maximum contaminant level (MCL) of 0.01 mg/l for arsenic.

I.2 Proposed Project

The U.S. Environmental Protection Agency (EPA) has revised the arsenic standard or MCL for drinking water from 0.05 mg/l to 0.01 mg/l to protect consumers served by public water systems from the effects of long-term, chronic exposure to arsenic.

The arsenic concentration in the groundwater from Well #3 is currently above 0.02 mg/l. To be in compliance with the MCL of 0.01 mg/l for arsenic, Spring Creek Utilities Co. has proposed an arsenic removal facility at Well #3, as well as two other wells in the water system, by using the coagulation/filtration (C/F) technology to reduce the arsenic concentration in the water from the well to a level below 0.01 mg/l.

C/F is considered the best technology for the well due to the high silica content, pH value greater than 7 and the moderate to moderately low arsenic level in the water. Moreover, C/F is the most cost-effective technology for the well based on a preliminary engineering report prepared by Sunrise Engineering. C/F involves both chemical and physical stages to remove arsenic. Ferric salts are added to the untreated (raw) water. The metals hydrolyze to form iron hydroxides that subsequently bind to other iron hydroxides to form particulate flocs. During this process, arsenic binds to, or is entrapped in, the growing particulates and is thereby removed from solution. The arsenic-containing particulates are then removed from the water through filtration. Sludge containing arsenic from the filtration process is backwashed to a tank where most of the water is recycled and returned to the start of the treatment process. The sludge with some water is settled to the bottom of the tank and collected in a container, dewatered and trucked once per month to a landfill for disposal. There will be no fluid discharge to the surface or subsurface. The sludge will meet Toxicity Characteristic Leaching Procedure (TCLP) requirements for disposal in a landfill.

Two structures each with an area of approximately 350 square feet will be constructed at the well site to house pre-treatment equipment, C/F treatment equipment, associated piping, plumbing, and monitoring components. A 25,000-gallon backwash tank and sludge container will be adjacent to the treatment facilities. In addition, approximately 150 feet of 8-inch piping and associated valves and other plumbing components will be installed to connect the treatment facility to existing water infrastructure. Security fencing will also be provided. There will be no office facilities or restroom facilities in the structures.

After construction of the proposed project is completed, the ground surface will be restored to the original surface contour as much as practically possible.

The proposed project will not involve any federal action: no federal land will be needed; no federal funding is involved; and no federal approval is required. Therefore, this permit application document is prepared in accordance with Nevada Administrative Code (NAC) 703.423.

II REQUIREMENT OF NAC 703.423

II.1 Description of Location

1. A description of the location of the proposed utility facility, as required by subsection 1 of NRS 704.870 including:

   (a) A general description of the location of the proposed utility facility, including a regional map that identifies the location of the proposed utility facility (NAC 703.423(1)(a)):

   The proposed treatment facility will be housed in two approximately 350-square-foot structure adjacent to the existing well house of Well #3 in the 200 Tract. The proposed project site can be described as within the southeastern quarter of the northeastern quarter of Section 27, Township 34 North, Range 56 East of the Mount Diablo Base and Meridian in Elko County, Nevada (see Maps and Drawings in **Attachment A**)

   (b) A legal description of the site of the proposed utility facility, with the exception of electric lines, gas transmission lines and water and wastewater lines, for which only a detailed description of the site is required (NAC 703.423(1)(b)):

   A legal description of the site is included in **Attachment B** and is summarized below:

   All that parcel of land in Elko County, Nevada, beginning within Section 27, Township 34 North, Range 56 East, Mount Diablo Base and Meridian, described as follows:

   Commencing at the brass cap ¼ section corner common to Section 22 and 27, said township and rang; thence South 35° 55' 11" East, 2,590.06 feed to Corner No. 1, the TRUE POINT OF BEGINNING; thence South 80° 00' 00" East, 373.00 feet to Corner No. 2; thence South 11° 50' 00" East, 508.67 feet to Corner No. 3, a point on a nontangent curve to the left having a radius of 340.00 feet, a radial line at said point bears South 05° 02" 08" East; thence along the arc of said curve 40.34 feet through a central angle of 6° 47' 52" to Corner No. 4; thence South 78° 10' 00" Weast, 306.00 feet to Corner No. 5; thence North 11° 50' 00" West, 645.00 feet to Corner No. 1, the TRUE POINT OF BEGINNING, containing 4.576 acres, more or less.

(c) Appropriately scaled site plan drawings of the proposed utility facility, vicinity maps and routing maps (NAC 703.423(1)(c)).

See **Attachment A** (Maps and Drawings).

II.2 General Description of Facility

2. A description of the proposed utility facility including:

(a) The size and nature of the proposed utility facility (NAC 703.423(2)(a)):

Two structures housing treatment equipment each with an area of approximately 350 square feet will be erected at the site. A 25,000-gallon backwash tank and sludge container will be installed adjacent to the structures. Additionally, approximately 150 feet of 8-inch diameter piping and associated valves and other plumbing components will be installed to connect the treatment facility to existing water infrastructure. Security fencing will also be provided.

(b) The natural resources that will be used during the construction and operation of the proposed utility facility (NAC 703.423(2)(b)):

Resources required for construction would be:

Steel to form vessels and tanks
Fuel for vehicles to transport materials to the site and to operate equipment
Paint to coat interior and exterior of vessels and tanks and exterior of building
Chlorine for disinfection of vessels tanks and pipes upon completion
Concrete for concrete pads
Steel pipes
Gravel, road base and structural fill for roads and parking space
PVC pipe to connect structures to water system

The proposed project will not have any significant adverse impact on natural resources (see **Attachment C** – Limited Environmental Statement)

(c) Layout diagrams of the proposed utility facility and its associated equipment (NAC 703.423(2)(c)): and

See **Attachment A** (Maps and Drawings).

(d) Scaled diagrams of the structures at the proposed utility facility (NAC 703.423(2)(d)):

See **Attachment A** (Maps and Drawings).

II.3 Environmental Studies

3. A copy and summary of any studies which have been made of the environmental impact of the proposed utility facility as required by subsection 1 of NRS 704.870 (NAC 703.423(3)).

Attachment C is a Limited Environmental Statement for the proposed project and assesses the potential environmental impact of the proposed project on human health and the environment. Based on the analysis in **Attachment C**, the proposed project will not have any significant adverse impact on the following important environmental elements:

- Land use
- Floodplain
- Wetlands
- Biological resources
- Cultural resources
- Water quality
- Socio-economic/environmental justice
- Air quality
- Transportation
- Noise

Attachment D is a Geotechnical Report prepared based on a geotechnical investigation conducted at the proposed project site. The report indicates that the site is suitable for the proposed project construction.

Attachment E is a Preliminary Engineering Report (PER). The report provides a discussion of arsenic mitigation strategies that included both non-treatment and treatment strategies. The report determined that the most feasible mitigation strategies for Tract 200 wells include the treatment strategies of treating the source water at a centralized treatment facility, site-specific treatment facilities, or a combination of centralized and site-specific facilities. Following the discussion on arsenic mitigation strategies is a discussion on treatment technologies. The evaluation of treatment technologies determined that the best technologies for Tract 200 wells would be either C/F or iron based adsorption (IBA). The final portion of the report introduces four separate project alternatives, all of which consider treatment. Each project alternative is evaluated based on non-economic and economic factors. Opinions of probable cost were developed for comparison of alternatives and to provide a present worth analysis. Based on the non-economic and economic factors, the PER provides the recommendation that the Spring Creek Utility, Co. provide three separate site-specific treatment facilities at each of the three wells in Tract 200 that treat the water using C/F.

II.4 Reasonable Alternative Locations

4. A description of any reasonable alternate locations for the proposed utility facility, a description of the comparative merits or detriments of each location submitted and a statement of the reasons why the location is best suited for the proposed utility facility as required by subsection 1 of RS 704.870 (NAC 703.423(4)).

The utility facility proposed in this application, a C/F arsenic removal facility, would be located at Well #3 (in addition, separate C/F arsenic removal facilities would also be located at the other two wells in the water system). Because this facility is to be located at the existing wellhead, there are no other reasonable alternate locations.

In assessing whether to construct a wellhead treatment project as proposed in this application, a centralized treatment plant for the three wells (Wells #1, #3, and #11) was considered as a possible alternative. If a centralized treatment plant were proposed, then it could be constructed in alternate locations. However, a centralized treatment plant alternative was rejected based on several factors, including the need to acquire additional land and easements, and the need to construct additional distribution piping. Based on these factors, the time and cost to construct a centralized treatment plant make it less favorable relative to a wellhead treatment project. While these factors generally apply to any centralized treatment plant, they can be illustrated by the following examples of possible locations where such a plant could be located. One possible location for a centralized treatment plant would be in the property east of Tract 200 near the east end of the paved portion of Valdez Drive. In order for this alternative to be viable, the design and construction of the facilities would likely be phased (so the delivery of treated water could begin as soon as possible). The first phase would include the centralized facility. The facility could be constructed with a capacity to treat well water immediately from Well #3. Well #3 would then become the primary well for the system and operate during the winter while the remainder of the project was being constructed as the second phase. The next priorities would be the transmission line from the centralized facility to the distribution system and providing a transmission line from Well #11 to the centralized treatment plant. The transmission line from the centralized facility to the distribution system would need to be sized for all three wells. The transmission line from Well #11 to the centralized treatment plant would need to be sized for the flows from Well #11 and Well #1. Among the estimated quantities for this alternative are 6,100 linear feet of 12 inch pipe, 5,800 linear feet of 10 inch pipe, and 2,200 linear feet of 8 inch pipe. This alternative requires that approvals be obtained to construct in right-of-ways, easements be acquired, and the land for the treatment plant be purchased. Due to the land and right-of-way acquisition requirements and the amount of distribution pipeline required for this alternative, this alternative is neither time- nor cost-effective.

Another alternative includes combining Wells #3 and #11 into a centralized treatment facility and also providing a site-specific facility for Well #1 at the well site. One possible location for the centralized treatment facility would be in the property east of Tract 200 near the east end of the paved portion of Valdez Drive. This alternative would also likely involve a phased approach in which the combined treatment plant would be constructed first with at

least enough capacity to treat Well #3 during the winter months. This alternative would require additional distribution piping to transport water from Well #11 to the treatment site, and then from the treatment plant to the system. This would require that approval be obtained to construct in right-of-ways, easements would need to be acquired, and the land for the treatment facility would need to be purchased. This option is neither time- nor cost-effective.

II.5 Public Notice

5. A copy of the public notice of the application or amended application and proof of the publication of the public notice as required by subsection 4 of NRS 704.870 (NAC 703.423(5)).

The proof of publication is attached in **Attachment F**.

II.6 State Clearinghouse

6. Proof that a copy of the application or amended application has been submitted to the Nevada State Clearinghouse within the Department of Administration to enable agency review and comment (NAC 703.423(6)).

A copy of the certificate of service can be found in **Attachment G**.

II.7 Probable Effect on Environment

7. An explanation of the nature of the probable effect on the environment, including:

(a) A reference to any studies, if applicable (NAC 703.423(7)(a)):

See **Attachment C** (Limited Environmental Statement).

(b) An environmental statement that includes (NAC 703.423(7)(b)):

(1) The name, qualifications, professions and contact information of each person with primary responsibility for the preparation of the environmental statement (NAC 703.423(7)(b)(1)):

Dow Yang, P.E.
Project Environmental Engineer/Hydrogeologist
Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

(2) The name, qualifications, professions and contact information of each person who has provided comments or input in the preparation of the environmental statement (NAC 703.423(7)(b)(2)):

Dow Yang, P.E.
Project Environmental Engineer/Hydrogeologist
Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

Steve Hansen, P.E.
Project Manager
Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

Derek Anderson, P.E.
Environmental/Energy Manager
Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

Kevin Brown, P.E.
Salt Lake Municipal Service Center Manager
Sunrise Engineering, Inc.
12227 South Business Park Drive, Suite 220
Draper, Utah 84020

(3) A bibliography of materials used in the preparation of the environmental statement (NAC 703.423(7)(b)(3)):

See Section 4 (References) and Appendices A and B of **Attachment C** (Limited Environmental Statement).

(4) A description of (NAC 703.423(7)(b)(4)):

(I) The environmental characteristics of the project area existing at the time of the application or amended application is filed with the Commission:

The proposed arsenic removal facility is located approximately 300 feet north of a gravel road. Well #3 and the well house are located at the site. The proposed treatment building will be located adjacent to and southwest of the well house. Most of the ground surface at the site is bare or is covered with miscellaneous weeds due to surface disturbance that occurred when the well and well house were

constructed. The surrounding areas are covered primarily with bluebunch wheatgrass, Thurber's needlegrass, Wyoming big sagebrush and miscellaneous grasses.

(II) The environmental impacts of the construction and operation of the proposed utility facility will have on the project area before mitigation: and

The proposed construction activities will temporarily generate a small amount of fugitive dust and vehicle emissions (see Limited Environmental Statement in **Attachment C**).

(III) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area after mitigation:

No significant adverse environmental impacts are expected (see Limited Environmental Statement in **Attachment C**).

II.8 Reliable Utility Service

8. An explanation of the extent to which the proposed utility facility is needed to ensure reliable utility service to customers in this State, including:

(a) If the proposed utility facility was approved in a resource plan or an amendment to a resource plan, a reference to the previous approval by the Commission (NAC 703.423(8)(a)):

Spring Creek Utilities Co. is simultaneously submitting an amendment to the action plan to its Integrated Resource Plan (the action plan was previously approved in Docket No. 09-03003).

(b) If the proposed utility facility was not approved in a resource plan or an amendment to a resource plan, a description of the extent to which the proposed utility facility will (NAC 703.423(8)(b)):

(1) Provide utility service to customers in this State (NAC 703.423(8)(b)(1)):

With implementation of the proposed project, the existing water system will provide customers in the Mobile Home Section service area (Tract 200, NV5027) with drinking water that is compliant with the arsenic MCL as required by federal and state law.

(2) Enhance the reliability of utility service in this State (NAC 703.423(8)(b)(2)):

The project will enhance the reliability of utility service in this State by brining water supplies into compliance with the arsenic MCL as required by federal and state law.

(3) Achieve interstate benefits by the proposed construction or modification of transmission facilities in this State, if applicable (NAC 703.423(8)(b)(3)):

Not Applicable.

II.9 Discussion of Need versus Effect on Environment

9. An explanation of how the need for the proposed utility facility as described in subsection eight balances any adverse effects on the environment as described in subsection seven (NAC 703.423(9)):

The proposed project will not cause any significant adverse environmental impact. The proposed project is needed to meet the new drinking water standards for arsenic set forth by the EPA and adopted by the Nevada Division of Environmental Protection.

II.10 Minimum Adverse Impact on Environment

10. An explanation of how the proposed utility facility represents the minimum adverse effect on the environment, including:

(a) The state of available technology (NAC 703.423(10)(b)):

A number of treatment technologies are available for the removal of arsenic to meet the EPA drinking water standards. The Best Available Technology (BAT) list developed by the EPA includes activated alumina (AA), coagulation/filtration (C/F), coagulation/microfiltration (C/MF) iron based adsorption (IBA), ion exchange (IX), lime softening (LS), reverse osmosis (RO), electrodialysis (ED) and oxidation/filtration (O/F). Additional analysis is contained in the PER (**Attachment E**).

(b) The nature of various alternatives (NAC 703.423(10)(b)):

All of the technologies listed above use one of three generalized removal approaches including: 1) adsorption by electro-potential charge, 2) precipitation, and 3) membrane technologies. Adsorption processes utilize a charged and stationary media to attract and bind arsenic. Technologies relying upon adsorption include AA, IBA and IX. Precipitation processes involve chemical addition to form suspended or colloidal particulates that can settle out of solution or can be filtered, including LS, O/F, C/F and C/MF. Membrane processes utilize membranes in one of two

manners including RO and ED. Additional analysis is contained in the PER (**Attachment E**).

(c) The economics of various alternatives (NAC 703.423(10)(c)):

C/F is considered the best technology for the Tract 200 wells due to the pH value greater than 7 and the high silica content in the water. The high silica content in the water reduces the effectiveness of the adsorption technologies. The PER (**Attachment E**) shows C/F to be the best and most cost effective option based on a present worth analysis. In 2005, a pilot test was also completed in Tract 200 showing that C/F is a viable method for the Spring Creek Tract 200 water. Additional analysis is contained in the PER (**Attachment E**).

II.11 Facility Conforms to Local Laws

11. An explanation of how the location of the proposed utility facility conforms to applicable state and local laws and regulations, including a list of all permits, licenses and approvals required by federal, state and local statutes, regulations and ordinances. The explanation must include a list that indicates:

(a) All permits, licenses and approvals the applicant has obtained, including copies thereof (NAC 703.423(11)(a)):

See table in part 11(b).

(b) All permits, licenses and approvals the applicant is in the process of obtaining to commence construction of the proposed utility facility. The applicant must provide an estimated timeline for obtaining these permits, licenses and approvals (NAC 703.423(11)(b)):

Permit/Approval Required	Approving Agency and Contact information	Application Submittal Date	Date of Issuance
UEPA Permit to Construct	Nevada Public Utilities Commission 1150 East William St. Carson City, NV 89701-3109 Greg Meinzer Tel: 775-684-6179	To be filed	
Environmental Clearance	State Clearinghouse Nevada Department of Administration Division of Budget and Planning 209 East Musser Street, Room 200 Carson City, NV 89701-4298 Tel: 775-684-0222	To be filed	
Design Approval	Nevada Division of Environmental Protection 901 South Stewart St., Suite 4001 Carson City, NV 89701-5249 Tel: 775-687-4670	To be filed	
Building Permit	Elko County – Building Department 571 Idaho Street Elko, NV 89801 Tel: 775-738-6816	To be filed	

II.12 Public Interest

12. An explanation of how the proposed utility facility will serve the public interest, including:

(a) The economic benefits that the proposed utility facility will bring to the applicant and this State (NAC 703.423(12)(a)):

The proposed project will benefit the applicant by providing community residents with drinking water compliant with the arsenic MCL. In addition, the installation of the facility will result in a temporary increase in construction activities in Spring Creek with its associated financial benefits to the community.

(b) The nature of the probable effect on the environment in this State if the proposed utility facility is constructed (NAC 703.423(12)(b)):

The proposed project will have no significant adverse impact on the environment (see **Attachment C**).

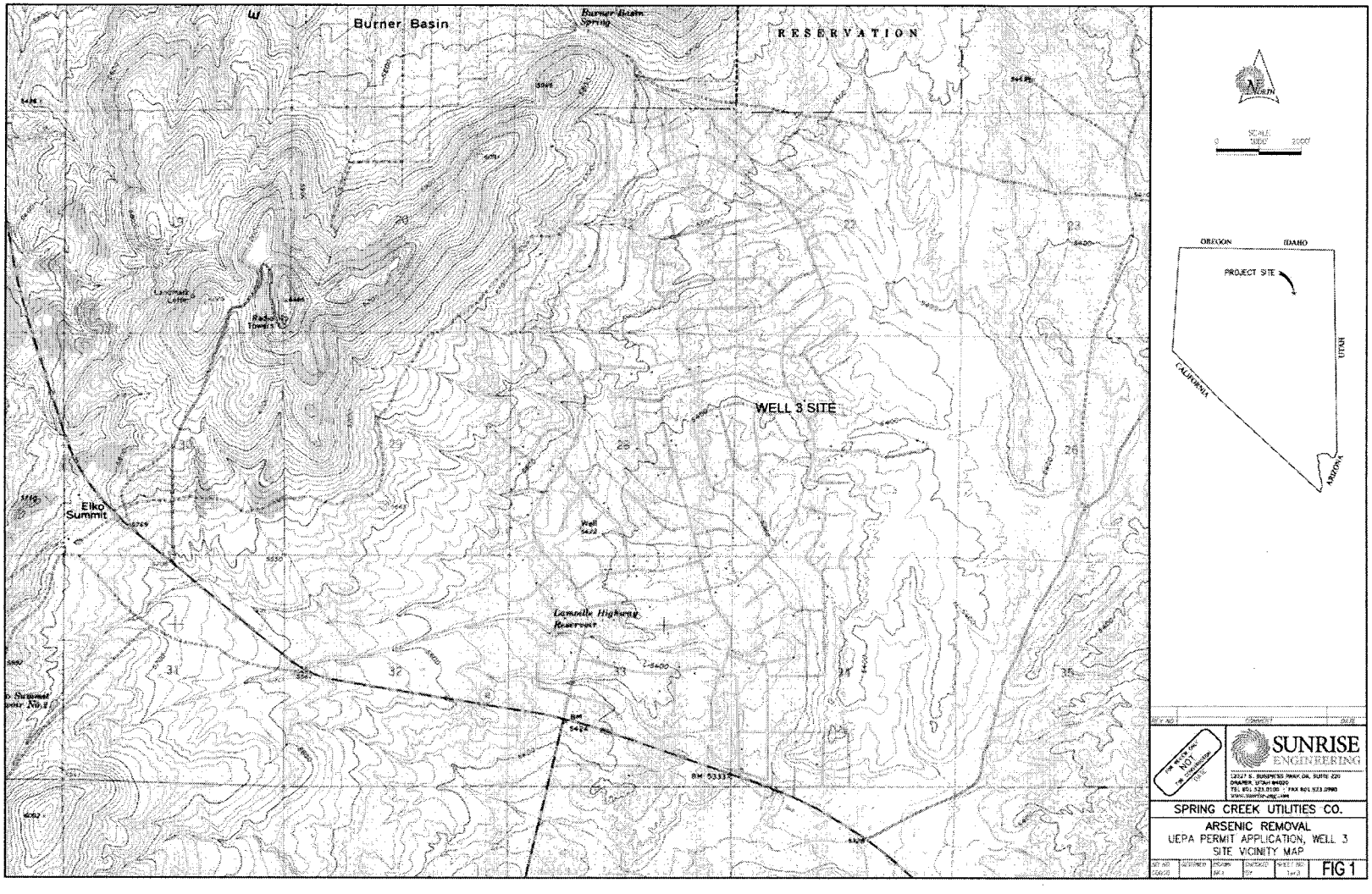
(c) The nature of the probable effect on the public health, safety and welfare of the residents in this State if the proposed utility facility is constructed (NAC 703.423(12)(c)):

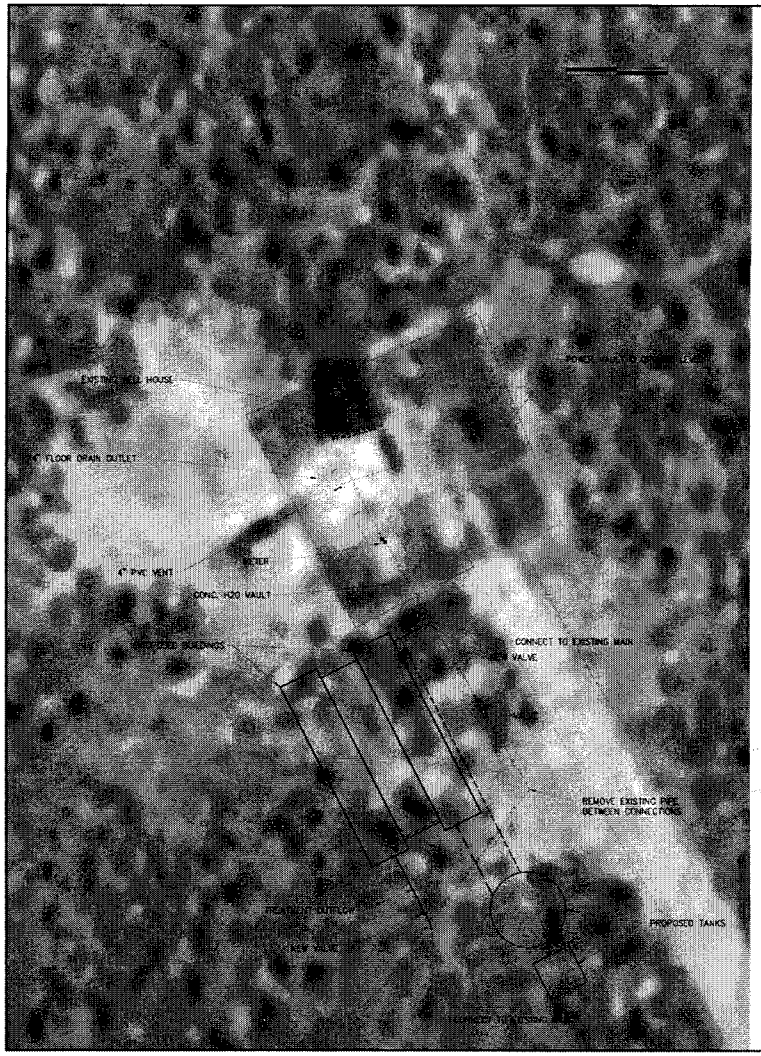
The proposed project will improve public health, safety and welfare of the community residents by providing drinking water that will meet the MCL for arsenic.

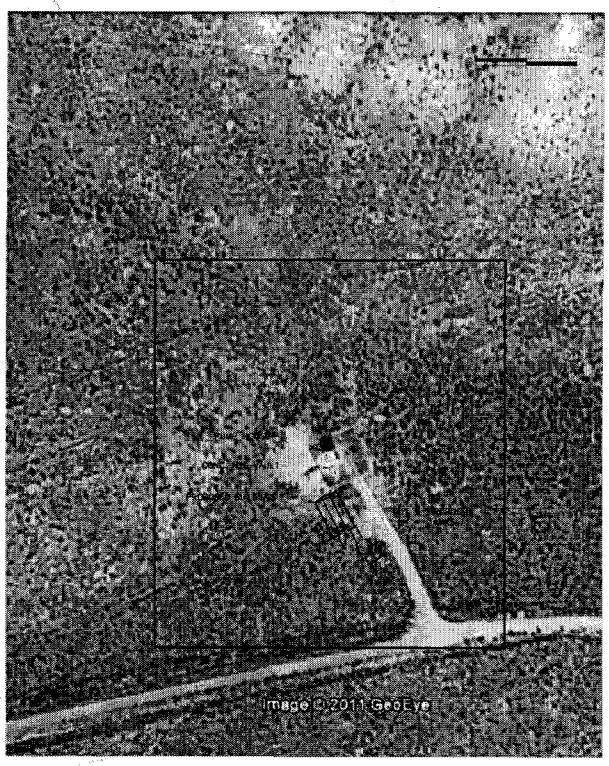
(d) The interstate benefits expected to be achieved by the proposed electric transmission facility in this State, if applicable (NAC 703.423(12)(d)):

Not Applicable.

Attachment A
Maps and Drawings


Burner Basin
Burner Basin Spring
RESERVATION
WELL 3 SITE
Elko Summit
Well
Lamoille Highway
Reservoir
BM 5333
BM 5422
NORTH
SCALE
1" = 2000'
OREGON
IDAHO
PROJECT SITE
UTAH
CALIFORNIA
ARIZONA
SUNRISE ENGINEERING
SPRING CREEK UTILITIES CO.
ARSENIC REMOVAL
UEPA PERMIT APPLICATION, WELL 3
SITE VICINITY MAP
FIG 1





NORTH

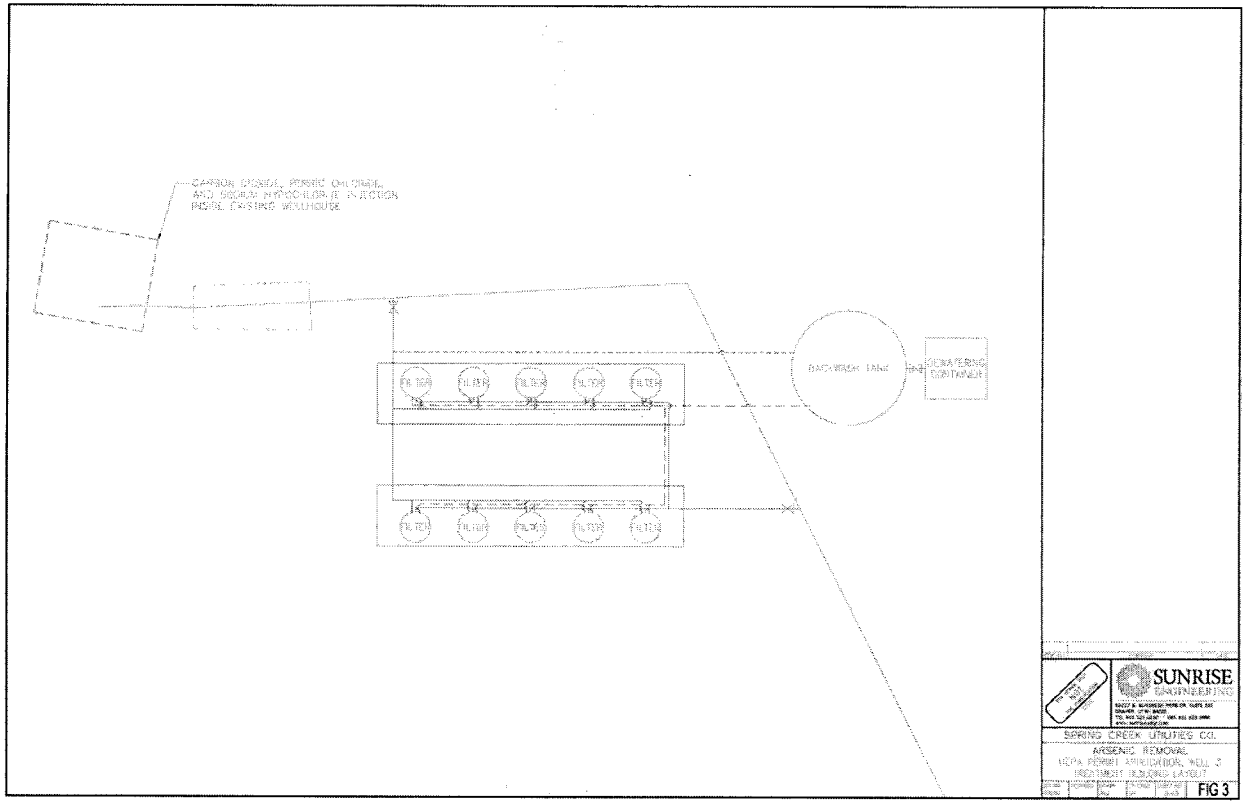
NOT FOR CONSTRUCTION

SUNRISE ENGINEERING

SPRING CREEK UTILITIES CO.

ARSENIC REMOVAL
UEPA PERMIT APPLICATION, WELL 3
SITE MAP

FIG 2


CARBON DIOXIDE, PERMIT ON TRAIL
AND ORDER NOTIFICATION
FROM EXISTING WELLHOUSE
BACKWASH TANK
DEWATERING
CONTAINER
SUNRISE
ENGINEERING
SPRING CREEK UTILITIES CO.
ARSENIC REMOVAL
FIG 3

Attachment B
Legal Description

Commencing at the southeast section corner of said Section 33, said Township and Range; thence N. 60° 20' 44" W., 615.90 feet to Point No. 1, the TRUE POINT OF BEGINNING;

thence S. 75° 41' 54" W., 72.15 feet to Point No. 2;

thence S. 89° 37' 54" W., 180.53 feet to Point No. 3;

thence N. 85° 41' 05" W., 559.85 feet to Point No. 4;

thence N. 89° 01' 05" W., 175.97 feet to Point No. 5;

thence N. 83° 35' 50" W., 156.30 feet to Point No. 6;

thence N. 72° 30' 35" W., 90.09 feet to Point No. 7;

thence N. 61° 41' 49" W., 89.73 feet to Point No. 8, the POINT OF ENDING, being a point on the east boundary line of Spring Creek Corporation Tract 201, as shown upon the plat of Spring Creek Corporation Tract 201 filed in the office of the County Recorder of Elko County, Nevada, as Document No. 63718, from which the northeast corner of Lot 14, Block 2 of said tract bears N. 19° 20' 00" E., 390.29 feet.

PARCEL VII (Well Site No. Three) 3

All that parcel of land in Elko County, Nevada, beginning within Section 27, Township 34 North, Range 56 East, Mount Diablo Base and Meridian, described as follows:

Commencing at the brass cap ¼ section corner common to Sections 22 and 27, said township and range; thence S. 35° 55' 11" E., 2,590.06 feet to Corner No. 1, the TRUE POINT OF BEGINNING;

thence S. 80° 00' 00" E., 373.00 feet to Corner No. 2;

thence S. 11° 50' 00" E., 508.67 feet to Corner No. 3, a point on a nontangent curve to the left having a radius of 340.00 feet, a radial line at said point bears S. 05° 02' 08" E.;

thence along the arc of said curve 40.34 feet through a central angle of 6° 47' 52" to Corner No. 4;

thence S. 78° 10' 00" W., 306.00 feet to Corner No. 5;

thence N. 11° 50' 00" W., 645.00 feet to Corner No. 1, the TRUE POINT OF BEGINNING, containing 4.576 acres, more or less.

TOGETHER with an 80.00 foot wide strip of land within Section 27, Township 34 North, Range 56 East, Mount Diablo Base and Meridian, to be used as an access road to Well Site No. 3. Said strip of land being 40.00 feet on either side of the following described centerline:

Commencing at the brass cap ¼ section corner common to Sections 22 and 27, said Township and Range; thence S. 00° 12' 24" W., 2,753.90 feet to Point No. 1, the TRUE POINT OF BEGINNING, said point also being on the centerline of Valdez Drive and the Tract Boundary of Spring Creek Corporation Tract 202, as shown upon the plat filed in the office of the County Recorder of Elko County, Nevada, as Document No. 68608;

Attachment C
Limited Environmental Statement

LIMITED ENVIRONMENTAL STATEMENT

Arsenic Removal Facility
Well #3

Prepared for:

Spring Creek Utilities Co.
285 Spring Creek Parkway
Spring Creek, NV 89815

Prepared by:

Sunrise Engineering, Inc.
12227 South Business Park Drive
Suite 220
Draper, Utah 84020
Tel: 801.523.0100
Fax: 801.523.0990

June 21, 2011

Table of Contents

APPENDICES

LIMITED ENVIRONMENTAL STATEMENT
Spring Creek Utilities Co. Arsenic Removal Facility at Well #3

1 INTRODUCTION

This limited environmental statement is prepared to support the application of a permit from the Nevada Public Utilities Commission under the Utilities Environmental Protection Act (UEPA) for a water treatment facility proposed by Spring Creek Utilities Co. at Well #3. The proposed project will not involve any federal action.

1.1 Background

Spring Creek Utilities Co. owns and operates two independent public water systems: Spring Creek Mobile Home Section (Tract 200, NV5027) and Spring Creek Housing Section (Tracts 100, 300, and 400, NV0036) for the community of Spring Creek located approximately 10 miles southeast of Elko, Nevada.

The water system for the Mobile Home Section (Tract 200, NV5027) is serviced by three wells:

Well #1 - 350 gallons per minute (gpm),
Well #3 - 750 gpm, and
Well #11 - 800 gpm.

Each of the wells produces groundwater with arsenic concentrations above 0.02 parts per million (ppm) or milligrams per liter (mg/l).

There are four water storage tanks:

Twin Tank A - 250,000-gallons,
Twin Tank B - 500,000-gallons,
High Zone Tank - 500,000-gallons, and
Karval Tank - 1,000,000-gallons.

The water system for the Housing Section (Tracts 100, 300 and 400, NV0036) is serviced by nine wells:

Well #4 - 730 gpm,
Well #5 - 750 gpm,
Well #7 - 150 to 450 gpm,
Well #8 - 500 gpm,
Well #9 - 600 gpm,
Well #10 - 380 gpm,
Well #12 - 550 gpm,

Well #14 - 230 gpm, and
Well #101 - 1,200 gpm.

There are six water storage tanks and one hydropneumatic tank with a total storage capacity of 3,042,000 gallons. The arsenic concentration of groundwater derived from the nine wells, when mixed, is below 0.01 mg/l and only Wells #4 and #10 at times produces water with arsenic concentrations of 0.012 and 0.013 mg/l, respectively (Rothberg, Tamburini & Winsor, Inc., 2007). Spring Creek Utilities Co. has been approved by the Nevada Division of Environmental Protection to blend the well waters and utilize an alternative monitoring program to maintain compliance with the new maximum contaminant level (MCL) of 0.01 mg/l for arsenic.

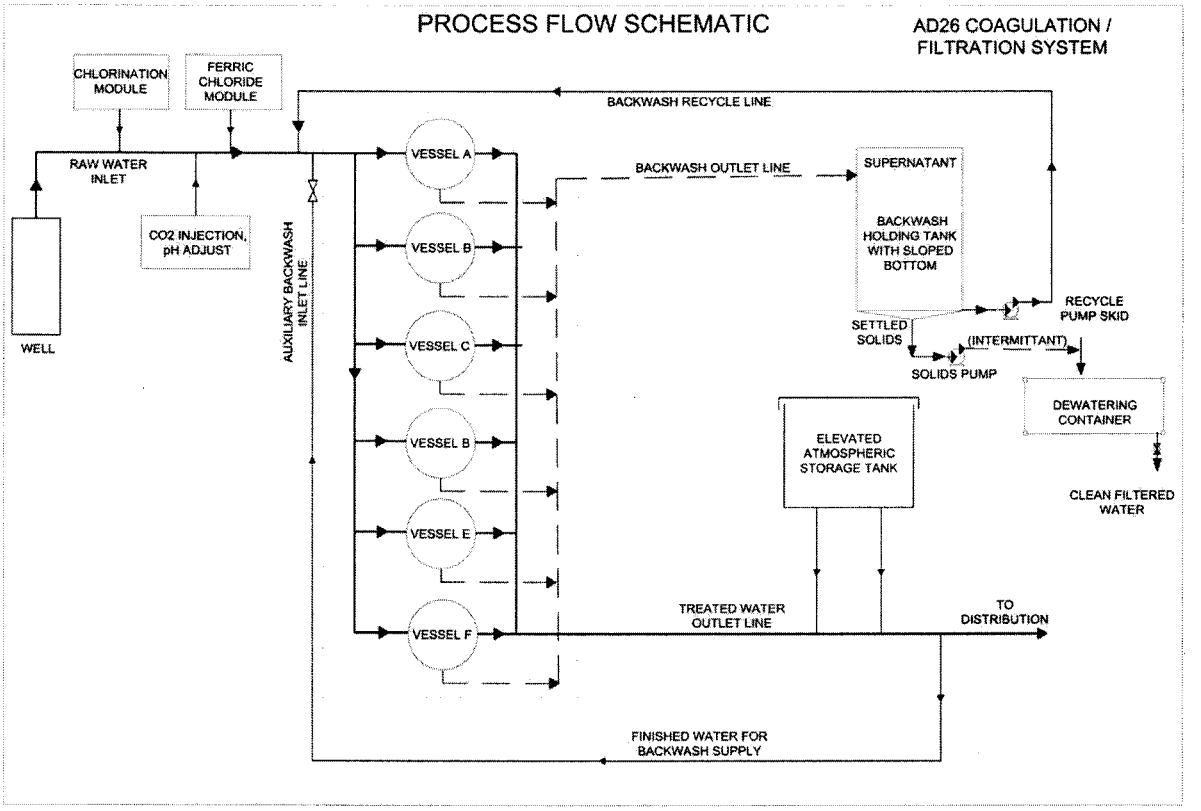
1.2 Purpose of and Need for Project

The U.S. Environmental Protection Agency (EPA) has revised the arsenic standard or MCL for drinking water from 0.05 mg/l to 0.01 mg/l to protect consumers served by public water systems from the effects of long-term, chronic exposure to arsenic (EPA, 2011).

The arsenic concentration in the groundwater from Well #3 is currently above 0.02 mg/l (Rothberg, Tamburini & Winsor, Inc., 2007). To be in compliance with the MCL of 0.01 mg/l for arsenic, Spring Creek Utilities Co. has proposed an arsenic removal facility at Well #3, as well as two other wells in the water system, by using the coagulation/filtration (C/F) technology to reduce the arsenic concentration in the water from the well to a level below 0.01 mg/l.

1.3 Proposed Project

C/F is considered the best technology for the well due to the high silica content, pH value greater than 7 and the moderate to moderately low arsenic level in the water. Moreover, C/F is the most cost-effective technology for the well based on a preliminary engineering report prepared by Sunrise. C/F involves both chemical and physical stages to remove arsenic. Ferric salts are added to the untreated (raw) water. The metals hydrolyze to form iron hydroxides that subsequently bind to other iron hydroxides to form particulate flocs. During this process, arsenic binds to, or is entrapped in, the growing particulates and is thereby removed from solution. The arsenic-containing particulates are then removed from the water through filtration. Sludge containing arsenic from the filtration process is backwashed to a tank where most of the water is recycled and returned to the start of the treatment process. The sludge with some water is settled to the bottom of the tank and collected in a container, dewatered and trucked once per month to a landfill for disposal. There will be no fluid discharge to the surface or subsurface. The sludge will meet Toxicity Characteristic Leaching Procedure (TCLP) requirements for disposal in a landfill. The following schematic chart illustrates the process:



Two structures each with an area of approximately 350 square feet will be constructed at the well site to house pre-treatment equipment, C/F treatment equipment, associated piping, plumbing, and monitoring components. A 25,000-gallon backwash tank and sludge container will be adjacent to the treatment facilities. In addition, approximately 150 feet of 8-inch piping and associated valves and other plumbing components will be installed to connect the treatment facility to existing water infrastructure. Security fencing will also be provided. There will be no office facilities or restroom facilities in the structures.

After construction of the proposed project is completed, the ground surface will be restored to the original surface contour as much as practically possible.

1.4 Authorizing Actions, Permits and Licenses

Implementation of the proposed project will require a number of authorizations or permits from state agencies and local government as follows:

- UEPA permit from the State of Nevada Public Utilities Commission
- Environmental clearance from the State Clearinghouse
- Approval of system design by the Nevada Division of Environmental Protection
- Building permit from the Elko County Building Department

2 AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES

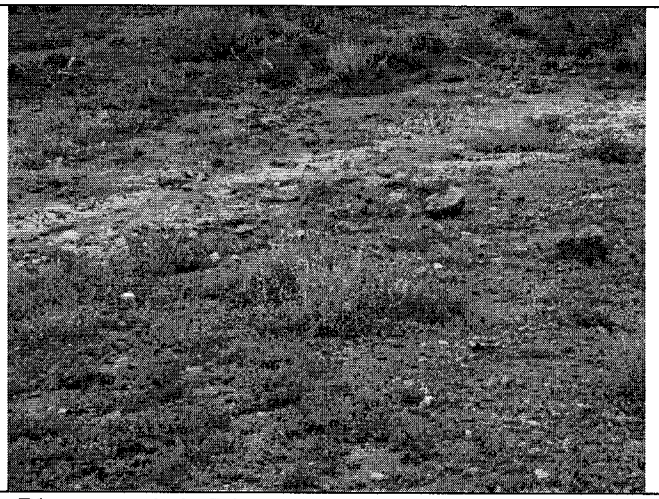
This section is organized by the resource topic, with each resource discussion addressing the existing environmental setting as it relates to the proposed project.

2.1 Land Use

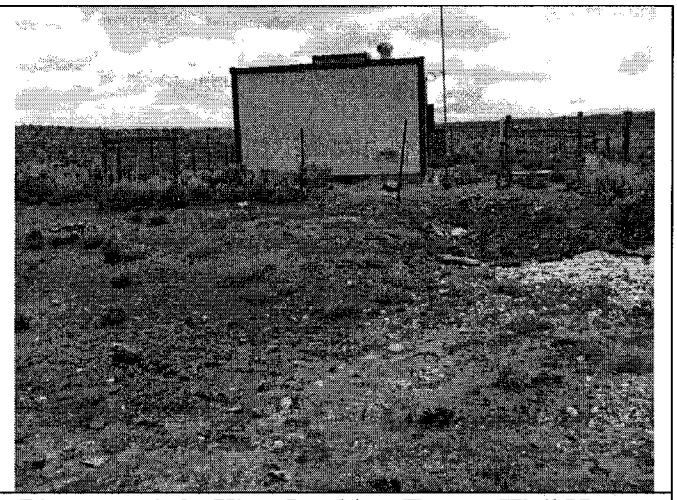
2.1.1 General Land Use

A NEPA Screening Package was obtained from Environmental Data Resources Inc. (**Appendix A**) and a review of the information contained in the package indicates that the land that will be used for the proposed treatment facility consists of vacant land in private holdings. Construction of the proposed project is not in conflict with any land use plan or ordinance of Elko County since there is an onsite well house.

A site visit was conducted on May 24, 2011 and photographs of the proposed construction areas were taken. Photographs 1 and 2 cover the site and the well house.



Photograph 1. View Looking North to Proposed Treatment Building Location



Photograph 2. View Looking East to Well House and Proposed Treatment Building Location

The proposed treatment building will be constructed on land that had previously been disturbed during construction of the well and the associated well house. Thus, construction of the proposed treatment facility will not result in any new surface disturbance.

2.1.2 Important Farmland, Prime Rangeland and Forest Land

Prime farmland is land best suited for producing food, feed, forage, fiber and oilseed crops as delineated by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS). An area defined to be prime farmland must be available to produce these crops and have been actively farmed within the previous 5 years and in some instances qualifies only if irrigated.

The proposed treatment facility site has not been used for farming for many years and therefore is not qualified for important farmland.

The definition of Prime Rangeland is found in USDA Departmental Regulation 9500-3. DR 9500-3 is included in Rural Development Instruction 1940-G as Exhibit A. Prime Rangeland is defined as rangeland that, because of its soil, climate, topography, vegetation, and location, has the highest quality or value for grazing animals. The potential natural vegetation is palatable, nutritious, and available to the kinds of herbivores common to the area. Because the site has been disturbed by the construction of the well, it does not qualify as Prime Rangeland.

Since the land is in private holdings and there are no trees on the site, the site is not qualified to be forest land. Additionally, the site is not located in any national forest (see **Appendix A**).

2.1.3 Formally Classified Lands

None of the following Formally Classified Lands will be affected by the proposed project:

- National parks and monuments
- National natural landmarks
- National battlefield park sites
- National historic sites and parks
- Wilderness areas
- Wild, scenic and recreational rivers
- Wildlife refuges
- National seashores, lake shores and trails.
- State Parks

2.2 Floodplains

A floodplain is flat or nearly flat land adjacent to a stream or river that experiences occasional or periodic flooding. It includes the floodway, which consists of the stream channel and adjacent areas that carry flood flows, and the flood fringe, which are areas covered by the flood, but which do not experience a strong current. A 100-year flood is calculated to be the level of flood water expected to be equaled or exceeded every 100 years on average. The 100-year flood is more accurately referred to as the 1% flood, since it is a flood that has a 1% chance of being equaled or exceeded in any single year. Based on the expected flood water level, a predicted area of inundation can be mapped.

The NEPA Screening Package (**Appendix A**) indicates that the proposed treatment facility site is not located within a floodplain.

2.3 Wetlands

Wetlands are defined as areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 Code of Federal

Regulations [CFR] 328.3[b], 40 CFR 230.3). For a wetland to qualify as jurisdictional by the U.S. Army Corps of Engineers (ACOE) and therefore be subject to regulation under Section 404 of the Clean Water Act, the site must support a prevalence of hydrophytic vegetation, hydric soils and wetland hydrology. Other waters of the United States are sites that typically lack one or more of the three indicators.

The NEPA Screening Package (Appendix A) indicates that the proposed treatment facility site is not within a wetland.

2.4 Cultural Resources

An experienced archaeologist from Bighorn Archaeological Consultants, LLC conducted a cultural resources survey at the proposed project site. A record search, preliminary cultural resources assessment, and pedestrian survey were completed. No cultural resources were identified to be located on the project site. A Cultural Resources Inventory Negative Report was prepared and is attached in **Appendix B**.

To avoid any potential significant adverse impact on cultural resources, the following environmental commitment shall be implemented:

During trenching and/or other related earth excavation in the construction phase of the project, it shall be the responsibility of the Contractor and Spring Creek Utilities Co., that in the event of discovery of anything with cultural, historical or archaeological properties, to immediately report such discovery to the Nevada State Historic Preservation Office (SHPO) at 775-684-3448 and Spring Creek Utilities Co. at 775-753-6889. Excavation activities shall be immediately halted temporarily pending the notification process and further directions issued by the SHPO.

2.5 Biological Resources

According to Nevada's Protected Species by County updated by the U.S. Fish and Wildlife Service, or USFWS, (2011) on March 7, 2011, there are seven federally listed species that may occur in Elko County, Nevada, as summarized in the table below:

Species Name	Scientific Name	Status
Amphibian		
Columbia spotted frog	*Rana luteiventris*	Candidate
Birds		
Greater sage-grouse	*Centrocercus urophasianus*	Candidate
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate
Fish		
Bull trout (Jarbidge River)	*Salvelinus confluentus*	Threatened
Clover Valley speckled dace	*Rhinichthys osculus oligoporus*	Endangered
Independence Valley speckled dace	*Rhinichthys osculus lethoporus*	Endangered
Lahontan cutthroat trout	*Oncorhynchus clarkia henshawi*	Threatened
Plants		
Goose Creek Milkvetch	*Astragalus Anserinus*	Candidate

2.5.1 Columbia Spotted Frog

The Columbia spotted frog, like most other frogs, is highly aquatic and lives in or near permanent bodies of water, including lakes, ponds, slow-moving streams and marshes (Wikipedia, 2011). It prefers areas with thick algae and vegetation for cover, but may also hide under decaying vegetation. It is most often found in non-woody wetland plant communities (species such as sedges, rushes and grasses). The project site and the surrounding area do not have suitable habitat for the Columbia spotted frog and thus the proposed project will not have any impact on this candidate species.

2.5.2 Yellow-billed Cuckoos

Yellow-billed cuckoos prefer mature cottonwood-willow stands but utilize willows and cottonwoods mixed with tall mesquites to a lesser extent (California Partners in Flight, 2011). The project site and the surrounding area do not have suitable habitat for the yellow-billed cuckoo and thus the proposed project will not have any impact on this candidate species.

2.5.3 Greater Sage-grouse

Greater sage-grouse are sagebrush obligates; they require sagebrush ecosystems for each stage of their life (Tetra Tech EC, Inc., 2010). During the site inspection conducted on May 24, 2011, no sagebrush was observed on the proposed project site. Most of the site is bare or covered with miscellaneous weeds due to surface disturbance that occurred when the well and well house were constructed. The surrounding areas were covered primarily with bluebunch wheatgrass, Thurber's needlegrass, Wyoming big sagebrush and miscellaneous grasses. No Greater sage-grouse were observed on and surrounding the proposed project site. As a result, it is highly unlikely that the proposed project will significantly adversely impact the Greater sage-grouse.

2.5.4 Fishes

All fish species need water. Therefore, due to absence of suitable habitat, it is not likely that the proposed project will have any impact on any fish species.

2.5.5 Goose Creek Milkvetch

A site visit was conducted on May 24, 2011, no Goose Creek Milkvetch was observed to be present at the site and surrounding area.

2.5.6 Summary and Environmental Commitment

Based on the analysis in Sections 2.5.1 through 2.5.5, the proposed project will not have any significant impact on federally listed species. Nonetheless, to avoid potential significant impact on biological resources, the following environmental commitment shall be implemented:

During construction activities, any evidence of the presence of an endangered and/or threatened and/or candidate species or their critical habitat should be brought to the attention of Spring Creek

Utilities Co. Construction shall be temporarily halted pending the notification process and further directions issued by Spring Creek Utilities Co. after consultation with the USFWS.

2.6 Water Quality

The proposed construction activities will temporarily generate fugitive dust and diesel engine emissions. The quantities generated by the project will be relatively small and will affect only a localized area for a brief period. No violations of air quality standards will occur during construction. Therefore, the impact associated with fugitive dust is considered less than significant. During the construction period, watering will be conducted to minimize fugitive dust.

Also, the standby diesel power generator will generate minimal diesel exhaust emissions during monthly on/off maintenance operations. During an extended power outage, diesel exhaust emissions will be generated. The quantity will be based on the length of time the generator is in operation. Nonetheless, the overall diesel emissions from the standby generator will be minimal under normal conditions and the environmental impact from the standby diesel generator is not considered significant.

2.7 Socio-Economic/Environmental Justice

The proposed project will not have any effect of discrimination against anyone based on civil rights. The proposed project will not induce population growth. Instead, the proposed project is to improve the water quality to meet the current EPA water quality requirements. Therefore, the proposed project would not result in any significant adverse impacts associated with socio-economic/environmental justice.

2.8 Air Quality

The proposed construction activities will temporarily generate fugitive dust and vehicle emissions. The quantities generated by the project will be relatively small and will affect only a localized area for a brief period. No violations of air quality standards will occur during construction. Therefore, the impact associated with fugitive dust and vehicle emissions is considered less than significant. During the construction period, watering will be conducted to minimize fugitive dust.

2.9 Transportation

The proposed construction site is in an unincorporated area. Construction activities are not expected to cause any road closure because no construction activity will occur on or near any paved road or highway.

2.10 Noise

Noise is a fundamental component of the human environment. High noise levels can be detrimental to the health and well being of human and wildlife receptors located near the source of an obtrusive noise. While the physical intensity of a sound can be easily measured, the effect of a sound on a receptor is a complex and intangible value that must consider the combination of its intensity, duration and time of the day. Louder noises are perceived as acceptable if they last for short periods of time.

Noise, which may be acceptable during the day, can be annoying or intolerable during evening or nighttime periods.

Construction of the proposed project will not generate much noise during the process. The noise impact will not be significant and will disappear after construction is completed. Construction activities for the proposed project will be limited to normal daylight working hours and exclude weekends and holidays to minimize the effects of construction-related noise levels. Standard noise control devices will be required on all construction equipment.

3 CONCLUSION

Based on the above analysis, it is concluded that the project will not have any significant impact on human health and the environment.

4 REFERENCES

Rothberg, Tamburini & Winsor, Inc. 2007. Preliminary Engineering report – Arsenic Compliance Evaluation.

Tetra Tech EC, Inc. 2010, Draft Greater Sage-Grouse Conservation Plan for the China Mountain Wind Project.

U.S. Environmental Protection Agency. 2011. http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/index.cfm.

U.S. Fish and Wildlife Service, 2011. http://www.fws.gov/nevada/protected_species/species_by_county.html.

Wikipedia. 2011. http://en.wikipedia.org/wiki/Columbia_Spotted_Frog.

California Partners in Flight. 2011. http://www.prbo.org/calpif/htmldocs/species/riparian/yellow-billed_cuckoo.htm.

Appendix A
NEPA Screening Report

Well #3
SEC 27 TWP 34N RGE 56E MDB&M
Spring Creek, NV 89815

Inquiry Number: 3085579.1s
June 02, 2011

EDR NEPACheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EDR NEPACheck® DESCRIPTION

The National Environmental Policy Act of 1969 (NEPA) requires that Federal agencies include in their decision-making processes appropriate and careful consideration of all environmental effects and actions, analyze potential environmental effects of proposed actions and their alternatives for public understanding and scrutiny, avoid or minimize adverse effects of proposed actions, and restore and enhance environmental quality as much as possible.

The EDR NEPACheck provides information which may be used, in conjunction with additional research, to determine whether a proposed site or action will have significant environmental effect.

The report provides maps and data for the following items (where available). Search results are provided in the Map Findings Summary on page 2 of this report.

Section	Regulation
Natural Areas Map	
• Federal Lands Data:	
- Officially designated wilderness areas	47 CFR 1.1307(1)
- Officially designated wildlife preserves, sanctuaries and refuges	47 CFR 1.1307(2)
- Wild and scenic rivers	40 CFR 6.302(e)
- Fish and Wildlife	40 CFR 6.302
• Threatened or Endangered Species, Fish and Wildlife, Critical Habitat Data (where available)	47 CFR 1.1307(3); 40 CFR 6.302
Historic Sites Map	
• National Register of Historic Places • State Historic Places (where available) • Indian Reservations	47 CFR 1.1307(4); 40 CFR 6.302
Flood Plain Map	
• National Flood Plain Data (where available)	47 CFR 1.1307(6); 40 CFR 6.302
Wetlands Map	
• National Wetlands Inventory Data (where available)	47 CFR 1.1307(7); 40 CFR 6.302
FCC & FAA Map	
• FCC antenna/tower sites, FAA Markings and Obstructions, Airports, Topographic gradient	47 CFR 1.1307(8)
Key Contacts and Government Records Searched	

MAP FINDINGS SUMMARY

The databases searched in this report are listed below. Database descriptions and other agency contact information is contained in the Key Contacts and Government Records Searched section on page 20 of this report.

TARGET PROPERTY ADDRESS

WELL #3
SEC 27 TWP 34N RGE 56E MDB&M
SPRING CREEK, NV 89815

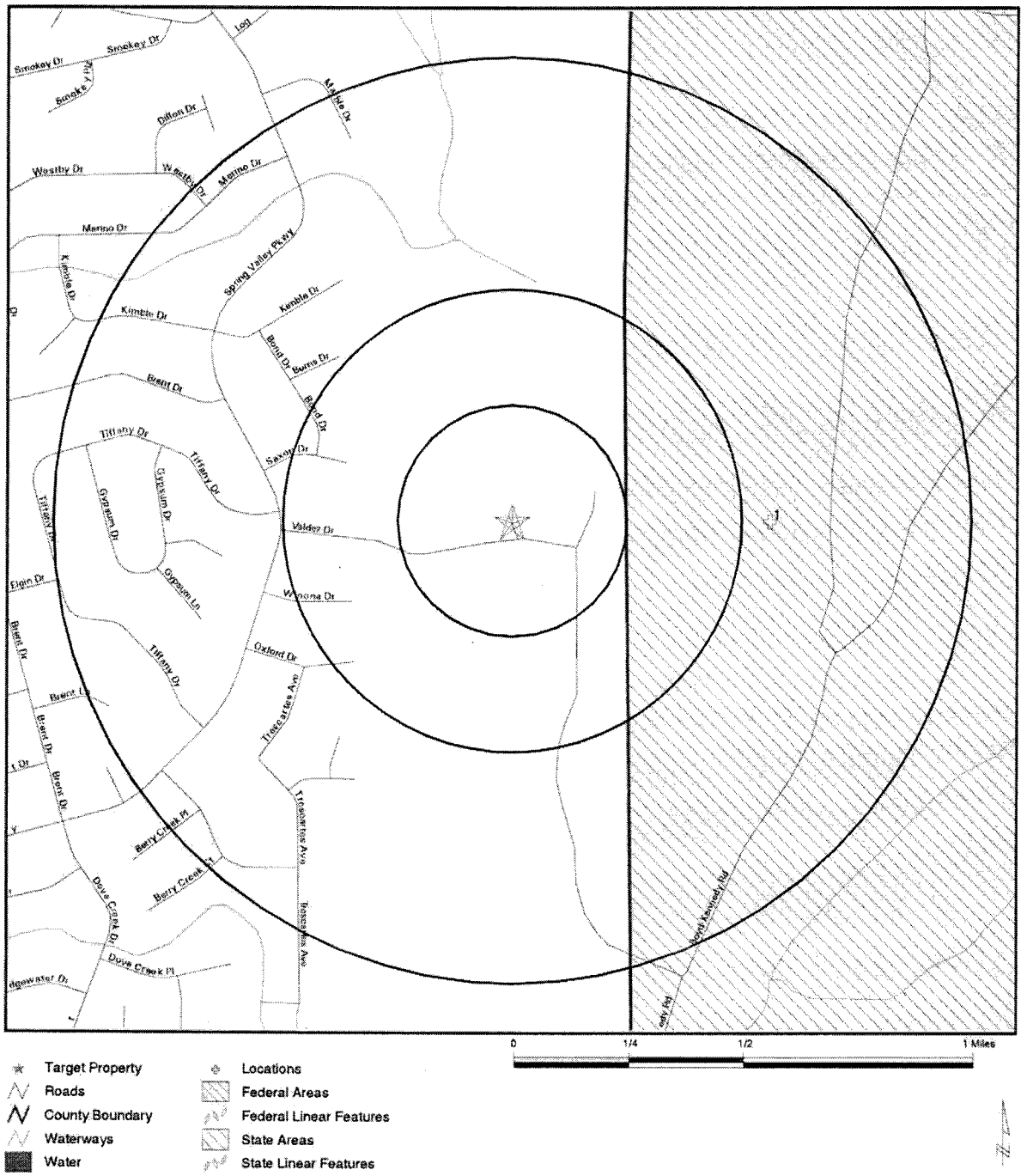
Inquiry #: 3085579.1s
Date: 6/2/11

TARGET PROPERTY COORDINATES

Latitude (North):	40.803398 - 40° 48' 12.2"
Longitude (West):	115.645103 - 115° 38' 42.4"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	614291.7
UTM Y (Meters):	4517604.5

Applicable Regulation from 47 CFR/FCC Checklist	Database	Search Distance (Miles)	Within Search	Within 1/8 Mile
NATURAL AREAS MAP				
1.1307a (1) Officially Designated Wilderness Area	US Federal Lands	1.00	YES	NO
1.1307a (2) Officially Designated Wildlife Preserve	US Federal Lands	1.00	YES	NO
1.1307a (3) Threatened or Endangered Species or Critical Habitat	County Endangered Species	County	YES	N/A
HISTORIC SITES MAP				
1.1307a (4) Listed or eligible for National Register	National Register of Hist. Pla	1.00	NO	NO
1.1307a (4) Listed or eligible for National Register	NV Historic Sites	1.00	NO	NO
	Indian Reservation	1.00	NO	NO
FLOODPLAIN MAP				
1.1307 (6) Located in a Flood Plain	FLOODPLAIN	1.00	NO	NO
WETLANDS MAP				
1.1307 (7) Change in surface features (wetland fill)	NWI	1.00	NO	NO
FCC & FAA SITES MAP				
	Cellular	1.00	NO	NO
	4G Cellular	1.00	NO	NO
	Antenna Structure Registration	1.00	NO	NO
	Towers	1.00	NO	NO
	AM Antenna	1.00	NO	NO
	FM Antenna	1.00	NO	NO
	FAA DOF	1.00	NO	NO
	Airports	1.00	NO	---
	Power Lines	1.00	NO	---

Natural Areas Map



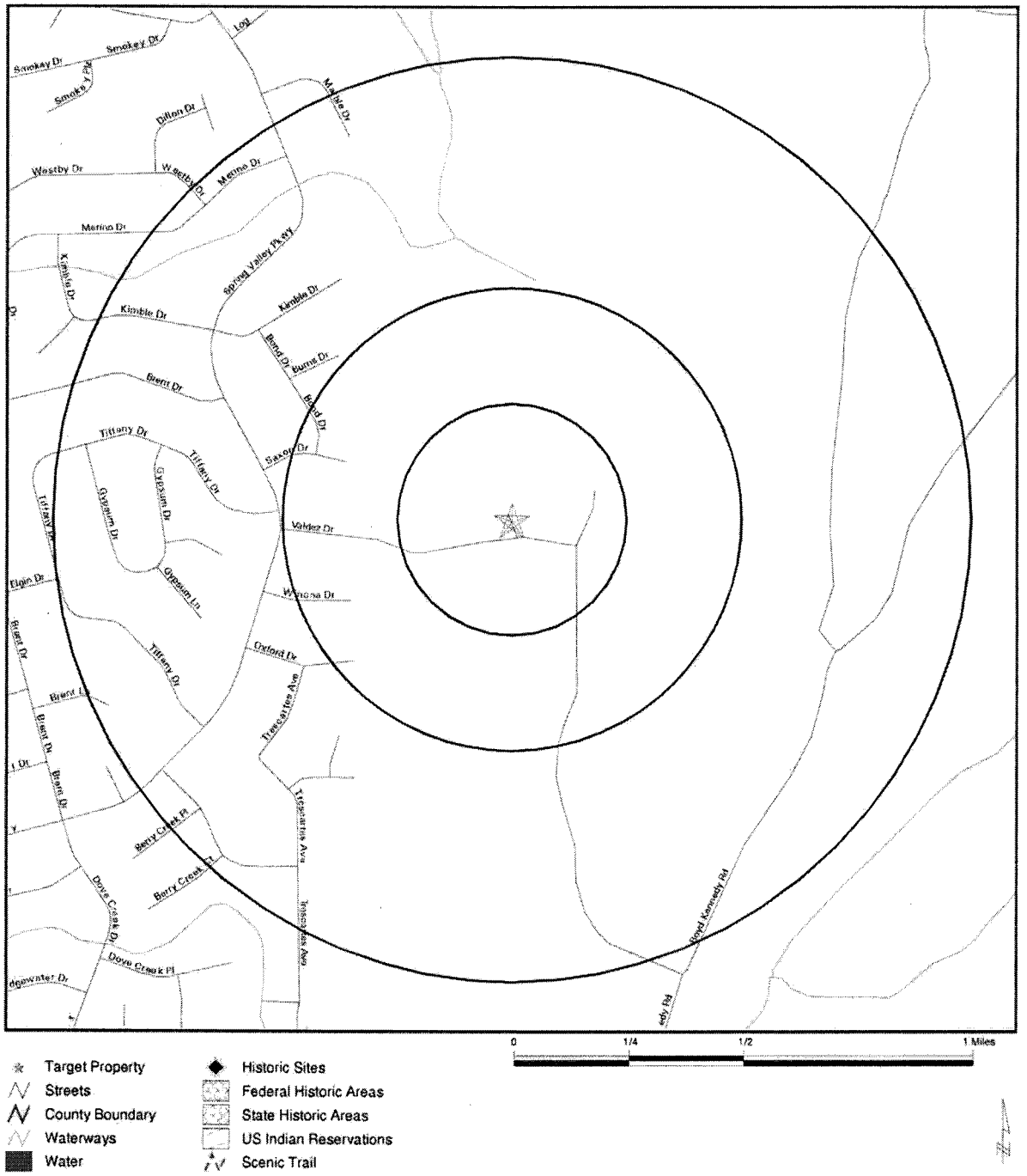
NATURAL AREAS MAP FINDINGS

Endangered Species Listed for: ELKO County, NV.
Source: EPA Endangered Species Protection Program Database

BIRD:	EAGLE, BALD
FISH:	TROUT, LAHONTAN CUTTHROAT
FISH:	DACE, CLOVER VALLEY SPECKLED
FISH:	DACE, INDEPENDENCE VALLEY SPECKLED

Map ID Direction Distance Distance (ft.)			EDR ID Database
1 East 1/8-1/4 mi 1312	Feature1: Feature2: Feature3: Agbur: Url: Name1: Name2: Name3: State: State fips:	Public Domain Land BLM Not Reported Not Reported Bureau of Land Management. Not Reported Not Reported Not Reported Not Reported NV 32	CUSA125117 US Federal Lands

Historic Sites Map



HISTORIC SITES MAP FINDINGS

Map ID
Direction
Distance
Distance (ft.)

EDR ID
Database

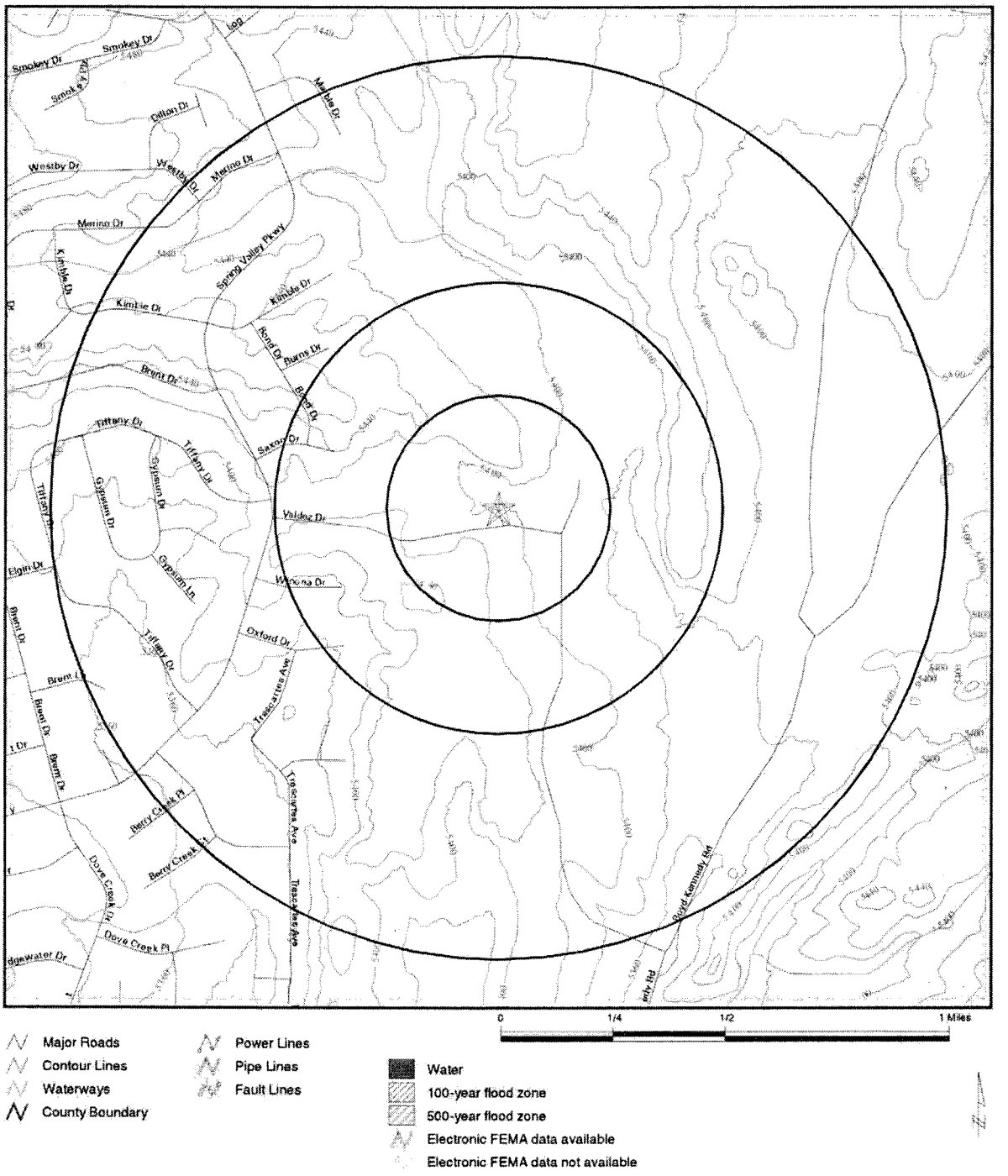
No mapped sites were found in EDR's search of available government records within the search radius around the target property.

UNMAPPABLE HISTORIC SITES

Due to poor or inadequate address information, the following sites were not mapped:	Status EDR ID Database

No unmapped sites were found in EDR's search of available government records.

Flood Plain Map

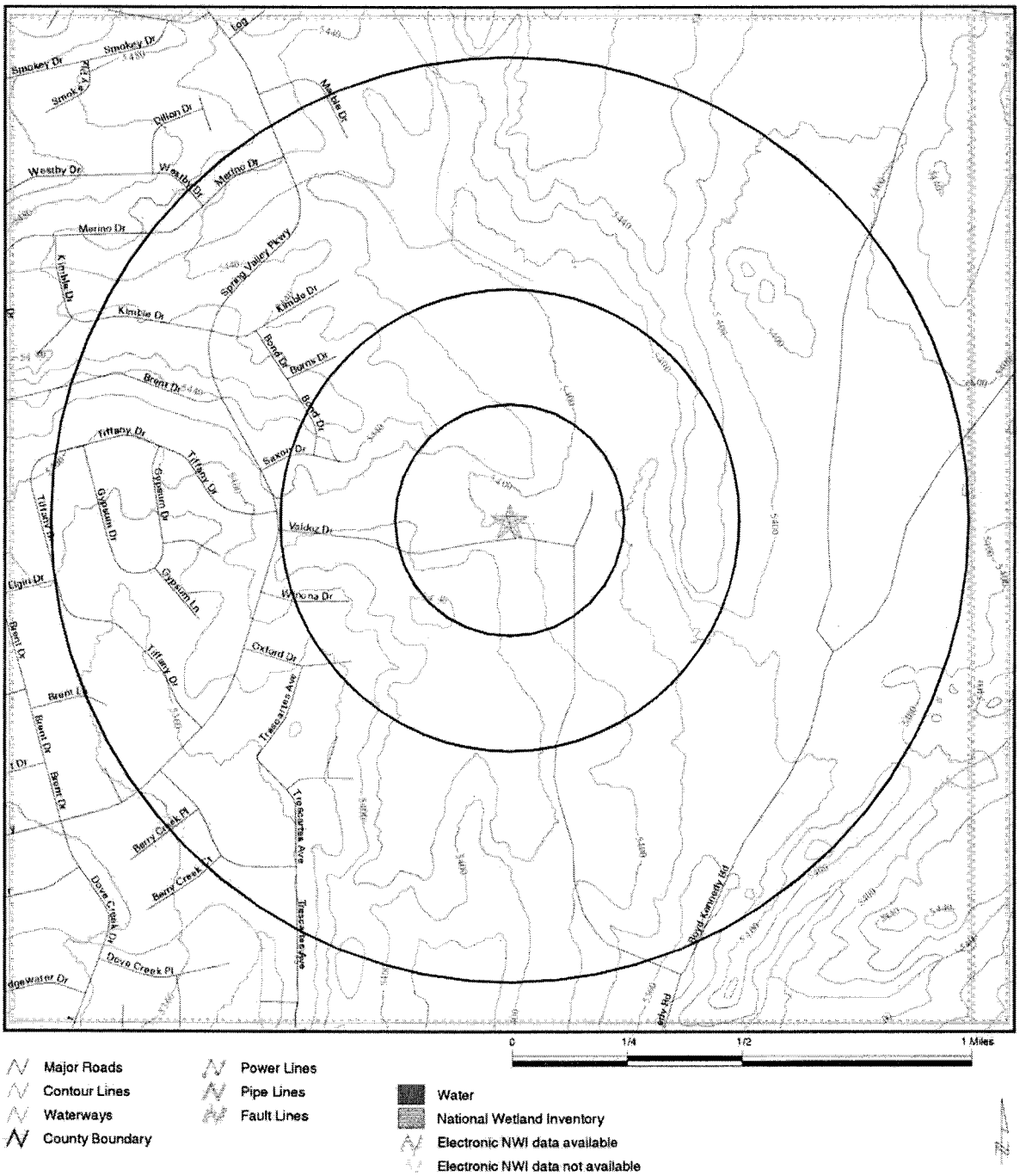


FLOOD PLAIN MAP FINDINGS

Source: FEMA DFIRM Flood Data, FEMA Q3 Flood Data

County	FEMA flood data electronic coverage
ELKO, NV	NO
Flood Plain panel at target property:	None Reported
Additional Flood Plain panel(s) in search area:	None Reported

National Wetlands Inventory Map



WETLANDS MAP FINDINGS

Source: Fish and Wildlife Service NWI data

NWI hardcopy map at target property: Elko East
Additional NWI hardcopy map(s) in search area:
Not reported in source data

Map ID Direction Distance Distance (ft.)	Code and Description*	Database

No Sites Reported.

WETLANDS CLASSIFICATION SYSTEM

National Wetland Inventory Maps are produced by the U.S. Fish and Wildlife Service, a sub-department of the U.S. Department of the Interior. In 1974, the U.S. Fish and Wildlife Service developed a criteria for wetland classification with four long range objectives:

- to describe ecological units that have certain homogeneous natural attributes,
- to arrange these units in a system that will aid decisions about resource management,
- to furnish units for inventory and mapping, and
- to provide uniformity in concepts and terminology throughout the U.S.

High altitude infrared photographs, soil maps, topographic maps and site visits are the methods used to gather data for the productions of these maps. In the infrared photos, wetlands appear as different colors and these wetlands are then classified by type. Using a hierarchical classification, the maps identify wetland and deepwater habitats according to:

- system
- subsystem
- class
- subclass
- modifiers

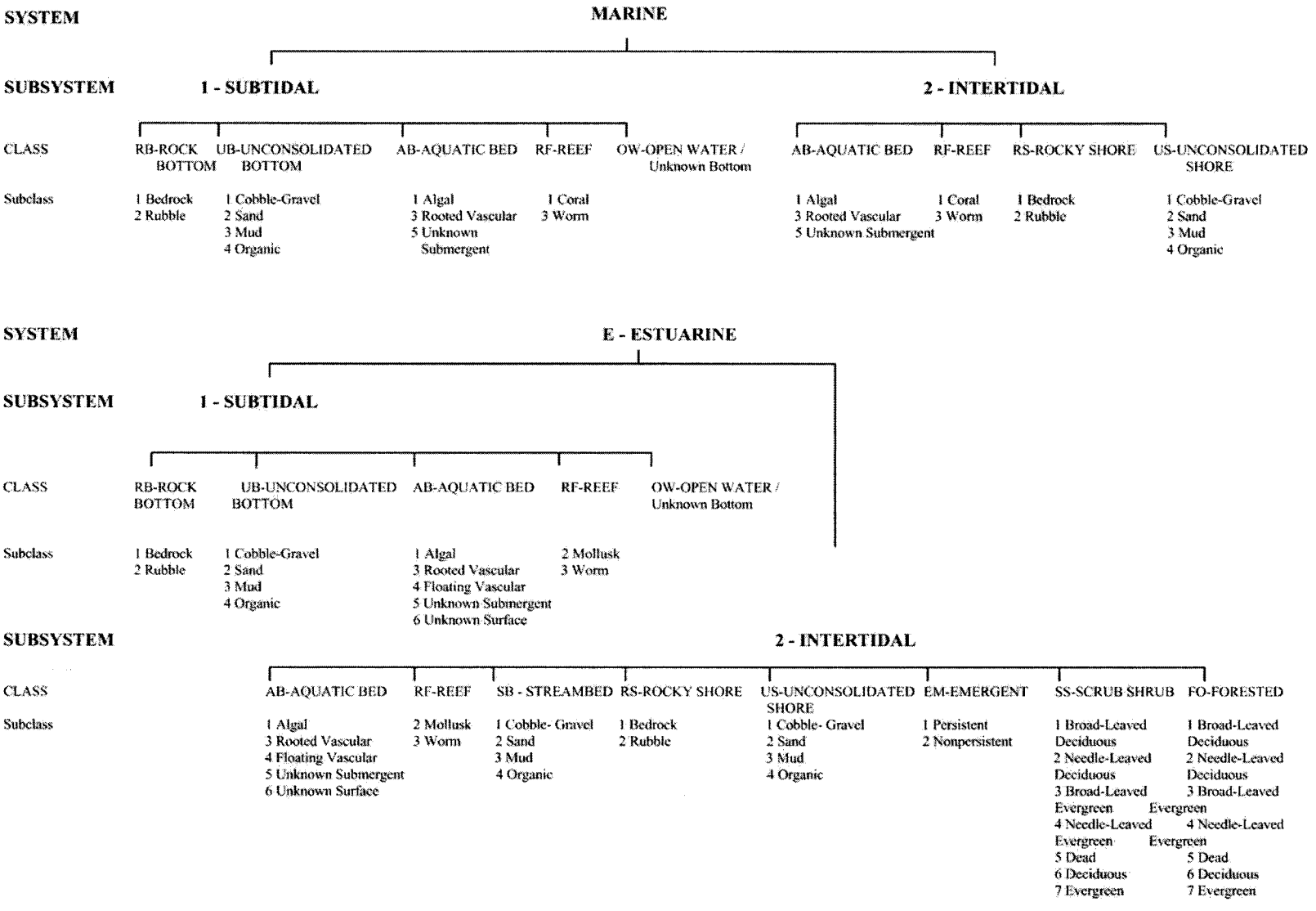
(as defined by Cowardin, et al. U.S. Fish and Wildlife Service FWS/OBS 79/31. 1979.)

The classification system consists of five systems:

1. marine
2. estuarine
3. riverine
4. lacustrine
5. palustrine

The marine system consists of deep water tidal habitats and adjacent tidal wetlands. The riverine system consists of all wetlands contained within a channel. The lacustrine systems includes all nontidal wetlands related to swamps, bogs & marshes. The estuarine system consists of deepwater tidal habitats and where ocean water is diluted by fresh water. The palustrine system includes nontidal wetlands dominated by trees and shrubs and where salinity is below .5% in tidal areas. All of these systems are divided in subsystems and then further divided into class.

National Wetland Inventory Maps are produced by transferring gathered data on a standard 7.5 minute U.S.G.S. topographic map. Approximately 52 square miles are covered on a National Wetland Inventory map at a scale of 1:24,000. Electronic data is compiled by digitizing these National Wetland Inventory Maps.


SYSTEM
MARINE
SUBSYSTEM
1 - SUBTIDAL
2 - INTERTIDAL
CLASS
RB-ROCK BOTTOM
UB-UNCONSOLIDATED BOTTOM
AB-AQUATIC BED
RF-REEF
OW-OPEN WATER / Unknown Bottom
AB-AQUATIC BED
RF-REEF
RS-ROCKY SHORE
US-UNCONSOLIDATED SHORE
Subclass
1 Bedrock
2 Rubble
1 Cobble-Gravel
2 Sand
3 Mud
4 Organic
1 Algal
3 Rooted Vascular
5 Unknown Submergent
1 Coral
3 Worm
1 Algal
3 Rooted Vascular
5 Unknown Submergent
1 Coral
3 Worm
1 Bedrock
2 Rubble
1 Cobble-Gravel
2 Sand
3 Mud
4 Organic
SYSTEM
E - ESTUARINE
SUBSYSTEM
1 - SUBTIDAL
CLASS
RB-ROCK BOTTOM
UB-UNCONSOLIDATED BOTTOM
AB-AQUATIC BED
RF-REEF
OW-OPEN WATER / Unknown Bottom
Subclass
1 Bedrock
2 Rubble
1 Cobble-Gravel
2 Sand
3 Mud
4 Organic
1 Algal
3 Rooted Vascular
4 Floating Vascular
5 Unknown Submergent
6 Unknown Surface
2 Mollusk
3 Worm
SUBSYSTEM
2 - INTERTIDAL
CLASS
AB-AQUATIC BED
RF-REEF
SB - STREAMBED
RS-ROCKY SHORE
US-UNCONSOLIDATED SHORE
EM-EMERGENT
SS-SCRUB SHRUB
FO-FORESTED
Subclass
1 Algal
3 Rooted Vascular
4 Floating Vascular
5 Unknown Submergent
6 Unknown Surface
2 Mollusk
3 Worm
1 Cobble- Gravel
2 Sand
3 Mud
4 Organic
1 Bedrock
2 Rubble
1 Cobble- Gravel
2 Sand
3 Mud
4 Organic
1 Persistent
2 Nonpersistent
1 Broad-Leaved Deciduous
2 Needle-Leaved Deciduous
3 Broad-Leaved Evergreen
4 Needle-Leaved Evergreen
5 Dead
6 Deciduous
7 Evergreen
1 Broad-Leaved Deciduous
2 Needle-Leaved Deciduous
3 Broad-Leaved Evergreen
4 Needle-Leaved Evergreen
5 Dead
6 Deciduous
7 Evergreen

SYSTEM: R - RIVERINE

SUBSYSTEM	CLASS	Subclass
1 - TIDAL	RB-ROCK BOTTOM	1 Bedrock 2 Rubble
	UB-UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
2 - LOWER PERENNIAL	*SB-STREAMBED	1 Bedrock 2 Rubble 3 Cobble-Gravel 4 Sand 5 Mud 6 Organic 7 Vegetated
	AB-AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface
3 - UPPER PERENNIAL	RS-ROCKY SHORE	1 Bedrock 2 Rubble
	US-UNCONSOLIDATED SHORE	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
4 - INTERMITTENT	**EM-EMERGENT	2 Nonpersistent
5 - UNKNOWN PERENNIAL	OW-OPEN WATER/ Unknown Bottom	

* STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

SYSTEM: L - LACUSTRINE

SUBSYSTEM: 1 - LIMNETIC

CLASS	Subclass
RB-ROCK BOTTOM	1 Bedrock 2 Rubble
UB-UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB-AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface
OW-OPEN WATER/ Unknown Bottom	

SUBSYSTEM: 2 - LITTORAL

CLASS	Subclass
RB-ROCK BOTTOM	1 Bedrock 2 Rubble
UB-UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB-AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface
RS-ROCKY SHORE	1 Bedrock 2 Rubble
US-UNCONSOLIDATED SHORE	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
EM-EMERGENT	2 Nonpersistent
OW-OPEN WATER/ Unknown Bottom	

SUBSYSTEM — **P - PALUSTRINE**

CLASS	RB--ROCK BOTTOM	UB--UNCONSOLIDATED BOTTOM	AB-AQUATIC BED	US--UNCONSOLIDATED SHORE	ML--MOSS-LICHEN	EM--EMERGENT	SS--SCRUB-SHRUB	FO--FORESTED	OW-OPEN WATER/ Unknown
Bottom									
Subclass	1 Bedrock 2 Rubble 3 Mud 4 Organic	1 Cobble-Gravel 2 Sand	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 Unknown Submergent 6 Unknown Surface	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 Deciduous 7 Evergreen	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6Deciduous 7 Evergreen	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal

A Temporarily Flooded
B Saturated
C Seasonally Flooded
D Seasonally Flooded/ Well Drained
E Seasonally Flooded/ Saturated
F Semipermanently Flooded
G Intermittently Exposed

Tidal

H Permanently Flooded
J Intermittently Flooded
K Artificially Flooded
W Intermittently Flooded/Temporary
Y Saturated/Semipermanent/ Seasonal
Z Intermittently Exposed/Permanent
U Unknown

CoastalHalinityInlandSalinitypHModifiersfor

K Artificially Flooded
L Subtidal
M Irregularly Exposed
N Regularly Flooded
P Irregularly Flooded

*S Temporary-Tidal
*R Seasonal-Tidal
*T Semipermanent -Tidal
V Permanent -Tidal
U Unknown

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

1 Hyperhaline
2 Euhaline
3 Mixohaline (Brackish)
4 Polyhaline
5 Mesohaline
6 Oligohaline
0 Fresh

7 Hypersaline
8 Eusaline
9 Mixosaline
0 Fresh

all Fresh Water

a Acid
i Circumneutral
i Alkaline

SOIL

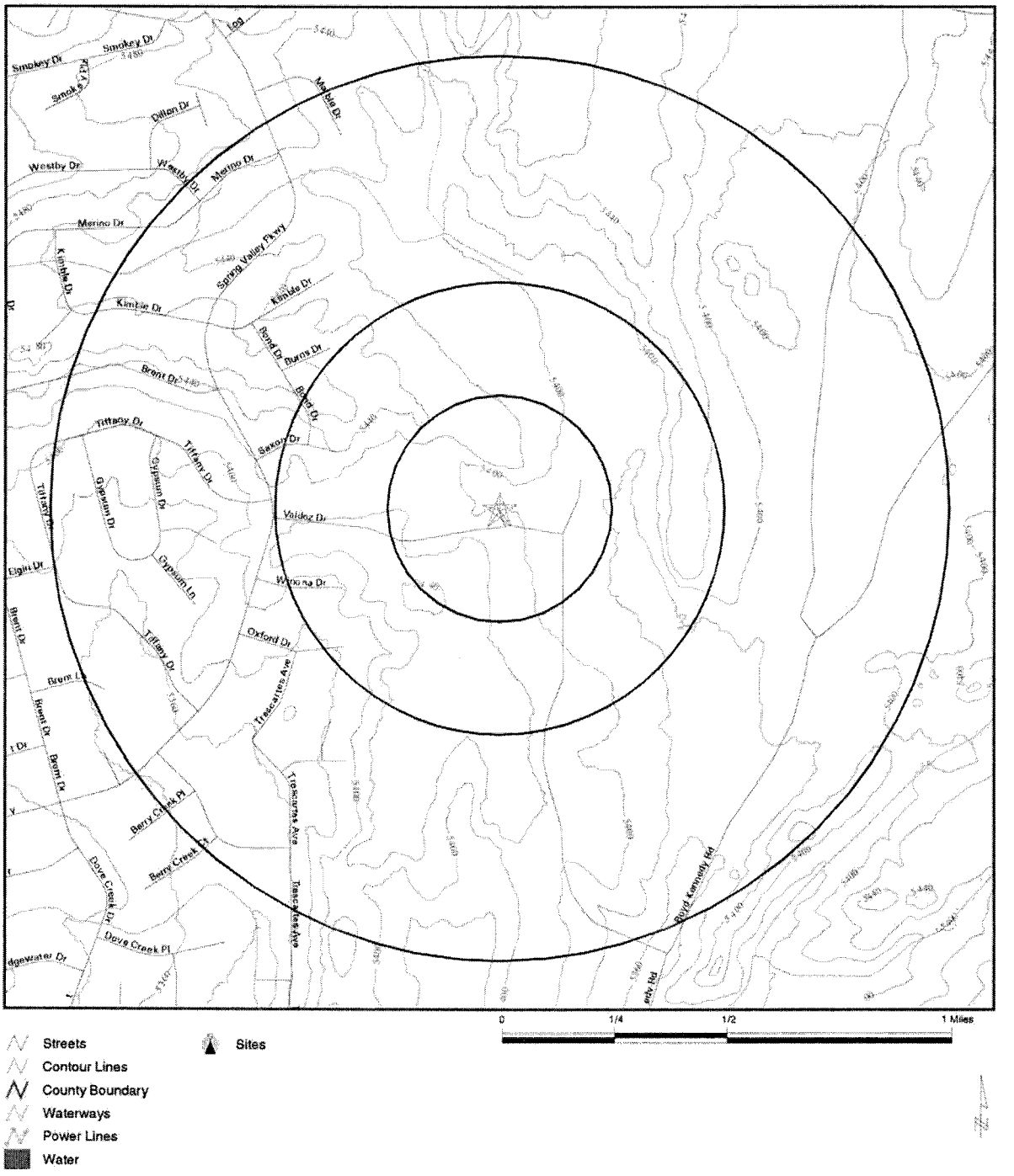
g Organic
n Mineral

SPECIAL MODIFIERS

b Beaver
d Partially Drained/Ditched
f Farmed
h Diked/Impounded
r Artificial Substrate
s Spoil
x Excavated

Source: U.S. Department of the Interior
Fish and Wildlife Service
National Wetlands Inventory

FCC & FAA Sites Map



FCC & FAA SITES MAP FINDINGS
TOWERS

Map ID Direction Distance Distance (ft.)	EDR ID Database

No Sites Reported.

FCC & FAA SITES MAP FINDINGS
AIRPORTS

EDR ID
Database

No Sites Reported.

FCC & FAA SITES MAP FINDINGS
POWERLINES

EDR ID
Database

No Sites Reported.

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

Various Federal laws and executive orders address specific environmental concerns. NEPA requires the responsible offices to integrate to the greatest practical extent the applicable procedures required by these laws and executive orders. EDR provides key contacts at agencies charged with implementing these laws and executive orders to supplement the information contained in this report.

NATURAL AREAS
Officially designated wilderness areas
Government Records Searched in This Report

FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, and Fish and Wildlife Service.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.

Date of Government Version: 12/31/2005

Federal Contacts for Additional Information

National Park Service, Pacific West Region
600 Harrison Street, Suite 600
San Francisco, CA 94107
415-427-1300

USDA Forest Service, Intermountain
Federal Building 324 25th Street
Ogden, UT 84401-2310
801-625-5352

BLM - Nevada State Office
P.O. Box 12000
Reno, NV 89520-0006
775-861-6586

Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

Officially designated wildlife preserves, sanctuaries and refuges
Government Records Searched in This Report

FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, and Fish and Wildlife Service.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.

Date of Government Version: 12/31/2005

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

State Contacts for Additional Information
Dept. of Wildlife Conservation & Natural Resources 702-688-1590

Wild and scenic rivers
Government Records Searched in This Report
FED_LAND: Federal Lands
Source: USGS
Telephone: 703-648-5094
Federal data from Bureau of Land Management, National Park Service, Forest Service, and Fish and Wildlife Service.
- National Parks
- Forests
- Monuments
- Wildlife Sanctuaries, Preserves, Refuges
- Federal Wilderness Areas.

Date of Government Version: 12/31/2005

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

Endangered Species

Government Records Searched in This Report
Endangered Species Protection Program Database
A listing of endangered species by county.
Source: Environmental Protection Agency
Telephone: 703-305-5239

Federal Contacts for Additional Information
Fish & Wildlife Service, Region 1
Eastside Federal Complex 911 NE 11th Avenue
Portland, OR 97232-4181
503-231-6188

State Contacts for Additional Information
Natural Heritage Program, Dept. of Conservation, & Natural Resources 775-687-4245

LANDMARKS, HISTORICAL, AND ARCHEOLOGICAL SITES
Historic Places
Government Records Searched in This Report
National Register of Historic Places:
The National Register of Historic Places is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture. These contribute to an understanding of the historical and cultural foundations of the nation.

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

The National Register includes:
- All prehistoric and historic units of the National Park System;
- National Historic Landmarks, which are properties recognized by the Secretary of the Interior as possessing national significance; and
- Properties significant in American, state, or local prehistory and history that have been nominated by State Historic Preservation Officers, federal agencies, and others, and have been approved for listing by the National Park Service.

Date of Government Version: 03/23/2006

NV Historic Sites: State Register of Historic Places
Listing of historic sites on the State Register.
Source: State Historic Preservation Office.
Telephone: 775-684-3448

NV Historic Sites: National Register of Historic Places
Listing of historic sites included on the National Register for Nevada.
Source: State Historic Preservation Office.
Telephone: 775-684-3448

Federal Contacts for Additional Information
Park Service; Advisory Council on Historic Preservation
1849 C Street NW
Washington, DC 20240
Phone: (202) 208-6843

State Contacts for Additional Information
Historic Preservation Office 775-684-3440

Indian Religious Sites
Government Records Searched in This Report
Indian Reservations:
This map layer portrays Indian administrated lands of the United States that have any area equal to or greater than 640 acres.
Source: USGS
Phone: 888-275-8747
Date of Government Version: 12/31/2005

Federal Contacts for Additional Information
Department of the Interior- Bureau of Indian Affairs
Office of Public Affairs
1849 C Street, NW
Washington, DC 20240-0001
Office: 202-208-3711
Fax: 202-501-1516

National Association of Tribal Historic Preservation Officers
1411 K Street NW, Suite 700
Washington, DC 20005
Phone: 202-628-8476
Fax: 202-628-2241

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

State Contacts for Additional Information
A listing of local Tribal Leaders and Bureau of Indian Affairs Representatives can be found at:
http://www.doi.gov/bia/areas/agency.html

Phoenix Area Office, Bureau of Indian Affairs
One North First Street P.O. Box 10
Phoenix, AZ 85001
602-379-6600

FLOOD PLAIN, WETLANDS AND COASTAL ZONE

Flood Plain Management
Government Records Searched in This Report
Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

Federal Contacts for Additional Information
Federal Emergency Management Agency 877-3362-627

State Contacts for Additional Information

Wetlands Protection
Government Records Searched in This Report
NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2004 from the U.S. Fish and Wildlife Service.

Federal Contacts for Additional Information
Fish & Wildlife Service 813-570-5412

State Contacts for Additional Information
Dept. of Conservation & Natural Resources 702-688-1590

Coastal Zone Management
Government Records Searched in This Report
CAMA Management Areas
Dept. of Env., Health & Natural Resources
919-733-2293

Federal Contacts for Additional Information
Office of Ocean and Coastal Resource Management
N/ORM, SSMC4
1305 East-West Highway
Silver Spring, Maryland 20910
301-713-3102

State Contacts for Additional Information

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

FCC & FAA SITES MAP
For NEPA actions that come under the authority of the FCC, the FCC requires evaluation of Antenna towers and/or supporting structures that are to be equipped with high intensity white lights which are to be located in residential neighborhoods, as defined by the applicable zoning law.

Government Records Searched in This Report

Cellular
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

4G Cellular
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

Antenna Structure Registration
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

Towers
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

AM Antenna
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

FM Antenna
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554
888-225-5322

FAA Digital Obstacle File
Federal Aviation Administration (FAA)
1305 East-West Highway, Station 5631
Silver Sprinng, MD 20910-3281
Telephone: 301-713-2817
Describes known obstacles of interest to aviation users in the US. Used by the Federal Aviation Administration (FAA) and the National Oceanic and Atmospheric Administration to manage the National Airspace System.

Airport Landing Facilities
Federal Aviation Administration
Telephone (800) 457-6656
Private and public use landing facilities.

KEY CONTACTS & GOVERNMENT RECORDS SEARCHED

Electric Power Transmission Line Data
Rextag Strategies Corp.
14405 Walters Road, Suite 510
Houston, TX 77014
281-769-2247
U.S. Electric Transmission and Power Plants systems Digital GIS Data.

Excessive Radio Frequency Emission
For NEPA actions that come under the authority of the FCC, Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the determination of whether the particular facility, operation or transmitter would cause human exposure to levels of radio frequency in excess of certain limits.

Federal Contacts for Additional Information
Office of Engineering and Technology
Federal Communications Commission
445 12th Street SW
Washington, DC 20554
Phone: 202-418-2470

OTHER CONTACT SOURCES

NEPA Single Point of Contact
State Contacts for Additional Information
Department of Administration
State Clearinghouse
209 E. Musser Street
Room 200
Carson City, NV 89701
775-684-0209

STREET AND ADDRESS INFORMATION

Appendix B
Cultural Resources Inventory Negative Report

CULTURAL RESOURCES INVENTORY NEGATIVE REPORT

Project Name: A Cultural Resource Inventory of an Arsenic Treatment Facility (Well #3) in Elko, Nevada.
Inventory Date(s): May 27, 2011
County: Elko

Organization/Field Crew: Bighorn Archaeological Consultants, LLC/Jon Baxter

Project Description: Spring Creek Utility Company has proposed to construct one arsenic treatment facility (Well #3) in Elko, Nevada to meet the maximum contaminant level of 0.01 mg/l set forth for arsenic by the U.S. Environmental Protection Agency. A building with a size of 30 feet wide and 50 feet long housing the treatment equipment will be constructed adjacent to the existing well house.

Project Area or Length:
Private: Total of 2 acres

Inventory Acreage and Length:
Private: Total of 2 acres

Geographic Unit: Humboldt River Basin
Legal Description: Well #3: T 34N, R 56E, Section 27
County: Elko

Map Reference: USGS _(Elko East)__ 7.5' Quad.
UTM Reference: UTM 11 North, NAD 83, 4517828Nm, 614258Em
Records Check: _ BLM Records; _ NR List; X State Museum

Results of Previous Inventories:
Examination of State Museum records indicated no cultural inventories had been recorded within one mile of the project area.

Recorded and Unrecorded Sites:
No archaeological sites were recorded within one mile of the project area.

Expectation: While small lithic scatters and/or isolated flakes are possibly expected to be found within the inventory corridor, historic sites also may occur, including trail and road segments, irrigation ditches and other water works, and perhaps structural remnants such as building foundations.
Inventory Type: _ Class II X Class III _ Reconnaissance
Field Techniques: The survey corridor consisted of several parallel transects spaced 15 meters apart over the entire two acre area (approximately 300ft. by 300ft.) to cover the project area.

Findings: No cultural resources were located during this inventory

ATTACH CLEAN REPRODUCIBLE 15' or 7.5' MAP(S) SHOWING AREA OF POTENTIAL EFFECT AND AREA INVENTORIED

Prepared By: Jon Baxter **Date:** 06/08/11

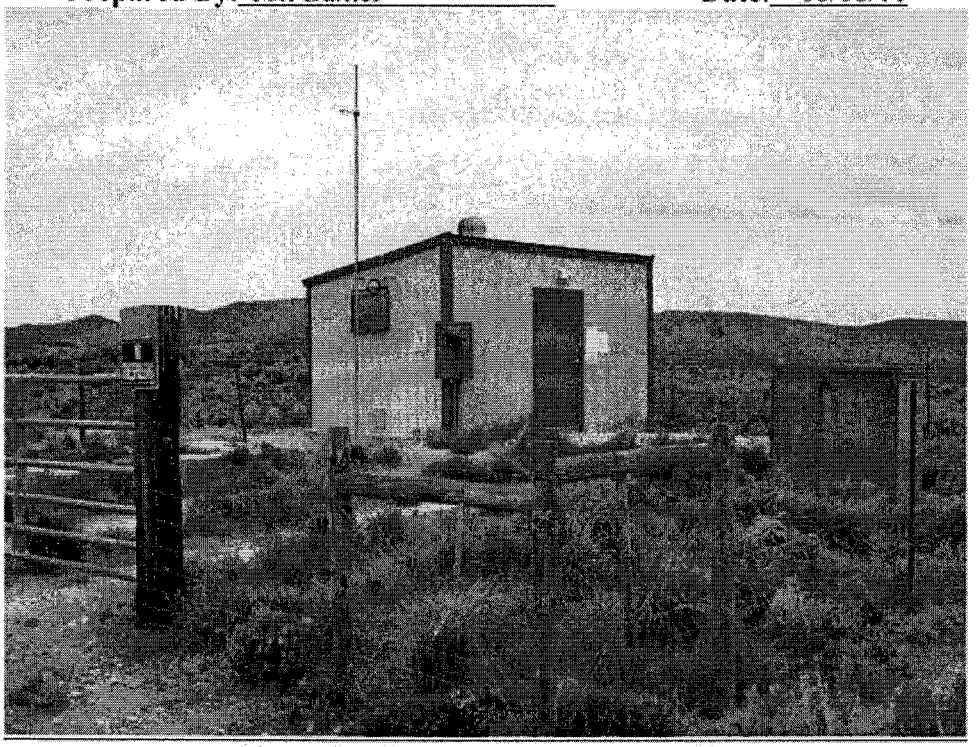
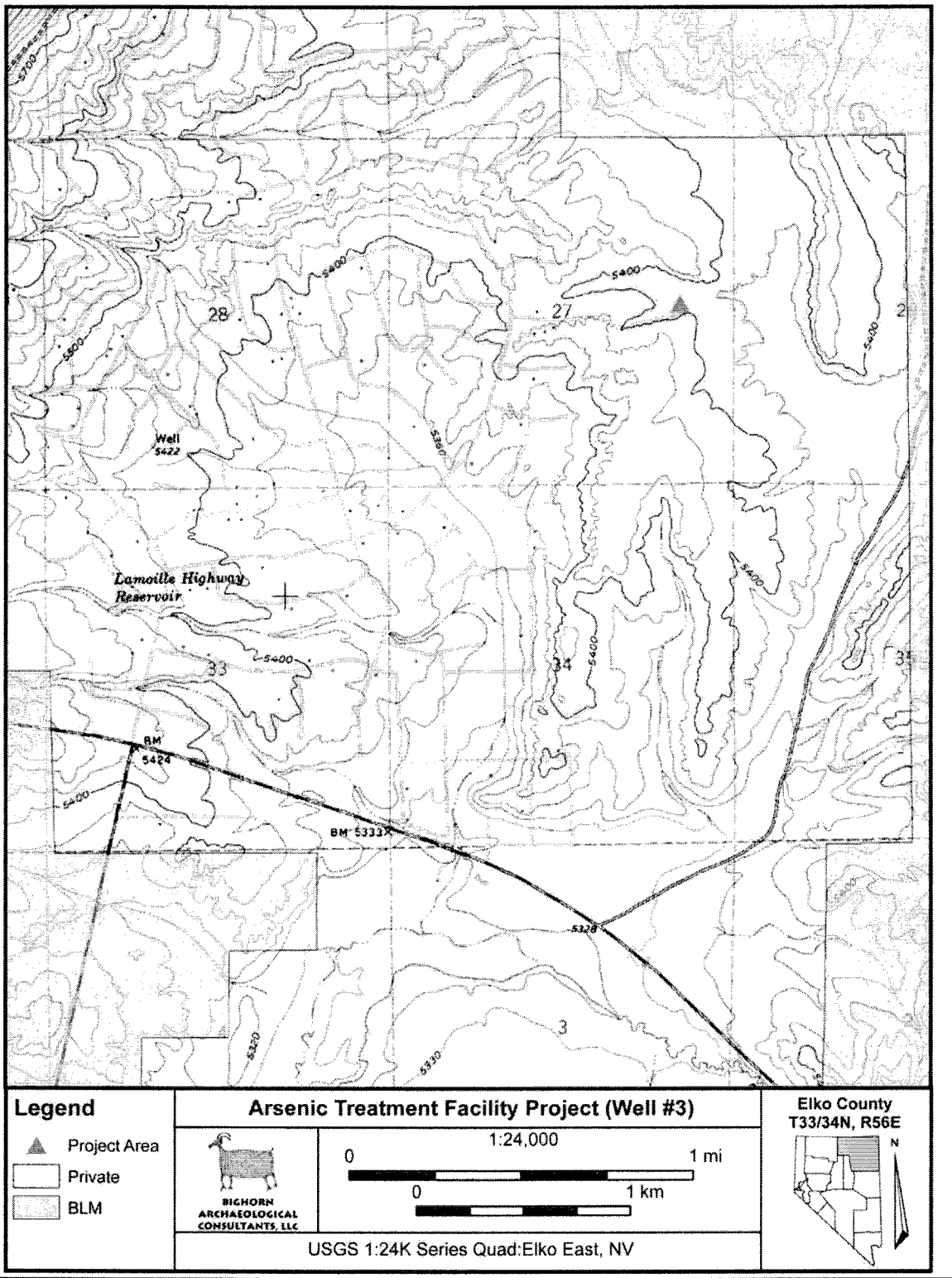


Figure 1. Photo overview of Well #3.


Legend
Project Area
Private
BLM
Arsenic Treatment Facility Project (Well #3)
BIGHORN ARCHAEOLOGICAL CONSULTANTS, LLC
1:24,000
0
1 mi
0
1 km
USGS 1:24K Series Quad:Elko East, NV
Elko County
T33/34N, R56E
N
Well
5422
Lamoille Highway
Reservoir
BM
5424
BM 5331
28
27
33
34
3
5400
5320
5330

Attachment D
Geotechnical Report

GEOTECHNICAL INVESTIGATION REPORT

ARSENIC REMOVAL FACILITIES FOR SPRING CREEK UTILITIES SPRING CREEK, NEVADA

Prepared for:

Chilton Engineering and Surveying
421 Court Street
Elko, Nevada

Converse Project No. 11-25138-01

June 14, 2011

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

June 16, 2011

Mr. Chris Woster, PE, PLS
Chilton Engineering and Surveying
421 Court Street
Elko, Nevada 89801-3599

Subject: **GEOTECHNICAL INVESTIGATION REPORT**
Arsenic Removal Facilities for Spring Creek Utilities
Spring Creek, Nevada
Converse Project No. 11-25138-01

Dear Mr. Woster:

Converse Consultants (Converse) is pleased to submit this *Geotechnical Investigation Report* for three arsenic removal facilities within the city of Spring Creek in Elko County, Nevada. This report was prepared in accordance with our proposal dated June 1, 2011 and your authorization dated June 1, 2011.

Based on our field investigation, laboratory data and analysis, the proposed project is considered feasible from a geotechnical standpoint provided recommendations presented in this report are incorporated in the design and construction.

We appreciate the opportunity to be of continued service to Chilton Engineering and Surveying. If you should have any questions, please do not hesitate to contact us at (775) 856-3833.

CONVERSE CONSULTANTS

Stephen Pottéy, E.I.
Staff Engineer

Review and Approval

Ben Smith, P.E.
Senior Engineer

4840 Mill Street, Suite 5
Reno, Nevada 89502
Telephone (775) 856-3833 ◆ Fax (775) 856-3513

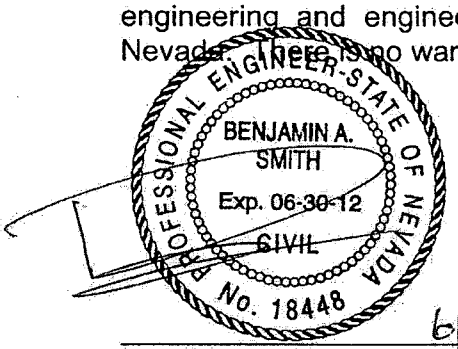
4708 Roseville Road, Suite 114
North Highlands, California 95660
Telephone (916) 331-5444 ◆ Fax (916) 331-6444

www.ConverseConsultants.com

PROFESSIONAL CERTIFICATION

This report has been prepared by the staff of Converse under the professional supervision of the individual whose seal and signature appear hereon.

The findings, recommendations, specifications or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice in this area of Reno Nevada. There is no warranty, either expressed or implied.



6/16/11

Ben Smith, P. E.
Senior Engineer

EXECUTIVE SUMMARY

The following is a summary of our geotechnical investigation, conclusions and recommendations as presented in the body of this report. Please refer to the appropriate sections of the report for complete conclusions and recommendations. In the event of a conflict between this summary and the report, or an omission in the summary, the report shall prevail.

- The project consists of the design and construction of three arsenic removal facilities within the city of Spring Creek in the County of Elko, Nevada.

- The facilities will be located adjacent to Well #1, Well #11, and Well #3. Well #1 is located near the intersection of Martin Avenue and Lamoille Highway. Well #11 is located near the intersection of Berry Creek Drive and Trescartes Avenue, off of Berry Creek Drive. Well #3 is located approximately ½ mile west of the intersection of Valdez Drive and Spring Valley Parkway, off of Valdez Drive.

- The depth of footings will be approximately two (2) to three (3) feet bgs.

- Our scope of work included the following tasks: field exploration, laboratory testing, engineering analysis, and preparation of this report.

- A total of three (3) test pits were excavated for this project on June 2, 2011. Test pit TP-1 was excavated to a maximum depth of 10 feet below grade surface (bgs) near Well #1, test pit TP-2 was excavated to a maximum depth of 10 feet bgs near Well #11, and test pit TP-3 was excavated to a maximum depth of 11.5 feet bgs near Well #3.

- Based on the exploratory test pit TP-1, the subsurface materials near Well #1 consisted of approximately three (3.5) feet of Gravelly Sand fill and Sandy Clayey Silt below 3.5 feet. Based on the exploratory test pit TP-2, the subsurface materials near Well #11 consisted of Silty Sand, Poorly graded fine grained sand, and Well Graded Sand with gravel and cobbles. Based on the exploratory test pit TP-3, the subsurface materials near Well #3 consisted of Silty Sand and Well Graded Sand to the maximum explored depth of 11.5 feet bgs..

- During our exploration and laboratory testing, no odors or other evidence of contaminated soils and/or hazardous materials were noticed based on visual observations. It should be noted, our scope of work did not include any environmental sampling and testing.

- Groundwater was not encountered in any test pits to the maximum depth explored. Based on a review of the State of Nevada Engineering well log for existing wells in the area, groundwater in the project area should vary between 20 to 50 or more feet bgs. It should be noted that the depth to groundwater could vary depending upon

the season, precipitation, and possible groundwater pumping activity in the vicinity of the proposed arsenic treatment facilities.

- According to the Geologic Map of Elko County, Nevada, there are no active faults projecting toward or crossing the project location.

- The potential of seismic hazards due to the secondary effects of earthquakes including surface fault rupture, surface manifestations of soil liquefaction, seismically induced differential settlement, lateral spreading, landslides, and earthquake-induced flooding is considered to be low. Based on the site location, tsunamis or seiches do not pose a hazard.

- *In-situ* moisture and density of the subsurface soils ranged from 16.5 to 29.0 percent moisture content, and 104.0 to 119.9 pounds per cubic foot.

- Liquid Limit (LL) of the soils ranged from 26 to 34 percent and the Plasticity Index (PI) ranged from 5 to 7.

- Soil from test pit TP-3 at a depth of 4 feet bgs was tested for resistivity and corrosivity. The soil had a resistivity of 1800 ohms.cm which corresponds to a moderate to highly corrosive rating, depending on if moisture is introduced. The chloride/sulphate content of the soil was low and the pH was neutral. The soil in TP-3 changed soil type at approximately 4 feet bgs. The soil above 4 feet bgs did not show typical characteristics of corrosive soil upon visual inspection. Therefore, footings for the structure at Well #3 should be designed for placement above 4 feet bgs, or appropriate protection from corrosive soils, such as coating concrete, should be implemented.

- Earthwork should be performed in accordance with recommendations presented in this report or as required by Chilton Engineering and Surveying. All backfill material should be compacted to a minimum of 90 percent of the laboratory maximum dry density. The upper one (1) foot of backfill beneath pavement sections (if any are encountered) should be compacted to 90 percent of the laboratory maximum dry density. Moisture content of compacted soils should be kept to within three (3) percent of the optimum moisture content for coarse-grained soils and 2 percent above optimum moisture for fine-grained soils. Aggregate base located below any paved surface shall be compacted to 95 percent of the laboratory maximum dry density.

- Soils at Well #1, below a depth of 3.5 feet bgs, may not be suitable for a foundation subgrade. These soils are very fine, and the bottom of any footing should have a two (2) foot minimum separation from these soils to avoid excessive settlement. Documentation showing proper compaction of the fill, located in the top 3.5 feet of the soils at Well #1, should be obtained, or the fill should be removed and recompacted prior to pouring the foundation.

- Based on the results of our field exploration, the soils in the project area should be excavatable with conventional excavation equipment. Oversized materials consisting of cobbles may be encountered and should be taken into account during design and construction.

- Prior to the start of earthwork, existing utilities should be located in the field and either re-routed or protected. All debris, surface vegetation, deleterious material, and surficial soils containing roots and perishable materials should initially be stripped and removed from the site. Any unsuitable materials uncovered by the stripping operation should be excavated to expose a firm native soil.

- Spread footings should be a minimum 18 inches wide and embedded at least 36 inches below the lowest adjacent subgrade. For these conditions, the foundations may be founded upon undisturbed native soils (with the exception of Well #1 as detailed above) or structural fill where they may be designed for an allowable bearing pressure of 3,000 pounds per square foot (psf). This allowable value may be increased by 350 psf for each additional foot of width, and 500 psf for each additional foot of embedment up to a maximum of 4,000 psf. A one-third increase in allowable net bearing pressure may be used for short duration loads, such as seismic.

- Resistance to lateral loads and lateral bearing capacity may be provided by the passive earth pressures and frictional resistance at the base of the footing. A coefficient of friction of 0.36 between concrete and soil may be used with the dead load forces. An allowable passive earth pressure of 350 psf per foot of footing depth may be used for sides of footings poured against recompacted native soil. The passive resistance should be limited to a maximum of 2,000 psf.

The results of our investigation indicate that the proposed arsenic removal facilities locations are suitable from a geotechnical standpoint, provided the recommendations presented in the attached report are considered and implemented in the design and construction.

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APPENDICES

1.0 INTRODUCTION

This report contains the findings of a geotechnical investigation performed by Converse for three arsenic removal facilities which will be 1,200 square feet in size, 12 feet in height, and will be of concrete masonry unit construction with standard concrete spread footings and slab-on-grade floors, in the County of Elko, Nevada. The structures will be adjacent to the following existing well houses: Well #1, Well #11, and Well #3. The approximate locations of exploratory test pits are shown on Plate No. 1. Test Pits TP-1, TP-2, and TP-3 correspond to Well #1, Well #11, and Well #3 respectively.

The purpose of the investigation was to evaluate the nature and engineering properties of the subsurface soils, groundwater conditions, and to provide geotechnical recommendations for the design and construction of the proposed structures.

This report is prepared for the project described herein and is intended for use solely by Chilton Engineering and Surveying and their design team. It should not be used as a bidding document but may be made available to the potential contractors for information. This report may not contain sufficient information for the contractors to prepare their bid for the contract. They should conduct their own investigation if additional information is required for bidding purposes.

2.0 PROJECT DESCRIPTION

The project consists of design and construction of three arsenic removal facilities within the city of Spring Creek, Nevada.

The facilities will be located adjacent to Well #1, Well #11, and Well #3. Well #1 is located approximately 540 feet SSW of the intersection of Martin Avenue and Lamoille Highway, off of Lamoille Highway. Well #11 is located approximately 240 feet WSW of the intersection of Berry Creek Drive and Trescartes Avenue, off of Berry Creek Drive. Well #3 is located approximately ½ mile west of the intersection of Valdez Drive and Spring Valley Parkway, off of Valdez Drive.

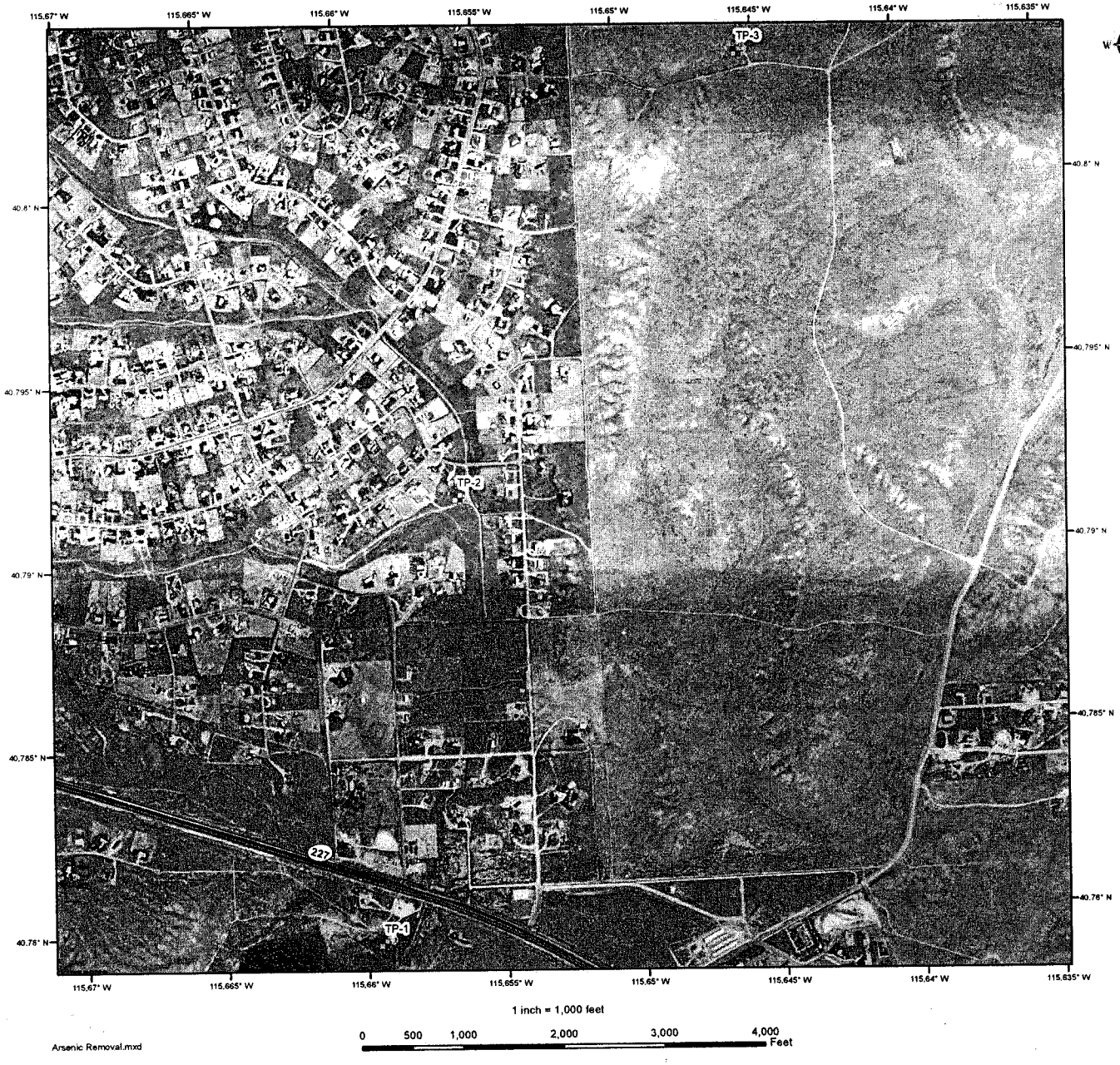
3.0 SCOPE OF WORK

The scope of this investigation included the following tasks:

3.1 Project Set-up

As part of the project set-up, staff personnel from our office performed the following:

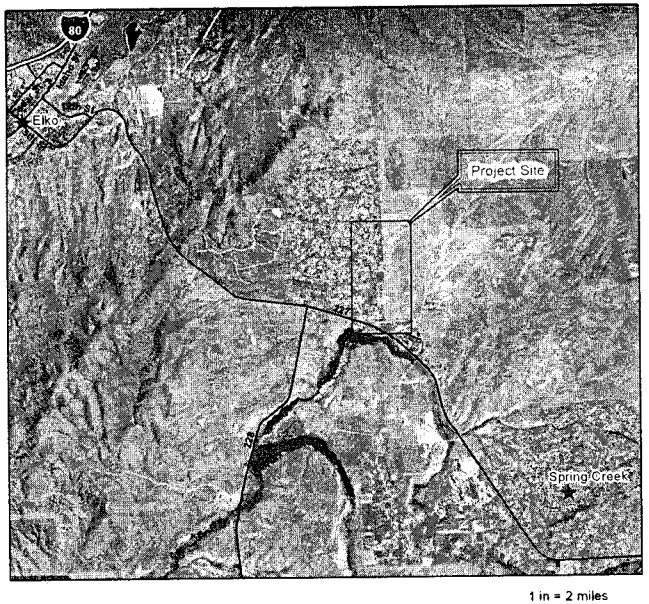
- Perform site reconnaissance to verify existing conditions.
- Verify that there were no conflicts with existing underground utilities.



1 inch = 1,000 feet

0 500 1,000 2,000 3,000 4,000 Feet

Arsenic Removal.mxd



1 in = 2 miles

Converse Consultants

Over 60 Years of Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

DRAFT

Legend

- Test Pit Locations
- Faults

SITE MAP

ARSENIC REMOVAL FACILITIES FOR SPRING CREEK UTILITIES

Route 227
Spring Creek, Nevada

Plate No. 1

Date Created: 06/13/11

Project No: 11-25138-01

- Reviewed available pertinent geotechnical, and geologic literature and maps for the area. Reports and maps reviewed are presented in the reference section of this report.

3.2 Subsurface Exploration

Three (3) test pits were excavated for the proposed sites. Test pit TP-1 was excavated for the structure near Well #1. Test pit TP-2 was excavated for the structure near Well #11. Test pit TP-3 was excavated for the structure near Well #3. Test pits were excavated to the maximum explored depths of 10 feet, 10 feet, and 11.5 feet respectively, below ground surface (bgs).

The test pit soils were visually logged by our engineer and sampled at regular intervals and at changes in subsurface soils. The test pits were excavated using a backhoe equipped with a 24 inch bucket. All test pits were backfilled, not compacted, at the completion of excavating.

For a description of the field exploration and sampling program see Appendix A, *Field Exploration.*

For a map showing test pit locations see Figure No. 1 *Site Map.*

3.3 Laboratory Testing

Representative soil samples from the test pits at proposed arsenic removal facility locations were tested in the laboratory to aid in the soils classification and to evaluate the relevant engineering properties of the site soils. These tests included:

- *In situ* moisture contents and dry densities (ASTM Standard D2216)
- Corrosivity, Resistivity, Sodium Sulfate, Chloride & pH (EPA 300.0, SW846 9045B, SM 2510B)
- Sieve Analysis (ASTM C136, C117, D1140)
- Atterberg Limits (LL & PI) (ASTM D4318)

For a description of the laboratory test methods and test results, see Appendix B, *Laboratory Testing Program.*

3.4 Analysis and Report Preparation

Data obtained from the field exploration and laboratory testing program were compiled and evaluated. Geotechnical analyses of the compiled data were performed and this report was prepared to present our findings, conclusions and recommendations for the proposed arsenic treatment facilities.

4.0 SITE CONDITIONS

4.1 Subsurface Profile

Based on the exploratory test pit TP-1, the subsurface materials near Well #1 consisted of approximately three and a half (3.5) feet of fill and Sandy Clayey Silt to the maximum explored depth of 10 feet bgs. Based on the exploratory test pit TP-2, the subsurface materials near Well #11 consisted of Silty Sand, Poorly graded fine grained sand, and Well Graded Sand with gravel and cobbles to the maximum explored depth of 10 feet bgs. Based on the exploratory test pit TP-3, the subsurface materials near Well #3 consisted of Silty Sand and Well Graded Sand to the maximum explored depth of 11.5 feet bgs.

Bedrock was not encountered during the subsurface investigation performed by Converse. The depth to bedrock in the project area is estimated to be over 100 feet below existing ground surface. The estimated depth to bedrock is based on previous studies done by Converse in the area.

During our exploration and laboratory testing no odors or other evidence of contaminated soils and/or hazardous materials were noticed based on visual observations. It should be noted, our scope of work did not include any environmental sampling and testing.

4.2 Groundwater

Based on a review of the State of Nevada Engineering well log for existing wells in the area, groundwater in the project area should vary between 20 to 50 or more feet below grade surface (bgs). There may be isolated areas where groundwater is shallower. No groundwater was encountered during our field exploration.

It should be noted that the depth to groundwater could vary depending upon the season, precipitation, and possible groundwater pumping activity in the vicinity.

4.3 Excavatability

Based on the results of our field exploration, the soils in the project area should be excavatable with conventional excavation equipment, such as excavators.

4.4 Subsurface Variations

Based on results of the subsurface exploration and our experience, some variations in the continuity and nature of subsurface conditions within the project site should be anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the test pit locations.

For a detailed description of the subsurface materials encountered in the exploratory test pits, see Drawing Nos. A-2 through A-4, *Logs of Test Pits,* in Appendix A, *Field Exploration.*

5.0 LABORATORY TEST RESULTS

Laboratory testing was performed to determine the physical characteristics and engineering properties of the subsurface soils. Tests results are included in Appendix B, *Laboratory Testing Program.* Discussions of the various test results are presented below:

- *In-situ* Moisture and Dry Density – *In-situ* dry density of the upper two (2) feet of the soil material for the proposed facilities. Moisture content for the soils varied from 16.5 to 29.0 percent, and the in-place density varied from 104.0 to 119.9 pounds per cubic foot.

- Grain Size Distribution Sieve Analysis – Results of five (5) gradation analysis tests indicated the soils tested are primarily well graded sands, silty sands, and low plasticity silts.

- Three (3) Atterberg Limits tests were done, one from each test pit. The Plasticity Index (PI) for the representative soil samples from the project area ranged from 5 to 7, and the Liquid Limit (LL) ranged from 26 to 34. This indicates that the soils are slightly plastic with a low inherent swelling potential.

- One pH and corrosivity test was done for the project area. For information on this test please refer to Section 8 Soil Corrosivity Evaluation.

6.0 ENGINEERING GEOLOGY

A general description of the regional and local geology of the project site is presented in this section.

6.1 Geologic Setting

Spring Creek, Nevada lies in the northeastern portion of the Basin and Range Geologic Province, in an area that is surrounded, for the most part, by a series of mountain chains and associated valleys. These ranges and basins were the result of parallel normal faults, which produced a series of horsts and grabens in the Province. This basic topographic pattern extends from eastern California to central Utah, and from southern Idaho into Mexico.

6.2 *Local Geology*

According to the Geologic Map of Elko County, Nevada (Coats, R. R., 1972), there are no faults crossing or transecting the site. No evidence of ground movement was observed at the time of our site visit. The majority of the site is located in the area identified as a Tertiary aged formation of sedimentary and volcanic rocks from the Humboldt and Young American Gravel Formations. These formations are characterized by; tuff, vitric ash, tuffaceous siltstones and sandstones, conglomerates, and limestones. The remaining portion of the project area is located on alluvium characterized by silt, sand and gravel along present streams.

7.0 FAULTING AND SEISMICITY

7.1 *Faulting*

According to the Geologic Map of Elko County, Nevada by Robert R. Coats, the nearest known fault to the project area is approximately 2.5 miles away. This fault does not extend across or trend towards the proposed structures, and there are no other active faults near the project area. An active fault is defined as one that has had surface displacement within Holocene time (about the last 11,000 years).

7.2 *Secondary Effects of Seismic Activity*

Permanent structures and foundations are subjected to dynamic stresses due to ground acceleration during earthquake events. A seismic event may also affect structures by liquefaction and seismic differential settlement, landslides, lateral spreading, differential settlement due to seismic shaking, earthquake-induced flooding, and seiches. A discussion on a site-specific evaluation of each of these seismic effects is presented below:

Liquefaction and Seismic Differential Settlement: Liquefaction is the sudden decrease in shearing strength of cohesionless soils due to vibration. During dynamic or cyclic shaking, the soil mass is distorted, and inter-particulate stresses are transferred from the sand grains to the pore water. When the pore water pressure increases to the point that the inter-particulate effective stresses are reduced to zero, the soil behaves temporarily as a viscous fluid (liquefaction) and, consequently, loses its capacity to support the structures founded thereon. Liquefaction potential has been found to be the greatest where the groundwater level and loose sands occur within a depth of approximately 50 feet or less. The potential for liquefaction decreases with increasing clay and gravel content, but increases as the ground acceleration and duration of shaking increase. A liquefaction analysis is out of the scope of services for this report, however based on the silt/clay content of the soils and the high percentage of gravels and cobbles in the native soils and potential of groundwater to be below 50 feet, the potential of liquefaction appears to be slight.

Landslides: Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The sites is relatively flat and therefore has a low potential for seismically-induced landslides.

Lateral Spreading: Seismically induced lateral spreading involves lateral movement of earth materials due to ground shaking. It differs from a slope failure in that ground failure involving a large movement does not occur due to the flatter slope of the initial ground surface. Lateral spreading is characterized by near-vertical cracks with predominantly horizontal movement of the soil mass involved over the liquefied soils. The potential for lateral spreading at the proposed site is considered low.

Differential Settlement Due to Seismic Shaking: As discussed above liquefaction can also result in lateral spreading of the soils. Another potential hazard is the settlement of deep sand deposits. However, this site should not be subject to this type of damage any more than other sites in the area.

Earthquake-Induced Flooding: This is flooding caused by failure of dams or other water-retaining structures as a result of earthquakes. The potential of flooding as a result of earthquake activity affecting the project area is considered to be low.

Seiches: Seiches are large waves generated in enclosed bodies of water in response to ground shaking. The potential for seismically induced flooding in the project area due to seiches is considered to be low.

8.0 SOIL CORROSIVITY EVALUATION

One soil sample from test pit TP-3 at a depth of 4 feet bgs was tested for resistivity and corrosivity. The soil had a resistivity of 1800 ohms.cm which corresponds to a moderate to highly corrosive rating, depending on if moisture is introduced. The chloride/sulphate content of the soil was low and the pH was neutral. The soil in TP-3 changed soil type at approximately 4 feet bgs. The soil above 4 feet bgs did not show typical characteristics of corrosive soil upon visual inspection. Therefore, footings for the structure at Well #3 should be designed for placement above 4 feet bgs, or appropriate protection from corrosive soils, such as coating concrete, should be implemented.

9.0 EARTHWORK AND SITE GRADING RECOMMENDATIONS FOR ARSENIC REMOVAL STRUCTURES

9.1 Site Clearing and Preparation of Fill Areas

Within the areas to be graded, existing vegetation, debris, and uncontrolled fill soils (if any) should be removed. Loose or disturbed native soils should be scarified, moisture-conditioned, and properly compacted. When the loose or disturbed soil depth is greater than one foot, removal and stockpiling of the upper loose soils may be required to achieve the required compaction of all the loose soils down to at least medium dense or stiff native soils. Surface preparation should extend at least 2 feet beyond exterior concrete flatwork areas and at least 5 feet beyond the exterior of structures.

Areas to receive fill that are sloped steeper than 5:1 (horizontal to vertical) should be benched with a series of relatively level terraces prior to fill placement. The benches should extend through any loose surface soils.

Structural fill should consist of processed, excavated on-site soils or imported soils meeting the criteria presented in *9.2 Placement and Compaction of Fill Areas* of this report. Structural fill should be placed on a properly prepared and approved subgrade. All areas to receive structural fill should be scarified to a depth of at least 6 inches, moisture conditioned to within 2 percent of the optimum moisture content and recompacted to at least 90 percent of the maximum laboratory dry density as determined by ASTM D1557. All areas to receive compacted structural fill should be observed and approved by the Geotechnical Engineer before the placement of structural fill.

9.2 Placement and Compaction of Structural Fill

Compacted fill for the support of footings, mats, slabs-on-grade, exterior concrete flatwork, and asphaltic pavements should be considered structural fill. Structural fill should consist of processed, excavated on-site soils or similar imported granular soils satisfying the following criteria:

- Free of all deleterious materials
- Contain no particles larger than 4 inches in the largest dimension
- Contain less than 30 percent by weight retained on ¾-inch sieve
- Contain between 5 to 20 percent fines (passing #200 sieve)
- Have a Plasticity Index of 12 or less

At the owner's discretion, criteria for imported soils used for access roads may be less strict. Any import fill should be tested and approved by the owner's representative prior to delivery to the site.

Structural fill should be evenly spread in maximum nine-inch loose lifts, moisture conditioned to within 2 percent of the optimum moisture content and compacted to at least 90 percent of the maximum laboratory dry density as determined by ASTM D1557.

Representative samples of materials being utilized in compacted structural fills should be analyzed in the laboratory by the Geotechnical Engineer to determine certain physical properties. The maximum laboratory dry density of each soil type used in compacted structural fills should be determined by ASTM D1557. Structural fill should not be placed, spread, or compacted while the ground is saturated or during unfavorable weather conditions. When site grading is interrupted by heavy rain, filling operations should not resume until the Geotechnical Engineer approves the moisture and density conditions of the previously placed fill.

9.3 Permanent Slopes

It is not anticipated that cut or fill slopes will be needed for this project. In the event that such slopes are required, the following applies: Permanent cut or fill slopes with a maximum height of 15 feet should have slope angles that are no steeper than 2 to 1 (horizontal to vertical). Fill slopes constructed with the on-site soils will be susceptible to erosion and, therefore, occasional slope maintenance to repair erosion ruts may be required. To minimize future slope maintenance, berms or other drainage devices such as drainage swales should be constructed at the tops of slopes to divert surface run-off away from the slope surface.

The placement of fill near the tops of slopes should be done in such a manner that loose soils do not slough over the slope and are not allowed to build up on the slope surface.

9.4 Excavation of On-Site Materials

The near surface soils should be excavatable with conventional earthwork equipment.

9.5 Earthwork Material Volume Changes

There will be shrinkage losses when excavating and compacting the surficial, on-site soils. A shrinkage factor of 5 to 15 percent is estimated for the on-site soils.

10.0 DESIGN RECOMMENDATIONS FOR STRUCTURES

10.1 General

The following design recommendations are based on our analysis of the data obtained during field investigation, laboratory testing, and our understanding of the proposed project.

10.2 Foundations and Slabs-on-Grade

The new arsenic removal structures may be supported by conventional spread footings. Specific design recommendations are presented as follows:

1. Spread footings should be a minimum 18 inches wide and embedded at least 36 inches below the lowest adjacent subgrade. For these conditions, the foundations may be founded upon undisturbed native soils (with the exception of Well #1, see below) or structural fill where they may be designed for an allowable bearing pressure of 3,000 pounds per square foot (psf). This allowable value may be increased by 350 psf for each additional foot of width, and 500 psf for each additional foot of embedment up to a maximum of 4,000 psf. A one-third increase in allowable net bearing pressure may be used for short duration loads, such as seismic.

   Soils at Well #1, below a depth of 3.5 feet bgs, may not be suitable for a foundation subgrade. These soils are very fine, and the bottom of any footing should have a two (2) foot minimum separation from these soils to avoid excessive settlement. Documentation showing proper compaction of the fill, located in the top 3.5 feet of the soils at Well #1, should be obtained, or the fill should be removed and recompacted prior to pouring the foundation.

2. Spread footings that are designed for the recommended maximum allowable net bearing pressure are anticipated to settle about 1 inch. Differential settlements are expected to range from about ¼ to ½ inch. The estimated settlements are anticipated to occur primarily during construction with little to no post-construction settlement.

3. Due to the potential for damaging differential settlement, individual spread footings should not bear on both undisturbed native soils and structural fill soils. If both are present at the footing base, the native soil should be overexcavated by a depth of 18 inches below the bottom of footing and replaced with properly placed and compacted structural fill.

4. Concrete floor slabs should be supported by a 4-inch minimum layer of Aggregate Base overlying medium dense to very dense undisturbed native soil or properly placed and compacted structural fill. The Aggregate Base should be compacted to at least 90 percent of the maximum laboratory dry density at a moisture content within 2 percent of optimum (ASTM D1557). Where moisture sensitive floor coverings are planned or where the potential of a damp slab condition is otherwise intolerable, a visqueen moisture barrier that is at least 10 mils thick should be placed underneath the layer of Aggregate Base. The layer of Aggregate Base should be

moisture conditioned before pouring the concrete slab-on-grade to aid in the curing process.

5. Concrete placement, curing operations, and control joint spacing should be in accordance with American Concrete Institute (ACI) recommendations.

10.3 Lateral Earth Pressures and Resistance to Lateral Loads

The following subsections outline lateral earth pressures and resistance to lateral loads. Lateral earth pressures and resistance to lateral loads are estimated by using on-site native soils compacted to an average of 92 percent of the laboratory maximum dry density. The following recommendations are considered applicable for all structure sites.

10.3.1 Lateral Earth Pressures

The active earth pressure behind any buried wall depends primarily on the allowable wall movement, type of backfill materials, backfill slopes, wall inclination, surcharges, and any hydrostatic pressures. In general, the lateral earth pressures are presented below.

Table No. 1, Lateral Earth Pressure for Structure

Loading Conditions	Equivalent Fluid Pressure
Active earth conditions (wall is free to deflect at least 0.001 radian) -	38
At-rest (wall is restrained) -	58

These pressures assume a level ground surface behind the wall for a distance greater than the wall height, no surcharge, no hydrostatic pressure, and soil expansion index less than 30. Adequate drainage could be provided to avoid hydrostatic pressures.

If water pressure is allowed to build-up behind the wall, the active pressures should be reduced by 50 percent and added to the full hydrostatic pressure to compute the design pressures against the wall.

10.3.2 Passive Earth Pressure

Resistance to lateral loads can be assumed to be provided by friction acting at the base of foundations and by passive earth pressure. An allowable coefficient of friction of 0.36 between concrete and soil may be used with the dead load forces. An allowable passive earth pressure of 350 psf per foot of depth may be used for resistance against recompacted native soils. A factor of safety of 1.5 was applied in calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 2,000 psf for alluvial soils.

Passive earth resistance values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above passive resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.

Due to the low overburden stress of the soil at shallow depth, the upper one foot of passive resistance should be neglected unless the soil is confined by pavement or slab.

11.0 CONSTRUCTION RECOMMENDATIONS

11.1 General

It is not anticipated that sloped or vertical braced excavations will be necessary for this project. In the event that they are necessary, recommendations pertaining to temporary excavations are presented in this section.

In the event that excavations need to be made within existing streets, vertical side wall excavation may be required. Where the side of the excavation is a vertical cut, it should be adequately supported by temporary shoring to protect workers and any adjacent structures.

All excavation work should be performed in accordance with all applicable State, Federal, and local safety requirements. The soils exposed in cuts should be observed during excavation by the owner's representative. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

11.2 Temporary Sloped Excavations

Temporary open-cut trenches may be constructed with side slopes as recommended in Table No. 5, *Slope Ratios for Temporary Excavations*. Temporary cuts encountering soft and wet fine-grained soils; dry loose, cohesionless soils or loose fill from trench backfill may have to be constructed at a flatter gradient than presented below.

Table No. 2, Slope Ratios for Temporary Excavations

Depth of Cut (feet)	Recommended Maximum Slope (Horizontal: Vertical)[1]
0-4	½ : 1
4-10	1:1

Temporary trench excavations in the uncemented, near-surface soils will not stand vertically and should be shored or sloped back in accordance with the maximum allowable slope ratios presented in *Appendix B* to *Subpart P* of *Occupational Safety and Health Standards for the Construction Industry (OSHA) 29 CFR, State of Nevada, Division of Occupational Safety and Health, Part 1926.* The soil type definitions in

Appendix A to *Subpart P* of *OSHA 29 CFR, Part 1926* should be applied to soils encountered in trenches to determine the maximum allowable slope ratio.

Surface drainage should be directed away from the top edge of excavations. Surcharge loads such as construction equipment or stockpiled materials should not be placed within a distance from the top edge of the excavation equal to the depth of the excavation.

Safety during construction is the Contractor's responsibility. Contractors should meet the safety requirements set forth in *OSHA 29 CFR, Part 1926, State of Nevada, Division of Occupational Safety and Health, Subpart P - Excavations, Trenching, and Shoring*, Sections 1926:650 through 1926:653 as currently amended.

11.3 Shoring Design

Excavations for the arsenic removal facilities will be shallow and there are no foreseen confined space issues. Therefore, it is not anticipated that shoring design will be necessary for this project.

12.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION

During excavation of facility foundations, the project geotechnical consultant should be present to observe conditions and test the density and moisture of the backfill. The excavations and backfill should also be observed and tested as to the compliance with project specifications.

13.0 CLOSURE

This report is prepared for the project described herein and is intended for use solely by Chilton Engineering and Surveying, to assist in the design and construction of the proposed arsenic removal facilities. Our services have been performed in accordance with applicable state and local ordinances, and generally accepted practices within our profession.

Converse Consultants is not responsible or liable for any claims or damages associated with interpretation of available information provided by others. Site exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Data derived through sampling and laboratory testing is extrapolated by Converse employees who render an opinion about the overall soil conditions. Actual conditions in areas not sampled may differ. In the event that changes to the project occur, or additional, relevant information about the project is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the recommendations of this report are modified or verified in writing. In addition, the recommendations can only be finalized by observing actual subsurface conditions revealed during construction.

Converse cannot be held responsible for misinterpretation or changes to our recommendations made by others during construction.

Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied. Our conclusions and recommendations are based on the results of the field investigations and laboratory tests, combined with interpolation and extrapolation of soil conditions between and beyond the test pit locations.

14.0 REFERENCES

Well Log Database. State of Nevada, Department of Conservation & Natural Resources, Division of Water Resources. http://water.nv.gov/Engineering/wlog/wlog.cfm

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Das, M. Braja. Principles of Geotechnical Engineering. 25th Edition. 2009

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Standard Specifications For Public Works Construction. Regional Transportation Commission of Washoe County, Carson City, Churchill County, City of Reno, City of Sparks, City of Yerington, Washoe County

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Our field investigation included a subsurface exploration program consisting of excavating test pits.

A total of Three (3) test pits were excavated for this project on June 2, 2011. Test pit TP-1 was excavated for the structure near Well #1. Test pit TP-2 was excavated for the structure near Well #11. Test pit TP-3 was excavated for the structure near Well #3. Test pits were excavated to the maximum explored depths of 10 feet, 10 feet, and 11.5 feet respectively, below ground surface (bgs).. The test pits were excavated using a backhoe equipped with a 24-inch wide bucket. Soils were continuously logged and classified in the field by visual examination in accordance with the Unified Soil Classification System. The field descriptions have been modified where appropriate to reflect laboratory test results.

Relatively undisturbed ring and disturbed bulk samples of the subsurface soil were obtained from the test pits where possible. The relatively undisturbed samples were obtained using a drive sampler with thin stainless steel sample rings having a 2.88 inch inner diameter. The sampler was driven into the bottom of the test pit with successive drops of a 10-pound hammer falling 25 inches by manual means. The soil was retained in stainless steel rings (2.88 inches in inner diameter and 2.75 inches in height).

The samples were carefully sealed with waterproof plastic caps for shipment to the laboratory. Bulk soil samples were collected in plastic bags and brought to the laboratory.

For a key to soil symbols and terminology used in the test pit logs, refer to Drawing No. A-1, *Unified Soil Classification and Key to Test Pit Log Symbols*. For Logs of Test Pits, see Drawing Nos. A-2 through A-4, *Logs of Test Pits*.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS — MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS — MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS — MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY; ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG SYMBOLS

SAMPLE TYPE

STANDARD PENETRATION TEST
Soil barrel sampler in accordance with ASTM D-1586-84 Standard Test Method

DRIVE SAMPLE 2.88" I.D. sampler

DRIVE SAMPLE No Recovery

BULK SAMPLES

GROUNDWATER WHILE DRILLING

GROUNDWATER AFTER DRILLING

Apparent Density	Very Loose	Loose	Medium	Dense	Very Dense
SPT (N)	<4	4 - 11	11 - 30	31 - 50	> 50
CA Sampler	<6	6 - 12	13 - 35	36 - 60	> 60
Relative Density (%)	< 20	20 - 40	40 - 60	60 - 80	> 80

LABORATORY TESTING ABBREVIATIONS

TEST TYPE (Results shown in Appendix B)

CLASSIFICATION

Plasticity	pi
Grain Size	ms
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	mec
Hydrometer	h
Swell	sw
Disturb	Dist.

STRENGTH

Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (one point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Sheer	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electric Resistivity	er
Permeability	perm
Soil Cement	sc

Consistency	Very Soft	Soft	Medium	Stiff	Very Stiff	Hard
SPT (N)	<2	2-4	5-8	9-15	16-30	>30
CA Sampler	<3	3-6	7-12	13-25	26-50	>50

UNIFIED SOIL CLASSIFICATION AND KEY TO TEST PIT LOG SYMBOLS

Converse Consultants

Engle Drive to Licht Parkway, Spring Creek Waterline
Spring Creek, Nevada
For: Oscar Larson

Project No. 09-75201-01

Drawing No. A - 1

Project ID: 09-81327-01 [GPJ; Template: KEY

Boring Log No. TP-1

Date of Drilling: 6/2/2011 **Location:** WELL #1 **Elevation (ft):** 5322
Driller: **Borehole Diameter:** **Equipment:** BACKHOE
Logged By: SMP **Groundwater Depth (ft):** Not Encountered **Driving Wt. and Drop:**

DRAFTED BY SMP

APPROVED BY ON

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.

Depth (ft)	Graphic Log	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
0	FILL: WELL GRADED SAND WITH GRAVEL (SW), Fine to coarse grained, Gravel to 3 inches in largest dimension, Loose to Medium Dense, Moist, Light Brown							
1								
2						29.0	104.0	
3								
3.5	SANDY SILT (ML), Fine to medium grained, Loose to Medium stiff, Moist, Brown							
4								
5								
6								
7								
8								
9								
10	End of Test Pit 10 feet bgs. Test Pit Backfilled Loose With Excavated Soils.							

Spring Creek Arsenic
Wells 1, 3, and 11
Spring Creek, NV

Project No.
11-25138-01

Converse Consultants

Drawing No.
A-2

Boring Log No. TP-2

Date of Drilling: 6/2/2011 | Location: WELL #11 | Elevation (ft): 5340
Driller: | Borehole Diameter: | Equipment: BACKHOE
Logged By: SMP | Groundwater Depth (ft): Not Encountered | Driving Wt. and Drop:

DRAFTED BY SMP

APPROVED BY ON

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
0		This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.							
1		SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown							
2							16.5	119.9	
3									
4		POORLY GRADED SAND (SP), Fine grained, Loose to medium dense, Moist, Light Brown							
5									
6		WELL GRADED SAND WITH GRAVEL (SW), Fine to Coarse grained, Gravel up to 3 inches in largest dimension, Cobbles up to 6 inches in largest dimension, Loose to medium dense, Slightly Moist, Light Brown							
7									
8									
9									

Spring Creek Arsenic
Wells 1, 3, and 11
Spring Creek, NV

Project No.
11-25138-01

Drawing No.
A-3

Converse Consultants

Boring Log No. TP-2

Date of Drilling: 6/2/2011 Location: WELL #11 Elevation (ft): 5340
Driller: Borehole Diameter: Equipment: BACKHOE
Logged By: SMP Groundwater Depth (ft): Not Encountered Driving Wt. and Drop:

DRAFTED BY SMP

APPROVED BY ON

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
10		This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.							
11									
12		End of Test Pit 10 feet bgs. Test Pit Backfilled Loose With Excavated Soils							
13									
14									
15									
16									
17									
18									
19									

Spring Creek Arsenic
Wells 1, 3, and 11
Spring Creek, NV

Project No.
11-25138-01

Drawing No.
A-4

Converse Consultants

SPT

Boring Log No. TP-3

Date of Drilling: 6/2/2011 Location: WELL #3 Elevation (ft): 5399
Driller: Borehole Diameter: Equipment: BACKHOE
Logged By: SMP Groundwater Depth (ft): Not Encountered Driving Wt. and Drop:

DRAFTED BY SMP

APPROVED BY ON

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
0		This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.							
1		SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown							
2							17.7	113.8	
3									
4		WELL GRADED SAND (SW), Fine to medium grained, Loose to medium dense, Slightly Moist, Light Brown							
5									
6									
7									
8									
9									

Spring Creek Arsenic
Wells 1, 3, and 11
Spring Creek, NV

Project No.
11-25138-01

Drawing No.
A-4

Converse Consultants

Boring Log No. TP-3

Date of Drilling: 6/2/2011 | Location: WELL #3 | Elevation (ft): 5399
Driller: | Borehole Diameter: | Equipment: BACKHOE
Logged By: SMP | Groundwater Depth (ft): Not Encountered | Driving Wt. and Drop:

DRAFTED BY SMP

APPROVED BY ON

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
10		Thin poorley cemented caliche layers embeded in soil							
11									
12		End of Test Pit 11.5 feet bgs. Test Pit Backfilled Loose With Excavated Soils							
13									
14									
15									
16									
17									
18									
19									

Spring Creek Arsenic
Wells 1, 3, and 11
Spring Creek, NV

Project No.
11-25138-01

Drawing No.
A-5

Converse Consultants

SPT

APPENDIX B

LABORATORY TESTING PROGRAM

APPENDIX B

LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Test Pits, in Appendix A, *Field Exploration*. Test results are presented in Figures B-1 through B-6 after the summary of tests conducted. The following is a summary of the various laboratory tests conducted for this project:

In-Situ Moisture Content and Dry Density

Relatively undisturbed ring of the subsurface soil were obtained, one from each test pit at 2 to 3 feet bgs. The relatively undisturbed samples were obtained using a drive sampler with thin stainless steel sample rings having a 2.88 inch inner diameter. The sampler was driven into the bottom of the test pit with successive drops of a 10-pound hammer falling 25 inches by manual means. The soil was retained in stainless steel rings (2.88 inches in inner diameter and 2.75 inches in height). Results of tests performed on relatively undisturbed ring samples were used to aid in the classification and to provide quantitative measure of the *in situ* dry density and moisture content. Data obtained from this test provides qualitative information on strength and compressibility characteristics of the site soils. For test results, see the Logs of Test Pits in Appendix A, *Field Exploration*..

Grain-Size Analysis

To assist in classification of soils, mechanical grain-size analyses were performed on five (5) selected samples. Testing was performed in accordance with the ASTM D422 method. Grain-size curves are shown in Figure Nos. B-1 through B-5, *Grain Size Distribution Results*.

Atterberg Limits

Atterberg Limits tests were performed on three (3) representative samples. Testing was performed in accordance with ASTM D4318-10. The results are presented on Figure No. B-6.

Soil Corrosivity

A representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations by EPA 300.0, SW846 9045B, and SM 2510B. The purpose of this tests is to determine the corrosion potential of site soils when placed in contact with common construction

materials. These tests were performed by Western Environmental Testing Laboratory. Test results are summarized on the table below.

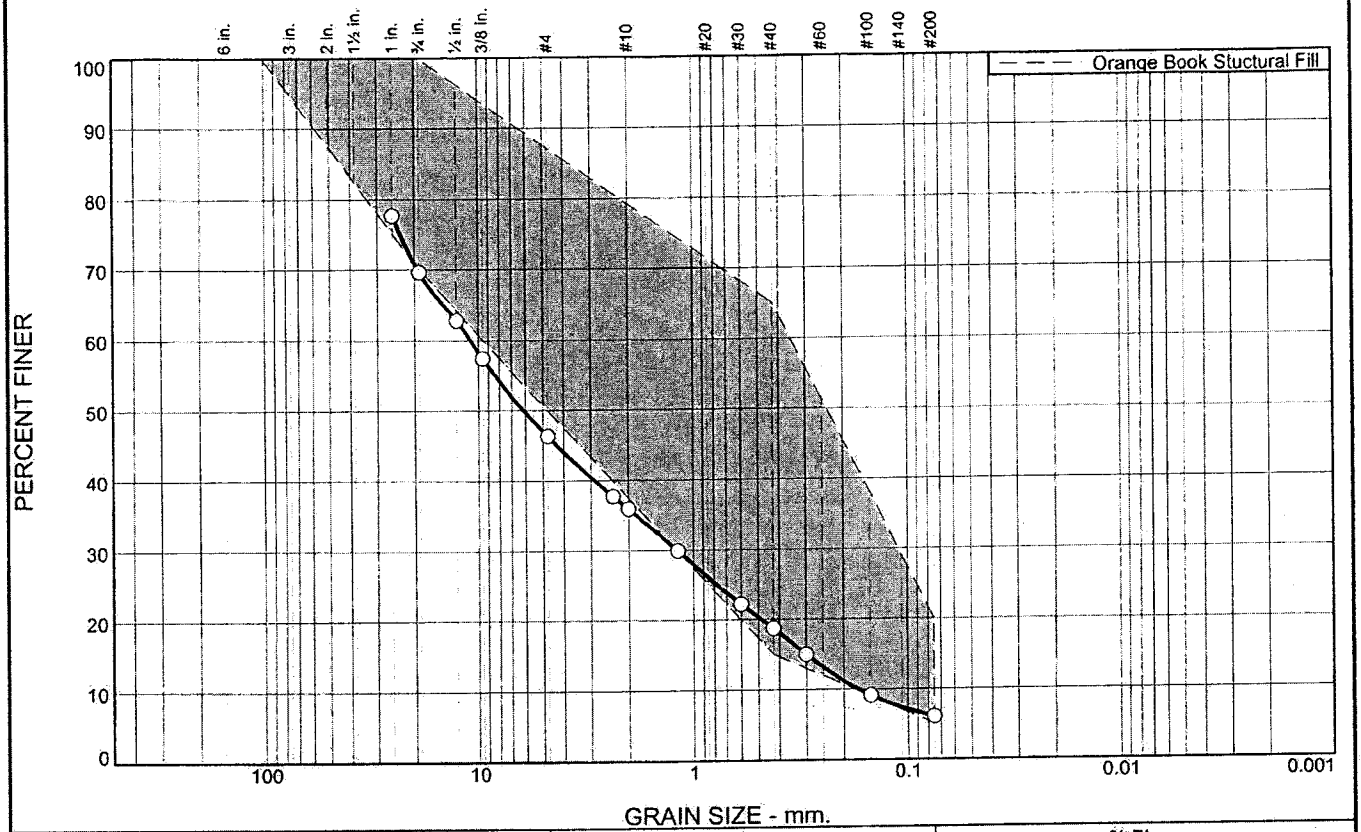
Table No. B-1, Summary of Corrosivity Test Results

Sample Location (Test Pit/Depth, feet)	pH	Soluble Sulfates (EPA 300.0) (ppm)	Soluble Chlorides (EPA 300.0) (ppm)	Min. Resistivity (SM 2510B) (Ohms-cm)
TP-3 @ 4'	7.88	<15	<15	1800

Sample Storage

Soil samples currently stored in our laboratory will be discarded 30 days after the date of the final report, unless this office receives a specific request to retain the samples for a longer period.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		23.3	10.4	17.2	12.6	6.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	77.7		
0.75	69.6	70.0 - 100.0	X
0.5	62.8		
0.375	57.4		
#4	46.3		
#8	37.7		
#10	35.9		
#16	29.9		
#30	22.2		
#40	18.7	15.0 - 65.0	
#50	15.0		
#100	9.1		
#200	6.1	5.0 - 20.0	

* Orange Book Stuctural Fill

Soil Description

FILL:WELL GRADED SAND WITH GRAVEL (SW), Fine to coarse grained, Gravel to 3 inches in largest dimension, Loose to Medium Dense, Moist, Light Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= 10.8930 D_{50}= 6.1487
D_{30}= 1.1901 D_{15}= 0.3000 D_{10}= 0.1716
C_u= 63.50 C_c= 0.76

Classification

USCS= AASHTO=

Remarks

Source of Sample: TP-1 **Depth:** 2

Date: 6/2/11

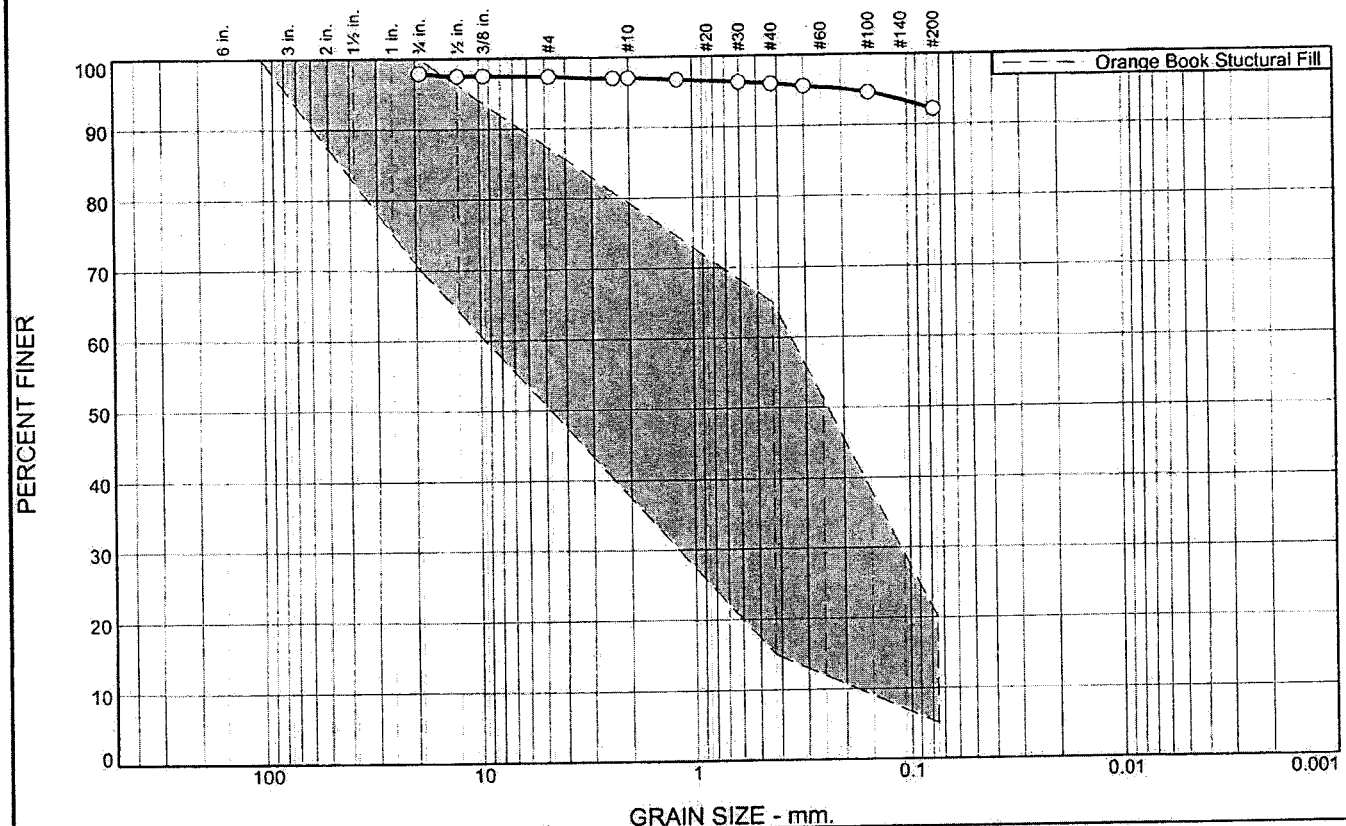
CONVERSE CONSULTANTS

Client: Chilton Engineering
Project: Spring Creek Arsenic

Project No: 11-25138-01 **Figure** B-1

Tested By: SMP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		0.6	0.3	1.0	3.8	92.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	97.9	70.0 - 100.0	
0.5	97.5		
0.375	97.5		
#4	97.3		
#8	97.0		
#10	97.0		
#16	96.7		
#30	96.3		
#40	96.0	15.0 - 65.0	X
#50	95.6		
#100	94.6		
#200	92.2	5.0 - 20.0	X

* Orange Book Stuctural Fill

Soil Description

SANDY SILT (ML), Fine to medium grained, Loose to Medium dense, Moist, Brown

Atterberg Limits

PL= 29 LL= 34 PI= 5

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(6)

Remarks

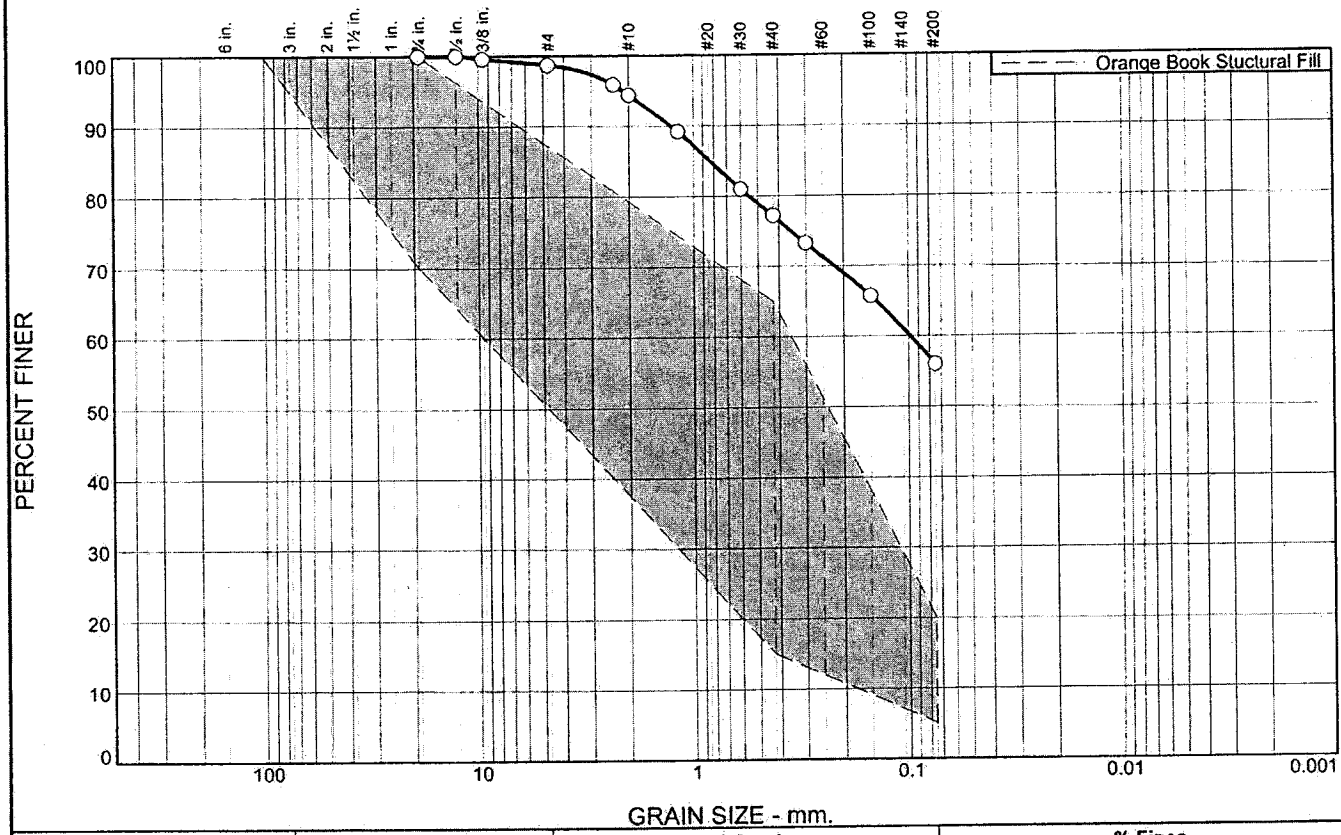
Source of Sample: TP-1 **Depth:** 3.5 **Date:** 6/2/11

CONVERSE CONSULTANTS

Client: Chilton Engineering
Project: Spring Creek Arsenic
Project No: 11-25138-01 **Figure** B-2

Tested By: SMP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	4.3	17.2	21.2	56.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0	70.0 - 100.0	
0.5	100.0		
0.375	99.6		
#4	98.7		
#8	95.9		
#10	94.4		
#16	89.2		
#30	81.0		
#40	77.2	15.0 - 65.0	X
#50	73.3		
#100	65.7		
#200	56.0	5.0 - 20.0	X

* Orange Book Stuctural Fill

Soil Description

SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown

Atterberg Limits

PL= 20 LL= 27 PI= 7

Coefficients

D_{85}= 0.8321 D_{60}= 0.0984 D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(2)

Remarks

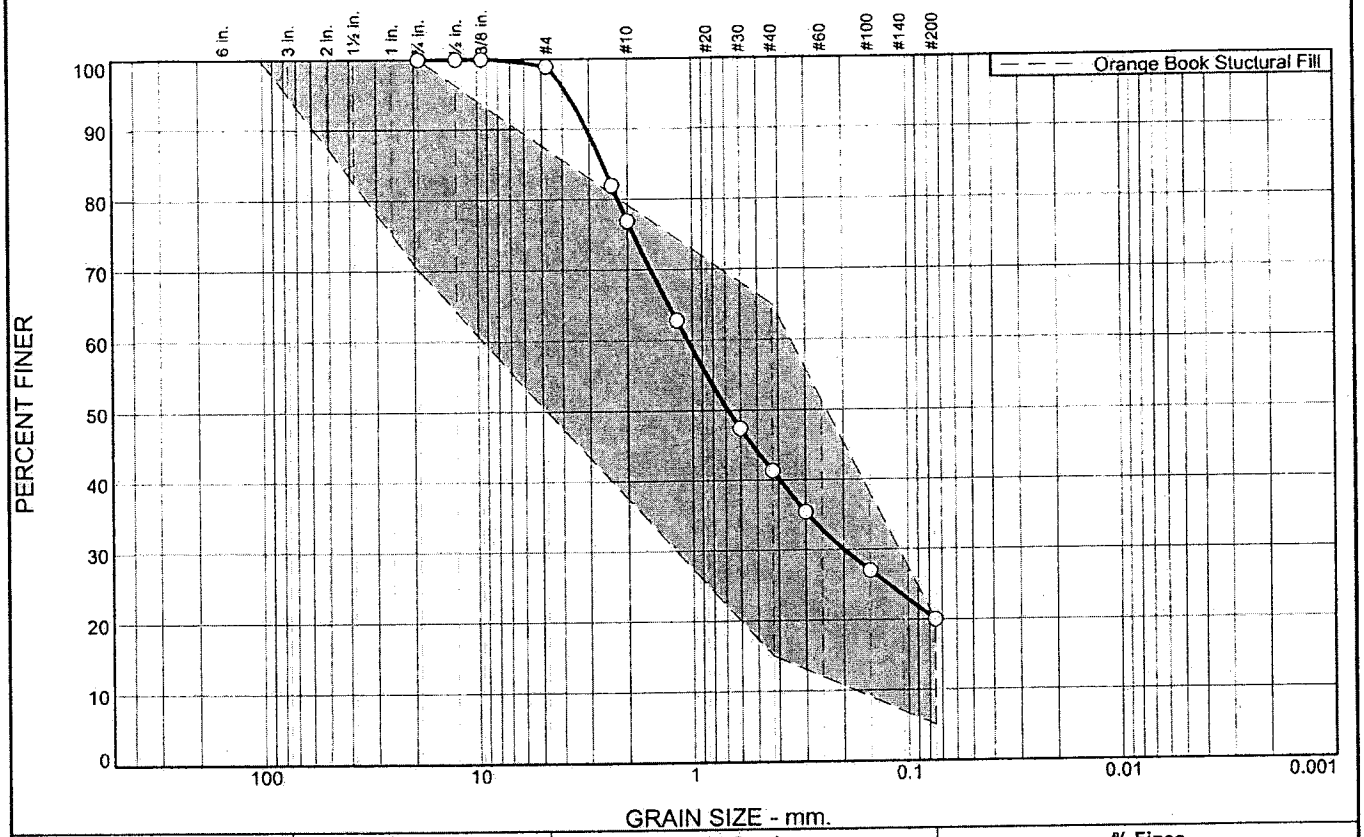
Source of Sample: TP-2 **Depth:** 2 **Date:** 6/2/11

CONVERSE CONSULTANTS

Client: Chilton Engineering
Project: Spring Creek Arsenic
Project No: 11-25138-01 **Figure** B-3

Tested By: SMP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	22.0	35.6	21.3	20.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0	70.0 - 100.0	
0.5	100.0		
0.375	100.0		
#4	98.9		
#8	82.0		
#10	76.9		
#16	62.8		
#30	47.4		
#40	41.3	15.0 - 65.0	
#50	35.4		
#100	27.0		
#200	20.0	5.0 - 20.0	

* Orange Book Stuctural Fill

Soil Description

POORLY GRADED SAND (SP), Fine grained, Loose to medium dense, Moist, Light Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.6018 D_{60}= 1.0537 D_{50}= 0.6829
D_{30}= 0.1988 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

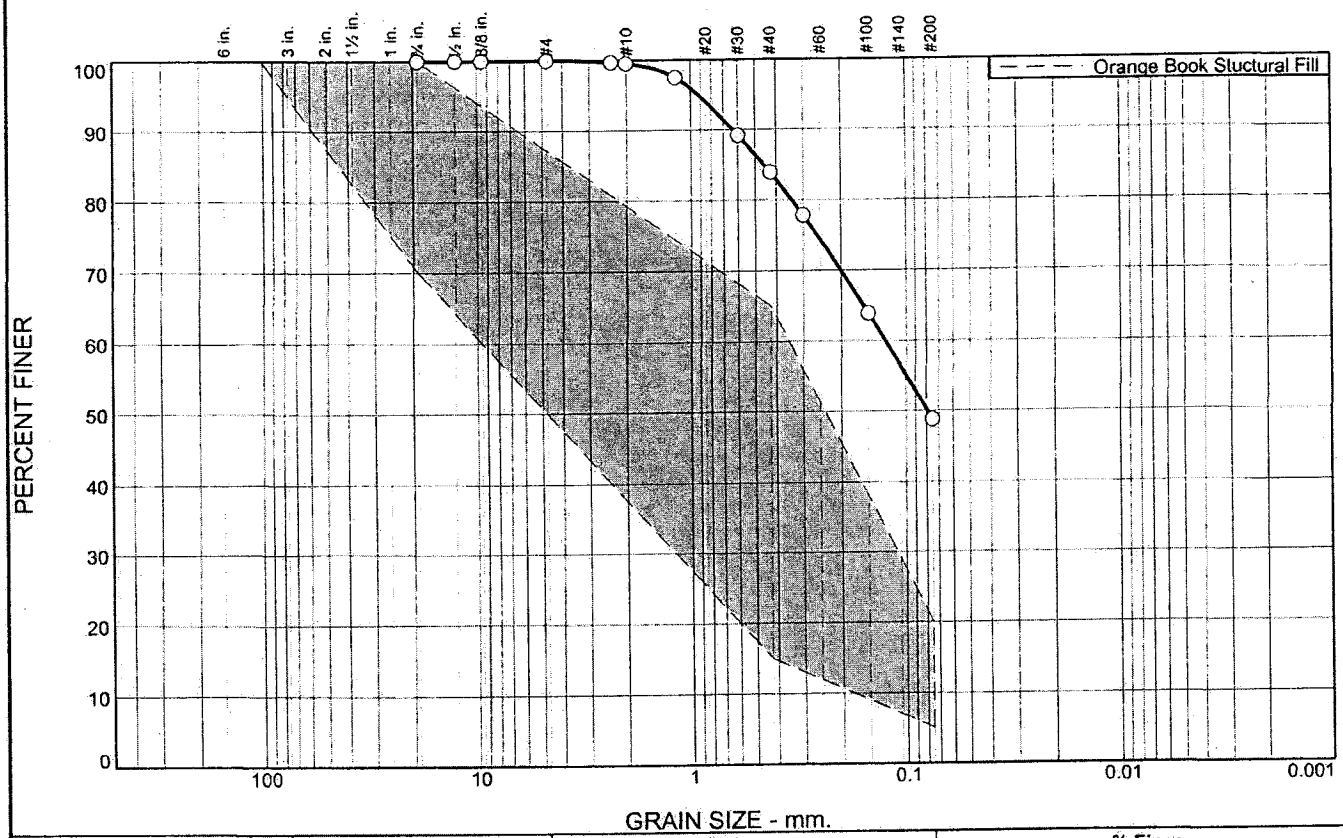
Source of Sample: TP-2 **Depth:** 3.5 **Date:** 6/2/11

CONVERSE CONSULTANTS

Client: Chilton Engineering
Project: Spring Creek Arsenic
Project No: 11-25138-01 **Figure** B-4

Tested By: SMP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	15.6	35.1	48.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.75	100.0	70.0 - 100.0	
0.5	100.0		
0.375	100.0		
#4	100.0		
#8	99.7		
#10	99.5		
#16	97.5		
#30	89.2		
#40	83.9	15.0 - 65.0	X
#50	77.8		
#100	63.9		
#200	48.8	5.0 - 20.0	X

* Orange Book Stuctural Fill

Soil Description

SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown

Atterberg Limits

PL= 21 LL= 26 PI= 5

Coefficients

D_{85}= 0.4551 D_{60}= 0.1250 D_{50}= 0.0792
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Source of Sample: TP-3 **Depth:** 2

Date: 6/2/11

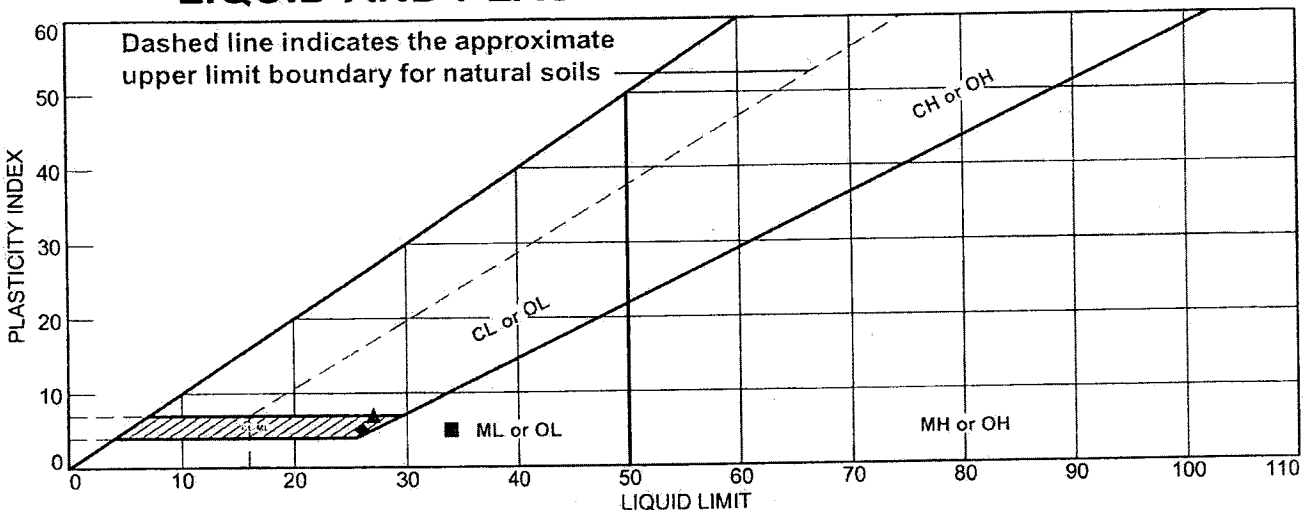
CONVERSE CONSULTANTS

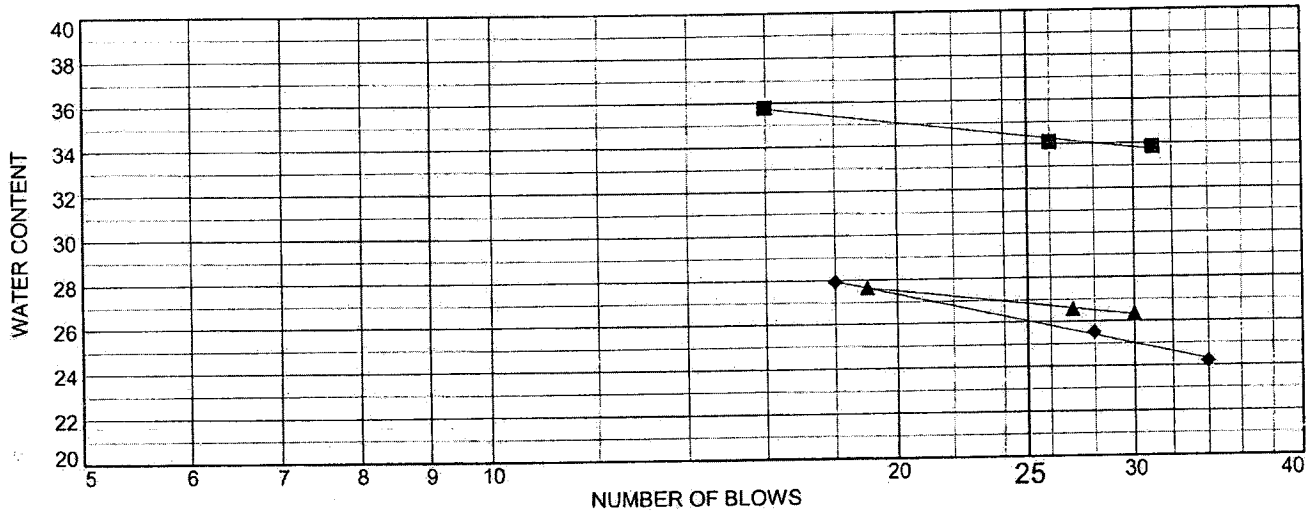
Client: Chilton Engineering
Project: Spring Creek Arsenic

Project No: 11-25138-01 **Figure** B-5

Tested By: SMP

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SANDY CLAYEY SILT (ML), Fine to medium grained, Loose to Medium dense, Moist, Brown					78.8	
■	SANDY SILT (ML), Fine to medium grained, Loose to Medium dense, Moist, Brown	34	29	5	96.0	92.2	ML
▲	SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown	27	20	7	77.2	56.0	CL-ML
◆	SANDY SILT (ML), Fine to medium grained, Loose to medium dense, Moist, Brown	26	21	5	83.9	48.8	SC-SM

Project No. 11-25138- **Client:** Chilton Engineering

Project: Spring Creek Arsenic

● **Source of Sample:** TP-1 **Depth:** 4

■ **Source of Sample:** TP-1 **Depth:** 3.5

▲ **Source of Sample:** TP-2 **Depth:** 2

◆ **Source of Sample:** TP-3 **Depth:** 2

Remarks:

● #200 Wash only

CONVERSE CONSULTANTS

Figure B-6

Attachment E
Preliminary Engineering Report

SUNRISE
ENGINEERING

SPRING CREEK UTILITIES, COMPANY
PRELIMINARY ENGINEERING REPORT

TRACT 200 ARSENIC REMOVAL JUNE 2011

SPRING CREEK UTILITIES, COMPANY

PRELIMINARY ENGINEEING REPORT

TRACT 200 ARSENIC REMOVAL

June 2011

Prepared by:

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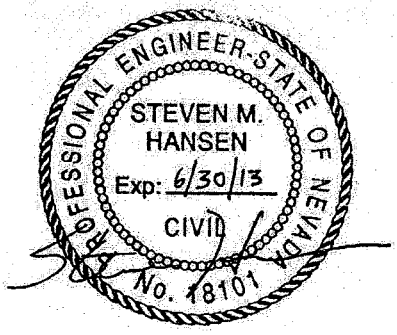

6/15/2011

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PRELIMINARY ENGINEERING REPORT- TRACT 200 ARSENIC REMOVAL, SPRING CREEK UTILITIES, COMPANY

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1 INTRODUCTION

Sunrise Engineering was hired by Spring Creek Utilities, Company to prepare a preliminary engineering report (PER) for their culinary water system source wells in Tract 200. In January of 2001, the U.S. Environmental Protection Agency (US EPA) revised the Maximum Contamination Limit (MCL) on arsenic in drinking water from 50 parts per billion (ppb) to 10 ppb. Compliance of the new regulation took effect in January of 2006. In May of 2005, SCUC hired a consultant to perform an arsenic compliance study for Tract 200. The study evaluated the water quality in the SCUC Tract 200 source wells, and determined that the wells would be out of compliance with the new MCL on arsenic (Lumos and Associates 2005).

The purpose of this PER is to evaluate arsenic mitigation strategies that can be used by the SCUC to lower the arsenic levels in the Tract 200 water. Treatment technologies are also introduced and evaluated for applicability based on existing water quality. Project alternatives are introduced for Tract 200 and evaluated based on economic and non-economic factors. The final section of this PER provides a recommended project alternative to lower the arsenic levels in the Tract 200 drinking water.

2 SCUC EXISTING CULINARY WATER SYSTEM OVERVIEW

The purpose of this section is to introduce the Spring Creek Water system and provide an overview of the physical assets and facilities that make up the water system. A basic understanding of the water system is necessary in order to evaluate treatment alternatives and to assist in the recommendation process of this report.

2.1 General Overview

The Spring Creek water system is owned by Spring Creek Utilities, Co. (SCUC). SCUC is a wholly owned subsidiary of Utilities, Inc. (UI), a private, investor-owned, national water and wastewater utilities owner and operator. The Spring Creek water system is composed of twelve groundwater wells that supply water to the system. The wells pump water to storage tanks that feed water to the system. Currently, there are 10 water tanks in operation in the system. The 10 water tanks feed the system through a distribution system made up of more than 135 miles of piping. Most of the transmission pipe lines range from 6 to 12 inches in diameter. A large portion of the distribution piping is 2, 3, and 4 inch diameter PVC pipe.

The water system provides water to the Spring Creek community, which covers an area approximately 8 miles east to west by 9 miles north to south. The area is subdivided into approximately 5,420 lots that are divided by areas in to four separate tracts, which are labeled tract 100, 200, 300, and 400. The water system is actually divided into two separate systems that are not currently connected. One system provides water for tracts 100, 300, and 400, while the other system provides water for tract 200. **This report focuses on the water system that provides water to Tract 200.** It has been reported that Tract 200 has reached approximately 96% of buildout capacity (RTW 2007).

2.2 Tract 200 Water Sources

The Tract 200 water system is completely independent of the system that feeds the other Tracts. Tract 200 gets its source water from three underground wells referred to as Well #1, Well #3, and Well #11. Because Tract 200 is almost built out, it is not anticipated that additional source capacity will be needed.

Well #1 is located on the south side of Tract 200, just off of Lamoille highway. The location of the well site is shown on the facility map in Exhibit 2.0. Well #1 produces approximately 424 gallons per minute (gpm). The well primarily operates during summer months representing the peak demand season in the area. During its operating months it is utilized approximately 80% of the time. The well pumps water through an 8 inch transmission/distribution line that feeds the Twin tanks. It is important to note that water services and several other distribution lines are connected to the line that transports water from the wells to the tanks. The existing well house at Well #1 is approximately 10 by 22 feet and is equipped with the pump motor, mechanical piping, sodium hypochlorite storage tank, injection system, and SCADA system. The well is powered from an overhead power line located a few feet from the building. The site for well 1 is approximately 1.45 acres. There is abundant space available at this well site for additional facilities.

Well number 3 is located on the east side of Tract 200, approximately a quarter mile east of the gate at the end of Valdez Drive. The location of the well site is shown on the facility map in Exhibit 2.0. Well 3 produces approximately 712 gpm, and primarily operates during the summer months.

During the peak summer months, it is utilized approximately 80% of the time. The well is equipped with a 125 hp pump motor. The well pumps water through an 8 inch transmission/distribution line that feeds the Twin tanks. Similar to well 1, water services and other distribution lines are connected to the line that transports water from the wells to the tanks. The existing well house at Well #3 is the smallest of the three wells and is approximately 10 by 14 feet. It is equipped with the pump motor and the sodium hypochlorite disinfection tank and injection system. All of the mechanical piping, metering, and control valves are located on the exterior of the well house inside a buried concrete vault. The site includes approximately 4.5 acres and there is abundant space available at this well site for additional facilities.

Well #11 is located within the residential area of Tract 200. The site is just south of Berry Creek Drive and east of Berry Creek Court. The location of the well site is shown on the facility map in Exhibit 2.0. Well #11 produces around 800 gpm and is the primary well for the Tract 200 system. During the peak summer months, it is estimated to be utilized 70 to 90% of the time. The well is equipped with a 125 hp pump motor. The well pumps water through an 8 inch transmission/distribution line that feeds the Twin tanks. Similar to the other two wells, water services and distribution lines are connected directly to the line that transports water from the wells to the tanks. The existing well house at well 11 is approximately 15 by 17 feet and is equipped with the pump motor, mechanical piping, sodium hypochlorite storage tank, injection system, and SCADA system. The well house receives power through an underground power line fed from a transformer on the north side of the well house. There is abundant room adjacent to the existing well house for additional facilities.

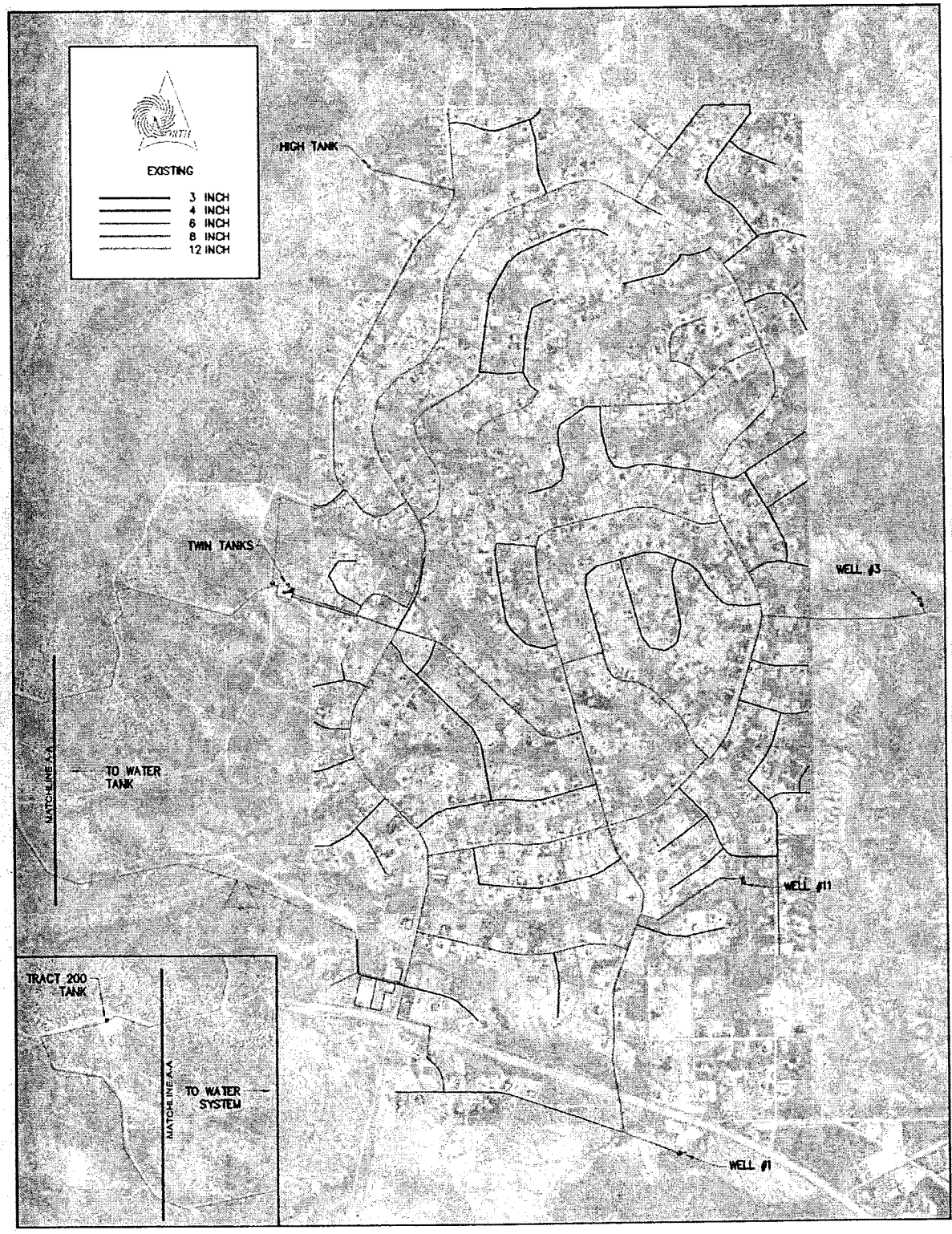

Exhibit 2.0- Tract 200 Distribution System and Facility Map

2.3 Tract 200 Water Storage Facilities

All culinary water systems are required to have water storage capacity. Storage capacity is used in the case that water is not available immediately from the sources providing water to the system. A storage reservoir also mitigates the instantaneous demands of the system which will vary dramatically throughout the day. The idea is that if a source goes down or some other emergency happens that the water system will still be able to provide water to the users and even be able to provide adequate fire flow throughout the system.

The Tract 200 water system has four water tanks connected to the water system. These water tanks are referred to as the "Twin Tanks", "High Tank", and the "Tract 200 Tank".

The Twin Tanks are located on the western edge of the track, at the end of Engle Drive. There are two water tanks at this location. One of the tanks has a storage capacity of 250,000 gallons, and the other has a storage capacity of 500,000 gallons. The smaller tank was constructed in the early 1970's and the larger tank was constructed a few years after the smaller tank. Both of these tanks are fed from Wells #1, #3, and #11. Both of these tanks are made of steel, and are above ground.

The High Tank is located in the northwest corner of Tract 200, and can be accessed from Holiday Drive. This tank has a storage capacity of 500,000 gallons. The High Tank was constructed in the early 1970's. The High Tank is fed from the booster station located at the Twin Tanks site. The High Tank is constructed of steel and is an above ground storage tank.

The Tract 200 Tank is located in the southwest corner of Tract 200. This water tank has a storage capacity of 1.1 MG. This tank was recently built in the year 2008. This water tank is also fed from the booster station located at the Twin Tanks site. It is constructed of steel and is an above ground storage tank.

2.4 Tract 200 Distribution System

The Tract 200 water system is currently divided into three pressure zones. The water system is comprised of approximately 36 miles of water main pipeline, and 2 pressure reducing valves (PRVs), with 1 pressure sustaining valve. The table below shows the quantity of water line in the Tract 200 distribution system categorized by diameter.

Table 2.0- Tract 200 Distribution Pipe by Diameter

Diameter (in)	Length (lf)	Percent of Total
2	653	0%
3	3,288	2%
4	73,708	39%
6	46,626	24%
8	44,114	23%
12	21,943	12%
	190,332	100%

Currently, wells 1, 3, and 11 supply water to the Twin tanks through 8 inch transmission/ distribution lines in the lower zone that function as transmission lines and distribution lines. These

8 inch lines are not used as a dedicated transmission line and there are multiple distribution lines and service connections connected to these lines.

From the Twin Tanks, water is boosted to the High Tank and the Tract 200 Tank. The water that is boosted to the High Tank is transmitted through an 8 inch water line that is also used for distribution for the northwest section of Tract 200. There is an 8 inch PRV located at the northern most border of the distribution system between the Lily Drive and Sterling Drive that feeds water from the upper High Tank zone to the lower zone.

The line extending from the Twin tanks to the Tract 200 Tank is a 12 inch line. The transmission line from the Tract 200 Tank to the system is also a 12 inch water line that extends along the southern boundary of Tract 200. Along this line there is a 12 inch PRV that provides the boundary between zones.

3 TRACT 200 SOURCE WATER QUALITY

The three wells that supply water to Tract 200 of the Spring Creek system have been tested to ensure water quality of the wells meets or exceeds the water quality requirements of the state of Nevada. A summary of the water quality results as reported from the lab from October of 2010 are shown in Table 3.0 below.

Table 3.0- 2010 Water Quality Parameters of Tract 200 Wells

Parameter	Units	Results		
		Well #1	Well #3	Well #11
pH	pH Units	8.18	7.89	7.9
Chloride	mg/L	16	48	76
Fluoride	mg/L	0.4	0.53	0.47
Sulfate	mg/L	24	41	31
Nitrate	mg/L	<1.0	1.7	1.7
TDS	mg/L	250	300	360
Silica	mg/L	57	51	55
Aluminum	mg/L	<0.045	<0.045	<0.045
Barium	mg/L	0.13	0.085	
Beryllium	mg/L		<0.0010	
Cadmium	mg/L	<0.0010	<0.0010	
Chromium	mg/L	<0.0050	<0.0050	
Copper	mg/L	<0.050	<0.050	<0.050
Iron	mg/L	<0.010	0.31	0.018
Magnesium	mg/L	3.8	13	11
Manganese	mg/L	<0.0050	<0.0050	<0.0050
Nickel	mg/L		<0.010	
Silver	mg/L	<0.0050	<0.0050	<0.0050
Sodium	mg/L	45	34	36
Zinc	mg/L	<0.010	<0.010	<0.010
Mercury	mg/L	<0.00010	<0.00010	
Antimony	mg/L		<0.0025	
Arsenic	mg/L	0.022	0.035	
Selenium	mg/L	<0.0050	<0.0050	
Thallium	mg/L		<0.0010	

** Water Quality Data Colected on 10/20/2010, except for Silica.*

The table above does not show water quality results for arsenic. Separate arsenic monitoring has been taking place for all three wells since May of 2010. The results of the arsenic testing are shown in Table 3.1 below. Figure 3.0 is a graph of the arsenic levels in the wells since May 2010. This shows the basic arsenic trending for each well. It is important to note that all three wells currently exceed the EPA MCL for arsenic.

Table 3.1- Arsenic Test Results in Tract 200

Date Collected	Arsenic Test Sample Result (mg/L)		
	Well #1	Well #3	Well #11
5/11/2010	0.020	0.026	0.021
6/8/2010	0.022	0.025	0.027
7/7/2010	0.023	0.028	0.030
8/16/2010	0.021	0.041	0.021
9/9/2010	0.022	0.033	0.026
10/12/2010	0.021	0.024	0.025
11/9/2010	0.022	0.023	0.026
12/8/2010	0.021	0.021	0.021
1/11/2011	0.020	0.019	0.020
2/9/2011	0.022	0.021	0.023
3/8/2011	0.023	0.022	0.024
4/6/2011	0.020	0.021	0.022
5/9/2011	0.021	0.022	0.021

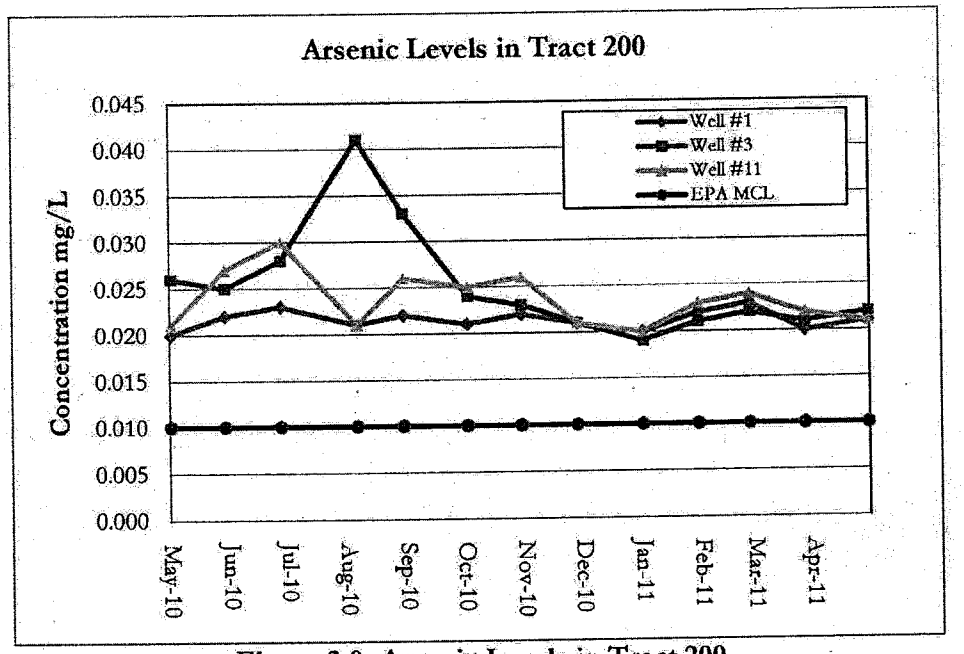

Figure 3.0- Arsenic Levels in Tract 200

The arsenic level in Well #1 over the sampling period has remained fairly constant, averaging about 0.21 mg/L with a range of 0.003 mg/L. This is also consistent with levels reported for this well in prior studies conducted in recent years.

The arsenic level in Well #3 has had the greatest range of the three wells with a large spike in August of 2010. The range of the test results was 0.022 mg/L, and the average was about 0.025 mg/L. Removing that spike, the average of this well remains the highest of the three wells but becomes

more consistent with the other two wells. The overall level is about 0.008 mg/L lower than that reported in recent years.

Well #11 had the most varied or inconsistent results. However, the range of the results was less than for Well #3. This well averaged about 0.024 mg/L over the 13 month period, with a range of 0.010 mg/L. This level is about 0.005 mg/L lower than what was reported in recent years.

The trend for the level of arsenic in Wells #1 and #11 appears to be flat, or unchanging, during the sampling period. This is further justification that SCUC needs to implement a mitigation strategy.

4 INTRODUCTION OF ARSENIC MITIGATION STRATEGIES

4.1 Status Quo

This arsenic mitigation strategy is to maintain the status quo. In some unique cases when considering strategies for treatment, maintaining the status quo may be the best short term option. This decision is made based off of current water quality and money available for a project, and overall need of the project. Sometimes, projects may be evaluated as options for existing problems and no resulting project completed based on the decision that at the time it is better to "do nothing". **This is not an option for SCUC**. The arsenic levels in the well are currently above the MCLs. The NDEP has recently issued an administrative order (AO) for the water system. Something must be done to lower the arsenic levels in the water in Tract 200. There will be no further discussion on this arsenic mitigation strategy based on the fact that **to "do nothing" is not an option for the SCUC.**

4.2 Blending with Other Tracts

Blending with other tracts involves transporting water from other Tracts in order to blend with water from Tract 200. In effect, blending is a way to dilute the hazardous content in water by combining water with little or no contaminants with water containing a higher level of contaminants. In many instances this alternative is practiced due to relatively low costs without requiring any form of mechanical treatment. The primary costs associated with this alternative are the infrastructure necessary to be able to blend water from two separate locations.

The only option for blending in Spring Creek comes from the other Tracts. As discussed previously, Tract 200 is completely separate from the other Tracts. Also, Tract 100 has been shown to have arsenic levels that are near the new EPA MCL making these wells not a viable alternative for blending. Blending with the other Tracts in Spring Creek would also require new infrastructure to connect Tract 200 to the other Tracts, which would require significant time and capital cost to accomplish. This strategy is not feasible due to high capital cost and does not help the SCUC deliver compliant water to the Spring Creek users in a timely manner. **For this reason, this strategy will not be evaluated further in this report.**

4.3 New Wells

Another arsenic mitigation strategy is to abandon existing wells and locate, drill, and construct new wells that provide water that is compliant with the arsenic MCLs required by the EPA. The advantage to this strategy is that compliant water can be provided to users without the long term costs and hassles associated with treatment. The disadvantages to this strategy include substantial design and construction time requirements along with high initial capital costs. Implementation of a new drinking well requires obtaining or transferring water rights, performing studies to locate compliant source water, obtaining easements, purchasing property, obtaining environmental clearance from the regulatory agencies, providing source protection plans, and providing approved well drilling specifications. This process is followed by the actual drilling, testing and constructing of the new well. Once the well is constructed it typically requires some sort of well house and transmission pipeline to the system. The process required in order to drill new wells typically is a multi-year process.

In 2009, the SCUC completed an integrated resource plan (IRP) for Tract 200 which recommended providing new wells for Tract 200. This plan was approved by the NDEP and Public Utilities Commission (PUC). The location of these wells was determined through exploratory means in 2008 which considered hydrological conditions, geology, geological structure, and existing groundwater wells in the region. SCUC had been working diligently to follow the approved plan; however, circumstances beyond the company's control have forced the company to reevaluate alternatives for treating the water. Because of the local opposition to this project and the circumstances beyond the control of the SCUC, this option will **no longer be evaluated as a viable arsenic mitigation strategy**.

4.4 Centralized Treatment

Centralized treatment involves transporting the water from all of the wells to a centralized treatment plant that is big enough to handle flows from all of the wells. The treatment facility will require sufficient land for the required buildings.

The advantage to centralized treatment is that there is one treatment facility. All of the operations and maintenance required is focused at one single facility. All of the required chemicals can be shipped, stored, and stocked at one facility. General building maintenance such as painting, snow removal, cleaning, etc. can be performed at one site. One facility also may result in reduced power usage for lighting, heating, and cooling in comparison with multiple facilities. This depends on specific rates for power and potential demand charges for the facilities.

This alternative also provides a single facility for sludge storage, handling, and disposal. This will reduce the time required to collect and dispose of the sludge.

A major disadvantage to this alternative is the fact that new transmission lines will need to be provided in order to transport water from wells to the centralized treatment plant. This is especially true when considering Tract 200. The existing infrastructure in the Spring Creek Tract 200 water system is designed for three separate wells. There are no significant transmission lines in the system. The wells distribute water through primarily eight and six inch lines to the system and also function to fill the tanks.

Another disadvantage to this alternative in the specific case of Spring Creek Tract 200 is the fact that design and construction of this option will take a significant amount of time to complete. The design portion of a centralized plant with dedicated transmission lines typically requires approvals to construct in right-of-ways and requires easements for transmission lines. This process generally is timely and will not allow SCUC to supply Spring Creek users with compliant water in a short time period. Typically, centralized facilities require the purchase of new land. The purchase of land takes time and is contingent upon the cooperation of land owners to be willing to sell.

Independent of economic factors, the pros and cons of centralized treatment as described above can be summarized as follows:

Pros

- Lower operations and maintenance costs
- Sludge containment, handling, and disposing from one site.

Cons

- New infrastructure required (transmission lines)
- Time required for design and construction

In order for this arsenic mitigation strategy to be considered viable in Tract 200, the design and construction of the facilities will need to be phased. The centralized facility will need to be constructed in a location with the ability to use existing transmission lines from Well #3 or Well #11 immediately. Phasing of this alternative would need to be approved by the NDEP as an acceptable method to meet the requirements of the Administrative Order. This strategy **will be considered in more detail as a possible arsenic mitigation strategy in this report.**

4.5 Site-Specific Treatment

Site-specific treatment involves providing treatment for the water at or near the source. This type of treatment can be beneficial when multiple sources are not close together and when infrastructure to combine source water does not exist within a system. In the case of Spring Creek Tract 200, this would mean providing a treatment facility at each of the three wells that provide water for this system.

One advantage to site-specific treatment is that it typically requires less design and construction time, which generally helps reduce up-front costs. Design time is shortened because it is not necessary to obtain survey, right-of-way approvals, and easements for pipelines. Not having to install a significant amount of pipeline also reduces overall construction time greatly. The focus of construction activities can be on the treatment facilities. Another advantage to site-specific treatment during construction is that generally site-specific facilities require less earthwork and foundation work than a large centralized facility. In some cases, modular pod type systems can be installed that require only a concrete pad as a foundation.

Another advantage to site-specific treatment is that it typically functions well without any major alterations to a system's distribution system. New transmission lines do not need to be constructed, pipes do not have to be upsized and existing distribution systems can remain unchanged. This is especially true in Tract 200 because the existing infrastructure in the Spring Creek Tract 200 water system is designed for three separate wells pumping water to the system in three separate locations. Combining the three wells at a centralized facility and connecting back to the system is one single location would require significant distribution system upgrades.

This arsenic mitigation strategy has another advantage because it introduces additional levels of redundancy to the system. Typically, each site-specific facility has some built in redundancy. Having that redundancy at multiple sites provides another level of redundancy.

One of the disadvantages to having site specific treatment is that the operator of the system has to maintain and operate three separate facilities. This strategy requires that multiple buildings at multiple sites be properly maintained. This includes general building upkeep such as cleaning, painting, snow removal, fixing broken rain gutters, etc. Each facility also requires its own chemicals depending upon the treatment process. The chemicals have to be shipped, stored, and stocked regularly at each individual site. If the facility involves an adsorptive media, filter media, or membrane system, they will need to be maintained and replaced as well. This increases operations and maintenance costs in comparison to a centralized facility. Also, any sludge or waste material

produced by the treatment process will need to be stored and disposed of regularly from each individual site.

Another disadvantage to site-specific treatment is that each facility will have regulatory oversight by the regulatory agency. Each site will be required to meet the effluent standards required by the assigned regulatory agency. This will require testing of effluent at each site. For Tract 200, this testing will not be a factor as the SCUC currently monitors the water at each individual well site.

Independent of direct economic factors, the pros and cons of site-specific treatment as described above can be summarized as follows:

Pros

- Ability to provide compliant water in a timely manner
- Required piping infrastructure already in place
- Treatment redundancy with three separate facilities

Cons

- More operations and maintenance required
- More regulatory oversight and compliance requirements

For Tract 200, it would not be necessary to purchase additional land or additional easements for site-specific treatment. The existing well-sites owned and leased by the SCUC currently have sufficient space to construct additional treatment facilities. This will play an important role in helping the water company deliver compliant water to the Tract 200 users in a timely manner.

Providing site-specific treatment is a good option for the SCUC because the distribution infrastructure that is currently in place would not have to be replaced, altered, or modified. Installation of new pipe would be limited to on-site piping required for the treatment systems.

Due to the fact that no additional transmission piping is required for this option, construction time will be reduced. This will be an advantage in total construction time. The focus of the construction activities can be on the treatment facilities.

This arsenic mitigation strategy is also conducive to a phased construction schedule. If needs be, a treatment facility at Well #3 can be constructed first in order to begin supplying the system with compliant water. Well #3 has the capacity to provide water to all of Tract 200 during the winter months and can be assigned as the primary well for the system during the winter months as the other facilities are being constructed. Phasing of this alternative would need to be approved by the NDEP as an acceptable method to meet the requirements of the Administrative Order. **This strategy will be considered in more detail as a possible arsenic mitigation strategy in this report.**

4.6 Combination of Centralized and Site-Specific Treatment

Another mitigation strategy that is a possibility in Tract 200 includes a combination of site-specific treatment and a centralized facility. This involves combining water form two or more sources into a centralized treatment plant and providing site-specific treatment for other sources in the system. Typically this strategy is most viable when a few of the sources are close in proximity with other

sources far away. This strategy is also viable when existing infrastructure in a specific area of a system is conducive to centralized treatment where in other areas it is not.

The purpose of this strategy is to be able to use the advantages of a centralized facility along with the advantages from site-specific treatment as it applies to a particular system. For Tract 200 this would involve combining Well #3 and Well #11 into a centralized facility while providing site-specific treatment at Well #1. The advantage to this would be that Well #3 and #11 provide most of the source for Tract 200 and could be combined to a centralized facility to reduce operations and maintenance responsibilities for the operator. The disadvantage to this strategy is that the infrastructure does not exist to transport water from Well #11 to Well #3 or vice versa and that a new distribution line would be required from the centralized facility to the distribution system. **This strategy will be considered in more detail as a possible arsenic mitigation strategy in this report.**

5 TREATMENT TECHNOLOGIES

The previous section identified arsenic mitigation strategies that can be used by SCUC to provide compliant drinking water for Tract 200. The viable strategies for the system include treatment of the water at either a centralized facility, site-specific facilities, or at a combination of centralized and site-specific facilities. This section provides a discussion on the technologies available to treat water for arsenic at treatment facilities. The purpose of this section is to identify viable treatment technologies and determine which will be most effective in treating water exhibiting the water quality parameters in Tract 200.

5.1 EPA Best Available Technology (BAT)

Along with providing new MCL requirements for arsenic levels in drinking water, the EPA has provided a best available technologies (BAT) list for treatment of arsenic. The original BAT list for arsenic treatment included activated alumina (AA), coagulation/filtration (C/F), ion exchange (IX), lime softening (LS), reverse osmosis (RO), electrodialysis (ED), and oxidation/filtration (O/F). The existing list now includes coagulation/microfiltration (C/MF) and iron-based adsorption (IBA). All of these technologies were reviewed and discussed in the 2007 PER (RTW 2007).

All of the technologies listed in the EPA BAT are presented and discussed in substantial detail in *Arsenic Treatment Technology Evaluation Handbook for Small Systems* (EPA 2003). For a detailed examination of each process, the reader should consult the EPA handbook. This section of this report is meant to provide a brief summary of each process with a focus on the ability and effectiveness of the treatment method in treating the specific water of Tract 200.

5.1.1 Activated Alumina (AA)

Activated alumina is a porous, granular material with ion exchange properties. The removal of Arsenic(V) by AA adsorption can be accomplished by continuously passing water under pressure through one or more beds packed with AA media (EPA 2003). The Arsenic ions are attracted to the AA as the water passes through the media bed. In this manner, the arsenic is removed from the water.

The level of competing ions affects the performance of AA for Arsenic(V) removal. Several water constituents interfere with the adsorption process, either because they are also attracted to the AA or they just fill the void space in the media with particulate matter. The primary competing constituent in the Tract 200 water is the silica. The problem level for silica pertaining to AA adsorption is anything above 30 mg/L (EPA 2003). The silica content in all three wells ranges from 51 to 57 mg/L. The silica content is above the problem level.

The pH level of the water has an effect on the performance of this treatment method. Several different studies have established the optimum pH range as 5.5-6.0, and AA columns run at these pH levels are 5 to 20 times longer than under conditions with ranges of 6.0-9.0 (EPA 2003). The pH levels of the Tract 200 wells ranges from 7.7 to 8.0. This means that the adsorptive lifespan of the AA media if used in Tract 200 would be short. For AA to be effective, the pH level would need to be lowered.

Due to the high silica content in the Tract 200 water and the pH levels ranging from 7.7 to 8.0, this treatment technology will **not be considered as an effective treatment technology for the wells.**

5.1.2 Coagulation / Filtration (C/F)

This treatment technology is a multi-step process that involves the primary steps of coagulation and filtration. Coagulation is the process of destabilizing the surface charges of colloidal and suspended matter to allow for the agglomeration of particles resulting in the formation of large, dense, "floc". Floc is a large particulate which can be removed from water by clarification or filtration.

Coagulation in drinking water is typically accomplished through the use of aluminum and ferric salts. The optimal pH range for coagulation with aluminum salts is 5 to 7. Above 7, the removal performance fo aluminum-based coagulants drops markedly. The optimal pH ranges for coagulation with ferric salts is 5 to 8 (EPA 2003). Due to the pH level of the Tract 200 water, the ferric salts would provide better coagulation than the aluminum salts.

Filtration can be accomplished through passing the water through a bed of granular media. Various filter equipment suppliers provide different types of media. The media that is used is where the suppliers claim that their product is more efficient than others. The filtration media typically not only filters the floc, but also provides adsorbtion of the arsenic(V). As the floc collects on the filtration media, the effectiveness of the system reduces and the ability to treat the required flows is greatly reduced. For this reason the filters must be backwashed regularly. Backwashing is a process where high pressure water is reversed through the filters. The backwashing system loosens the media and removes the particles that have been collected to the filters. As a result of this process the backwash water must be disposed of. Typically, the backwash water is disposed of in sanitary sewer systems. Tract 200 does not have a sanitary sewer system and contains septic systems. For this reason, this process will require either an evaporation pond or mechanical dewatering of the backwash and disposal of the remaining sludge.

The silica in the Tract 200 water will interfere with the coagulation and filtration process. The interference of the coagulation process can be reduced by adding higher dosages of the coagulant. The interference to the filtration process can be resolved by more frequently backwashing the filters.

This treatment technology is a viable alternative for Tract 200 and **will be considered in further detail as part of this report.** In 2005, a pilot study was performed by Layne Christensen Company that validated coagulation/filtration as an effective method to treat the Tract 200 water.

5.1.3 Ion Exchange (I/X)

Ion Exchange is a physical-chemical process in which ions are swapped between a solution phase and solid resin phase. The water is run through a charge bed of resin through which the Arsenic(V) ions displace the chloride or hydroxide groups in the resin. For this process the resin beds are re-generated using a four step process: (1) backwash, (2) regeneration with brine, (3) slow water rinse, and (4) fast water rinse. If the re-generation process is not performed often enough, this treatment technology has the potential to create an effluent with arsenic levels higher than the influent. This process is known as chromatographic peaking. The re-generation process also has a hazardous nature and is not recommended for treatment facilities without sewer systems.

This process is a viable alternative for Spring Creek. However, there are other methods of treatment that produce less hazardous waste materials and do not require brine or caustic regeneration facilities. The IX process also has produces a higher volume of backwash water increasing the volume and handling cost of waste. For these reasons this method of treatment **will be eliminated from consideration as an effective treatment technology for Tract 200.**

5.1.4 Lime Softening (LS)

Lime softening is a chemical-physical treatment process that is typically used to remove calcium and magnesium from a solution. Lime is dissolved into the water solution which raises the pH level of the solution which results in precipitates of calcium carbonate and magnesium hydroxide. These precipitates can then be removed through filtration or sedimentation. As its name implies, this method is typically used in systems to reduce water hardness. Removal of Arsenic(V) is possible by increasing the amount of lime added to the water. As the pH level in the water increases above 10.5, Arsenic(V) co-precipitates with magnesium hydroxide and can be removed with it.

LS solely for arsenic removal is uneconomical and is generally considered cost-prohibitive (EPA 2003). The water that exists in Tract 200 does not have need of softening, thus this treatment technology **will not be considered further as an effective treatment technology.**

5.1.5 Reverse Osmosis (RO)

Reverse Osmosis is a membrane process used to remove arsenic and other minerals from water. The membrane allows the passage of water through the system while retaining the arsenic and other dissolved particulate matter. Reverse Osmosis is typically used as a point of use (POU) solution to water contamination. In order to treat the quantity of water from the Tract 200 wells, the RO process would require expensive membranes and would result in, "a large wastewater volume, potentially several times greater than any produced by the other arsenic treatments discussed (RTW 2007)". The wastewater would need to be settled and the sludge removed. This technology is good for removing all sorts of contaminants.

This treatment technology would work in Tract 200 but is typically used where there is a need to treat several contaminants. Since the only contaminant above the EPA MCLs is arsenic, this method would be an exorbitant way to treat for arsenic. Other methods previously discussed are specifically used to treat arsenic and are better technologies for water with the quality parameters as exhibited in Tract 200. For these reasons, **this technology will not be considered any further.**

5.1.6 Electrodialysis (ED)

Electrodialysis is similar to RO in that the water is passed through a membrane. With ED, however, the membrane is charged through an electric current causing an attraction to ions such as Arsenic(V). This method also produces an extremely large amount of wasted water. Since other methods focus on treating arsenic only and produce less wastewater and provide similar treatment, this method **will not be considered any further as a viable technology for Tract 200.**

5.1.7 Oxidation Filtration (O/F)

Oxidation filtration is a treatment technology that is primarily used to remove naturally occurring iron and manganese from water. The process involves oxidation of the soluble forms of iron and

manganese to their insoluble forms and then removal by filtration. If arsenic is present in the water, removal occurs by both adsorption and co-precipitation (EPA 2003). The filtration process usually involves a greensand filter process.

Effectiveness of this technology for removal of arsenic depends on the naturally occurring iron or manganese concentration in the water. For this technology to be considered as an effective arsenic removal mechanism, the iron to arsenic mass ratio should be at least 20:1 (EPA 2003). If the ratio is not quite high enough, it may be appropriate to add a ferric coagulant to the beginning of the process to make this method more effective. The mass ratio of iron to arsenic in the Tract 200 water is significantly below the required ratio for this technology to be effective. For this reason **this technology will not be considered further as a possible arsenic treatment technology in Tract 200.**

5.1.8 Coagulation / Microfiltration (C/MF)

This technology is very similar to coagulation/filtration in that it is a two step process involving chemical and physical processes. Coagulation is performed by the addition of aluminum or ferric salts which causes precipitants that is then captured by way of filtration through a membrane instead of a media bed. The membranes require frequent cleaning through backwash using water and air. This method of treatment is especially effective for water with high levels of arsenic.

This technology is a viable method for Tract 200; however, this method is typically used to treat high levels of arsenic. Tract 200 has moderate levels of arsenic, thus this method would be less cost-effective than coagulation / filtration for Tract 200 as was shown in the 2007 PER (RTW 2007). Coagulation/ microfiltration **will not be considered further as a treatment technology.**

5.1.9 Iron Based Adsorption (IBA)

Iron based adsorption is a process similar to the Aluminum Adsorption (AA) process. Iron based adsorption can occur for both Arsenic(III) and Arsenic(V) ions. The arsenic contaminated water is fed through a pressurized filter containing the iron-based adsorption media. The media attracts the negative ions adsorbing the arsenic contaminant in the water. The resulting effluent has significantly reduced levels of arsenic.

One advantage of the iron based adsorption process is the minimal amount of backwash required for the backwash process. Similar to other filtration technologies, the media in the pressure filters requires backwashing to reclassify the media bed, prohibit preferential channeling, and to remove the fine contaminants that have been contained in the adsorption process. Typically this treatment technology does not require an automated backwash system. This reduces the capital cost involved for automated valves and controls of the backwash system. This also reduces the complexity of the system as a whole which can be a benefit to rural communities where system operators tend to come and go frequently. In some states, a backwash tank is required for this process in order to settle out fine particulate matter. No sludge removal or de-watering equipment is required for this process. This process is known as a "cleaner" process than coagulation/ filtration.

One of the disadvantages to this technology is that several water constituents can potentially interfere with the adsorption process, either because they are also attracted to the media or they just

fill the void space in the media. The primary competing constituent in the Tract 200 water is the silica. The silica content in all three wells ranges from 51 to 57 mg/L, which is considered high. The high silica content reduces the adsorptive life of the media significantly. Replacement cost of the IBA media can be significant and can increase the operations and maintenance costs for this technology to levels that are two to four times that of coagulation/ filtration.

The IBA process is a viable treatment technology for Tract 200 and **will be considered in more detail as a possible treatment technology method.**

5.2 Preferred Treatment Technology

Based on the discussion above, the most viable treatment technologies for Spring Creek Tract 200 are coagulation/ filtration (C/F) and Iron Based Adsorption (IBA). As part of the preliminary research and evaluation for this report, water treatment suppliers with specific knowledge on the treatment methods were invited to submit proposals for treatment equipment at site-specific facilities. The suppliers were given the option of submitting proposals for coagulation/filtration or iron-based adsorption. All of the suppliers submitted proposals for coagulation/filtration. The general consensus is that for individual treatment sites IBA would require a high rate of media exchange which would greatly reduce the effectiveness of treating the water.

Based on the input and feedback from the suppliers, it was assumed that the coagulation/ filtration technology will be the more cost-effective technology for the specific water parameters in Spring Creek Tract 200. This was also demonstrated in the 2007 PER for Tract 200 (RTW 2007). For this report, **coagulation/ filtration will be the treatment technology for the majority of the project alternatives**; however, one project alternative will be presented using the IBA technology for comparison purposes. A schematic of the coagulation/ filtration treatment process is shown in Exhibit 5.0 below.

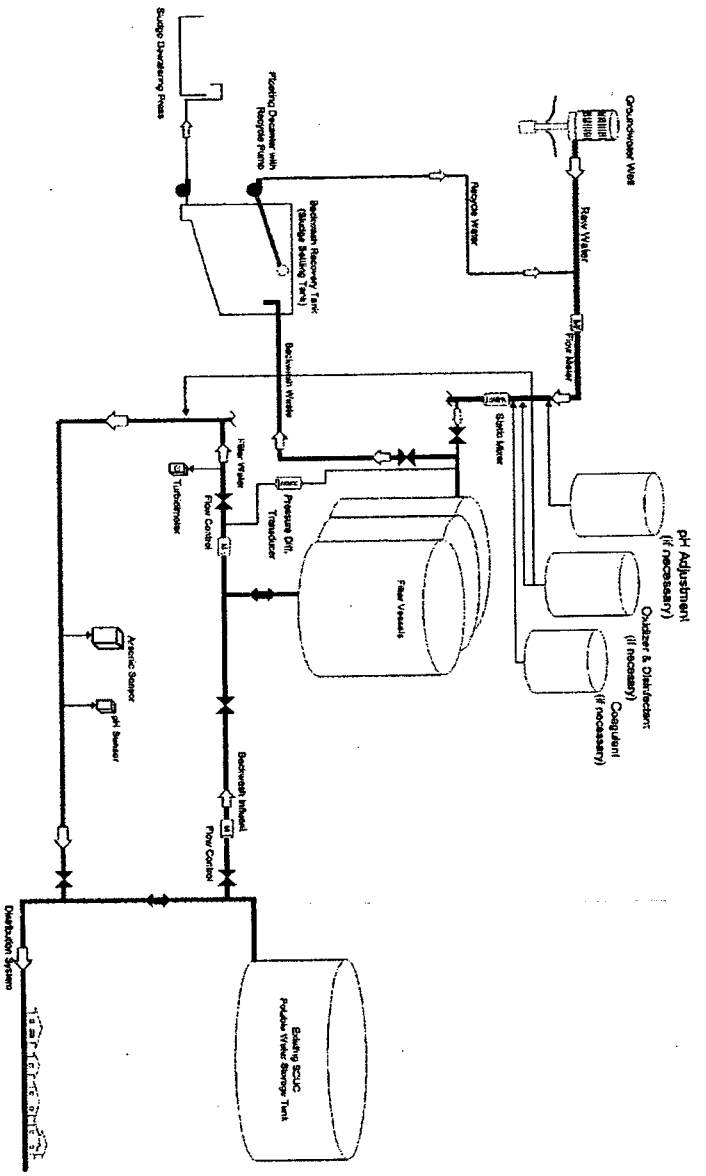

Exhibit 5.0- Coagulation/ Filtration Process Schematic

6 PROJECT ALTERNATIVES

Section 4 of this report identified possible arsenic mitigation strategies that would be evaluated for potential projects. Among the probable strategies included treatment at a centralized facility, treatment at site specific facilities, or treatment using a combination of a centralized facility and a site-specific facility. The method of treatment to be considered was determined in Section 6 based off of the existing water quality in Tract 200 and submission of proposals from equipment suppliers. This section is used to introduce the actual project alternatives that are presented in this PER for implementation by SCUC. These project alternatives will be evaluated in the following section.

6.1 Alternative #1- Centralized Treatment using C/F

This project alternative involves constructing a centralized treatment facility and all the necessary infrastructure to transport water from the sources to the facility. The treatment technology to be implemented at the facility for this alternative would be coagulation/ filtration. A schematic of this alternative is shown in Exhibit 6.0.

6.1.1 Phase 1- Construct Centralized Facility

In order for this alternative to be feasible for the SCUC, it would need to be constructed using a phased approach. Phase 1 would include just the construction of the treatment facility with at least enough treatment capacity to treat the flows from Well #3. This would allow the water from Well #3 to be treated during the low demand winter months while the remainder of the project is being completed. The treatment plant would need to be designed to handle flows from all of the wells with the ability to initially treat only Well #3. As determined in the previous section, the selected treatment method is coagulation/ filtration.

The location for the centralized treatment plan in this exhibit is shown near the existing Well #3 east of the paved portion of Valdez Drive. There are two primary reasons that this site was chosen as a potential location of the centralized facility. The first reason that this area was chosen was that the land is privately owned. For this alternative it is assumed that the existing owners will be willing to sell sufficient land for a centralized facility. Secondly, the strategy of providing a centralized treatment plant will only be a successful alternative for SCUC if it is accomplished using a phased approach. The focus of the first phase would have to be construction of a facility to begin treating water and providing Tract 200 with compliant water as soon as possible. The idea is that the facility could function as a treatment facility for one of the wells during the low demand winter months while the rest of the project including transmission lines is being constructed. This requires the treatment facility to be located directly adjacent to one of the existing transmission lines from either Well #3 or Well #11. Well #1 is does not provide enough flow to be considered. This enables the treatment facility to be used without the need to construct a new transmission line during the initial phase, thus making this project a possible alternative. Well #11 is in a central location, but the land surrounding it is not privately owned and is used for equestrian purposes. It is uncertain that this land could be obtained in sufficient time to construct a treatment facility in the first phase. For this reason, the site shown in Exhibit 6.0 has been chosen.

The estimated capital cost for the centralized treatment plant is shown in the opinion of probable cost (OPC) in Appendix A. The total capital cost of this alternative is summarized in Table 6.0 at the end of this section. The land purchase price shown on the OPC was obtained from a local real estate agent assuming that the property owner would be willing to sell. The building for the

centralized treatment plant was assumed to be either a pre-fabricated steel structure or a concrete masonry structure approximately 80 feet by 40 feet in size. The treatment equipment cost was obtained by taking the actual proposed costs from suppliers for individual site-specific treatment summed and then multiplied by 0.75 to account for equipment savings by combining equipment. The opinion of probable cost also includes all mechanical, electrical, SCADA, and controls costs for the facility. Also included is all of the equipment necessary for the backwash process, dewatering, and handling of the sludge.

6.1.2 Phase 2- Construct Transmission Pipelines

The three separate wells in Tract 200 pump water to water lines that are part of the distribution system. The existing infrastructure in the distribution system is not set up with direct transmission lines that directly transport water to the tanks. For this alternative to be feasible, dedicated transmission lines will need to be constructed to the treatment plant so that the water can be treated prior to entering the distribution system. Examination of the existing lines in the system shows that a small portion of the existing water lines between Well #1 and Well #11 can be used strictly as a transmission line to transport water.

Phase 2 of the project requires construction of a transmission line from Well #11 to the centralized facility. This line would need to be big enough for the flows of Well #11 and Well #1 combined. Preliminary sizing of the transmission line indicates that this would need to be a 10 inch transmission line. It is also possible that a booster station will be required at Well #11 to boost water from both wells to the centralized treatment facility. At the time this report was being written, existing pump curves have not been supplied to the author in order to perform a hydraulic analysis as to how much additional horsepower would be needed to boost both wells to the treatment plant.

Also part of phase 2 would be constructing an 8 inch transmission line along Dove Creek Court from where the existing line begins to provide service to the existing homes to the existing distribution line that currently connects Well #11 to the system. At this point the new line would connect to the existing line and use the existing line in reverse from its existing direction to the booster station located near well #11.

Another major portion of Phase 2 is to complete a new transmission line from the treatment facility to the system. The existing transmission line from Well #3 to the system is an 8 inch line that does not have sufficient capacity for the flows of all three wells. It is proposed that the transmission line go from the new treatment facility down Valdez Drive to Spring Valley Parkway. The transmission line cannot connect directly into the system at Spring Valley Parkway because the system is primarily 6 inch lines and does not have the capacity for all of the water from all three wells entering the system at one single location. For this reason, it is proposed that the transmission line be extended north and south along Spring Valley Parkway and connect into the system near Tiffany Drive on the north and at Brent Drive on the south. It should be noted that the proposed infrastructure has not been modeled as part of this PER. Modeling the system prior to design would be required. A complete water model is not required for this level of preliminary engineering and for the alternative evaluation in question. It is understood that Tract 200 currently has potential fire flow deficiencies and pressure issues. This alternative as proposed is not intended to fix any of the existing fire flow or pressure issues. More research would need to be completed to determine exact locations of deficiencies along with methods to resolve them, which is beyond the scope of this report.

The estimated capital costs for the Phase 2 portion of this alternative are included in the opinion of probable cost (OPC) shown in Appendix A. The total capital cost for this alternative is summarized in Table 6.0 at the end of this section. The OPC includes capital costs for the proposed booster station and all of the required transmission line. It was assumed that most of the transmission line would be installed outside of existing asphalt roadways and that existing landscape would need to be restored. It was also assumed that pipe bedding would need to be imported for the entire amount of the pipeline, and that import material would be required as backfill for the entire length of pipe. Asphalt cut and replacement costs were considered for 20 percent of the transmission line, primarily required for the 8 inch transmission line from Well #1 to Well #11 and for the transmission line from the centralized treatment plant to the distribution system. It was also assumed that three valves would be installed at every tee, four at every cross, and every 1,000 feet along the pipeline. The cost also includes funds for utility investigation during construction.

A summary of the operations and maintenance costs for this project alternative are also shown in Table 6.0. The details of these costs are included in the opinion of probable operations and maintenance cost spreadsheet shown in Appendix A. One advantage to this alternative is that all of the operations and maintenance occur at one single facility. This saves time and costs associated with constantly traveling to separate facilities. Also, the chemicals can be shipped, stored, and replaced from one single facility. General building maintenance is less at one single facility, and sludge disposal logistics are simpler from one individual facility. This alternative is projected to have the lowest annual operations and maintenance costs. The operations and maintenance costs shown in the OPCs for this alternative include chemical costs, equipment power, building lighting heating and cooling, general equipment replacement, replacement of media, labor for replacement and disposal of media, man-hours for general operation, and sludge disposal costs. Sludge disposal costs were based off of hauling sludge to the landfill in Wendover, Nevada. The operation and maintenance costs for this alternative also assume that the SCUC will contract with an outside company to provide a level 3 operator for the facility.

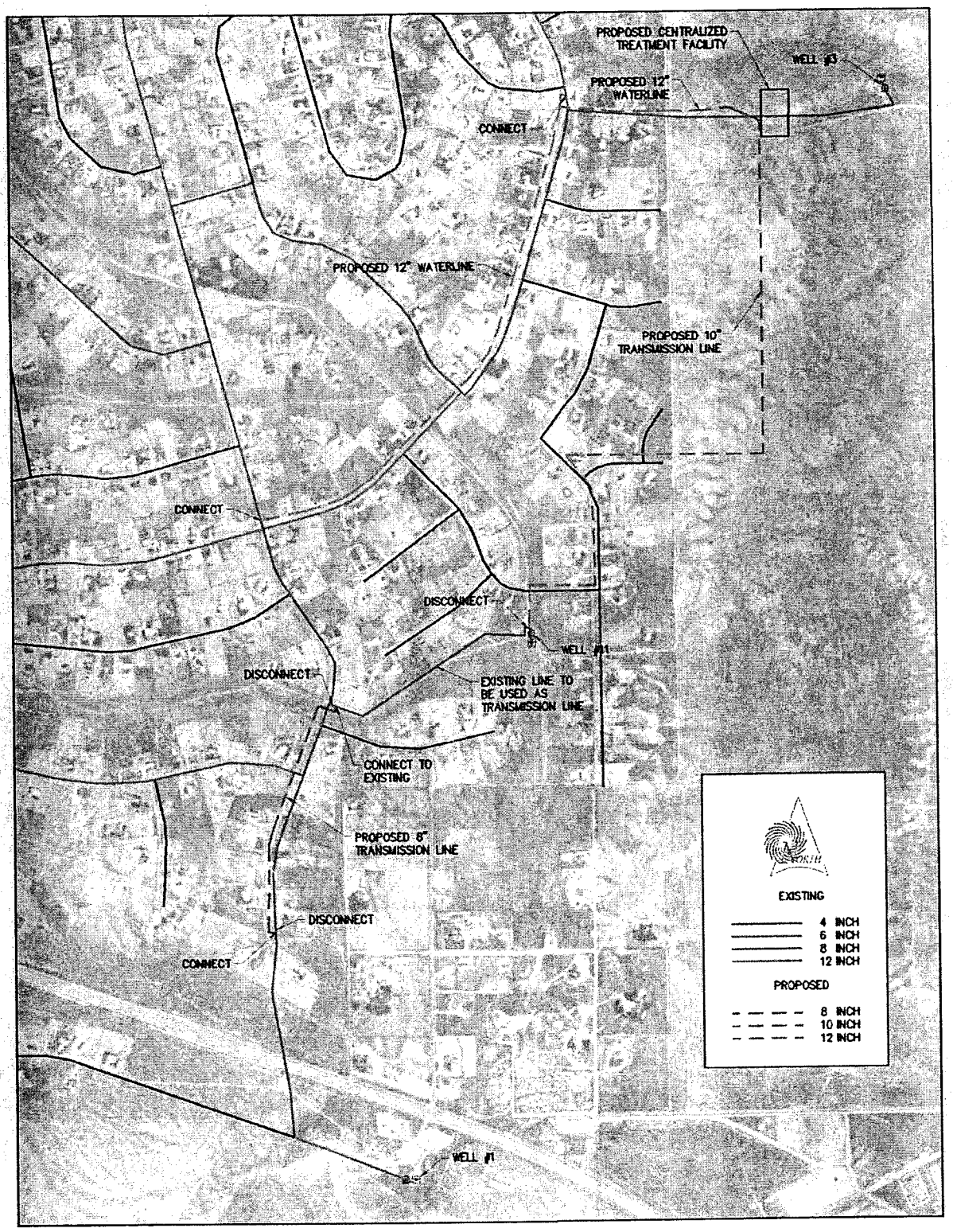

Exhibit 6.0- Alternative #1- Centralized Treatment using C/F

6.2 Alternative #2- Site-Specific Treatment using C/F

This project alternative involves providing treatment facilities at each of the site-specific sources in Tract 200. The three sources are groundwater wells that have been providing water for the system for years. This project alternative is for the coagulation/ filtration treatment technology to be used for each individual site. One major advantage to this alternative is that there is sufficient land available at each of the sites to provide site-specific treatment. No additional land will need to be purchased for the project. Exhibit 6.1 shows a schematic of this option. As shown in the exhibit, the existing infrastructure throughout the Tract 200 distribution system remains unchanged. The only additional piping required will be on site piping.

The location for the treatment facility at Well #1 will likely be just to the southeast of the existing building on existing SCUC property. At Well #1, it is estimated that a 30 x 50 foot building be required to house all of the required mechanical equipment including the proposed backwash tank and sludge handling facilities. Site piping will be required to re-route the water in the transmission line through the treatment facility. This report assumes that the building will be a prefabricated steel building or concrete masonry unit building. The opinion of probable cost (OPC) for a site-specific treatment facility at Well #1 is shown in Appendix A.

The location for the treatment facility at Well #3 will likely be to the southeast of the existing building on existing SCUC property. At Well #3, it is estimated that a 40 x 60 foot building be required to house all of the required mechanical equipment including the proposed backwash tank and sludge handling facilities. Site piping will be required to re-route the water in the transmission line through the treatment facility. This report assumes that the building will be a prefabricated steel building or concrete masonry unit building. The opinion of probable cost (OPC) for a site-specific treatment facility at Well #3 is shown in Appendix A.

The location for the treatment facility at Well #11 will likely be to the southeast of the existing building. At Well #11, it is also estimated that a 40 x 60 foot building be required to house all of the required mechanical equipment including the proposed backwash tank and sludge handling facilities. Site piping will be required to re-route the water in the transmission line through the treatment facility. This report assumes that the building will be a prefabricated steel building or concrete masonry unit building. The opinion of probable cost (OPC) for a site-specific treatment facility at Well #11 is shown in Appendix A.

A summary of the operations and maintenance costs for this project alternative are shown in Table 6.0. The details of these costs are included in the opinion of probable operations and maintenance cost spreadsheet shown in Appendix A. One disadvantage to this alternative is that the time and expense to maintain three separate facilities is increased over just one centralized facility. Chemicals must be shipped, stored, and replaced at three separate facilities. General building maintenance must be provided for each of the facilities, and sludge disposal must occur from three separate facilities. Having three separate facilities increases the total operations and maintenance costs required. The operations and maintenance costs shown in the OPCs for this alternative include chemical costs, equipment power, building lighting heating and cooling, general equipment replacement, replacement of media, labor for replacement and disposal of media, man-hours for general operation, and sludge disposal costs. Sludge disposal costs were based off of hauling sludge to the landfill in Wendover, Nevada. The operation and maintenance costs for this alternative also

assume that the SCUC will contract with an outside company to provide a level T3 operator for the facility.

This alternative also has the potential for a phased approach. If approved by the NDEP, phase 1 would include construction of the treatment facility at Well #3. The facility could be constructed with equipment installed and functioning with the ability to provide compliant water to Tract 200 in a timely manner. Well #3 has the capacity to provide all of the water necessary for the low demand winter and spring months. The treatment facility at Well #3 would provide compliant drinking water to the system during the low demand months. Phase 2 would include completing the construction of the other treatment facilities at the other wells. It is anticipated that phase 2 would be completed prior to the high demand summer months.

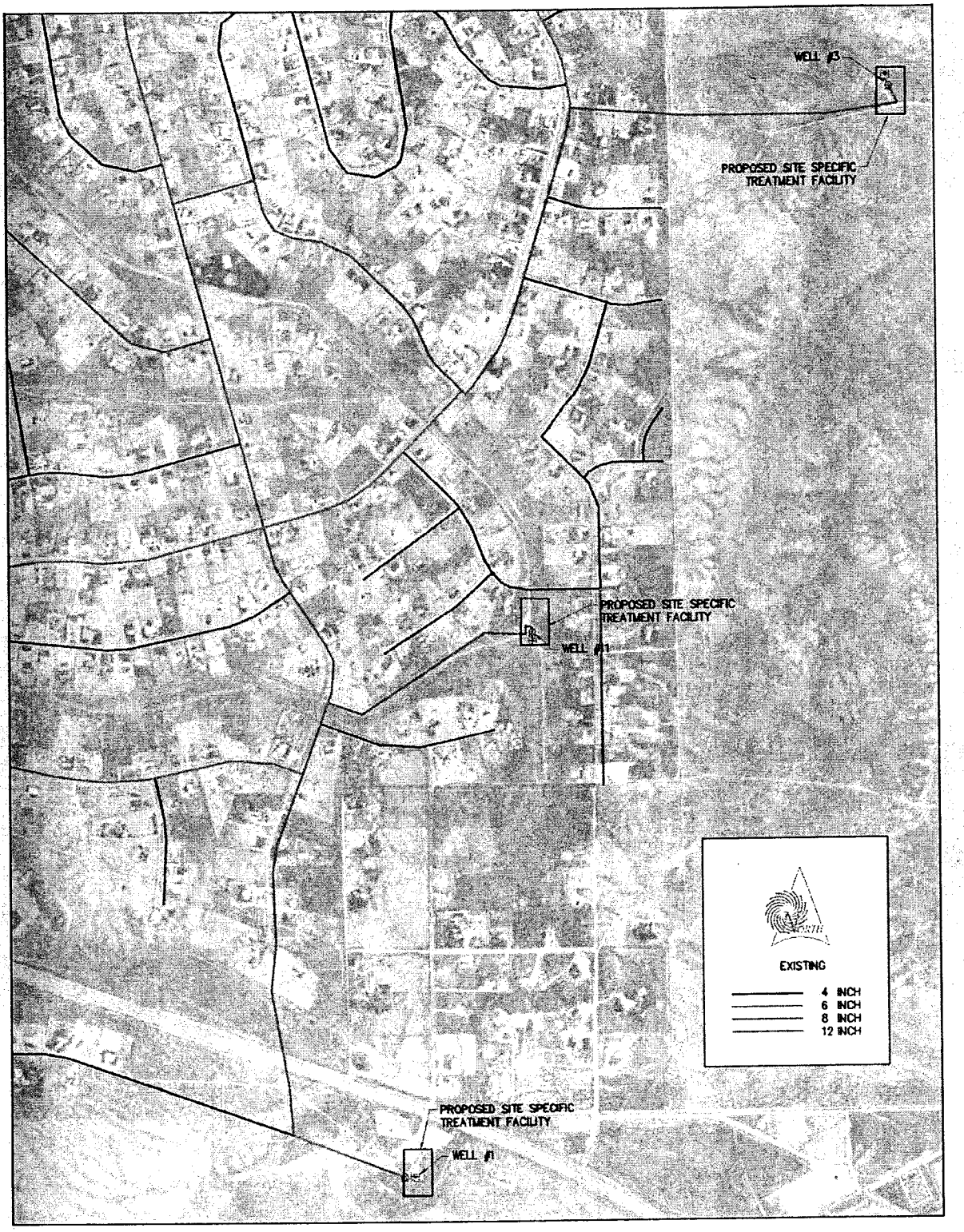

Exhibit 6.1- Alternative #2- Site-Specific Treatment using C/F

6.3 Alternative #3- Centralized & Site-Specific Facilities using C/F

This project alternative involves constructing two treatment facilities. The first facility is a centralized facility sized for the water pumped from Well #3 and Well #11. The second facility is a site-specific treatment facility at Well #1. This alternative also includes the necessary infrastructure required to transport water from Well #3 and Well #11 to the treatment facility. The treatment facility at Well #1 would not require additional transmission lines or off-site infrastructure. The treatment technology to be implemented at both facilities for this alternative is coagulation/filtration. A schematic of this alternative is shown in Exhibit 6.2.

6.3.1 Phase 1- Construct Centralized Facility for Well #3 & #11

In order for this alternative to be feasible for the SCUC, it would need to be constructed using a phased approach. Similar to alternative #1, Phase 1 would include just the construction of the treatment facility with at least enough treatment capacity to treat the flows from Well #3. This would allow the water from Well #3 to be treated during the low demand winter months while the remainder of the project is being completed. The treatment plant would need to be designed to handle flows from both Well #3 and Well #11 with the ability to initially treat only Well #3. The selected treatment method for this alternative is coagulation/ filtration.

The location for the centralized treatment facility for this alternative is the same as in Alternative #1. This is shown in Exhibit 6.2 near the existing Well #3 east of the paved portion of Valdez Drive. There are two primary reasons that this site was chosen as a potential location for the centralized facility. The first reason that this area was chosen was that the land is privately owned. For this alternative it is assumed that the existing owners will be willing to sell sufficient land for a centralized facility. Secondly, the strategy of providing a treatment plant for both Well #3 and Well #11 will only be a successful alternative for SCUC if it is accomplished using a phased approach. The focus of the first phase would have to be construction of a facility to begin treating water and providing Tract 200 with compliant water as soon as possible. As is the case for alternative #1, the facility needs to function as a treatment facility for one of the wells during the low demand winter months while the transmission line infrastructure is being constructed. This requires the treatment facility to be located directly adjacent to one of the existing transmission lines from either Well #3 or Well #11. This enables the treatment facility to be used without the need to construct a new transmission line during the initial phase, thus making the project a possible alternative. Well #11 is in a central location, but the land surrounding it is not privately owned and is used for equestrian purposes. It is uncertain that this land could be obtained in sufficient time to construct a treatment facility in the first phase. For this reason the site shown in Exhibit 6.2 has been chosen.

The estimated capital cost for the centralized treatment plant portion of this alternative is shown in the opinion of probable cost (OPC) in Appendix A. The total capital cost of this alternative is summarized in Table 6.0 at the end of this section. The land purchase price shown on the OPC was obtained from a local real estate agent assuming that the property owner would be willing to sell. The building for the centralized treatment plant was assumed to be either a pre-fabricated steel structure or a concrete masonry structure approximately 80 feet by 40 feet in size. The treatment equipment cost was obtained by taking the actual proposed costs from suppliers for individual site-specific treatment summed and then multiplied by 0.75 to account for equipment savings by combining equipment. The opinion of probable cost also includes all mechanical, electrical,

SCADA, and controls costs for the facility. Also included is all of the equipment necessary for the backwash process, dewatering, and handling of the sludge.

6.3.2 Phase 2- Construct Transmission Pipelines

Phase 2 of the project requires construction of a transmission line from Well #11 to the centralized facility. This line will need to be a new line sized for the potential flows of Well #11. Preliminary sizing of the transmission line indicates that this would need to be an 8 inch transmission line.

Another major portion of Phase 2 is to complete a new transmission line from the treatment facility to the system. The existing transmission line from Well #3 to the system is an 8 inch line that does not have sufficient capacity for the flows of all three wells. It is proposed that the transmission line go from the new treatment facility down Valdez Drive to Spring Valley Parkway. The transmission line cannot connect directly into the system at Spring Valley Parkway because the system is primarily 6 inch lines and does not have the capacity for all of the water from all three wells entering the system at one single location. For this reason, it is proposed that the transmission line be extended north and south along Spring Valley Parkway and connect into the system near Tiffany Drive on the north and at Brent Drive on the south. It should be noted that the proposed infrastructure has not been modeled as part of this PER. Modeling the system prior to design would be necessary. A complete water model is not required for this level of preliminary engineering and for the alternative evaluation in question.

Also a part of Phase 2 construction will be the site-specific treatment facility at the well site of Well #1. This facility is the same as proposed in Alternative #2 at Well #1. The treatment technology considered for this facility is coagulation/ filtration. This portion of the project could also be constructed entirely or as a part of Phase 1, as it is not reliant upon completion of any other infrastructure.

The estimated capital costs for the Phase 2 portion of this alternative are included in the opinion of probable cost (OPC) shown in Appendix A. The total capital cost for this alternative is summarized in Table 6.0 at the end of this section. The OPC includes capital costs for the treatment facility at Well #1 and the required transmission lines for the centralized facility. It was assumed that most of the transmission line would be installed outside of existing asphalt roadways and that existing landscape would need to be restored. It was also assumed that pipe bedding would need to be imported for the entire amount of the pipeline, and that import material would be required as backfill for the entire length of pipe. Asphalt cut and replacement costs were considered for 20% percent of the transmission line, primarily required for the 8 inch transmission line from Well #1 to Well #11 and for the transmission line from the centralized treatment plant to the distribution system. It was also assumed that three valves would be installed at every tee, four at every cross, and every 1,000 feet along the pipeline. The cost also includes funds for utility investigation during construction.

A summary of the operations and maintenance costs for this project alternative are shown in Table 6.0. The details of these costs are included in the opinion of probable operations and maintenance cost spreadsheet shown in Appendix A. One disadvantage to this alternative is that only some of the savings in operations and maintenance costs from a centralized facility can be realized due to the extra O & M costs from the site-specific facility. The operations and maintenance costs shown in the OPCs for this alternative include chemical costs, equipment power, building lighting heating and

cooling, general equipment replacement, replacement of media, labor for replacement and disposal of media, man-hours for general operation, and sludge disposal costs. Sludge disposal costs were based off of hauling sludge to the landfill in Wendover, Nevada. The operation and maintenance costs for this alternative also assume that the SCUC will contract with an outside company to provide a level T3 operator for the facility.

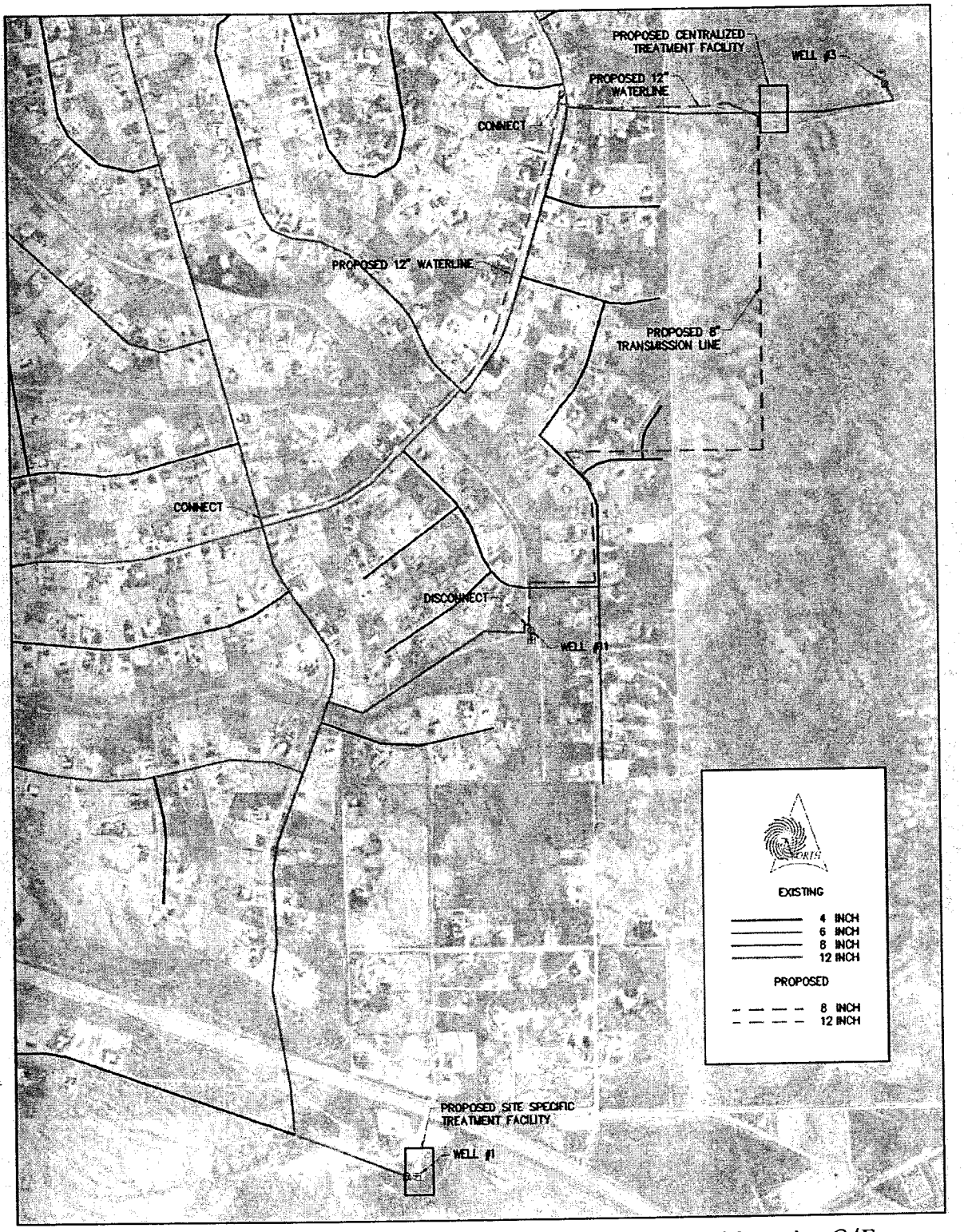

Exhibit 6.2- Alternative #3- Centralized and Site-Specific Facilities using C/F

6.4 Alternative #4- Site-Specific Treatment Using IBA

This alternative is to install site-specific treatment facilities at each individual well site in Tract 200, using the Iron Based Adsorption (IBA) treatment technology. A schematic of this alternative is included in Exhibit 6.3. The major difference between this alternative and Alternative #2 is the treatment technology.

It is anticipated that the treatment facilities at each individual well site will be in the same locations and of the same sizes as described for Alternative #2. This is reflected in the OPC's shown in Appendix A. The buildings have the same requirements and the capital costs for the facilities are similar.

As mentioned when describing treatment technologies, one of the major differences between the IBA and coagulation/ filtration is the frequency of backwashing that occurs in the system. Backwashing with the IBA system is expected to occur approximately once every 45 to 60 days. This reduces the capital cost for this treatment technology. Due to the infrequent backwashing requirements of this treatment technology, the backwashing controls can be manually operated, which eliminates the need for automation in the backwash process. This also helps reduce capital costs of controls for the system.

The detailed opinion of probable cost (OPC) for this alternative is shown in Appendix A. The capital costs and operations and maintenance costs for this alternative are shown in Table 6.0 at the end of this section. The capital costs include site work, building costs, and any mechanical and site piping required. The costs also include running power to the buildings along with backup mobile generators. The equipment costs as shown in the OPCs were provided by equipment manufacturers representing actual costs.

One drawback to using the adsorptive media technology in Tract 200 is the high silica content in the water. The silica interferes with the available adsorptive space in the media and accelerates exhaustion of the media significantly. Preliminary design of this technology indicates that due to the frequent replacement costs of the media, the operations and maintenance costs are in the range of 2 to 4 times the costs of coagulation/ filtration. A summary of the operations and maintenance costs for this alternative are shown in Table 6.0. The details of these costs are included in the opinion of probable operations and maintenance cost spreadsheet shown in Appendix A. The operations and maintenance costs for this alternative include chemical costs for pretreatment, equipment power, building lighting heating and cooling, general equipment replacement, replacement of media, labor for replacement and disposal of media, and man-hours for general operation.

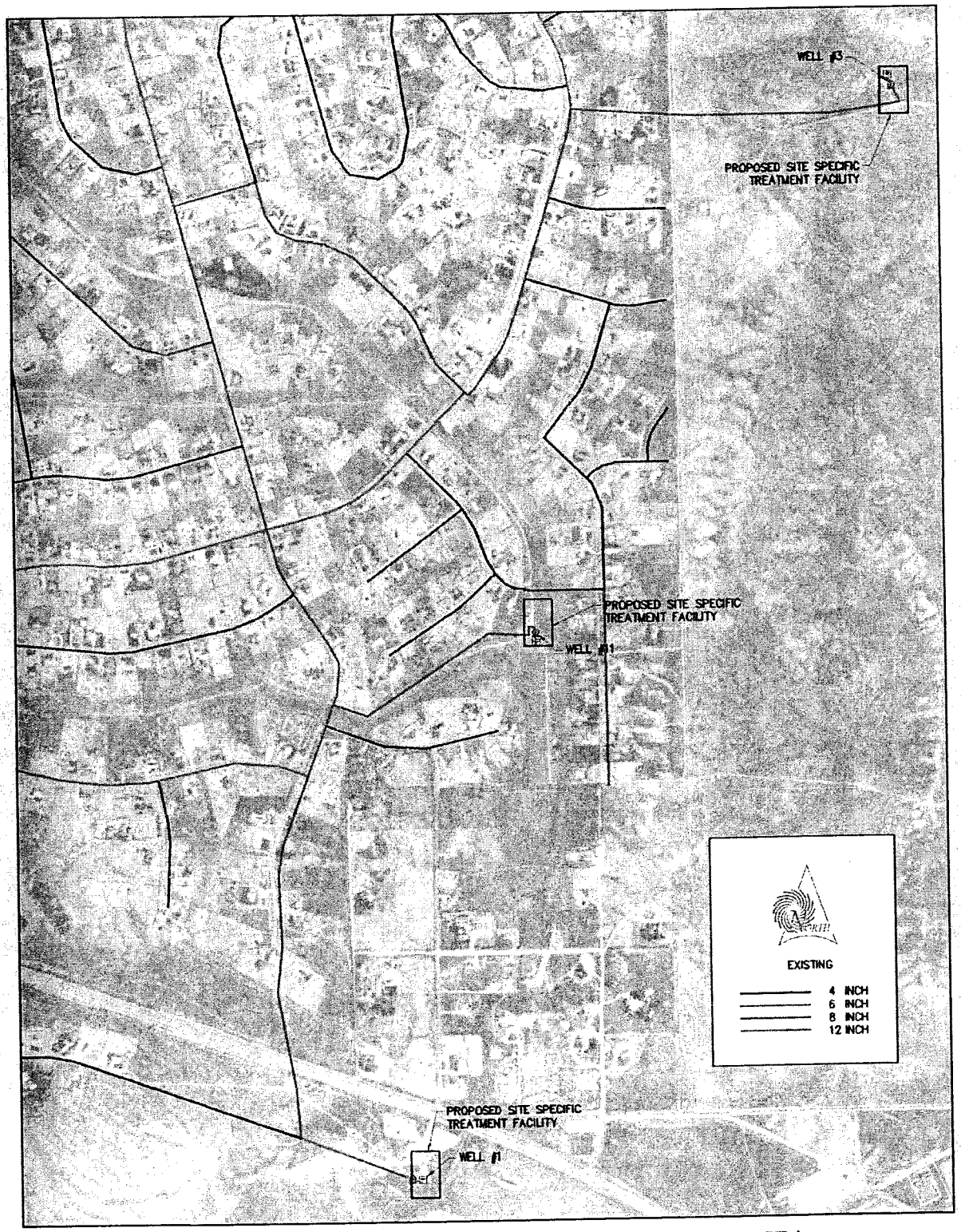

Exhibit 6.3- Alternative #4- Site-Specific Treatment using IBA

6.5 Summary of Alternative Costs

This section provides a summary of the capital costs associated with each alternative along with the operations and maintenance costs for each. These costs are used in the following section to provide a present worth analysis for the alternatives. Table 6.0 below is a summary of the costs.

Table 6.0- Summary of Alternative Costs

Alternative	Capital Costs in 2011 Dollars	Annual O & M Costs in 2011 Dollars
1 Centralized Treatment using C/F	$5,901,400	$140,000
2 Site-Specific Treatment using C/F	$4,551,160	$153,400
3 Centralized Facility & Site-Specific Facilty using C/F	$5,693,860	$137,300
4 Site-Specific Treatment using IBA	$4,248,620	$426,000

The table shown above demonstrates that the pipeline infrastructure required for the centralized facility increases the capital project cost significantly. The operations and maintenance costs are similar excluding the IBA treatment facility. Due to the water quality parameters of the Tract 200 water, specifically the silica in the water, the adsorptive media in the filters requires replacement often, which results in a high media replacement cost and overall O & M costs for the IBA technology.

7 EVALUATION OF ALTERNATIVES

7.1 Non-Economic Evaluation

An important part of any engineering evaluation is to evaluate the alternatives based on non-economic factors. The non-economic factors that need to be considered include ease of design & construction, time required for construction, impact of construction on environment, reliability and redundancy, implementability, expandability, service area factors, and management/ operational factors. Each of these categories is discussed briefly below followed by an evaluation of each of the alternatives for each category. There will always be other non-economic factors for consideration in a project comparison analysis. The non-economic categories selected for this analysis represent relevant and useful categories that can be used to differentiate project alternatives.

Ease of Design & Construction

Ease of design and construction involves measuring how difficult it is to design and construct the proposed alternative. Ease of design takes into consideration obtaining approvals to construct in existing right-of-ways, obtaining required easements, purchasing property, identifying potential conflicts with existing utilities, and special project design considerations. Special design considerations include potential special design requirements caused by know soil conditions, known abnormal topography, abnormalities caused by existing facilities, and any other factors requiring special detailing in plans. Ease of construction for pipelines takes into consideration existing utilities, existing landscaping, abnormal topography, abnormal soil conditions, conflicting structures, and property along alignments. Also taken into account in ease of construction is ability to construct required structures of a project. Are the structures simple or are they difficult with special requirements such as multiple levels. Another factor is ease of excavation and amount of earthwork required for structures. All of these factors are evaluated when determining the ease of design and construction of a project.

Alternative Evaluation: The project alternatives that require pipeline infrastructure will receive a lower score for ease of design and construction. The ability to obtain right-of-way approvals and acquire easements increases the difficulty and time of design significantly. Construction time is also increased by any required additional infrastructure. The design process is also delayed because the centralized treatment facility location has not been finalized. For this reason the centralized facility alternatives receive a lower score.

One advantage to a centralized facility in design is that plans and specifications are completed for one facility only. This potentially reduces time and effort in the plan production process. For Tract 200, the site-specific facilities will be very similar in design. Their similarities will greatly reduce the design effort that typically would be required for three separate facilities. For this reason, the score for site-specific facilities was not reduced significantly.

Time Required for Construction

An important non-economic factor in evaluating project alternatives is a consideration of time required for construction. Time not only has a significant effect on cost of a project, but can also have a significant effect on public opinion of a project. Time is especially important for the SCUC in that they are in non-compliance with existing arsenic levels in the water and desire to provide safe, compliant water to the Tract 200 residents in a timely manner. This also is a show of good faith to

the general public that the SCUC is concerned with the issues at hand and determined to implement a project that will resolve the compliance issues as soon as possible.

Alternative Evaluation: For the alternatives shown in the previous section, all of the alternatives that required off-site infrastructure such as transmission lines were given a lower score. The time required to obtain all approvals and construct the pipelines reduces the point total for the score.

Impact of on Environment

The impact a project has on the environment is not to be taken lightly. For this reason, prior to construction projects being approved, an evaluation needs to be performed on the impact to the environment. For federally funded projects this typically involves a formal submission of an Environmental Assessment. For private projects, it becomes the duty and responsibility of the local approving agencies to evaluate the impacts of potential projects on the environment. SCUC is required by the public utilities commission (PUC) to submit an Utility Environmental Protection Act Permit Application (UEPA) and an Integrated Resource Plan for projects pertaining to the Spring Creek water system. The requirements of these documents include an environmental impact study for the proposed project.

Alternative Evaluation: The first scoring criteria under this category relates to the effect on the environment during construction. The alternatives with significant amounts of pipeline infrastructure received a lower score because of the disturbance caused to existing landscaping and the environmental disturbance during construction. All of the treatment facilities with coagulation/ filtration produce sludge from the backwash process. The IBA technology only produces a fine particulate matter in the backwash, which is better for the environment resulting in a better score for IBA in this category. The resulting sludge from all plants is non-toxic and will be disposed in local landfills.

Reliability & Redundancy

The reliability of a project is measured by the ability of the project to function properly throughout its working life without major need for re-construction or repair. If properly maintained, the facilities and working infrastructure in a project should function without significant replacement or re-engineering costs. For the SCUC, reliability also takes into consideration the ability of the treatment facilities to remove the arsenic in the water for years to come. The project solution should be a reliable one.

Redundancy is a question of how redundant a project is. If one facility goes down, how does it affect the functionality of the whole system? Can specific parts of the treatment facility be removed and replaced without significantly affecting the functioning system? Good redundancy results in good reliability.

Alternative Evaluation: The site-specific facilities earned a slightly higher score in this category based on the additional level of redundancy provided over a centralized facility. The coagulation/filtration earned a slightly higher score for reliability due to the interference of silica with the IBA process.

Implementability

Implementability is a measure of how practical a project is to implement. This is a measure of how easy it is to obtain required permits, easements, and right-of-way approvals that will be required for a

project. Are there specific environmental hurdles that need to be overcome? What is the process and difficulty level of obtaining the required approvals from the regulatory agencies? This category also takes into account difficulties in obtaining required land and materials for construction. In some ways, implementability is an overall measure of general feasibility of a project with all factors taken into consideration.

Alternative Evaluation: The alternatives that require significant amounts of off-site transmission line received a lower score for implementability. The uncertainty associated with proposed alignments and land acquisition makes these alternatives more difficult to implement.

Expandability

In the case of a treatment facility, expandability is a determination of the ability of a facility to be expanded for future flows or future development. As stated previously, Spring Creek Tract 200 is approaching built out and is not expected that significant additional flows will be required. Some of the land surrounding tract 200 is privately owned and may be developed in the future. At this point it is assumed that these lands will require their own water sources that will have their own requirements for meeting water quality rules.

Alternative Evaluation: The alternatives that have centralized treatment were given a higher score in this category because a centralized facility can accommodate expansion easier than site-specific facilities.

Service Area Factors

This category specifically deals with the how well the project covers the existing service area. Does the proposed project affect the service area in any negative way? Does the proposed project expand service area for the SCUC? As stated previously, Tract 200 is approaching build out and the service area will not be expanded as a result of the project. Phasing of the project has a possibility to affect specific service areas and the ability to provide water to the entire service area for peaking months.

Alternative Evaluation: All of the alternatives received an equal score for this category because they all affect the service area the same. None of the alternatives has a significantly different negative effect on the service area when compared to the others.

Management/ Operational Factors

Management/ operational factors is a measure of ease of managing and operating the system following the implementation of the project. Are there specific labor requirements involved with the project alternatives? Does the project facilitate improved management of the system, or does the project create a management nightmare for the company? In the case of treatment facilities, this category is a measure of how easy it is to operate the treatment facilities. What level of operator is required? How often is significant maintenance required on the facilities? Ideally, the proposed project would not increase the difficulty of operating the system significantly and would be easily maintainable.

Alternative Evaluation: The alternatives that included a centralized treatment plant received higher scores in this category. A centralized facility is easier to operate and easier to manage.

Table 7.0 below is a non-economic scoring matrix for each of the alternatives presented in the previous section. The alternatives are scored on a scale of 0 to 5 based on the non-economic factors

detailed above. A score of 0 means that the alternative does not provide any benefit or is not capable meeting the criteria, where as 5 identifies the alternative as providing the benefit or meeting the criteria. This scoring matrix is used in conjunction with the economic analysis to determine a recommended project alternative. Alternative 2 and Alternative 4 received equal scores when considering the non-economic factors shown above.

Table 7.0- Non-Economic Scoring Matrix

	Evaluation Criteria	Alternative 1: Centralized C/F Treatment	Alternative 2: Site-Specific C/F Treatment	Alternative 3: Centralized C/F Facility & Site-	Alternative 4: Site-Specific IBA Treatment
1	Ease of Design & Construction	1	4	2	4
2	Time Required for Construction	2	4	2	4
3	Impact on Environment	3	3	3	4
4	Reliability & Redundancy	2	4	2	3
5	Implementability	1	3	1	3
6	Expandability	4	2	3	2
7	Service Area Factors	3	3	3	3
8	Management/ Operational Factors	4	2	3	2
	Total	20	25	19	25

7.2 Present Worth Analysis

A common method of evaluating a group of project alternatives to determine which is the most cost effective is to perform a present worth analysis of all of the options. The present worth analysis compares the total costs associated with a project for the projected life of the facilities. For the present worth analysis performed in this report, the life cycle of the treatment plant equipment, excluding the filter media, is 20 years. This expected life was provided by the equipment manufacturers as a good basis for comparison. The present worth analysis also takes into consideration operation and maintenance costs for the time period in consideration and determines the present worth of all the costs in 2011 dollars. The discount rate that is used in the present worth analysis is a value of 9.102% based off of the cost of capital. The present worth analysis is shown in Table 7.1 below.

Table 7.1- Present Worth Analysis of Alternatives

	Alternative	Capital Costs in 2011 Dollars	Annual O & M Costs in 2011 Dollars	Present Worth of O & M Costs	Total Present Worth in 2011 Dollars
1	Centralized Treatment using C/F	$5,901,400	$140,000	$1,268,800	$7,170,200
2	Site-Specific Treatment using C/F	$4,551,160	$153,400	$1,390,200	$5,941,400
3	Centralized Facility & Site-Specific Facilty using C/F	$5,693,860	$137,300	$1,244,300	$6,938,200
4	Site-Specific Treatment using IBA	$4,248,620	$426,000	$3,860,700	$8,109,300

The present worth analysis shown above demonstrates that the site-specific alternative is the most cost-effective of the alternatives presented. The site-specific alternative has much lower capital costs due to the fact that the only new pipe in these alternatives is site piping. The IBA treatment technology has the least capital cost due to minimized backwashing requirements that can be accomplished manually. However, this technology results in a high present worth for the specific Tract 200 water quality because of the high operations and maintenance costs associated with replacing the media.

8 SUMMARY AND RECOMMENDATION

Currently, the Spring Creek Tract 200 water system is in non-compliance for arsenic based off of the 2006 EPA MCLs. The purpose of this preliminary engineering report was to evaluate arsenic mitigation strategies for Tract 200 and to determine a viable strategy for SCUC to deliver compliant drinking water to the residents of Spring Creek in a timely manner. Based on the evaluation performed, it was determined that the best strategy to provide compliant water for the SCUC is to provide treatment of the water from the Tract 200 sources.

Four separate project Alternatives were evaluated in this report. The four alternatives included: centralized treatment using C/F, site-specific treatment using C/F, centralized & site-specific treatment using C/F, and site-specific treatment using IBA. All of these alternatives were scrutinized based on non-economic factors and economic factors. The evaluation criterion for the non-economic factors is detailed in Section 7. Based on the evaluation of the non-economic and economic factors, the **recommended project alternative** for the SCUC to provide compliant drinking water to the Spring Creek residents in a timely manner is **site-specific treatment using the coagulation/ filtration treatment technology**. The total capital costs are expected to be approximately $4,551,160 in 2011 dollars based off of the engineer's opinion of probable cost. The annual operations and maintenance costs associated with this alternative are $153,400 in 2011 dollars. It is the recommendation of this report that this project alternative be pursued and implemented as soon as possible.

9 REFERENCES

Lumos and Associates, Inc., May 19, 2005, *Spring Creek Water Utility- Arsenic Compliance Study for the Mobile Home Water System*

Rothberg, Tamburini & Winsor, Inc. (RTW), December 2007, *Preliminary Engineering Report- Arsenic Compliance Evaluation*

EPA, Office of Water, July 2003, *EPA 816-R-03-014 Arsenic Treatment Technology Evaluation Handbook* http://water.epa.gov/drink/info/arsenic/upload/2005_11_21_arsenic_handbook_arsenic_treatment-tech.pdf

APPENDIX A- OPINION OF PROBABLE COST (OPC)

Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.

Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using C/F (Well #1- 425 gpm site) 10-Jun-11

Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (50' x 40')	1	LS	$ 260,000.00	$ 260,000.00
5	Water Treatment Process Equipment	1	LS	$ 541,900.00	$ 541,900.00
6	Controls	1	LS	$ 20,000.00	$ 20,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 25,000.00	$ 25,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backkup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 936,900
	Contingency	20.0%			$ 187,380
	Total Construction				**$ 1,124,280**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 65,000
	Administrative, Meetings, Regulatory Issues	0.9%	L.S.		$ 12,000
	Engineering Construction Services	4.0%	Hourly		$ 51,700
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
			TOTAL PROJECT COST		**$ 1,280,980**

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.

Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using C/F (Well #3- 800 gpm sites) 10-Jun-11

Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (60' x 40')	1	LS	$ 312,000.00	$ 312,000.00
5	Water Treatment Process Equipment	1	LS	$ 744,815.00	$ 744,815.00
6	Controls	1	LS	$ 20,000.00	$ 20,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 25,000.00	$ 25,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 1,191,800
	Contingency	20.0%			$ 238,360
	Total Construction				**$ 1,430,160**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 83,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 16,000
	Engineering Construction Services	4.0%	Hourly		$ 64,400
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
		TOTAL PROJECT COST			**$ 1,621,560**

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.

Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using C/F (Well #11- 800 gpm sites) 10-Jun-11

Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (60' x 40')	1	LS	$ 312,000.00	$ 312,000.00
5	Water Treatment Process Equipment	1	LS	$ 765,628.00	$ 765,628.00
6	Controls	1	LS	$ 20,000.00	$ 20,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 25,000.00	$ 25,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 1,212,600
	Contingency	20.0%			$ 242,520
	Total Construction				**$ 1,455,120**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 84,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 16,000
	Engineering Construction Services	4.0%	Hourly		$ 65,500
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
		TOTAL PROJECT COST			**$ 1,648,620**

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Centralized Treatment Using C/F 10-Jun-11
Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
Centralized Treatment Plant					
1	Mobilization & Demobilization	1	LS	$ 80,000.00	$ 80,000.00
2	Treatment Plant Property Purchase	2	ACRE	$ 27,000.00	$ 54,000.00
3	Site Work/Grading	1	LS	$ 20,000.00	$ 20,000.00
4	Treatment Plant Building	1	LS	$ 416,000.00	$ 416,000.00
5	Water Treatment Process Equipment	1	LS	$ 1,523,647.50	$ 1,523,647.50
6	Raw Water Tank	1	LS	$ 55,000.00	$ 55,000.00
7	Clearwell Tank	1	LS	$ 105,000.00	$ 105,000.00
8	Obtaining Site Power	1	LS	$ 40,000.00	$ 40,000.00
9	Controls	1	LS	$ 45,000.00	$ 45,000.00
10	Site Piping	1	LS	$ 33,750.00	$ 33,750.00
11	Building Mechanical and Electrical	1	LS	$ 56,250.00	$ 56,250.00
12	Backup Generator	1	LS	$ 150,000.00	$ 150,000.00
				Subtotal	$ 2,578,647.50
Well #11 Booster Station					
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Booster Station Building	1	LS	$ 40,000.00	$ 40,000.00
3	Prepackaged Booster Station & Mechanical Piping	1	LS	$ 75,000.00	$ 75,000.00
4	HVAC	1	LS	$ 15,000.00	$ 15,000.00
5	Electrical	1	LS	$ 60,000.00	$ 60,000.00
6	Controls/SCADA	1	LS	$ 25,000.00	$ 25,000.00
7	Mobile Generator	1	LS	$ 60,000.00	$ 60,000.00
				Subtotal	$ 280,000.00
Transmission Pipeline					
1	Mobilization	1	LS	$ 30,000.00	$ 30,000.00
2	Traffic Control	1	LS	$ 30,000.00	$ 30,000.00
3	Utility Investigation	71	HRS	$ 200.00	$ 14,200.00
4	Remove Asphalt	1,880	SY	$ 3.50	$ 6,580.00
5	Landscaping	1	LS	$ 42,300.00	$ 42,300.00
6	Import Pipe Bedding	14,100	LF	$ 10.00	$ 141,000.00
7	Import Backfill	14,100	LF	$ 10.00	$ 141,000.00
8	Asphalt T-Patch	1,880	SY	$ 35.00	$ 65,800.00
9	8" PVC Pipe	2,200	LF	$ 55.00	$ 121,000.00
10	10" PVC Pipe	5,800	LF	$ 65.00	$ 377,000.00
11	12" PVC Pipe	6,100	LF	$ 80.00	$ 488,000.00
12	8" Gate Valves	3	EA	$ 2,000.00	$ 6,000.00
13	10" Gate Valves	6	EA	$ 2,000.00	$ 12,000.00
14	12" Butterfly Valves	16	EA	$ 2,500.00	$ 40,000.00
15	Water Main Connections	10	EA	$ 2,000.00	$ 20,000.00
				Subtotal	$ 1,534,880.00
	Sub-Total				$ 4,393,500
	Contingency	20.0%			$ 878,700
	Total Construction				$ 5,272,200
	INCIDENTALS				
	Engineering Design	5.2%	L.S.		$ 306,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 58,000
	Engineering Construction Services	4.0%	Hourly		$ 237,200
	Studies, Permitting, and Compliance				
	Operation and Maintenance Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
			TOTAL PROJECT COST		$ 5,901,480

In providing opinions of probable construction cost, the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as to the accuracy of such opinions compared to bid or actual costs.

Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Install Centralized C/F Treatment for Wells #11 & #3 & Site Specific C/F Treatment for Well #1 10-Jun-11
Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
	Centralized Treatment Plant				
1	Mobilization & Demobilization	1	LS	$ 60,000.00	$ 60,000.00
2	Treatment Plant Property Purchase	2	ACRE	$ 27,000.00	$ 54,000.00
3	Site Work/Grading	1	LS	$ 13,334.00	$ 13,334.00
4	Treatment Plant Building	1	LS	$ 416,000.00	$ 416,000.00
5	Water Treatment Process Equipment	1	LS	$ 1,117,222.50	$ 1,117,222.50
6	Raw Water Tank	1	LS	$ 36,685.00	$ 36,685.00
7	Clearwell Tank	1	LS	$ 70,350.00	$ 70,350.00
8	Site Power	1	LS	$ 40,000.00	$ 40,000.00
9	Controls	1	LS	$ 30,000.00	$ 30,000.00
10	Site Piping	1	LS	$ 22,500.00	$ 22,500.00
11	Building Mechanical and Electrical	1	LS	$ 37,500.00	$ 37,500.00
12	Backup Generator	1	LS	$ 100,000.00	$ 100,000.00
				Subtotal	$ 1,997,591.50
	Well #1 Treatment Plant				
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (50' x 40')	1	LS	$ 260,000.00	$ 260,000.00
5	Water Treatment Process Equipment	1	LS	$ 541,900.00	$ 541,900.00
6	Controls	1	LS	$ 20,000.00	$ 20,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 25,000.00	$ 25,000.00
9	Backup Generator	1	LS	$ 50,000.00	$ 50,000.00
				Subtotal	$ 934,900.00
	Transmission Pipeline				
1	Mobilization	1	LS	$ 60,000.00	$ 60,000.00
2	Traffic Control	1	LS	$ 20,000.00	$ 20,000.00
3	Utility Investigation	60	HRS	$ 200.00	$ 12,000.00
4	Remove Asphalt	1,587	SY	$ 3.50	$ 5,553.33
5	Landscaping	1	LS	$ 35,700.00	$ 35,700.00
6	Import Pipe Bedding	11,900	LF	$ 10.00	$ 119,000.00
7	Import Backfill	11,900	LF	$ 10.00	$ 119,000.00
8	Asphalt T-Patch	1,587	SY	$ 35.00	$ 55,561.33
9	8" PVC Pipe	5,800	LF	$ 55.00	$ 319,000.00
10	12" PVC Pipe	6,100	LF	$ 80.00	$ 488,000.00
11	8" Gate Valves	6	EA	$ 2,000.00	$ 12,000.00
12	12" Butterfly Valves	16	EA	$ 2,500.00	$ 40,000.00
13	Water Main Connections	10	EA	$ 2,000.00	$ 20,000.00
				Subtotal	$ 1,305,814.67
	Sub-Total				$ 4,238,300
	Contingency	20.0%			$ 847,660
	Total Construction				$ 5,085,960
	INCIDENTALS				
	Engineering Design	5.2%	L.S.		$ 295,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 56,000
	Engineering Construction Services	4.0%	Hourly		$ 228,900
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
			TOTAL PROJECT COST		$ 5,693,860

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using IBA (Well #1- 425 gpm site) 10-Jun-11
Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (50' x 40')	1	LS	$ 260,000.00	$ 260,000.00
5	Water Treatment Process Equipment (From Supplier)	1	LS	$ 400,000.00	$ 400,000.00
6	Controls	1	LS	$ 15,000.00	$ 15,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 20,000.00	$ 20,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backkup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 785,000
	Contingency	20.0%			$ 157,000
	Total Construction				**$ 942,000**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 55,000
	Administrative, Meetings, Regulatory Issues	0.9%	L.S.		$ 10,000
	Engineering Construction Services	4.0%	Hourly		$ 43,300
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
		TOTAL PROJECT COST			**$ 1,078,300**

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.

Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using IBA(Well #3- 800 gpm sites) 10-Jun-11

Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (60' x 40')	1	LS	$ 312,000.00	$ 312,000.00
5	Water Treatment Process Equipment (From Supplier)	1	LS	$ 690,000.00	$ 690,000.00
6	Controls	1	LS	$ 15,000.00	$ 15,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 20,000.00	$ 20,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 1,127,000
	Contingency	20.0%			$ 225,400
	Total Construction				**$ 1,352,400**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 78,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 15,000
	Engineering Construction Services	4.0%	Hourly		$ 60,900
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
		TOTAL PROJECT COST			**$ 1,534,300**

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.

Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Spring Creek Tract 200 Site Specific Treatment Using IBA (Well #11- 800 gpm sites) 10-Jun-11

Spring Creek Utility Company

NO.	DESCRIPTION	Estimated Quantity	Units	Unit Price	TOTAL COST
1	Mobilization	1	LS	$ 5,000.00	$ 5,000.00
2	Site Work/Grading	1	LS	$ 8,000.00	$ 8,000.00
3	Site Power	1	LS	$ 10,000.00	$ 10,000.00
4	Treatment Building (60' x 40')	1	LS	$ 312,000.00	$ 312,000.00
5	Water Treatment Process Equipment (From Supplier)	1	LS	$ 765,628.00	$ 765,628.00
6	Controls	1	LS	$ 15,000.00	$ 15,000.00
7	Site Piping	1	LS	$ 15,000.00	$ 15,000.00
8	Building Mechanical and Electrical	1	LS	$ 20,000.00	$ 20,000.00
9	Backup Generator Prep	1	LS	$ 2,000.00	$ 2,000.00
10	Backup Generator	1	LS	$ 50,000.00	$ 50,000.00
	Sub-Total				$ 1,202,600
	Contingency	20.0%			$ 240,520
	Total Construction				**$ 1,443,120**
	INCIDENTALS				
	Engineering Design	5.1%	L.S.		$ 84,000
	Administrative, Meetings, Regulatory Issues	1.0%	L.S.		$ 16,000
	Engineering Construction Services	4.0%	Hourly		$ 64,900
	Studies, Permitting, and Compliance				
	Operation and Maintanence Manual		Est.		$ 1,000
	SWPPP (Storm Water Pollution Protection Plan)		Est.		$ 1,500
	Building and Safety Plan Review		Est.		$ 500
	Geotechnical Engineering				
	Geotechnical Report		Est.		$ 4,000
	Geotechnical and Materials Testing		Est.		$ 1,000
	Mechanical & Electrical Engineering				
	Site Power		Est.		$ 2,000
	Building Electrical, Mechanical, and Controls		Est.		$ 15,000
	Survey and Mapping				
	Construction Staking		Est.		$ 3,000
	Land & RoW Acquisition		ACRE		$ -
	Land & RoW Negotiation		Est.		$ -
		TOTAL PROJECT COST			**$ 1,636,020**

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Install New C/F Treatment Plants at 1 Site 10-Jun-11
Spring Creek Utility Company

Chemical Cost (From Equipment Suppliers)			Annual Cost	
Wells #1, #3, #11			$ 45,872.00	
		Total	**$ 45,872.00**	
Equipment Power Costs (From Equipment Suppliers)			Annual Cost	
Wells #1, #3, #11			$ 9,590.40	
		Total	**$ 9,590.40**	
Building Lights Heating & Cooling			Annual Cost	
Wells #1, #3, #11			$ 4,800.00	
		Total	**$ 4,800.00**	
Equipment Replacement Costs	Frequency (yr)	Unit Cost	Annual Cost	
Wells #1, #3, #11 Equipment (Chem feed pump, backwash pump,	4	$ 15,000	$ 3,750.00	
		Total	**$ 3,750.00**	
Replacement Media (From Equipment Suppliers)			Annual Cost	
Wells #1, #3, #11			$ 15,500.00	
		Total	**$ 15,500.00**	
Media Replacement Labor and Disposal (From Equipment			Annual Cost	
Wells #1, #3, #11			$ 4,065.00	
		Total	**$ 4,065.00**	
Man-Hours for Operation			Annual Cost	
Wells #1, #3, #11			$ 20,000.00	
		Total	**$ 20,000.00**	
Sludge Disposal (See Sludge Disposal Spreadsheet)			Annual Cost	
Wells #1, #3, #11			$ 21,600.00	
		Total	**$ 21,600.00**	
Booster Station at Well #11 Power Costs			Annual Cost	
Power for Supply Pumps for Well #1 and Well #11			$ 15,000.00	
			$ 15,000.00	
		Total	**$ 140,177.40**	

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990

Engineer's Opinion of Probable Cost

Install New C/F Treatment Plants at 2 Sites 10-Jun-11
Spring Creek Utility Company

Chemical Cost (From Equipment Suppliers)			Annual Cost	
Well #1			$ 15,692.00	
Wells #3 & #11			$ 30,180.00	
		Total	**$ 45,872.00**	
Equipment Power Costs (From Equipment Suppliers)			Annual Cost	
Well #1			$ 3,196.80	
Wells #3 & #11			$ 6,393.60	
		Total	**$ 9,590.40**	
Building Lights Heating & Cooling				
Well #1			$ 3,600.00	
Wells #3 & #11			$ 4,200.00	
		Total	**$ 7,800.00**	
Equipment Replacement Costs	Frequency (yr)	Unit Cost	Annual Cost	
Well #1 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
Wells #3 & #11 Equipment (Chem feed pump, backwash pump,	4	$ 10,000	$ 2,500.00	
		Total	**$ 3,750.00**	
Replacement Media (From Equipment Suppliers)			Annual Cost	
Well #1			$ 3,500.00	
Wells #3 & #11			$ 12,000.00	
		Total	**$ 15,500.00**	
Media Replacement Labor and Disposal (From Equipment			Annual Cost	
Well #1			$ 1,275.00	
Wells #3 & #11			$ 2,790.00	
		Total	**$ 4,065.00**	
Man-Hours for Operation			Annual Cost	
Well #1			$ 10,000.00	
Wells #3 & #11			$ 15,000.00	
		Total	**$ 25,000.00**	
Sludge Disposal (See Sludge Disposal Spreadsheet)			Annual Cost	
Well #1			$ 4,050.00	
Wells #3 & #11			$ 21,600.00	
		Total	**$ 25,650.00**	
		Total	**$ 137,227.40**	

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Spring Creek Tract 200 C/F Treatment Plants at 3 Well Sites O & M Costs 10-Jun-11
Spring Creek Utility Company

Chemical Cost (From Equipment Suppliers)			Annual Cost	
Well #1			$ 15,692.00	
Well #3			$ 20,143.00	
Well #11			$ 10,037.00	
		Total	**$ 45,872.00**	
Equipment Power Costs (From Equipment Suppliers)			Annual Cost	
Well #1			$ 3,196.80	
Well #3			$ 3,196.80	
Well #11			$ 3,196.80	
		Total	**$ 9,590.40**	
Building Lights, Heating, and Cooling			Annual Cost	
Well #1			$ 3,600.00	
Well #3			$ 3,600.00	
Well #11			$ 3,600.00	
		Total	**$ 10,800.00**	
Equipment Replacement Costs	Frequency (yr)	Unit Cost	Annual Cost	
Well #1 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
Well #3 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
Well #11 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
		Total	**$ 3,750.00**	
Replacement Media (From Equipment Suppliers)			Annual Cost	
Well #1			$ 3,500.00	
Well #3			$ 6,000.00	
Well #11			$ 6,000.00	
		Total	**$ 15,500.00**	
Media Replacement Labor and Disposal (From Equipment			Annual Cost	
Well #1			$ 1,275.00	
Well #3			$ 1,395.00	
Well #11			$ 1,395.00	
		Total	**$ 4,065.00**	
Man-Hours for Operation			Annual Cost	
Well #1			$ 10,000.00	
Well #3			$ 10,000.00	
Well #11			$ 10,000.00	
		Total	**$ 30,000.00**	
Sludge Disposal (See Sludge Disposal Spreadsheet)			Annual Cost	
Well #1			$ 4,050.00	
Well #3			$ 21,600.00	
Well #11			$ 8,100.00	
		Total	**$ 33,750.00**	
		Total	**$ 153,327.40**	

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Engineer's Opinion of Probable Cost

SUNRISE ENGINEERING, INC.
Tel: (801) 523-0100 Fax: (801) 523-0990
Engineer's Opinion of Probable Cost

Spring Creek Tract 200 IBA Treatment Plants at 3 Well Sites O & M Costs 10-Jun-11
Spring Creek Utility Company

Chemical Cost (From Equipment Suppliers)			Annual Cost	
Well #1			$ 7,200.00	
Well #3			$ 6,900.00	
Well #11			$ 4,500.00	
		Total	**$ 18,600.00**	
Equipment Power Costs (From Equipment Suppliers)			Annual Cost	
Well #1			$ 1,801.80	
Well #3			$ 1,801.80	
Well #11			$ 1,801.80	
		Total	**$ 5,405.40**	
Building Lights, Heating, and Cooling			Annual Cost	
Well #1			$ 3,600.00	
Well #3			$ 3,600.00	
Well #11			$ 3,600.00	
		Total	**$ 10,800.00**	
Equipment Replacement Costs	Frequency (yr)	Unit Cost	Annual Cost	
Well #1 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
Well #3 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
Well #11 Equipment (Chem feed pump, backwash pump, etc.)	4	$ 5,000	$ 1,250.00	
		Total	**$ 3,750.00**	
Replacement Media (From Equipment Suppliers)			Annual Cost	
Well #1			$ 99,535.00	
Well #3			$ 179,199.00	
Well #11			$ 56,446.00	
		Total	**$ 335,180.00**	
Media Replacement Labor and Disposal (From Equipment			Annual Cost	
Well #1			$ 11,807.00	
Well #3			$ 20,526.00	
Well #11			$ 7,632.00	
		Total	**$ 39,965.00**	
Man-Hours for Operation			Annual Cost	
Well #1			$ 4,000.00	
Well #3			$ 4,000.00	
Well #11			$ 4,000.00	
		Total	**$ 12,000.00**	
Sludge Disposal (See Sludge Disposal Spreadsheet)			Annual Cost	
Well #1			$ -	
Well #3			$ -	
Well #11			$ -	
		Total	$ -	
		Total	**$ 425,700.40**	

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Appendix F
Public Notice and Proof of Publication

ELKO DAILY FREE PRESS

www.elkodaily.com
3720 Idaho Street • Elko, Nevada 89801

Affidavit of Publication

I, Dorothy Vance, business manager of the Elko Daily Free Press, published daily at Elko, Nevada, do solemnly swear that a copy of Well Permit Section 27 as per clipping attached, was published June 20, 2011, in the regular and entire issue of said newspaper, with general circulation of Elko and Lander counties, and not in any supplement thereof for one week in the issue dated June 20, 2011.

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA
NOTICE OF APPLICATION FOR A PERMIT TO CONSTRUCT UTILITY FACILITIES UNDER THE UTILITY ENVIRONMENTAL PROTECTION ACT

Spring Creek Utilities Co. (the "Company") is submitting, pursuant to the Nevada Utility Environmental Protection Act ("UEPA"), an application to the Public Utilities Commission of Nevada (the "Commission") for authority to construct a coagulation/filtration arsenic treatment facility which will be housed in two approximately 350 square-foot structures. The structures will house pre-treatment equipment, coagulation / filtration treatment equipment, associated piping, plumbing, and monitoring components. A 25,000 gallon backwash tank and sludge container will be adjacent to the treatment facilities. In addition, the Company will be installing approximately 150 feet of 8-inch piping and associated valves and other plumbing components in order to connect the treatment facility to existing water infrastructure. Security fencing will also be provided. The project will be located in Spring Creek, Nevada adjacent to the Company's existing well number 3 which is generally located East of W. Valdez Drive and is more specifically located in the Southeast quarter of the Northeast quarter of Section 27, Township 34 North, Range 56 East, M.D.B. & M., at a point from which the Northeast corner of said Section 27 bears North 21o 33' 26" East 2,508.69 feet. This project is being undertaken to bring the existing water system into compliance with the arsenic maximum contaminant level as established by the U.S. Environmental Protection Agency. The arsenic treatment facility will provide treated water to the Company's system users in Tract 200 in Spring Creek, Nevada.

The contents of the UEPA Application will include, but are not limited to:

1. A general description of the location of the project;
2. A statement on the environmental effect of the project;
3. A description of the arsenic treatment facility and the associated water pipe and plumbing components;
4. A description of how the arsenic treatment facility and associated water pipe and plumbing components will aid in providing customers with reliable service and will serve the public interest.

A copy of the application will be available on the Commission's website following the Company's filing of the application. Additional information about the UEPA process and a person's right to participate in that process can be found in Nevada Revised Statutes and Nevada Administrative Code Chapters 703 and 704.

June 20

Business Manager

Subscribed and sworn to before me, on June 20 2011.

Notary Public:

CAROL L. MOTT
Notary Public-State of Nevada
APPT. NO. 07-2623-6
My App. Expires February 28, 2015

Attachment G
Certificate of Service to State Clearinghouse

CERTIFICATE OF SERVICE

I hereby certify that I am an employee of Lionel Sawyer & Collins and on June 21, 2011, I caused to be served, a true and correct copy of the foregoing document via U.S. Mail or as indicated below to the following parties:

Regulatory Operations Staff
PUBLIC UTILITIES COMMISSION OF NEVADA
9075 West Diablo Drive, Suite 250
Las Vegas, Nevada 89148

OFFICE OF THE ATTORNEY GENERAL
BUREAU OF CONSUMER PROTECTION
555 E. Washington Avenue, Suite 3900
Las Vegas, Nevada 89101

NEVADA DEPARTMENT OF ADMINISTRATION (CD ROM VIA HAND DELIVERY)
209 E. Musser Street
Carson City, Nevada 89701

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (CD ROM VIA HAND DELIVERY)
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701

NEVADA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES (CD ROM VIA HAND DELIVERY)
John Walker, Executive Secretary
901 S. Stewart Street, Suite 5001
Carson City, Nevada 89701

ELKO COUNTY
571 Idaho Street
Elko, Nevada 89801

DATED this 21st day of June, 2011.

Jane Harrell