Colorado Springs Utilities
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1041 2008-002

March 18, 2011

Jacklynn Gould
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Bureau of Reclamation
Eastern Colorado Area Office
11056 West County Road 18E
Loveland, CO 80537-9711

Subject: Southern Delivery System (SDS) Integrated Adaptive Management Plan (IAMP), SDS Environmental Commitments Plan (ECP) and SDS Monitoring Plan

Ms. Gould:

Colorado Springs Utilities, the Southern Delivery System (SDS) Project Manager, is submitting the attached SDS Integrated Adaptive Management Plan, SDS Environmental Commitments Plan and SDS Monitoring Plan. The Record of Decision (ROD), GP-2009-01, approved March 20, 2009, requires submittal of these plans to the Bureau of Reclamation prior to finalization of contracts. The SDS IAMP provide a structured framework for decision making that can adjust SDS Project mitigations if outcomes from the proposed project mitigation measures are different than contemplated in the Final Environmental Impacts Statement. The Monitoring Plan provides a description of the various monitoring efforts that the SDS Project will implement as a part of mitigations for the SDS Project outlines the best management practices that will be used to minimize socioeconomic and land use impacts to properties surrounding the project. The SDS ECP provides a detailed and specific listing of the environmental commitments of the SDS Project for the seven programmatic permits/approvals and the intended actions for compliance of the commitments.

Please contact me at 719-668-8677, or Allison Mosser at 719-668-8667, with any questions regarding the attached document.

Sincerely,

Keith Riley

Southern Delivery System
Planning and Permitting Manager

Enclosures:
Southern Delivery System Integrated Adaptive Management Plan (2)
Southern Delivery System Environmental Commitments Plan (2)
Southern Delivery System Monitoring Plan (2)

Southern Delivery System Monitoring Plan

Prepared for:

Bureau of Reclamation

Submitted by:

Colorado Springs Utilities, SDS Project Manager
on behalf of the SDS Participants

CH2MHILL

March 18, 2011

Contents

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Figures

Acronyms and Abbreviations

1041 Permit	Pueblo County 1041 Permit No. 2008-002
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CSR	Clear Spring Ranch
CWC	Colorado Wildlife Commission
CWCB	Colorado Water Conservation Board
District	Fountain Creek Watershed, Flood Control and Greenway District
E. coli	*Escherichia coli*
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FGDC	Federal Geospatial Data Center
GMP	Geomorphic Mitigation Plan
FWMP	Fish and Wildlife Mitigation Plan
IAMP	Integrated Adaptive Management Plan
JUM	Joint Use Manifold
mgd	million gallons per day
MP	Monitoring Plan
NEPA	National Environmental Policy Act
PLS	Professional Land Surveyor
Reclamation	Bureau of Reclamation
ROD	Record of Decision
SDS Participants	City of Colorado Springs, City of Fountain, Security Water District, and Pueblo West Metropolitan District
SDS Project	Southern Delivery System
SAP	Sampling and Analysis Plan
SP	sampling point
USACE	United States Army Corps of Engineers

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UWCR	Upper Williams Creek Reservoir
WCR	Willows Creek Reservoir
WTP	water treatment plant
WWTP	wastewater treatment plant

Executive Summary

The Southern Delivery System Project (SDS Project) is a proposed regional water delivery system that will serve the City of Colorado Springs, City of Fountain, Security Water District, and Pueblo West Metropolitan District (collectively, the SDS Participants).

Purpose

The purpose of the SDS Monitoring Plan (MP) is to provide a description of the various monitoring efforts that the SDS Project will implement as a part of mitigations for the SDS Project. This MP has been prepared consistent with the requirements of the Bureau of Reclamation's (Reclamation) Record of Decision (ROD) (Reclamation 2009), but also addresses SDS Project monitoring commitments from other permits issued by agencies having jurisdiction over the SDS Project. The SDS MP was developed to be a companion to the SDS Integrated Adaptive Management Plan (IAMP) (Colorado Springs Utilities 2011).

Scope

This MP describes monitoring requirements in the following major areas:

- Head Pressure Monitoring: The ROD requires that the SDS Project develop and implement a head-pressure monitoring program on the Joint Use Manifold (JUM) if and when the SDS Project connects to the JUM.
- Annual flow: The ROD requires that the SDS Project consult with Reclamation each year on the average annual flow in Fountain Creek.
- Water Quality Monitoring: The ROD and 1041 Permit require that the SDS Project implement water quality monitoring for dissolved selenium, *Escherichia coli (E. coli)*, ammonia, salinity (as measured by specific conductance), and methyl mercury at both the inlet and outlet to Williams Creek Reservoir (WCR). The CDPHE 401 Certification of the SDS Project under its USACE 404 Permit requires groundwater monitoring at the Upper and Lower Williams Creek Reservoirs for selenium.
- Biological Monitoring: The SDS Project will collect macroinvertebrates and perform habitat assessments to monitor the biological health of the Fountain Creek Basin.
- Geomorphologic Monitoring: The SDS Project will perform geomorphic monitoring at designated points along Fountain Creek to assess any degradation, aggradation, and other changes to the geomorphologic surface.
- Construction Impact Monitoring: The SDS Project has committed to a variety of construction impact-related monitoring.

Reporting

SDS Project will summarize the findings of the monitoring performed as a part of this MP in an SDS Project Annual Monitoring Report, which will be submitted to Reclamation by January 31 of the subsequent year. Further, as required by the Pueblo County 1041 Permit, data gathered as a part of the MP that relates to water quality and geomorphic monitoring will be assembled and entered into an electronic database accessible to Pueblo County upon request.

Adjustment and Termination

Consistent with the SDS IAMP, SDS Project monitoring will continue, at a maximum, through the term of the Long Term Excess Capacity contracts that the SDS Project is requesting from Reclamation. The scope of this MP may be adjusted if findings of the SDS IAMP so warrant. Also consistent with the IAMP, if the findings of the IAMP indicate that the impacts associated with the SDS Project continue to be within the scope and range of the impacts estimated and analyzed in the Final Environmental Impact Statement (FEIS), and after discussions with Reclamation it is decided to modify or discontinue the IAMP, then Colorado Springs Utilities will coordinate with Reclamation to seek its approval to make changes to this MP that are consistent with such changes to the IAMP.

1.0 Introduction

1.1 Purpose

The SDS Monitoring Plan (MP) provides a description of the monitoring efforts that the SDS Project will implement as a part of the mitigations for the SDS Project. This MP has been prepared to be consistent with the requirements of the Bureau of Reclamation's (Reclamation) Record of Decision (ROD) (Reclamation 2009), but also to address SDS Project monitoring commitments from other finalized permits for the SDS Project. The SDS MP is designed to be a companion to the SDS Integrated Adaptive Management Plan (IAMP) (Colorado Springs Utilities 2011), which also has been prepared consistent with the requirements of the ROD. When implemented, the SDS Project monitoring will provide data on the water quality, biological, and geomorphic impacts, if any, of the SDS Project.

1.2 Southern Delivery System Project Overview

The SDS Project is a proposed regional water delivery project designed to serve most or all future water needs (through 2046) of the City of Colorado Springs, City of Fountain, Security Water District, and Pueblo West Metropolitan District (collectively, the SDS Participants).

The first phase of the SDS Project has a budget of $880 million and includes construction of the following facilities, which are scheduled to be in service in 2016:

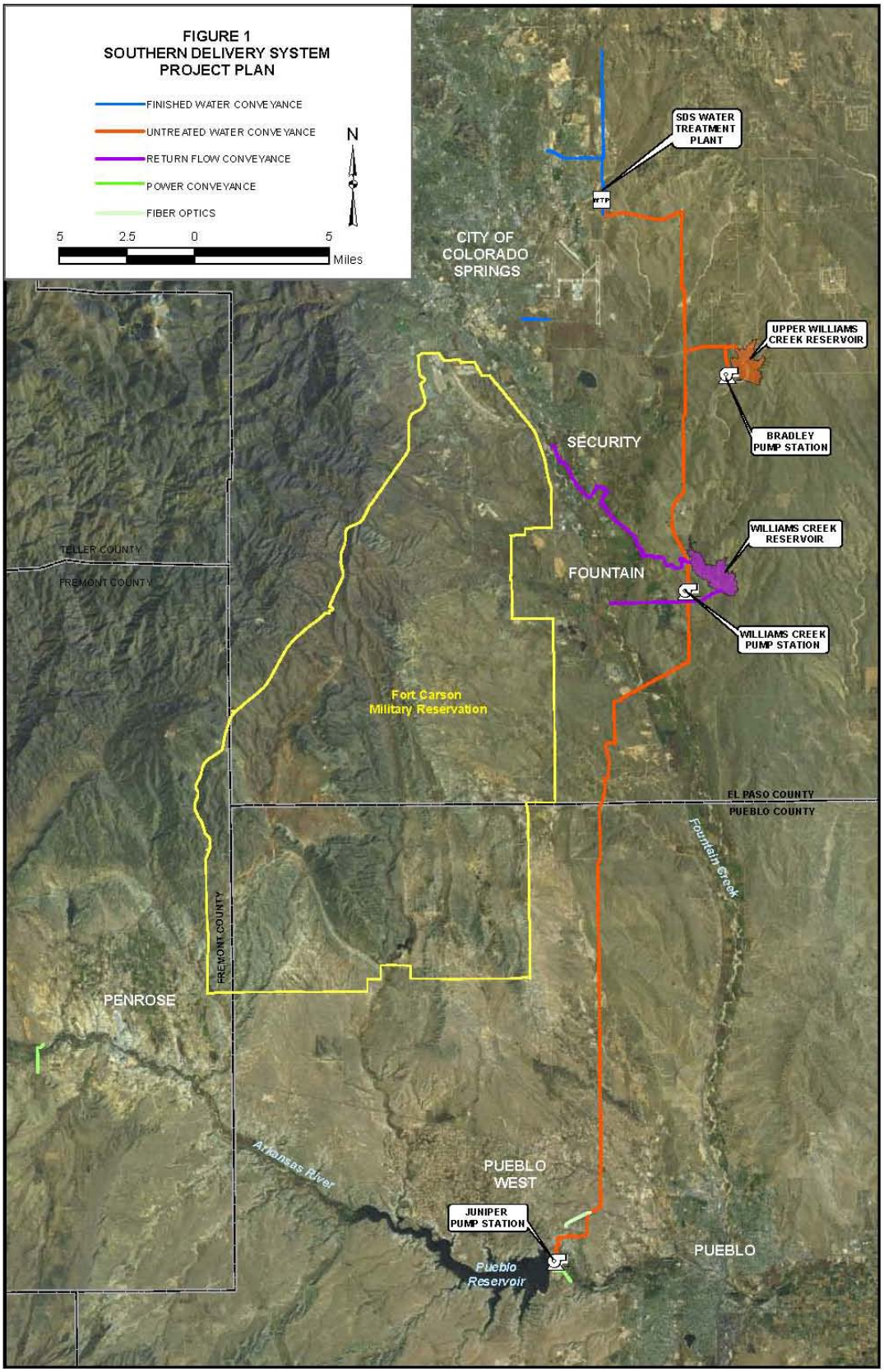
- A 53-mile raw water pipeline (66- and 72-inch diameter)
- Two 78-million-gallon-per-day (mgd) raw water pump stations and one 50-mgd raw water pump station (expandable in Phase 2)
- A water treatment plant (WTP) with a capacity of 50 mgd (expandable in Phase 2)
- Nine miles of 24- to 54-inch-diameter finished water pipelines

Phase 2 of the SDS Project includes the following:

- A 30,500 acre-feet terminal storage reservoir on upper Williams Creek, called Upper Williams Creek Reservoir (UWCR)
- Expansion of the 50-mgd raw water pump station and WTP to 100-mgd capacity
- Expansion of the treated water delivery system
- A 28,000 acre-foot exchange storage reservoir on Williams Creek and exchange conveyance facilities to transfer exchange water to and from Fountain Creek

Phase 2 is scheduled for completion in the 2020-2025 timeframe. The SDS Project facilities are shown on Figure 1-1.

FIGURE 1-1
Southern Delivery System Project Plan



1.3 Southern Delivery System Project Regulatory Review Process

The SDS Project has undergone, and continues to undergo, significant regulatory scrutiny at the federal, state, and local levels. At the federal level, Reclamation has performed extensive and detailed environmental studies as a part of the National Environmental Policy Act (NEPA) process, culminating in the Final Environmental Impact Statement (FEIS) and the ROD.

The ROD for the SDS Project was issued on March 20, 2009. It identified the SDS Project shown in Figure 1-1 as the Preferred Alternative. The SDS Project has been determined to cause "the least damage to the biological and physical environment" (Reclamation 2009). The ROD included extensive commitments by the SDS Participants to significant, long-term mitigation measures.

The SDS Project will cross wetlands and other waters of the United States. Activities that are a part of the SDS Project require a permit from the United States Army Corps of Engineers (USACE) under the dredged and fill material permit program established under Section 404 of the federal Clean Water Act. The SDS Project will result in permanent impacts to 0.23 acres of jurisdictional wetlands. It will also create permanent impacts to another estimated 12.0 acres of non-jurisdictional wetlands. A Section 404 Permit has been obtained for the SDS Project. Colorado Springs Utilities will define, in consultation with the Fountain Creek Watershed, Flood Control and Greenway District (District), the wetlands that will be created as compensatory mitigation for the Section 404 Permit application (Colorado Springs Utilities 2009).

At the state level, the SDS Project has received a 401 Certification from the Colorado Department of Public Health and Environment (CDPHE) in conjunction with its Section 404 Permit, as required by Section 401 of the Clean Water Act. The Colorado Division of Wildlife (CDOW) has also reviewed the SDS Project documents, and an SDS Fish and Wildlife Mitigation Plan (FWMP) has been prepared collaboratively with CDOW staff. This Plan has been approved by both the Colorado Wildlife Commission (CWC) and the Colorado Water Conservation Board (CWCB) (Colorado Springs Utilities, City of Fountain, Security Water District, Pueblo West Metropolitan District, and Colorado Division of Wildlife 2010a).

At the county and city levels, the SDS Project is subject to a variety of regulatory reviews and associated mitigations, including the Pueblo County 1041 Permit, El Paso County Location Approval, and review by the Fountain Creek Watershed, Flood Control and Greenway District (District). The 1041 Permit conditions include comprehensive and extensive mitigation requirements, some applying directly to monitoring described in this MP, which are detailed in the SDS 1041 Permit Terms and Conditions approved by the Pueblo Board of County Commissioners on March 18, 2009.

1.4 Regulatory Requirements

1.4.1 Record of Decision

The ROD for the SDS Project lists the following monitoring commitments by the SDS Participants (Reclamation 2009):

- "Develop and implement a head pressure monitoring program on the Joint Use Manifold to isolate effects attributable to the SDS Project and to mitigate those effects if they were to occur."
- "Participants will consult with Reclamation each year on the average annual flow in Fountain Creek.
- "Include water quality monitoring and adaptive management within the integrated adaptive management program."
- "Monitor the effects of the operation of the SDS Project upon aquatic life in Fountain Creek and the Arkansas River between Pueblo Dam and the Las Animas Gage."

In addition to the ROD commitments, the SDS Project's Pueblo County 1041 Permit (Pueblo County 2009) further requires that the:

- "Applicant shall implement a monitoring program to provide information on the current water quality and geomorphology (including erosion, sediment loading, and channel stability conditions) in Fountain Creek and the Arkansas River, and to track changes over time."
- "Applicant proposes to provide monitoring to identify the impacts of SDS and assess the effectiveness of proposed mitigation measures. Monitoring along Fountain Creek and the Arkansas River will focus on water quality and geomorphologic features."

Further, the commitments of the CDOW's FWMP (Colorado Springs Utilities, City of Fountain, Security Water District, Pueblo West Metropolitan District, and Colorado Division of Wildlife 2010) require:

- "The effects of the operation of the SDS Project upon aquatic life in Fountain Creek will be monitored. Aquatic sampling will be conducted once per year at up to 13 locations. Information obtained from this monitoring effort will be incorporated into the adaptive management program for the SDS Project."
- "In accordance with the Recommended Terms and Conditions and Mitigation of Project Impacts developed for the 1041 Permit, the following mitigation measures will be implemented by the Project Participants:
  - Sampling will be conducted monthly for dissolved selenium, *E. coli*, ammonia, and salinity at up to 13 monitoring locations within the Fountain Creek Basin and Arkansas River, beginning with project construction, then quarterly once the SDS Project is online.
  - The inlet and outlet to WCR will be monitored for methyl mercury on a quarterly basis following the start of reservoir operations for a period of 1 year, then annually for 4 years thereafter."

Finally, the conditions of the CDPHE 401 Certification require:

- "The SDS project will install groundwater monitoring wells up-gradient and down-gradient of the Upper and Lower Williams Creek Reservoirs. A minimum of five (5) down gradient and three (3) up-gradient monitoring wells will be constructed at each reservoir and developed to characterize the groundwater in the Williams Creek drainage. The information gathered from these wells will be used to evaluate if elevated selenium concentrations are occurring as the result of the construction and operation of the reservoirs. The exact location of the wells will be determined by a registered geologist."
- "The monitoring of these wells will begin three years prior to the operation of the reservoirs. Samples will be collected quarterly. Analytical results will be assessed to determine if statistically significant changes have occurred over the baseline data and over the up-gradient concentrations."

1.5 Monitoring Plan Layout

The monitoring requirements required by the regulatory requirements detailed in Section 1.4 above have been categorized into the following major areas, and are addressed in the following sections of this MP:

- Head-Pressure Monitoring – Section 2.0.
- Annual Flow – Section 3.0.
- Water Quality Monitoring – Section 4.0.
- Biological Monitoring – Section 5.0.
- Geomorphologic Monitoring – Section 6.0.
- Construction Impact Monitoring – Section 7.0.

1.6 SDS Participant Information

Contact details for the SDS Participants and their authorized agent are as follows.

1.6.1 SDS Participants

Colorado Springs Utilities
(Project Manager on behalf of SDS Participants)

Contact: John Fredell, Program Director
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Security, CO 80911

Phone: (719) 392-3475; Fax: (719) 390-7252
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City of Fountain (Participant)

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Pueblo West Metropolitan District (Participant)

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1.6.2 MP Preparer

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2.0 Head-Pressure Monitoring at Joint Use Manifold

The ROD requires that the SDS Project develop and implement a head-pressure monitoring program on the Joint Use Manifold (JUM) if and when the SDS Project connects to the JUM. The ROD states that, "This commitment will not be necessary if the intake for SDS is at the North River Outlet Works, and the Joint Use Manifold is not used for SDS" (Reclamation 2009). It is the intent of the SDS Project to connect to the North River Outlet Works at Pueblo Dam, and as such, no head-pressure monitoring is currently proposed.

3.0 Annual Flow

The ROD requires that the SDS Project consult with Reclamation each year on the average annual flow in Fountain Creek. If the average annual stream flow of Fountain Creek, as measured at Pueblo (United States Geological Survey [USGS] gage station number 071056500), exceeds the scope and range of the flow estimated and analyzed in the FEIS (see Table 33 of the FEIS), then the SDS Participants will coordinate with Reclamation within the framework of the IAMP to evaluate the cause(s) for the change in flows and determine whether appropriate response actions, such as additional monitoring and/or mitigation measures, are warranted.

The flow data described above are already being collected by the USGS as part of their existing hydrologic data collection efforts. No further flow data collection is required of the SDS Project. To meet the above requirement, Colorado Springs Utilities will each year assemble the twelve most recent monthly flows published by USGS, average these twelve flows, and present this annual average as a part of SDS Project annual report to Reclamation.

4.0 Water Quality Monitoring

4.1 Dissolved Selenium, *Escherichia coli*, Ammonia, and Salinity

The ROD and 1041 Permit require that the SDS Project implement water quality monitoring for dissolved selenium, *Escherichia coli (E. coli)*, ammonia, and salinity as measured by specific conductance.

4.1.1 Sampling Locations

Water quality monitoring will be performed at the 13 sampling points (SP) described below and shown on Figures 4.1 through 4.3.

- SP #1 – USGS Gage 07103700 on Fountain Creek near Colorado Springs, Colorado
- SP #2 – USGS Gage 07104905 on Monument Creek at Bijou Street at Colorado Springs, Colorado
- SP #3 – USGS Gage 07105500 on Fountain Creek at Colorado Springs, Colorado
- SP #4 – Point below Colorado Springs Utilities' Las Vegas Street Wastewater Treatment Plant (WWTP) (Janitel Road)
- SP #5 – USGS Gage 07105800 on Fountain Creek at Security, Colorado
- SP #6 – Point on Colorado Springs Utilities' Clear Spring Ranch (CSR), above SDS Project wetland mitigation on CSR (City of Fountain)
- SP #7 – USGS Gage 07106000 on Fountain Creek near Fountain, Colorado
- SP #8 – USGS Gage 07106300 on Fountain Creek near Pinon, Colorado
- SP #9 – Point above the Pueblo levee system
- SP #10- USGS Gage 07106500 on Fountain Creek at Pueblo, Colorado
- SP #11 – Point below the Pueblo levee system
- SP #12 – USGS Gage 07099970 on the Arkansas River at Moffat Street, Pueblo, Colorado
- SP #13 – USGS Gage 07109500 on the Arkansas River near Avondale, Colorado

FIGURE 4-1
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli*, Ammonia, and Salinity (North)

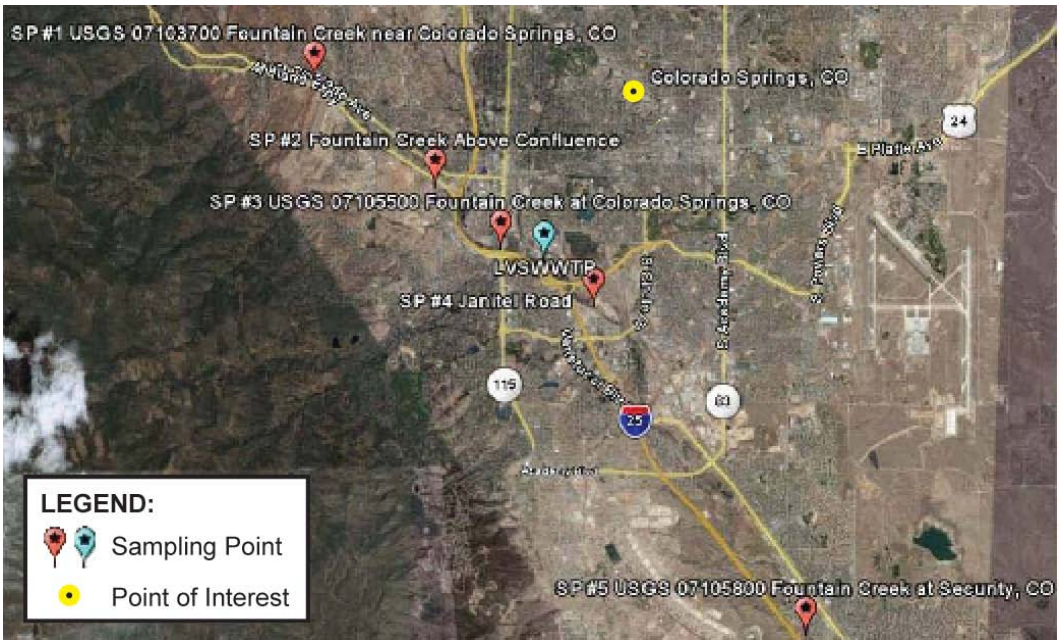


FIGURE 4-2
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli,* Ammonia, and Salinity (Central)

FIGURE 4-3
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli*, Ammonia, and Salinity (South)

4.1.2 Timing

Monitoring for these constituents will start when construction of the SDS Project begins, or 3 years prior to the SDS Project commencing operations, whichever is later. Monitoring will occur monthly until the SDS Project begins operation, and then every third month thereafter through the period of this MP.

4.1.3 Methodology

Methods to be used in the collection and analysis of water quality samples are detailed in the SDS Sampling and Analysis Plan (SAP) for Water Quality Monitoring included as Appendix A to this MP.

4.2 Methyl Mercury

In addition to the water quality constituents referenced above, the SDS Project will monitor methyl mercury at both the inlet to and outlet from Williams Creek Reservoir (WCR). Monitoring initially will be conducted on a quarterly basis for a period of 1 year, beginning following the start of reservoir operations (defined as being the first time operational releases are made from the reservoir), and then annually for 4 years thereafter, on or about the anniversary date of the start of reservoir operations.

As discussed in the attached SAP, reservoir operations for WCR are not expected to start until the 2020-2025 timeframe. Given the likelihood that sampling and analysis technologies will evolve during this period, a SAP for the methyl mercury monitoring will be prepared as a separate plan prior to the start of operations of WCR; therefore, protocols for methyl mercury are not discussed further in this MP or in the attached SAP.

4.3 Colorado Springs Utilities Wastewater Treatment Plant Effluent Monitoring

As a requirement of its State Discharge Permit, Colorado Springs Utilities regularly samples, analyzes, and reports on the quality of the effluent from each of its WWTPs in accordance with the permit requirements. Colorado Springs Utilities will continue to use effluent

monitoring data from its WWTPs to demonstrate the plants are operating in accordance with the specifications and standards associated with permits for its WWTPs. The results of these ongoing effluent monitoring efforts will be included in the SDS Project Annual Monitoring Report.

4.4 Groundwater Selenium

Colorado Springs Utilities will install groundwater monitoring wells up-gradient and down-gradient of the Upper and Lower Williams Creek Reservoirs. A minimum of five (5) down gradient and three (3) up-gradient monitoring wells will be constructed at each reservoir and developed to characterize the groundwater in the Williams Creek drainage. The information gathered from these wells will be used to evaluate if elevated selenium concentrations are occurring as the result of the construction and operation of the reservoirs. The exact location of the wells will be determined by a registered geologist.

Colorado Springs Utilities will ensure that the required down-gradient and up-gradient wells are installed at the Upper and Lower Williams Creek Reservoirs at least three years prior to operation. Colorado Springs Utilities will monitor these wells on a quarterly basis to characterize the groundwater in the Williams Creek drainage and to evaluate if elevated selenium concentrations are occurring as a result of the construction and operation of the reservoirs. If necessary, Colorado Springs Utilities will implement an effective adaptive management program to mitigate adverse water quality effects.

As discussed in the attached SAP, reservoir operations for WCR are not expected to start until the 2020-2025 timeframe. Given the likelihood that sampling and analysis technologies will evolve during this period, a SAP for the groundwater selenium monitoring will be prepared as a separate plan prior to the start of operations of WCR; therefore, protocols for groundwater selenium are not discussed further in this MP or in the attached SAP.

5.0 Biological Monitoring

Colorado Springs Utilities will contract with the USGS for the USGS to collect macroinvertebrates and perform habitat assessments to monitor the biological health of the Fountain Creek Basin.

5.1 Monitoring Locations

Biological monitoring will be performed at the following 10 USGS gage locations:

1. Fountain Creek near Colorado Springs
2. Fountain Creek at 8th Street
3. Monument Creek above Woodmen Road
4. Monument Creek at Bijou Street
5. Fountain Creek at Colorado Springs
6. Fountain Creek below Janitell Road
7. Fountain Creek at Security
8. Fountain Creek near Fountain
9. Fountain Creek near Pinon
10. Fountain Creek at Pueblo

5.2 Timing

Biological monitoring will be performed annually in October or November for the period of this MP.

5.3 Methodology

Biological monitoring will be performed by the USGS according to procedures described in the National Field Manual for the Collection of Water-Quality Data (USGS, variously dated). Results of the USGS monitoring will be included in the SDS Project Annual Report.

6.0 Geomorphic Monitoring

Colorado Springs Utilities will perform geomorphic monitoring at designated points along Fountain Creek to assess degradation, aggregation, or other changes to the geomorphologic surface.

6.1 Sampling Locations

Ten cross sections will be established at designated points along Fountain Creek, as shown on Figures 6-1 and 6-2 below.

FIGURE 6-1
Locations of SDS Monitoring Plan Geomorphic Monitoring Cross-Sections (North)

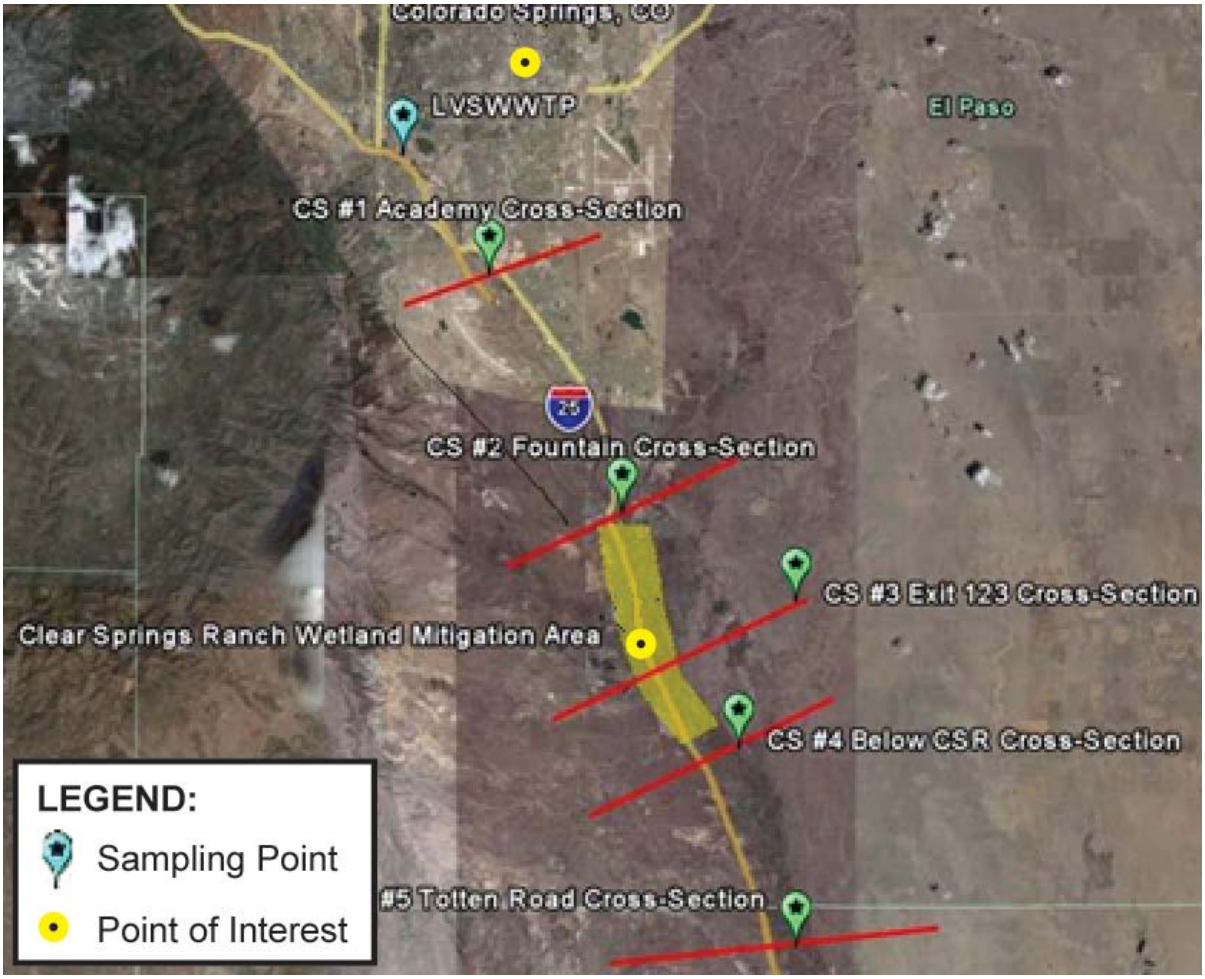
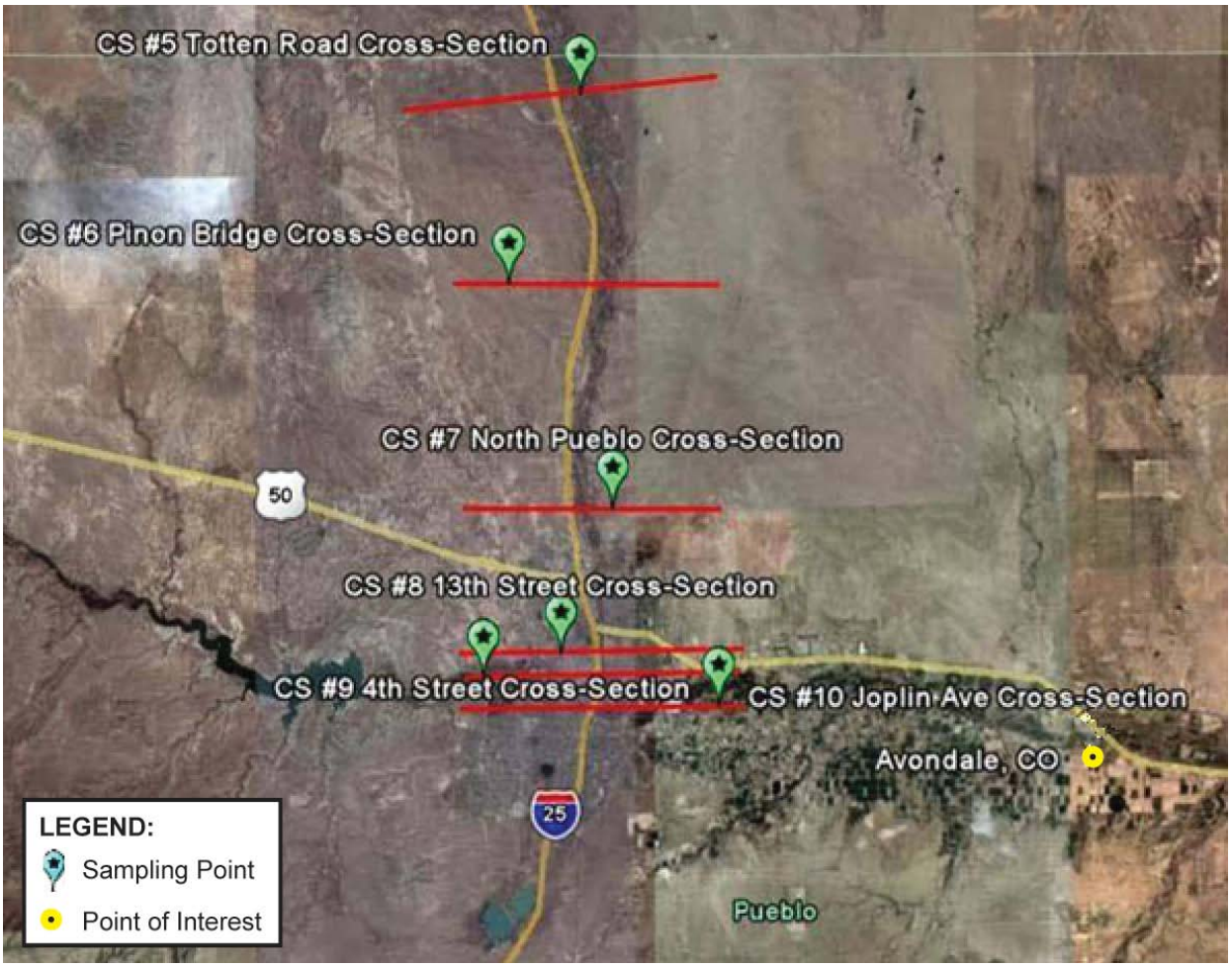


FIGURE 6-2
Locations of SDS Monitoring Plan Geomorphic Monitoring Cross-Sections (South)



6.2 Timing

Each cross-section will be surveyed once per year, beginning on or about October 15 following the start of project construction, or October 15 three years prior to the SDS Project commencing operations, whichever is later, and continuing for the period of this MP. Surveying will occur during the winter when stream flows are low and ground cover of leaves and other organic materials are at a minimum. Monitoring sessions will be conducted within 2 weeks of the established October 15 date.

6.3 Methodology

Survey work will be under the direct supervision of a Professional Land Surveyor (PLS) licensed in the State of Colorado.

The horizontal and vertical datum of the survey work will be that used for the 30 percent designs for the SDS Project.

Cross-section control monuments will be placed and similar in quality and durability to a Colorado Department of Transportation Type 2 monument.

Cross-section control monument location measurements will have a horizontal local accuracy of 0.08-foot and a vertical local accuracy of 0.02-foot at the 95 percent confidence level. Locations will be reported to the nearest hundredth of a foot. Accuracy of measurements will be determined by in a manner consistent with the Federal Geospatial Data Center (FGDC) standards.

The Federal Emergency Management Agency's (FEMA) "Guidelines and Specifications for Flood Hazard Mapping Partners," Appendix A, Section A.4.6 Cross-Sections, will be used as a guideline for determining the number and locations of data points to be monitored along each cross-section. The data point locations will be presented in the GMP.

Cross-section data point location measurements will have a horizontal local accuracy of 0.2-foot and a vertical local accuracy of 0.06-foot at the 95 percent confidence level. Locations will be reported to the nearest tenth of a foot. Accuracy of measurements will be determined in a manner consistent with the FGDC standards.

A sketch of each cross-section data point will be prepared showing a line of each of the monitoring sessions. The sketches will be drawn similar to Figure A-2 in the FEMA publication cited above, with each sketch looking downstream.

A photograph will be taken at each cross-section location during each monitoring session. The photograph will be taken to approximate the sketch for that cross-section, facing downstream.

7.0 Construction Impacts Monitoring

The SDS Participants have committed to a variety of construction impact-related monitoring. Because these monitoring efforts are short term and have specific defined cure actions required by the construction documents and/or construction permits, no further details of these construction impact-related commitments are included in this MP.

8.0 Reporting

Colorado Springs Utilities will summarize the findings of this MP in an SDS Project Annual Monitoring Report, which will be submitted to Reclamation by January 31 of the subsequent year. The Annual Monitoring Report will be prepared each year through the period of this MP. Further, as required by the Pueblo County 1041 Permit, data gathered as a part of the MP that relates to water quality and geomorphic monitoring will be assembled and entered into an electronic database once each year for the period of this MP. The data will be available publicly through existing USGS and/or SDS Participant data reporting websites.

9.0 Adjustment and Termination

Consistent with the SDS IAMP, SDS Project monitoring will be continued, at a maximum, through the term of the Long Term Excess Capacity contracts that the SDS Participants are requesting from Reclamation. The scope of this SDS MP may be adjusted if findings of the IAMP so warrant. Also consistent with the IAMP, if the findings of the IAMP indicate that the impacts associated with the SDS Project continue to be within the scope and range of the impacts estimated and analyzed in the FEIS, and after discussions with Reclamation it is decided to modify or discontinue the IAMP, then the SDS Participants will coordinate with Reclamation to seek its approval to make changes to this MP that are consistent with such changes to the IAMP.

10.0 References

Bureau of Reclamation. 2009. Record of Decision for the Southern Delivery System Project Final Environmental Impact Statement. Record of Decision Reference No. GP-2009-01.

Colorado Springs Utilities. 2009. Southern Delivery System Clean Water Act Section 404 Individual Permit Application. April 24.

Colorado Springs Utilities, City of Fountain, Security Water District, Pueblo West Metropolitan District, and Colorado Division of Wildlife. 2010. Southern Delivery System: Fish and Wildlife Mitigation Plan. March 11.

Colorado Springs Utilities. 2011. Southern Delivery System Integrated Adaptive Management Plan. March.

Pueblo County. 2009. 1041 Permit No. 2008-002. The Board of County Commissioners of Pueblo County Colorado; A Resolution Approving 1041 Permit No.2008-002 With Terms and Conditions for Construction and Use of a Municipal Water Project Known as the Southern Delivery System within Pueblo County, Colorado. April 21.

U.S. Geological Survey (USGS), variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey techniques of Water-Resources Investigations, book 9, chaps A1-A9, available online at http://pubs.water.usgs.gov/twri9A.

APPENDIX A

Sampling and Analysis Plan for Water Quality Monitoring

Southern Delivery System

Sampling and Analysis Plan for Water Quality Monitoring

Prepared for

Colorado Springs Utilities

Prepared by

CH2MHILL

MARCH 18, 2011

Contents

Tables

Figures

Acronyms and Abbreviations

^{0}C	degrees Celsius
ASTM	American Society for Testing and Materials
CDPHE	Colorado Department of Public Health and Environment
CSR	Clear Spring Ranch
DO	dissolved oxygen
DOT	United States Department of Transportation
EPA	United States Environmental Protection Agency
E. coli	*Escherichia coli*
GPS	global positioning system
HPLC	high-performance liquid chromotography
HSP	Health, Safety, and Environment Plan
IAMP	Integrated Adaptive Management Plan
IDW	investigative-derived waste
MDL	maximum detection limit
mgd	million gallons per day
mL	milliliter
MP	Monitoring Plan
MRL	maximum reporting limit
MS	matrix spike
MSD	matrix spike duplicate
NAD	North American Datum
NH_3	ammonia
O&M	operation and maintenance
PPE	personal protective equipment
QA	quality assurance
QC	quality control
QA/QC	quality assurance/quality control

ROD	Record of Decision
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SDS Participants	City of Colorado Springs, City of Fountain, Security Water District, and Pueblo West Metropolitan District
SDS Project	Southern Delivery System
SOP	standard operating procedure
µg/kg	micrograms per liter
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
UWCR	Upper Williams Creek Reservoir
WTP	water treatment plant
WWTP	wastewater treatment plant

SECTION 1.0

Introduction

This Sampling and Analysis Plan (SAP) provides a description of the Water Quality Monitoring efforts of the Southern Delivery System Project (SDS Project) that will be implemented as part of the mitigations for the SDS Project. The SAP is designed to be an attachment to the SDS Monitoring Plan (MP) and the SDS Integrated Adaptive Management Plan (IAMP) (Colorado Springs Utilities 2011a and 2011b), that was prepared consistent with the requirements of the Bureau of Reclamation's (Reclamation) Record of Decision (ROD) (Reclamation 2009). This SAP was also developed in accordance with the *National Field Manual for the Collection of Water-Quality Data: U.S. Geological Survey Techniques of Water-Resources Investigations* (Field Manual) published by the United States Geological Survey (USGS) on various dates.

1.1 Purpose and Background

The SDS Project is a proposed regional water delivery system that will serve the City of Colorado Springs, City of Fountain, Security Water District, and Pueblo West Metropolitan District (SDS Participants). The first phase of the SDS Project included construction of the following facilities and is scheduled to be in service in 2016:

- A 53-mile raw water pipeline (66- and 72-inch diameter)
- Two 78-million-gallon-per-day (mgd) raw water pump stations and one 50-mgd raw water pump station (expandable in Phase 2)
- A water treatment plant (WTP) with a capacity of 50 mgd (expandable in Phase 2)
- Nine miles of 24- to 54-inch-diameter finished water pipelines

Phase 2 of the SDS Project includes the following:

- Addition of 30,500 acre-feet of terminal storage at a new dam site on upper Williams Creek, called Upper Williams Creek Reservoir (UWCR)
- Expansion of the 50-mgd raw water pump station and WTP to 100-mgd capacity
- Expansion of the treated water delivery system
- Addition of a 28,000 acre-foot exchange storage reservoir on Williams Creek and exchange conveyance facilities to transfer exchange water to and from Fountain Creek

Phase 2 is scheduled for completion in the 2020-2025 timeframe. Figures A1-1 through A1-3 show the sample locations within the Fountain Creek Basin and along the Arkansas River.

FIGURE A1-1
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli*, Ammonia, and Salinity (North)

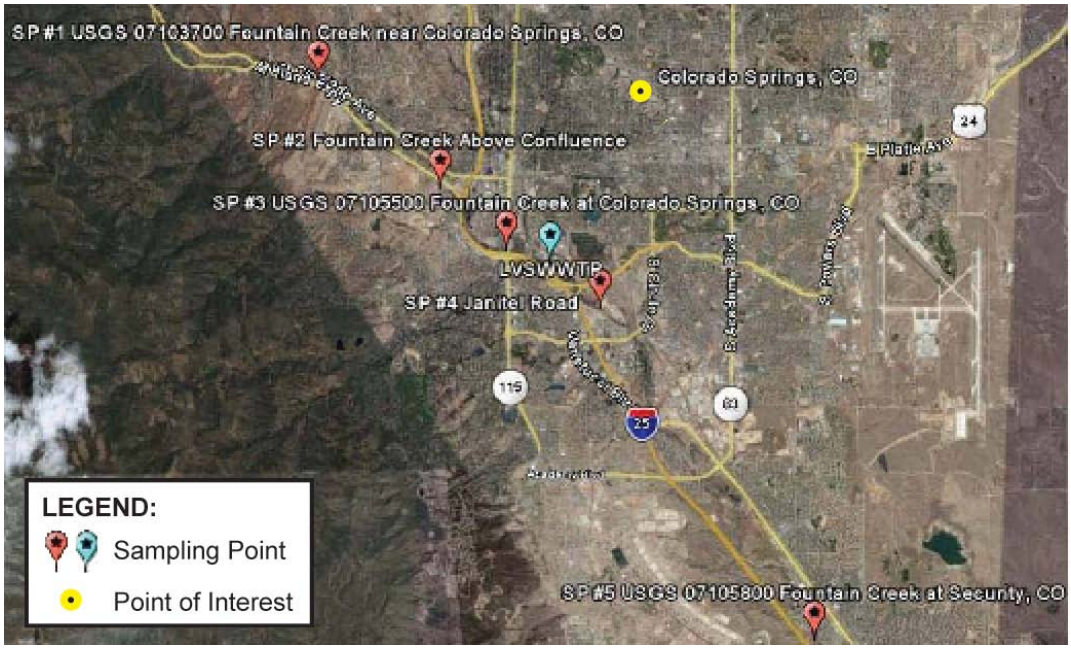


FIGURE A1-2
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli,* Ammonia, and Salinity (Central)

FIGURE A1-3
Locations of SDS Monitoring Plan Sampling for Dissolved Selenium, *E. coli*, Ammonia, and Salinity (South)

This SAP provides information and the rationale for sampling surface water at sampling locations within the Fountain Creek Basin and along the Arkansas River. The analytical results of sampling efforts will be used to monitor the quality of the surface water throughout the construction process to determine the impacts of the construction. Laboratory analytical results will be used to characterize the sample material.

This SAP has been prepared to provide the water quality data required by the Monitoring Plan (MP) and the Integrated Adaptive Management Plan (IAMP) for the SDS Project.

1.2 Project Description

The proposed water quality monitoring of the Fountain Creek Basin and along the Arkansas River will be conducted in order to monitor water quality throughout the period of the MP for the SDS Project.

1.3 Objectives

The objectives of this SAP are to perform water quality monitoring meeting the requirements of the ROD as previously identified in the MP.

1.4 Water Quality Sampling Locations

Per the SDS IAMP, the water quality sampling locations are as follows:

- SP #1 – USGS Gage 07103700 Fountain Creek near Colorado Springs, Colorado, and a baseline upstream of Colorado Springs
- SP #2 – USGS Gage 07104905 on Monument Creek at Bijou Street in Colorado Springs and a point below the J. D. Philips Water Reclamation Facility
- SP #3 – USGS Gage 07105500 Fountain Creek at Colorado Springs, Colorado, and a point above the Las Vegas Street WWTP
- SP #4 – Point below the Las Vegas Street WWTP
- SP #5 – USGS Gage 07105800 on Fountain Creek at Security, Colorado

- SP #6 – Point above the Clear Spring Ranch (CSR) wetland mitigation
- SP #7 – USGS Gage 07106000 on Fountain Creek near Fountain, Colorado, and a point below the CSR wetland mitigation
- SP #8 – USGS Gage 07106300 on Fountain Creek near Pinon, Colorado
- SP #9 – Point above the Pueblo levee system
- SP #10- USGS Gage 07106500 on Fountain Creek at Pueblo, Colorado, and a point within the Pueblo levee system
- SP #11 – Point below the Pueblo levee system
- SP #12 – USGS Gage 07099970 on the Arkansas River at Moffat Street in Pueblo, Colorado, and a point on Arkansas River above confluence to establish baseline
- SP #13 – USGS Gage 07109500 on the Arkansas River near Avondale, Colorado, and a point below confluence to determine exit conditions

Monitoring will occur during construction and operation of the SDS Project, as described in the MP.

1.5 Site Access

Property access for sampling will be coordinated by Colorado Springs Utilities before the start of water quality monitoring activities.

SECTION 2.0

Sampling Program

2.1 Pre-Task Activities

Prior to initial sampling, a site reconnaissance will be performed to identify potential contaminant sources, out-of-the-ordinary (large) debris, and potential health and safety hazards not previously observed. These areas will be marked for future evaluation and noted in the field logbook.

Before conducting water quality monitoring field activities, appropriate emergency services personnel and agencies will be notified, and necessary clearances and permits will be obtained.

2.2 Sampling Methodology

To fully perform water quality monitoring in the Fountain Creek Basin and along the Arkansas River, a downstream-to-upstream sampling scheme is proposed to avoid contaminating unsampled areas with the river sediment suspended as a result of working in the river.

Surface water samples will be collected from the upper part of the water column using a grab sampling device (Van Dorn, Niskin, or comparable bottle grab sampler) or by using a dip-sampling method at each sample location.

2.3 Sample Location and Analyte List

Physical analysis will include temperature, pH, conductivity, dissolved oxygen (DO), turbidity, and salinity. Chemical/biological analysis for samples will include dissolved selenium (field filtered*), Escherichia coli (E. coli),* ammonia, and salinity. At least two samples will be taken at each monitoring site. One sample from each monitoring location will be filtered for inorganic solid constituents in the field according to Section 5.2 of the USGS Field Manual to analyze for dissolved selenium. The other sample from each monitoring location will be analyzed for *E. coli*, ammonia, and salinity. All samples will be managed in accordance with the USGS Field Manual or approved EPA criteria for sample collection and management.

2.4 Methyl Mercury

In addition to the water quality monitoring at the Fountain Creek Basin and along the Arkansas River, Colorado Springs Utilities will monitor both the inlet to and outlet from the Williams Creek Reservoir for methyl mercury on a schedule as described in the MP. Samples are anticipated to be collected and analyzed following standard procedures according to the Field Manual and EPA Method 1630. Reservoir operations are not scheduled to start until 2025 or later; therefore, the SAP associated with the inlet and outlet

monitoring will be prepared as a separate plan and are not included as part of the SAP given the likelihood that sampling and analysis technologies will evolve.

SECTION 3.0

Field Procedures

3.1 Sample Field Screening Procedures

3.1.1 Field Measurements

Several of the field parameters are physically or chemically unstable and may be tested using either an in-flow multi-measurement system or a field test kit or instrument immediately after sample collection. Examples of unstable parameters include pH, temperature, and DO. Although the conductivity of a substance is relatively stable, the characteristic needs to be measured in the field to compare with the laboratory measurement to determine if significant dissolution or precipitation has occurred after sample collection. Most instruments measuring conductivity require temperature compensation. Therefore, the temperature of the samples will be measured at the time the conductivity is measured.

At a minimum, the following field parameters will be measured prior to sampling: pH, temperature, specific conductance, and DO.

An unfiltered water grab sample (if not employing an in-flow multi-measurement system) will be collected for measuring field parameters. One sample will be used to measure all field parameters; field parameters need to be measured as soon as possible after collection and this unfiltered sample should not be submitted for laboratory analysis. The field parameters will be measured in the following order, as applicable:

- Temperature and pH
- Conductivity
- DO
- Turbidity
- Salinity

The in-flow multi-parameter monitoring system or similar multi-parameter instruments may be used for measuring pH, temperature, conductivity, and DO. The instrument operation and maintenance (O&M) manual will be followed when operating or calibrating instruments.

3.1.2 Calibration of Field Equipment

For water analyses, field equipment requiring calibration includes: combination pH, electrical conductivity, temperature, and DO meters. The meters will be calibrated before the start of work and at the end of the sampling day. Any instrument "drift" from prior calibration should be recorded in a field notebook. Calibration will be in accordance with procedures and schedules outlined in the particular instrument's operation manual. The calibration standards to be used for the combination pH meter are standard buffered solutions of pH 4, 7, and 10. Water temperature measurements will be made using the temperature mode of the digital readout combination pH meter.

Calibrated equipment will be uniquely identified by using either the manufacturer's serial number or other means. A label with the identification number and due date of the next calibration will be physically affixed to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. In addition, the results of calibrations and records of repairs will be recorded in a logbook.

Scheduled periodic calibration of testing equipment does not relieve field personnel of the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, the device will be removed from service, tagged to avoid inadvertent use, and the appropriate personnel notified so that a re-calibration can be performed or a substitute piece of equipment can be obtained.

Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use or tagged to indicate it is out of calibration. Such equipment will be repaired and satisfactorily re-calibrated. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed re-calibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented, and the task manager and quality assurance/quality control (QA/QC) reviewer will be notified.

3.2 Surface Water Sampling Procedures

The subsections below describe procedures for collection of surface water samples from the Fountain Creek Basin and along the Arkansas River, including samples collected for laboratory analysis as well as field measurements of water quality parameters.

Surface water flow conditions may vary during water quality monitoring. Conditions expected to be encountered include the following:

- Areas of standing water
- Flowing streams and ditches
- Low flow seeps and springs

Separate sampling procedures are specified for each of the three flow condition types. The personnel performing sampling activities will have knowledge and experience in the sampling methods proposed or will work under the direct field supervision of knowledgeable and experienced personnel.

Field personnel will document sample collection in the field logbook. Generally, information to be documented includes sampling conditions, sample location and identification, and methods used. Photographs should be taken at each sampling location to document both the sample point and sampling conditions. Specifically, the following field notes will be recorded in the field book:

- Names of sampling personnel
- Weather conditions
- Date and time of sampling
- Sample location number

- Description of sampling location (e.g., description and sketch of surrounding site)
- Decontamination information
- Sampling method
- Sampler's signature
- Observations of conditions that may affect sample quality

3.2.1 Standing Water Sampling Procedures

Samples may be collected by direct submersion of the sample bottle in the standing water if the sample bottles provided by the laboratory do not contain preservatives. If the bottles contain preservatives, a transfer container must be used to initially collect the sample of the standing water prior to transferring the sample to the container to be submitted to the laboratory. The procedures for collection of standing surface water samples are as follows:

1. Rinse the laboratory-supplied sample bottle or transfer device three times with standing water before collecting the sample (discard rinse water well away from the sample location).

2. Submerge the laboratory-supplied sample bottle or decontaminated transfer container below the water surface, taking care to minimize disturbance of bottom materials. If possible, the sample should be collected from at least 6 inches below the water surface.

3. Fill the laboratory-supplied sample bottle to the required volume (either by submersion or from the transfer container). The filtering procedure for the dissolved selenium is described in a separate section below. Cap and appropriately label the samples as described in Section 4.2.

4. The laboratory will be supplying bottles with appropriate preservatives, but if necessary, add the appropriate preservative to the sample.

5. Place the samples for shipping to the laboratory in accordance with the sample handling procedures described in Section 4.5.

6. Collect a sample of the standing water in the transfer container and measure field parameters in accordance with Section 3.1.1. Record field measurements in the field logbook and discard the water.

3.2.2 Flowing Water Sampling Procedures

Samples may be collected by direct submersion of the sample bottle in the flowing water if the sample bottles provided by the laboratory do not contain preservatives. If the bottles contain preservatives, a transfer container must be used to initially collect the sample of the flowing water prior to transferring the sample to the container submitted to the laboratory. The procedures for collection of flowing surface water samples are as follows:

1. To avoid disturbing stream sediments that may affect the sample, approach the sampling location from downstream. Always stand downstream of each individual sampling location while collecting the sample. When collecting samples at successive locations in the river, always proceed from downstream to upstream locations to avoid contaminating unsampled areas with the stream sediment suspended as a result of working in the flowing water.

2. If a transfer container is to be used, triple rinse the container with flowing water prior to collecting the sample. Discard the rinse water downstream of the sampling location.
3. Fill the laboratory-supplied sample bottle to the required volume (either by submersion or from the transfer container). If possible, the sample should be collected from at least 6 inches below the water surface. The filtering procedure for the dissolved selenium is described in a separate section below. Cap and appropriately label the samples as described in Section 4.2.
4. The laboratory will be supplying bottles with appropriate preservatives, but if necessary, add the appropriate preservative to the sample.
5. Place the samples for shipping to the laboratory in accordance with the sample handling procedures described in Section 4.5.
6. Collect a sample of the standing water in the transfer container and measure field parameters in accordance with Section 3.1.1. Record field measurements in the field logbook and discard the water.

3.2.3 Low-Flow Sampling Procedures

The procedures for collection of low-flow surface water samples are as follows:

1. Dig a small depression in the soil adjacent to and within the path of flow.
2. Place a decontaminated stainless steel bowl in the depression with the rim of the bowl positioned to intercept the flow.
3. Allow the bowl to fill and to overflow for several minutes (preferably until the water is no longer turbid).
4. Obtain water samples from the stainless steel bowl by submerging the sample bottle or using a decontaminated transfer container (triple rinse the sample container prior to sample collection). The filtering procedure for the dissolved selenium is described in a separate section below. Cap and appropriately label the samples as described in Section 4.2.
5. The laboratory will be supplying bottles with appropriate preservatives, but if necessary, add the appropriate preservative to the sample.
6. Place the samples for shipping to the laboratory in accordance with the sample handling procedures described in Section 4.5.
7. Collect a sample of the standing water in the transfer container and measure field parameters in accordance with Section 4.1. Record field measurements in the field logbook and discard the water.

3.2.4 Filtering Procedures

The procedures for filtering dissolved selenium surface water samples using an in-line filter and peristaltic pump are as follows:

- Assemble the filter and peristaltic pump according to the manufacturer's instructions. Insert a new piece of tubing approximately 6 inches in length through the pump head of the peristaltic pump. New tubing will also be used for each sample.
- Place the unfiltered water sample into a decontaminated sample transfer device, such as a large beaker. Place the inlet tube into the sample transfer device and turn on the pump.
- Rinse and discard the first 25-100 milliliters (mL) of water that pass through the tubing and filter. The volume should be approximately three times the tubing volume.
- Use the discharge line from the pump to fill the appropriate sample container(s) with filtered water.
- Place the used filter and tubing in a suitable container and dispose of as investigative-derived waste (IDW).

The following procedure is used for filtering samples using a hand pump:

1. Assemble the filter unit according to the manufacturer's instructions. Use a new filter unit for each sample.
2. Pour the unfiltered water sample into the top portion of the filter unit. Use the hand pump to apply pressure to the filter unit to increase the rate of filtration.
3. Discard the first 25 mL of water that pass through the filter.
4. Transfer the filtered sample from the lower portion of the filter unit to the appropriate sample container(s) with filtered water.
5. Place the used filter unit in a suitable container and dispose of as IDW.

3.3 Surveying

The following general site survey standards will be applied to establish the location of each sample location for future mapping. Horizontal positions of the sampling locations will be established by using a submeter Trimble GeoXT handheld global positioning system (GPS).

Survey data for this site will attempt to obtain real-time submeter (less than 1 meter) horizontal accuracy using a GPS, depending on satellite geometry. The GPS latitude-longitude locations will be recorded in decimal degrees (five decimal places) using the North American Datum (NAD)83 datum. After post-processing, the GPS locations will be additionally calculated using these specifications: Datum: NAD83, Colorado State Plane Zone 1, Horizontal Units: U.S. Foot. Some historical imagery, and most historical drawing documents, were compiled using the NAD83 Datum.

3.4 Sampling Equipment

The following materials and equipment will be necessary for measurement of field water quality parameters and collection of surface water samples for laboratory analysis:

- In-flow water quality meter (minimum probes: pH, temperature, electrical conductivity, and DO)

- Calibration standards
- Spare pH or electrolyte cartridge, as applicable
- pH electrode storage location
- Deionized water for decontamination and field blanks
- High-performance liquid chromotography (HPLC) water for field and equipment blanks
- Decontamination equipment (buckets, spray bottles, brushes, alconox)
- Nitrile gloves/work gloves
- Safety glasses/orange vests/steel-toe boots
- Reference Maps
- 100-foot tape measure
- Surveying stakes or flags for marking of sample locations
- Digital camera
- Trash bags
- Sample bottles/labels/coolers/ice
- Tygon™ or silicone tubing
- Peristaltic pump
- 12-volt battery
- Wash bottle
- Kimwipes® or equivalent
- Logbook
- Discharge hoses
- 0.45-micron filters
- Tool bag
- Paper towels
- Ziploc or similar plastic bags
- Chain-of-custody forms/custody seals
- Waterproof pens
- Packaging tape, clear tape
- Batteries

3.5 Equipment Decontamination

Decontamination of sampling equipment must be conducted consistently to ensure the quality of the samples collected. Equipment that comes into contact with potentially contaminated samples will be decontaminated. Disposable equipment intended for one-time use that is factory-wrapped generally does not need to be decontaminated prior to use, unless evidence of contamination is present. One-time-use, disposable sampling equipment and accessories will be discarded once used, and a new set of equipment will be used for each subsequent sample.

Sampling equipment will be decontaminated before each use. The decontamination procedure will consist of the following basic steps:

- Wash the equipment with non-phosphate detergent
- Rinse the equipment with tap water
- Rinse the equipment with deionized/distilled water

Equipment will be protected from dust and allowed to air dry. Decontaminated equipment will not be allowed to touch contaminated surfaces. The equipment will be labeled as decontaminated for organic sampling, with the decontamination date included on the label.

At least one equipment blank will be collected after each sampling event to verify the effectiveness of the decontamination procedure. Section 4.3 of this SAP contains information related to QC samples.

Decontamination waste media will be collected, stored, and transported in approved containers. The media will then be characterized for disposal according to state and local regulations.

3.6 Investigation-Derived Waste Management

Waste generated during fieldwork includes PPE, disposable sampling equipment, decontamination fluids, and excess sediment samples. Table A3-1 summarizes the anticipated waste streams and disposal paths.

TABLE A3-1
Anticipated Waste Streams and Disposal Paths

Waste Stream	Disposal
Refuse	General refuse such as personal protective equipment, gloves, paper towels, plastic sheeting, etc., will be disposed of appropriately.
Sampling Water	Water encountered during water quality sampling operations will be discharged overboard or on the ground during water quality sampling activities.

SECTION 4.0

Sample Handling and Custody

4.1 Method, Sampling Containers, Preservation, and Holding Times

The sampling container, preservation, and holding time requirements are listed by analyte in Table A4-1. Certified pre-cleaned containers, laboratory-prepared with preservation, will be procured from the contracted analytical laboratory. No sample containers will be reused. Samples will be held at 4 degrees Celsius (°C) in a cooler until delivery to the laboratory.

TABLE A4-1
Water Quality Monitoring Sample Method, Container, Preservation, and Holding Times

Parameter	Matrix	Analytical Method	Container	Preservative [b]	Maximum Holding Times (4°C)
Dissolved Selenium	Water	SW6020[a]	1 x 250 mL poly	Nitric Acid to < pH 2	180 days
E. coli	Water	SM9221F[c] or EPA 1604[d]	poly or glass cup	Sterile < 4°C	6 hours, receipt by lab same day as collection
Ammonia	Water	SM4500-NH_3[c]	1 x 1,000 mL poly	Sulfuric Acid to < pH 2 cool < 4°C	28 days
Specific Conductance	Water	EPA 120.1[e] or SM2510[c]	500 mL poly	Cool < 4°C	28 days

[a] Method numbers refer to U.S. Environmental Protection Agency *Test Methods for Evaluation of Solid Waste, Physical and Chemical Methods*, SW-846, 3rd edition, Revision 4, 1996.
[b] Samples will be stored on ice during transport to the laboratory.
[c] Method numbers refer to the *Standard Methods for the Examination of Water and Wastewater*, 20th edition, 1998.
[e] Method number refers to U.S. Environmental Protection Agency *Method 1604: Total Coliforms and Escherichia coli in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium)*, EPA 821-R-02-024. 2002.
[e] Method number refers to U.S. Environmental Protection Agency *Methods for Chemical Analysis of Water and Wastes*, EPA 600/4-79-020. 1983.
NH_3 = ammonia
°C = degrees Celsius
mL = milliliter

4.2 Quality Control Samples

4.2.1 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS and MSD samples consist of duplicate field sample aliquots spiked by the laboratory with analytes of concern to evaluate the effects of the matrix on the recoveries of these analytes. MS/MSDs will be collected at the frequency of one per 20 samples (5 percent) of each matrix collected from each site, and designated on the chain-of-custody form for use as MS/MSD samples by the laboratory. The duplicate aliquots for MS/MSD analyses should

be collected simultaneously or in immediate succession with the parent sample. They will be treated in exactly the same manner as the parent sample during storage and shipment. The sampling locations for the MS/MSD samples will be documented in the field logbook and on sample record forms.

4.2.2 Field Duplicates

Field duplicate samples are independent samples collected as close as possible to the original sample from the same source and are used to document sampling precision. Field duplicates will be labeled and packaged in the same manner as other samples. Field duplicates will be collected by alternately filling sample and sample duplicate containers at a location of known or suspected contamination. Each duplicate will be taken using the same sampling and preservation method as other samples. Field duplicates will be collected at a minimum frequency of one in every 10 samples.

4.2.3 Field Blanks

The field blanks are collected to verify that contamination is not introduced to samples during collection, handling, or shipping of the samples. They will be prepared by pouring blank water directly into the sample bottles (true field blanks) or by pouring blank water over or through decontaminated sampling equipment (equipment blanks). Reagent-grade deionized water will be used for inorganic analyses using the same preservation methods and packaging and sealing procedures used during collection of other samples. Field blanks will be prepared and labeled in the same manner as the field samples. A field blank will be collected at the last sampling (equipment) location each day.

4.2.4 Temperature Blanks

Temperature blanks will be used so that the laboratory can verify the temperature upon receipt of the samples. The temperature of the samples upon arrival will be annotated on the chain-of-custody form and also mentioned in the laboratory narrative that accompanies the analytical results. One temperature blank should accompany each sample cooler.

4.3 Sample Labeling

During the field investigation, a consistent sample-identification system will be employed to ensure uniqueness and clarity in sample labeling. This section describes the protocol that will be followed in labeling samples that are submitted to the analytical laboratory. This section does not apply to those samples that will be collected but not retained for laboratory analysis.

Each sample collected during the fieldwork will be assigned a unique identification number that includes the following information:

- Sample Point (for example, SP1 = Sample Point 1)
- Sample Matrix (for example, SW = surface water)
- Sample Type (for example, GS = gage station, MP = monitoring point)
- Sample Number (gage station number or monitoring point number)

A complete sample name will consist of the components listed above, using the following format:

(sample point)(sample matrix)-(sample type)-(sample number)

For example, "SP1SW-GS-07103700" would represent the surface water sample collected from SP #1 – USGS Gage 07103700 Fountain Creek near Colorado Springs, CO

Matrix spike/matrix spike duplicate (MS/MSD) samples will be named the same as their parent sample, except with the "MS" and "MSD" designation at the end of the sample ID (for example, "SP1SW-GS-07103700MS" and "SP1SW-GS-07103700MSD").

Field duplicate samples will be named the same as their parent sample, except with the "FD" designation at the end of the sample ID (for example, "SP1SW-GS-07103700FD").

Field Blank samples collected during fieldwork will be assigned a unique identification number that includes the following information:

- Sample Type (for example, FB = Field Blank)
- Sample Number
- Sample Date (MMDDYYYY)

A complete sample name will consist of the components listed above, using the following format:

(sample type)(sample number)-(sample date)

For example, "FB01-04012016" would represent the first field blank sample collected on April 1, 2016.

4.4 Chain-of-Custody Record

Procedures must be taken to preserve and ensure the integrity of all samples from the time of collection through analysis. Records of the custody of samples must be maintained both in the field and in the laboratory. A sample is considered to be in someone's custody if it is in his or her physical possession or view, locked up, or kept in a secured and restricted area. Until the samples are shipped, their custody will be the responsibility of the sampling team leader.

Chain-of-custody records document sample collection and shipment to the laboratory. A chain-of-custody form will be completed in duplicate, at a minimum, for each sampling day. The original chain-of-custody form will be delivered with the sample shipping cooler, and the copy will be retained in the field documentation files. The chain-of-custody form will identify the contents of each shipment and maintain the custodial integrity of the samples. All chain-of-custody forms will be signed and dated by the responsible sampling team personnel. The "relinquished by" box will be signed by the responsible sampling team personnel, and the date, time, and air bill number (if applicable) will be noted on the chain-of-custody form.

Custody seals will be placed across the front and back edges of each sample cooler lid to maintain its integrity until it is opened by the laboratory. The shipping coolers containing the samples will be sealed with a custody seal any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated by the responsible sampling team personnel.

The following information must be documented on the chain-of-custody form at a minimum:

- Project name, project number, and project manager's name
- Unique sample identification (no dashes, spaces, or commas)
- Date and time of sample collection
- Matrix
- Number of sample containers
- Analyses required
- Designation of MS/MSD samples
- Preservative used
- Name and signature of sampler, receiver
- Bill of lading or transporter tracking number (if applicable)
- Requested turnaround time

Custody must be maintained at the laboratory once samples are received until all tests are completed. This will be accomplished using an internal custody system that requires samples to be kept in a secured and restricted area when not in use, and to be checked out and checked back in by the analysts who use them. Internal custody records must be maintained by the laboratory as part of the documentation file for each sample.

4.5 Sample Packaging and Transport

To minimize the potential for sample degradation and to maintain a temperature of about 4°C, samples will be chilled in a cooler with an ice substitute (for example, blue ice) or ice in a resealable plastic bag and shipped same as sample collection. The chain-of-custody form, and a QA sample form, if required, will be filled out in indelible ink, placed in a resealable plastic bag, and taped to the inside lid of the shipping cooler. It is anticipated that most project samples will be environmental samples in small volumes. Environmental samples are samples with contaminant concentrations significantly reduced by normal environmental weathering processes such as volatilization to the air, degradation caused by exposure to sunlight and microbes, or simple mixing with soil or groundwater. As such, the samples present little shipping hazard in terms of corrosiveness, flammability, and explosiveness.

The following procedures will be followed in packing environmental samples:

- Check the sample container caps to make sure they are tightened properly.
- Tape over the drain hole on the inside of the cooler.
- Place a layer of cushioning material in the bottom of the cooler.
- Enclose each bottle in a separate, clear, plastic bag and seal each bag. Place the bottles upright in the cooler so that they will not touch against each other during shipment.
- Place additional cushioning material around sample bottles, and fill voids between bottles.

- Place ice substitute between samples and over the containers to preserve them at approximately 4°C. (Note: loose bagged ice is not acceptable if coolers are transported by commercial aircraft.)
- Fill the cooler with cushioning material.
- Tape the cooler drain shut from the outside of the cooler.
- Place completed chain-of-custody form inside a resealable bag and tape the bag to the inside lid of the cooler.
- Close and latch the cooler. Wrap a strong adhesive tape around the ends of the cooler to secure it, making sure to cover the spigots at the bottom and any open space between the lid and the cooler. Tape the cooler latch closed with strapping tape.
- Seal the cooler with custody seals in two places, on the front and the rear, and seal the cooler with strapping tape. The signature on the custody seals should match the signature on the chain-of-custody form.
- Attach the completed shipping label to the top of the cooler; print "Laboratory Samples" and "This End Up" on the top of the cooler; and put upward-pointing arrows on all four sides. Place "Fragile" and "Chill, Do Not Freeze" labels on at least one side.

If the coolers are not to be delivered by hand to the project laboratory but shipped to the laboratory, the samples will be packaged for shipment according to United States Department of Transportation (DOT) regulations. Marking and labeling procedures will be consistent with DOT regulations. The method of shipment, courier name(s), and other pertinent information will be entered on the chain-of-custody form. Air bills will be properly completed, and copies will be retained and placed in the project file.

For environmental samples, no DOT marking, labeling, or shipping papers are required, and there are no DOT restrictions on the mode of transportation.

For hazardous samples, which are not expected, the following procedures must be followed:

- Place the sample container inside a 1-quart or 1-gallon paint can. Fill the void space with vermiculite. Place the paint can in a cooler and pack as described above.
- Complete a carrier-approved air bill or shipper's certification for restricted articles, providing the following information in the order listed:
  - "Flammable Liquid, No. UN 1993" or "Flammable Solid, No. UN 1325"
  - "Limited Quantity" (or "Ltd. Qty.")
  - Net weight or net volume of total sample material in cooler
  - "Laboratory Samples"
  - "Cargo Aircraft Only"
- Affix a corporate address label to the cooler with the address of the laboratory.

DOT regulations do not apply to transport by government-owned vehicles, including aircraft.

4.6 Transfer of Custody and Shipment

When transferring the samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody form. If the samples are required to be shipped, the primary or QA laboratory coordinators will be notified of when and how samples were sent. Notification will include the following information:

- Date of shipment
- Name of shipping company
- Air bill number
- Number of coolers
- Name, phone number, and facsimile number of point of contact
- Estimated date of shipment arrival
- Type of samples (water, sediment)

On receipt of each sample cooler and after verification of the chain-of-custody records, the primary or QA laboratory will provide a cooler receipt form documenting any discrepancies such as, but not limited to, the following:

- Inappropriate sample containers or preservation
- Broken sample containers
- Cooler temperature outside range of 2°C to 6°C (where applicable)
- Missing chain-of-custody form or QA sample form
- Errors on chain-of-custody or QA sample form
- Missing custody seals

The laboratory will notify the SDS Project team of any such discrepancies within 24 hours of its receipt of the samples.

SECTION 5.0

Quality Control

5.1 Sample Re-Analysis and Corrective Action

Laboratory results that do not meet specified method criteria or the laboratory's internal QC requirements shall be re-analyzed by the laboratory unless directed otherwise by the project manager.

The laboratory will review the data generated to verify that all samples have been run as specified in the procedure. Laboratory personnel are alerted that corrective actions may be necessary under the following conditions:

- QC data are outside the warning or acceptable windows for precision and accuracy established for laboratory samples.
- Test validation criteria are not met as identified in the respective procedure.
- Reference toxicant tests, if applicable, are outside two standard deviations of the mean.
- Deficiencies are detected by the laboratory QA director during internal or external audits, or from the results of performance evaluation samples.
- Reporting limits for non-detects must be at or below the CDPHE screening levels.

Corrective actions are implemented immediately when nonconformances in QC or sample results are identified. If the problem persists, cannot be identified, or cannot be remedied, the project manager must be notified about the nonconformance. All laboratory QC problems that will affect the final data must be documented. If data are affected, full documentation of the corrective action will be filed for inclusion in the project file. A copy of the corrective action report must be included in the laboratory data package deliverable.

Corrective actions may include:

- Re-analyzing suspect samples
- Evaluating and amending analytical procedures
- Accepting data with an acknowledged level of uncertainty

5.2 Laboratory Written Report

A written report will be prepared by the laboratory documenting all activities associated with sample analyses. As a minimum, the following will be included in the report:

- Results of the laboratory analyses and QA/QC results, reported both in hard copy and in electronic data format. Raw data will be legible or typed. Illegible data may result in the need for re-analysis if the regulatory agencies cannot interpret the data as a result.
- All protocols used during analyses, including explanation of the approved sampling plan.

- Chain-of-custody procedures, including explanation of any deviation from the identified protocols.
- Location and availability of data, laboratory notebooks, and chain-of-custody forms.

As appropriate, this SAP may be referenced when describing protocols.

5.3 Quality Assurance/Quality Control, Data Reviews, and Data Qualifiers

The integrity and validity of all analytical results require the implementation of an internal QA program. The program must meet the most stringent requirements in criteria specified by the American Society for Testing and Materials (ASTM) and/or EPA methods.

Analyses not meeting test validation criteria must be described in the case narrative. If the laboratory does not expect to be able to meet any of the limits, the sampling contractor project manager will be notified in writing (email or facsimile) as soon as any failure is noted by the laboratory. Any variances must be approved by appropriate laboratory personnel and the sample contractor project manager before the laboratory proceeds with sample analysis.

5.3.1 Data Validation

All data collected during the project will be subjected to a Stage 3 data validation process by the SDS Project team as specified by the EPA Contract Laboratory Program National Functional Guidelines. In addition to the data review conducted by the laboratory, this data validation process will involve a detailed review of the raw analytical data as well as the data summaries for each sample delivery group (SDG). The results of this data validation process will describe whether all the reported data are considered to be from valid, representative samples and, therefore, are acceptable for the data endpoints for which they were intended as set forth in the project SAP. Data QA/QC and validation summaries for each SDG will be included in a technical appendix to the final report.

Field sampling and laboratory analyses will be performed as outlined in the project SAP and in contracted laboratory's standard operating procedures (SOPs). This validation will be conducted using laboratory SOPs provided for laboratory data, analytical methods, and/or project-specific QA/QC procedures and guidelines. Detailed data validation reports will be prepared for each group of chemicals.

5.4 Reporting Limits

To ensure the analytical data provide information that can be used to assess the contaminant concentrations down to the levels of concern, it is necessary that the laboratory calibrate its equipment appropriately for the proposed project. The limits used to determine laboratory compliance are method reporting limits (MRLs) and method detection limits (MDLs). MRLs will be established using current CDPHE limits once sampling has started and throughout the sampling period for the SDS Project. The MDLs will be based upon site specific data and will be evaluated when the final SAP is implemented.

SECTION 6.0

Project Documentation

Project documentation and tracking include field recordkeeping, photographs, surface water sample logs, sample chains-of-custody, and other documents so that the location, sample type, requested analyses, and other sample-specific information are appropriately documented and retrievable during subsequent data evaluation efforts.

6.1 Project Logbook

Field personnel will maintain a project-specific notebook of daily activities to record any pertinent information and to describe sampling activities. Field personnel will update the project notebooks daily during field activities. Field notes, sketches, and investigation observations will be documented in dedicated, water-resistant field notebooks using permanent pens. The notebook will be bound, with consecutively numbered pages. All entries will be legibly written in indelible black or blue ink. Any entry errors will be corrected by drawing one solid line through the incorrect entry, followed by the user's initials and date. The end of each workday and/or task will be signed and dated by the individual making the entries. Factual and objective language will be used. All entries will be complete and accurate enough to allow reconstruction of each field activity. Activities should be recorded contemporaneously. When not in use, the logbook will be stored in the permanent project file. After completion of the sampling activities, the field notebooks will be in the custody of the sample contractor's task manager.

The field logbook cover will include the following information:

- Job name, contract, and delivery order numbers
- Site activity name
- Start date and end date of last logbook entry

Daily entries of the following minimum information will be recorded in the logbook, when applicable:

- Date and time, expressed in 24-hour (military) format
- Times of arrival and departure from the site
- Meteorological and water conditions – including stream flow if such data is available.
- Project personnel and subcontractor personnel onsite
- Any visitors to site and their level of protection
- Health and safety hazards and precautions
- Level of personal protection
- Field observations
- Task start/stop times
- Date and time of each entry
- Time and duration of sampling activities
- Site identification (visual sketches where appropriate)
- Bore length recovered

- Location of sampling points (visual sketches where appropriate)
- Station location (with GPS coordinates) and station name or number
- Description of sample
- Sample ID and analyses to be completed
- Number of samples taken
- Time of sample collection
- Number and type of QA/QC samples taken
- Type of field instrumentation
- Names of people collecting samples
- Comments on sampling (for example, equipment or sampling difficulties)
- Volume of sample return
- Decontamination procedures
- Equipment calibration records and all calibrations done
- Any other field instruments, general observations, or notes
- Any deviations from the sampling plan or sampling protocol, if any
- Health and safety observations
- Signature of recorder

6.2 Photographic Log

Digital photographs will be taken in the field to document sampling locations, collected samples, site conditions, and any other site-related observations. A photographic log will be maintained in which the date, location, photo identification number, brief photographic description, and direction the photographer is facing (if appropriate) will be recorded. Photographs and relevant log information will be downloaded onto a field computer on a regular basis.

6.3 Documentation Control

Project files will be maintained by the project task manager. Project documents and forms will be kept in the project files. Project personnel may keep their own duplicate files; however, original documents will be placed in the official project file. Field logs of bores, sampling, and other field activities will be maintained by the field supervisor and submitted to the task manager after the field effort.

SECTION 7.0

Project Team and Responsibilities

7.1 Project Planning and Coordination

Colorado Springs Utilities will lead the water quality monitoring. Colorado Springs Utilities may contract with a water quality testing consultant (Consultant) for all or part of the work described in this SAP.

7.2 Field Sampling Collection

Colorado Springs Utilities or the Consultant will provide overall direction to the field sampling and laboratory analysis programs in terms of logistics, personnel assignments, field operations, and analytical laboratory selection. Field supervision will include collection of the water quality samples, assuring accurate sample positioning; recording sample locations, and identification; assuring conformance to sampling and handling requirements, including field decontamination procedures; photographing, and physical evaluation; and chain-of-custody of the samples until they are delivered to the sample preparation laboratory.

Samples will be delivered to Colorado Springs Utilities or the Consultant, at an address to be determined.

7.3 Laboratory Preparation and Analysis

The delivered surface water samples will be physically evaluated and placed in appropriate sample containers. Appropriate protocols for decontamination, sample preservation, and holding times will be observed.

The laboratory responsible for physical and chemical analysis will handle and analyze the submitted samples in accordance with EPA analytical testing protocols and QA/QC requirements. A written report of analytical results and QA/QC procedures will be prepared and included as an appendix in the final report.

7.4 Final Data Report

Colorado Springs Utilities will summarize the findings of this SAP in an SDS Project Annual Monitoring Report, which will be submitted to Reclamation by January 31 of the subsequent year. The Annual Monitoring Report will be prepared each year through the period of this SAP. Further, as required by the Pueblo County 1041 Permit, data gathered as a part of the SAP that relates to water quality will be assembled and entered into an electronic database once each year for the period of this SAP. The data will be available publicly through existing USGS and/or SDS Participant data reporting websites.

SECTION 8.0

References

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