



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WATER RIGHTS

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September 17, 1998

Mr. George Douglass
Deep Creek Mountains Ranch
Callao Star Route, Box 380
Wendover, UT 84083

Re: Flow measuring devices in Granite and Red Cedar Creeks

Dear Mr. Douglass:

On August 26, my staff visited the diversion sites on Granite and Red Cedar Creeks with the purpose of evaluating the site and to make recommendations as to what measuring devices could be installed to better measure the water levels or flows being diverted. The following observation and recommendation were made:

1. Granite Creek at the Power House tailrace: It was observed that a concrete box, resembling a rectangular weir, was in place. The size of the weir opening was 30 inches. Water measurements were estimated to be 0.60 cfs. The water exiting the power house was very turbulent making the water level at the box fluctuate. Also, the bottom of the weir opening was not level.

Recommendations: Using the existing concrete box structure, it is recommended that a metal weir plate be installed at the bottom of the box opening to give a sharp edge and to insure proper aeration beneath the overflowing water. A wet well should be created to measure water level without disturbances. The stilling well could be built of corrugated metal pipe of about 18 inches in diameter. A staff gage should be installed inside the wet well (see attached sketches). A water level sensor with a data logger or removable memory modules should be installed at the wet well. There are many different kinds of sensors in the market for water level measurement. One sensor that requires little maintenance, is inexpensive and is easy to install is a potentiometer on a float and pulley system (Shaft Encoders). The shaft encoder has a 9-volt battery that is replaced on an annual basis. Intermountain Environmental of Logan (1-800-948-6236) manufactures the shaft encoders (called the AquaPod). The complete system with a storage capacity of 8000 data points costs \$741.00. The data is stored in a removable memory module that can be viewed in the field with a portable computer or by removing the memory module and taking it to the office to be retrieved by a computer. An extra memory module would be needed to record continuous water level reading. The memory module cost \$141.00. My staff would assist you in creating a table for the weir and staff gage which correlates gage height to flow rate. The commissioner could obtain instantaneous flow rate measurements from the staff gage and

the weir table. Monthly water use would be obtained by sending the data modules to the Division of Water Right to have it retrieved by the computer.

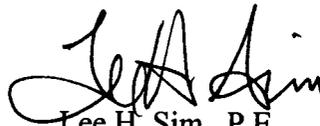
2. Red Cedar Creek by the Reservoir: It was noticed that the water was discharging through an overflowing pipe into a concrete box with a notch opening of 24 inches and then discharges into a pond. There was a staff gage installed in the side of the concrete box. It appears that at high flows water splashes by the staff gage making reading less accurate. Also, during high flows the water flowing over the weir opening would not have enough aeration to obtain accurate readings. We measured the flows using a rectangular sharp crested weir method. It was estimated that water was flowing at a rate of 0.27 cfs.

Recommendations: It is recommended that a weir plate be installed at the bottom of the box opening. The staff gage should be enclosed to create a wet well and have a stable water level. A corrugated metal pipe sealed on the end and with openings in the side should be used to create the wet well. For the collection of a long term record, a water level sensor with a data logger or removable memory modules should be installed at the wet well as described in recommendations for Granite Creek at the Power House Tailrace. An enclosure box possibly from an old ammunition canister could be set on top of the metal pipe to house the water level measurements' equipment. Again, the division staff would assist in developing a flow rate table and in downloading the flow data from the data modules.

3. Main Diversion at the head of Granite Creek. There are two pipe intakes originating at the concrete structure on Granite Creek. We were not sure which one was for the Douglass diversion and which one was the Allred diversion. Therefore, no specific suggestions can be made until it is further evaluated. Also, Cottonwood Creek diversion was not visited. My staff will contact you to set up a time to visit your diversion out of Cottonwood Creek and evaluate the situation. A weir was located a few feet above the concrete structure on Granite Creek. The upstream channel immediately above the weir needs to be cleaned out.

Attached please find copies of diversion pictures taken during the field investigation and other documentation on water level instrumentation. If you have any questions please contact me at (801) 538-7380.

Sincerely,



Lee H. Sim, P.E.

Assistant State Engineer
for Adjudication and Distribution

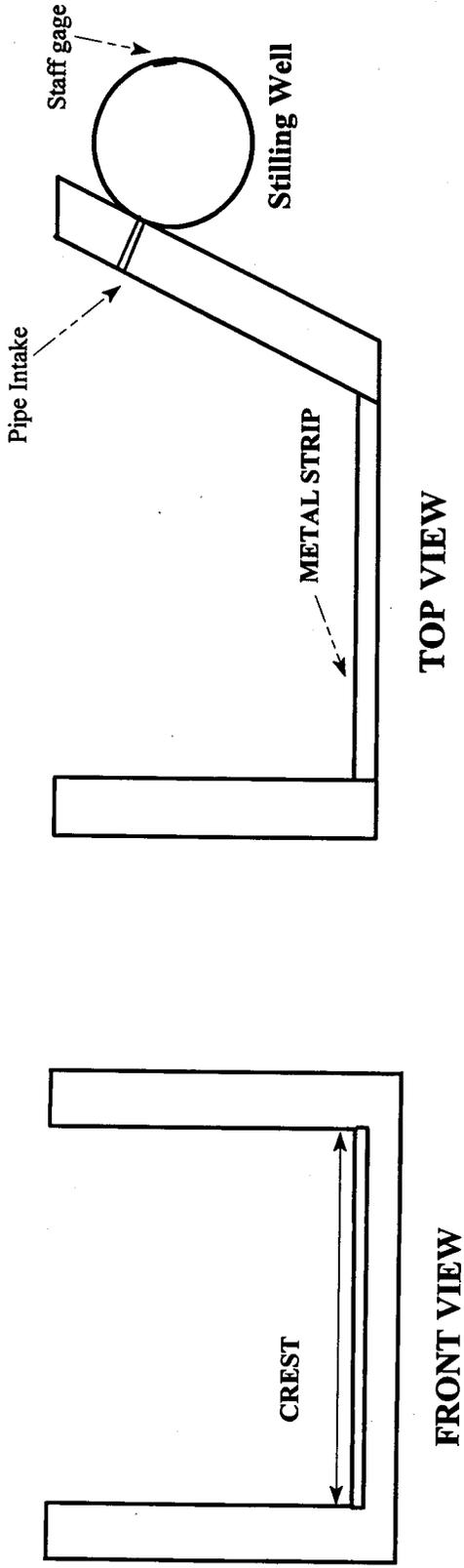
enclosures

cc: John Mann

Letter Sent to Mr. Glenn Allred

SKETCH OF A CONTRACTED RECTANGULAR WEIR

(Adapted to current situation at the Power House tailrace)

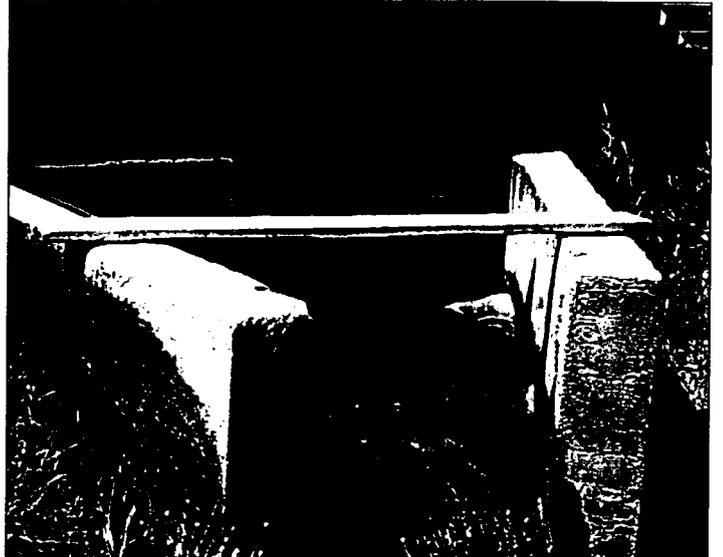


The above sketches (front and top view) show a rectangular weir that should be used to measure the water at the Granite Creek Power House Tailrace. When installing the weir plate, place it so the centerline of the weir is parallel to the direction of the water flow. The weir plate must be level so water passing over will be the same depth at all points. Set the staff gage reference point at the same elevation as the weir crest. My staff would be available to calibrate the weir and help with instrumentation, if needed.

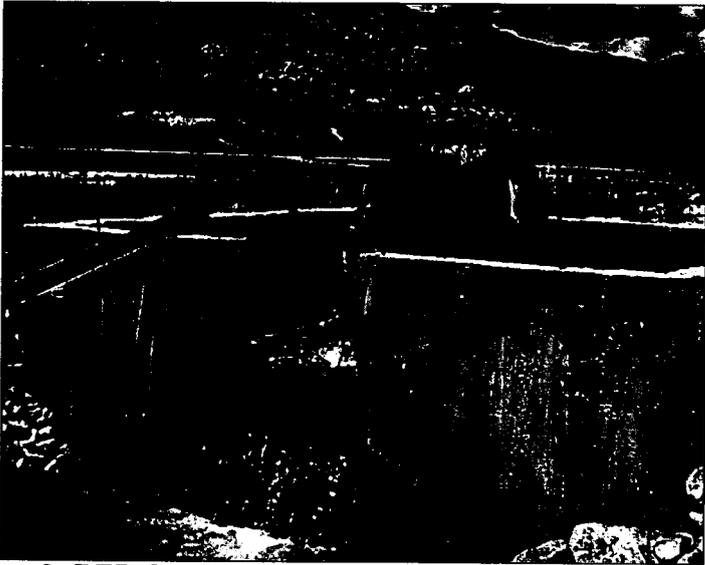
GRANITE & RED CEDAR CREEKS DIVERSIONS TOUR (8/26/98)



2: GRANITE CREEK AT POWER PLANT TAILRACE



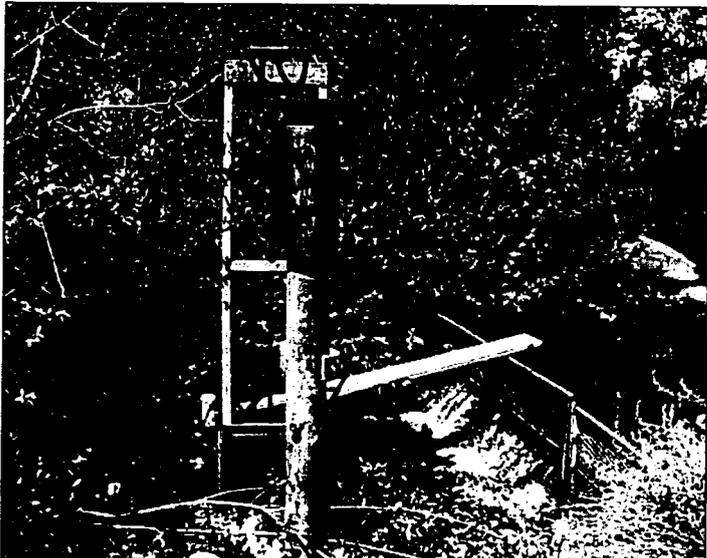
1: GRANITE CREEK AT POWER PLANT TAILRACE



3: RED CEDAR CREEK BY THE RESERVOIR



4: RED CEDAR CREEK BY THE RESERVOIR

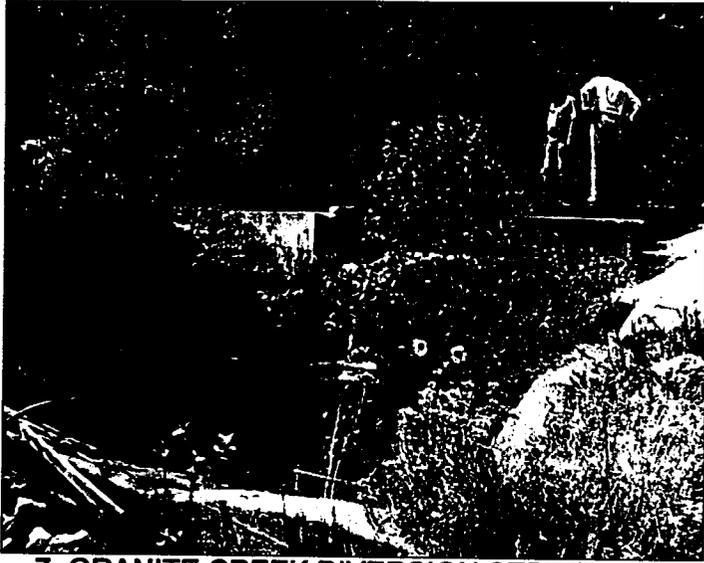


5: RED CEDAR CREEK MAIN DIVERSION

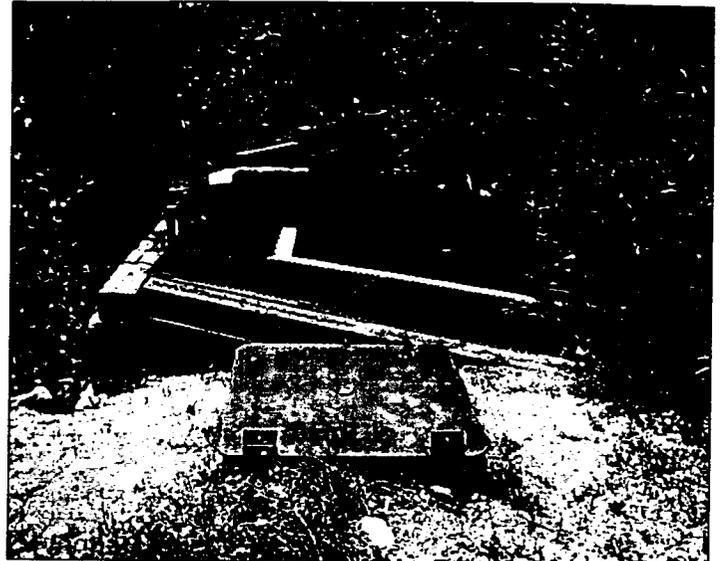


6: GRANITE CREEK PIPE INTAKE AT MAIN DIV,

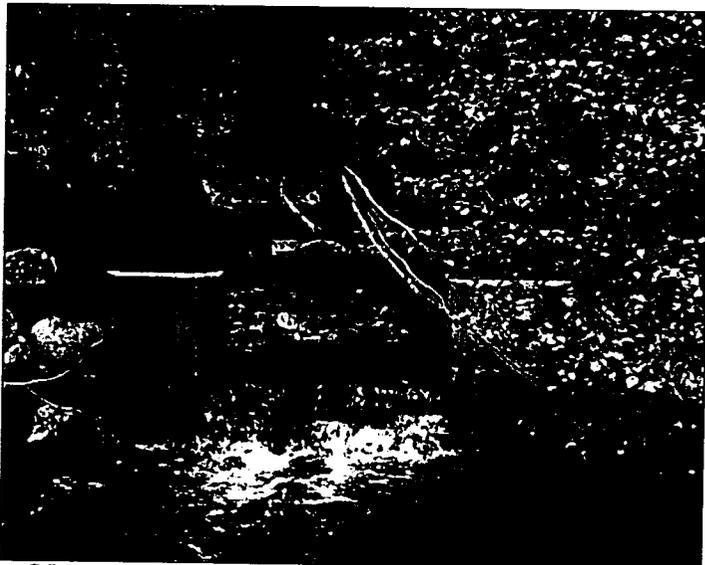
GRANITE & RED CEDAR CREEKS DIVERSIONS TOUR (8/26/98)



7: GRANITE CREEK DIVERSION STRUCTURE



: GRANITE CREEK MAIN DIVERSION STRUCTURE



: GRANITE CREEK WEIR ABOVE MAIN DIVERSION

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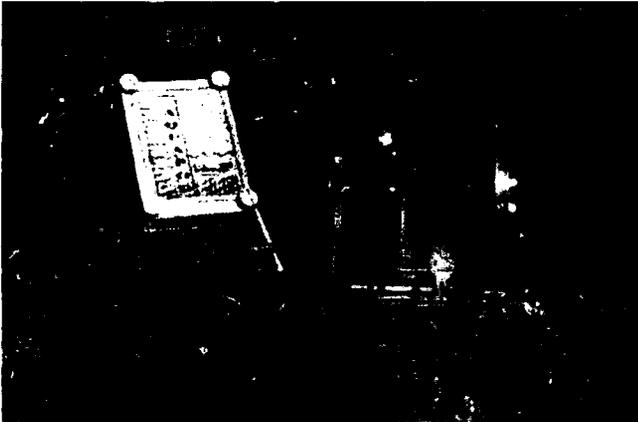
The AquaPod[®]

The AquaPod[®] is:

- Small, reliable, easy-to-use datalogger interfaced to a float & pulley water level sensor with potentiometer.
- Ideal for long-term unattended measurement and recording of surface water levels in streams, rivers, canals, and effluents.
- Powered by a single 9-volt alkaline battery. Operational unattended for over a year.
- Available for measurement in three level ranges: 0-3, 0-5, 0-10 ft.

The AquaPod[®] is easy to setup and deploy with software for DOS, Windows, or MAC. Simply point and click on the desired measurement interval and duration, specify starting time, and even high and low limit alarms, and you are ready to record water levels.

The AquaPod[®] is available with memory capacities of 2000, 8000, or 32000 data points. Data can be retrieved directly from the AquaPod[®] with a portable computer in the field or by exchanging memory modules.



For more information or to order the AquaPod please call (800) 948-6236 or email: info@inmtn.com