

Lake Powell Pipeline

Draft Water Quality Work Plan

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Section 1 Introduction

The purpose of this work plan is to define the procedures for analyzing impacts on water quality for surface water and groundwater for the Lake Powell Pipeline (LPP). This work plan presents the issues and concerns, defines the impact area and significance criteria, describes the analysis methodology, reviews existing data and identifies data needs, references an outline for the Water Quality Technical Report, and identifies dependency items and relationships to other resources.

Section 2 Issues

Water quality-related issues and concerns identified during the formal scoping process will be addressed in the analysis for the LPP alternatives. Related questions raised during the informal scoping process have been consolidated into the following issue.

- What impacts would occur on groundwater and surface water quality from construction and operation of the LPP?
- What are the potential groundwater quality impacts on groundwater recharged from Lake Powell water at Sand Hollow Reservoir?
- What are the potential impacts on aquifer recharge associated with blending waters with different chemistries?
- What are the potential impacts disposal of groundwater encountered during excavation?
- What would be the short term impacts on surface water quality in Lake Powell?
- How would water quality and water use be balanced for electricity generation, consumption and environmental purposes?

Additional issues that arise during the formal scoping process, or during the preparation of the analysis, will be added and addressed.

Section 3 Impact Topics

The water quality impact topics include the following:

- Surface water quality
 - Impacts on Sand Hollow Reservoir from project operation (storage of Lake Powell water in the reservoir)
 - Impacts on the Paria River, Kanab Creek, and other (numerous) intermittent washes during project construction (disturbance from pipeline installation (open cut crossings) and discharges from dewatering operations); definition of Standard Construction Procedures (SCPs) to be used in channel crossings and in proximity to streams and washes

- Impacts on Lake Powell water quality during installation of the intake facility
- Groundwater quality
 - Impacts on groundwater underlying Sand Hollow Reservoir from the storage of Lake Powell water in the reservoir – mixing with local surface water and existing groundwater

Section 4

Impact Area and Significance Criteria

4.1 Impact Area

The water quality impact area includes each of the streams, lakes, and reservoirs that would be affected by the construction or operation of the project alternatives. The areas of potential impact are similar for each of the LPP alternatives; each alternative takes water from the same intake location in Lake Powell and delivers it to roughly the same locations near Kanab, St. George and Cedar City. The general potential impact areas are listed below.

- Lake Powell
- Existing reservoirs that could serve as terminal storage or regulating storage reservoirs (Sand Hollow Reservoir)
- Proposed terminal storage reservoir and regulating reservoirs along the pipeline alignment
- All stream channels and washes that would be crossed by the pipeline, at and immediately downstream of the crossing location
- All channels and washes that accept releases from blowoff valves during maintenance activities
- Groundwater aquifers that would be subject to water deliveries or alterations in flow

4.2 Significance Criteria for Each Impact Topic

Impacts on water quality are considered significant if construction, operation or maintenance activities would result in any of the following conditions:

- Violation of applicable water quality standards
- Substantial degradation of water quality
- Substantial alteration of the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner, which would result in substantial erosion or siltation on- or off-site
- Precipitation resulting from mixing of water types that substantially affects infiltration and aquifer recharge from reservoirs

Section 5 Methodology

5.1 Introduction and Overall Approach

Water quality impacts under operation of the LPP will be analyzed by comparison of existing water quality of surface waters and groundwaters affected by the project with water quality in Lake Powell. The range of potential impacts, based on water volumes to be stored, will be projected and described. Predicted water quality will then be compared to applicable standards. Relevant surface waters include the Sand Hollow Reservoir (currently filled with local surface water).

Groundwater quality impacts from project operation will be analyzed by use of a simple model such as PHREEQE (USGS, 1994) in order to describe the effects of groundwater recharge caused by storage of Lake Powell water in Sand Hollow Reservoir on the underlying groundwater basin.

Construction, excavation, and grading could increase runoff during storm events and contribute to temporary water quality impairments downstream from the disturbed site. Water quality impacts from construction of the LPP will be analyzed and described, including for cases where there would be open cut across stream crossings and/or groundwater dewatering for pipeline installation, and for installation of the intake structure in Lake Powell.

5.1.1 Definition of Baseline Conditions

Water quality baseline conditions will be defined by summarizing the range of conditions observed based on recent available data for relevant surface and groundwaters. Parameters of interest include general physical (including turbidity), nutrients, primary and secondary inorganic contaminants (including metals), organics (including pesticides and volatile organics), and microbiological.

5.1.2 Analysis of Alternatives

Impacts on water quality will be analyzed for each of the alternatives. As each of the action alternatives would transport the same volume of water from Lake Powell, operation of each of the action alternatives would have the same impacts on surface water quality of Sand Hollow Reservoirs and on groundwater. However, since each alternative pipeline alignment would cross a different number of intermittent washes, a relative comparison of construction-related water quality impacts would be made. Differences among alternatives relative to necessary groundwater dewatering during construction also would be described, if any.

5.1.3. Analysis of Cumulative Impacts

The water quality cumulative impacts analysis will address the combined impacts of the alternatives and any past or future proposed or planned actions that have or are likely to affect water quality in the impact area.

Section 6

Data Needs and Analysis

6.1 Data Needed

The data needed to perform the analysis include:

- Existing water quality for Lake Powell and Sand Hollow Reservoir. Parameters of interest include: State of Utah primary and secondary drinking water standards and general water quality characteristics (dissolved oxygen, temperature, pH, total suspended solids).
- Existing water quality for the Virgin and Paria rivers, Kanab Creek and other streams as available
- Beneficial use designations for Lake Powell, Sand Hollow Reservoir, and Quail Creek Reservoir, and Virgin, Paria, and Kanab Rivers.
- Existing groundwater quality for the shallow groundwater underlying Sand Hollow Reservoir, and Cedar City.

6.2 Data Available and Adequacy

The data required to complete the water quality analysis can be acquired from the following identified and existing sources:

- Utah primary and secondary drinking water standards, Rule309-200 of the Utah Administrative Code, available at: <http://www.rules.utah.gov/publicat/code/r309/r309-200.htm#T5>)
- Utah Standards of Quality for Waters of the State, Rule317-2 of the Utah Administrative Code, available at: <http://www.rules.utah.gov/publicat/code/r317/r317-002.htm>
- Utah Standards of Ground Water Quality Protection, Rule R317-6 of the Utah Administrative Code, available at: <http://www.rules.utah.gov/publicat/code/r317/r317-006.htm>
- Utah Division of Water Quality Department of Environmental Quality. 2006. Utah 2006 Integrated Report Volume I - 305(b) Assessment (beneficial use designations)
- Arizona Department of Environmental Quality, Surface Water Quality Standards, available at: <http://www.azdeq.gov/enviro/water/standards/index.html> and http://www.azsos.gov/public_services/Title_18/18-11.pdf
- National Stream Quality Accounting Network (NASQAN) of the U.S. Geological Survey (USGS), available at <http://water.usgs.gov/nasqan/> (general physical, nutrients, major ions, trace elements, and pesticides (1996 to 2000 data for Colorado River at Lees Ferry, AZ – as proxy for Lake Powell water quality at Glen Canyon Dam)).
- USGS Grand Canyon Monitoring and Research Center (GCMRC) Lake Powell Water Quality Updates (temperature, specific conductance/salinity, dissolved oxygen, nutrients and turbidity), available at: http://www.gcmrc.gov/products/water_quality/water_quality.htm

- Utah Division of Water Quality's 2006-2007 Annual Monitoring Program available at: http://www.waterquality.utah.gov/Monitoring/2007_DWQ_Monitoring_plan.pdf (pH, alkalinity, dissolved metals, turbidity, salinity, bacteria, nutrients, and dissolved oxygen)
- Utah Aquifer Classification Maps available at: <http://www.waterquality.utah.gov/GroundWater/aquifermap.htm>
- U.S. Bureau of Reclamation quarterly water quality data from 1999 to 2006 for two monitoring stations near the dam, available from Jerry Miller (Excel spreadsheet to be sent April 2007 for EC, pH, DO, turbidity, chlorophyll *a*, cations and anions, some trace elements.)
- USGS groundwater quality data available at: <http://waterdata.usgs.gov/ut/nwis>
- Water quality data available from the U.S. Environmental Protection Agency at: <http://www.epa.gov/STORET/dbtop.html>
- V.M. Heilweil, D.D. Susong, P.M. Gardner, and D.E. Watt. Pre- and Post-Reservoir Ground-Water Conditions and Assessment of Artificial Recharge at Sand Hollow, Washington County, Utah, 1995-2005. U.S. Geological Survey Scientific Investigations Report 2005-5185.

6.3 Additional Data Needs

6.3.1 Primary

The following data will be required in addition to the data described in Section 6.2:

- Groundwater quality sample analytical results for major ions, nutrients, and physical parameters from shallow groundwater in the immediate vicinity of Sand Hollow Reservoir and in the Cedar Valley.

[Note: There are a lot of existing water quality data for Lake Powell. However, it is not confirmed that there are existing data for every primary and secondary drinking water standard parameter (e.g., radionuclides, VOCs, *Giardia* and *Cryptosporidium*, etc.). If this information is available from the City of Page Water Treatment Plant (see below), additional primary data might not be required. However, if additional analyses are deemed necessary, Bureau of Reclamation staff sample Lake Powell quarterly. They have indicated that if the State supplied the necessary bottles, they could conduct the sampling and then deliver the samples to the State for analysis.]

6.3.2 Secondary

The following data will be required in addition to the data described in Section 6.2:

- Water quality data from Navajo Generating Station
- City of Page, Arizona, water quality data from the Water Treatment Plant
- Washington County Water Conservancy District water quality data from the Quail Creek Water

- Treatment Plant
- Operation of Lake Powell by the Bureau of Reclamation under climate change alternatives

Section 7

Procedures For Developing Mitigation

The analysis of impacts on water quality will be based on the standard operating procedures and measures to avoid or reduce impacts, both of which will be included in the project description chapter of the Draft Water Quality Technical Report. The significance criteria for water quality will then be applied to determine if any impact would be significant. Mitigation measures would then be developed to offset significant impacts. The mitigation measures will be based on applicable state and Federal statutes and regulations, past experience and best professional judgment to either satisfy a legal requirement or to satisfy the public interest requirement. In some cases significant impacts may not be able to be mitigated. All reasonably foreseeable mitigation options will be evaluated by the Federal Energy Regulatory Commission, Bureau of Land Management, and other responsible federal agencies and factored into the respective decision documents.

Section 8

Technical Report

A technical report will be necessary to document in detail baseline conditions for surface and ground water quality. The technical report will follow the resource technical report outline common to all resource work plans (see Resource Technical Report Outline).

Section 9

Dependency Items From Other Resources

The following items are required from other MWH Team resource specialists:

- **GIS/Mapping** – Names and/or counts of stream/wash crossings by alternative pipeline alignments
- **Groundwater Resources** – Occurrence, depth of groundwater near reservoirs, stream crossings, and wetlands