

11.5 Iowa Hill Sediment Analysis Study Plan

This study is designed to assess the potential for operation of the Iowa Hill facility to negatively affect turbidity levels in Slab Creek Reservoir.

11.5.1 Pertinent Issue Questions

This Slab Creek Reservoir Sediment Sampling Study Plan addresses the following question:

- What is the potential for operation of the Iowa Hill facility to cause significantly increased turbidity in Slab Creek Reservoir?

There are four potential issues related to the above question. The issues are further developed into nine questions (Q1 – Q9) below.

- Whether the operation of Iowa Hill facility will further drawdown Slab Creek Reservoir (Q1), and thus result in erosion of the delta sediment (Q2). If yes, how long will it last and will it become a chronic problem (Q3)? What are potential remedies to prevent it from becoming a chronic problem (Q4)?
- How long will it take for the delta deposit to migrate to the Iowa Hill intake with (Q5) and without (Q6) the operation of the Iowa Hill project? What are the remedies to delay the arrival of the delta deposit at the Iowa Hill intake to an acceptable level if the predicted time is not long enough (Q7)?
- Whether the operation of the Iowa Hill project, the discharge from Iowa Hill Reservoir to the Slab Creek Reservoir in particular, will result in local turbidity increases in the reservoir and downstream from the reservoir (Q8).
- Whether the more frequent ramping in the Slab Creek Reservoir with the Iowa Hill operations will result in bank slumping (Q9).

11.5.2 Background

The Iowa Hill Pumped Storage Project is proposed as an addition to UARP facilities at Slab Creek Reservoir. The reservoir has historically experienced periodic turbidity problems associated with drawdown of the reservoir and resultant scour of exposed fine sediment deposits at the upstream end of the impoundment.

11.5.3 Study Objectives

The objective of this study is to describe the potential for operation of the Iowa Hill facility to significantly increase turbidity in, and downstream of, Slab Creek Reservoir as a result of facility operations.

11.5.4 Study Area

The study area will include Slab Creek Reservoir.

11.5.5 Information Needed From Other Studies

Information needed from other studies includes: 1) bathymetry of the reservoir in 1992 and 1999, 2) water quality sampling results from the reservoir, 3) turbidity monitoring data for the reservoir, 4) reservoir level records, 5) inflow records, 6) past operation records of Slab Creek Reservoir, 7) projected operation rule for Slab Creek Reservoir (including Iowa Hill facility), 8) reservoir water velocity profiles from the reservoir temperature model, 9) reservoir side slopes and substrates, 10) Information on Iowa Hill Reservoir intake structure (preliminary design), 11) aerial photography of Slab Creek Reservoir, and 12) Project Sources of Sediment study plan

11.5.6 Study Methods And Schedule

The study will be conducted in three steps, each of which is described below.

Step 1 – Information Gathering and Preliminary Analysis

As a first step, we will gather and analyze relevant information as listed in Section 1.1.5. Missing information will be identified and substituted or collected whenever possible. The preliminary analysis will include:

- Conducting a reconnaissance level field visit to the project site. We will coordinate with TWG members to make it a joint field visit, if schedule permits.
- Gathering relevant existing information as listed in 1.1.5 and any substitutions for missing data.
- Collecting potential missing data identified during information gathering.
- Analyzing hydrologic record (inflow and outflow to and from Slab Creek Reservoir, reservoir level record, etc.), turbidity record (both inflow and outflow) and past Slab Creek Reservoir operation record to identify past turbidity problems. This analysis will define conditions under which the delta sediment will not be remobilized and resuspended, and possibly conditions under which there were problems with remobilization and resuspension of the delta sediment.
- Analyzing 1992 and 1999 bathymetry data to get an estimate of sedimentation rate in the Slab Creek Reservoir (e.g., volume of sediment deposit in the reservoir) and from which, the time needed for the delta to advance to the location of the Iowa Hill Reservoir intake structure under the current conditions (Q6).
- Analyzing potential future operation rules with the addition of the Iowa Hill facility (Q1, Q2). It is possible that such rules are not yet available and will not be available at the time the analysis has to be conducted. In that case we will discuss with SMUD engineers and/or use the limitations of the intake structures to assume potential operation rules for analysis. One of the assumed operation rules will define the worst possible scenario (e.g., lowest potential water level in Slab Creek Reservoir).
- Estimate the time needed for the delta to advance to the location of the Iowa Hill Reservoir intake structure with the future operation rules (Q5). If the estimated time for the delta to advance to the Iowa Hill Reservoir intake is shorter than an acceptable value, we will discuss potential remedies based on principles of geomorphology and sediment transport (Q7).
- If there is potential lowering of the operating water surface level in the Slab Creek Reservoir (e.g., based on future operating rule, or future operating rule is not available), we will discuss the implications for the evolution of the delta deposit, including the duration and frequency of high turbidity and potential remedies, based on principles of geomorphic processes (Q3 and Q4).
- We will discuss the general geomorphic and sedimentation processes in the Slab Creek Reservoir area with and without the operation of the Iowa Hill facility, including the potential for turbidity problems related to the discharge from Iowa Hill Reservoir intake (Q8).
- We will evaluate slopes and substrates adjacent to Slab Creek Reservoir to qualitatively describe the potential for mass wasting events or erosion processes that may be affected by changes in reservoir fluctuation from Iowa Hill operation (Q9). This should cover the entire potential drawdown zone, as fine materials that contribute most to turbidity problems are likely to be located lower in the pool. Data for this evaluation will come from photos and aerial photos of the reservoir, mapping conducted for the reservoir fish habitat study, and possibly from field observations by qualified geomorphologists.
- We will make suggestions and work with TWG members to define the necessary tasks for Step 2 analysis.

Step 2 – Detailed Analysis

Analysis for Step 2 will be decided by the results of the preliminary analysis in Step 1 and through consultations between SMUD and TWG members. The potential analysis include

Collecting field data and developing a one-dimensional sediment transport model to further address part or all of the following questions as listed in Section 1.1.1: Q3, Q4, Q5, Q6, and Q7. Examples of surveys to be performed:

- 1) Measure the consistency of delta substrates at various levels to quantify composition of input (this may be part of Rosgen Level II analysis). Insight into delta materials can be obtained by looking at what is coming into the reservoir and examining the potential of the reservoir to trap incoming sediment.
- 2) Examine the potential of the reservoir to trap incoming sediment.
 - a. collect and review available suspended sediment records (quantity and grain size distribution) upstream from the impoundment,
 - b. collect bed material samples from point bar deposits from unimpacted reaches just upstream from the reservoir and determine grain size distributions of deposits,
 - c. conduct grain-size specific reservoir trap efficiency analyses of the reservoir.
- Other studies not yet identified and deemed necessary based on Step 1 analysis and SMUD – TWG consultation.

Details of the analysis will be defined at the conclusion of Step 1. Any additional data needed for Step 2 analysis will also be identified at that time.

11.5.7 Study Output

A presentation of study progress will be made to the Aquatics TWG in April. A written report including the issues addressed, objectives, description of study area and sampling locations, methods, results, discussion and conclusions will be prepared after field visits and analyses are complete.

11.5.8 TWG and Plenary Group Endorsement

This study plan was electronically approved by the Aquatic TWG on January 21, 2004. The comments received from the USFS were a compilation of agency comments; those comments were accepted without change. The Plenary Group approved this plan on February 4, 2004. The participants at the meeting who said they could “live with” the plan were Taxpayers Association of El Dorado County, Friends of El Dorado County, USFS, American River Recreation Association & Camp Lotus, El Dorado County Water Agency, Pacific Gas & Electric Company, SMUD, El Dorado County, El Dorado Irrigation District, NPS, SWRCB, USBLM, City of Sacramento, CDFG, and FOR. None of the participants at the meeting said they could not “live with” this study plan.

11.5.9 Literature Cited

None.