December 31, 1985

Wyoming Water Development Commission
Hershler Building, Third Floor East
Cheyenne, Wyoming 82002

Attention: Mr. Michael O'Grady
Project Manager

Re: Executive Summary, Level III Design, Sulphur Creek Reservoir
   Enlargement near Evanston, Wyoming.
   WWDC Purchase Order No. 9-00270
   WCC Job No. 21413

Gentlemen:

We have completed our Level III design work for this project and have prepared this executive summary of same in accordance with our Level III design contract. The major project components, the details of our design and our construction cost estimate for the project are summarized below.

The purpose of the Sulphur Creek Reservoir enlargement project is to provide additional water for the City of Evanston, Wyoming. The major project components include raising an existing dam to expand the size of an existing reservoir, constructing new reinforced concrete spillway and outlet works structures, relocating a portion of an existing county highway and constructing two new pipelines. The pipelines convey water from the Bear River to Sulphur Creek (Bear River pipeline), and from the enlarged reservoir to the Evanston Water Treatment Plant (Evanston pipeline). The locations of the major project components are shown on Figures 1 and 2.

The dam raise concept is substantially as shown in our Interim Report of November 1984. The dam will be raised about 32 feet and the crest length will increase to about 4630 feet. The storage capacity of the reservoir will be increased by 12,500 acre-feet. Plan views of the dam and reservoir are shown on Figure 3. Materials for dam construction will in large part be taken from borrow areas near the dam. A small quantity of material for a drain in the dam will be obtained from a nearby commercial source. A typical section of the earth dam embankment, illustrating details and material uses, is shown on Figure 4. Borrow areas for embankment construction are either on land held by Rocky Mountain Energy or by private land owners. Use of these materials will dictate paying royalties from both sources. Details of the royalties have been worked out between the WWDC and the land owners. Borrow areas are shown on Figure 5.
The new outlet works will be located near the existing outlet works and operating spillway (two separate pipes). These existing pipes will be removed from the existing dam embankment and the new reinforced concrete outlet works will be constructed within the limits of the excavation for removal of the existing pipes. The new outlet works will handle, separately, water to the Evanston Water Treatment Plant as well as water for the Sulphur Creek water users and for minimum flows in Sulphur Creek downstream of the dam. Controls for these facilities will be in a control building near the downstream toe of the dam. Remote monitoring and control will be provided through a telemetry system. Details of the new outlet works are shown on Figure 6.

The new spillway has been designed to pass the Probable Maximum Flood (PMF). It will be a "morning glory" intake structure with a reinforced concrete section extending through the dam into an open channel downstream of the dam. There is a flip bucket for energy dissipation at the end of the spillway. A plan view and section through the spillway are shown on Figure 7.

About 1 1/2 miles of county road will be relocated south of the reservoir. The relocated road will be built to Wyoming State Highway Department standards. The relocated road route is shown on Figure 2.

The Bear River pipeline will convey water from the Bear River, the source of the City's water rights, to Sulphur Creek. An infiltration gallery and intake structure in Bear River as well as an exit structure at Sulphur Creek are part of this construction. The pipe size varies from 30-inch to 24-inch to conduct the appropriate volume of water consistent with the grade of the pipe. Special precautions are being taken in backfill around the pipe to minimize losses of irrigation water into the area of the newly constructed pipe. Typical details of the Bear River pipeline are shown on Figure 8.

Water from the enlarged reservoir will be carried to the City of Evanston in the Evanston pipeline. This will be a 24-inch diameter line largely built within the right-of-way of the existing highway between Evanston and the dam. Construction within this existing right-of-way will be complex due to the number of existing utilities. There is also one crossing of the Bear River. Details of the Evanston pipeline are shown on Figure 9.

A new boat ramp will also be constructed on the reservoir and a wildlife easement will be provided at the edge of the reservoir to accommodate wildlife disturbed by the increased size of the reservoir.

An important aspect during the construction phase of the project will be the water diversion and sediment control system. This system entails a
major cost to the project but should provide appropriate water quality care for waters of the State of Wyoming.

Access to the dam area will be provided by constructing an access road on the right abutment side of the dam as well as a parking lot near the control building for the outlet works. The route of this relocated road follows, in large measure, the existing access road to the dam. The access road is shown on Figure 3.

Construction cost estimates for the project are summarized on Table I. This summary indicates that costs for the project are about $5 million higher than estimated in the 1984 interim report. The significant factors contributing to this are largely project components that have evolved since the interim report was prepared. The major items, in order of cost significance, include the Bear River pipeline, the complex diversion and sediment control system, reclamation of disturbed areas, access to the right abutment of the dam instead of the left, a telemetry system for outlet works control, and the boat ramp. Some costs for land acquisition, royalties, agreements with Evanston, and water storage interruption have also increased project costs.

The plans and specifications for the Bear River and Evanston pipelines will be an independent bidding package and the dam, structures, and relocated highway will be a second bidding package to take advantage of specialization by potential contractors in these diverse kinds of work.

Construction start up is anticipated in the summer of 1986 and will probably carry into late 1988 or early 1989. Construction schedules will not be firm until details of funding are finalized between the City of Evanston and the State of Wyoming. It is anticipated that the Sulphur Creek water users water supply will be disrupted for one irrigation season because of the construction time needed for the new outlet works.

In summary, we believe the current design is sound, practical and is readily constructible.

If has been a pleasure to complete this design work for the Wyoming Water Development Commission.

Yours truly,

Ted D. Johnson
Vice President and Project Manager

TDJ:gg (j17)
(150 copies sent)
Enclosures
### TABLE I
SULFUR CREEK PROJECT COST ESTIMATES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>1984 ESTIMATE</th>
<th>1985 PHASE 2 LEVEL III</th>
<th>1985 PHASE 2 WITH BEAR RIVER PIPELINE</th>
<th>NET CHANGE 1984 to 1985 WITH BEAR RIVER PIPELINE</th>
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<tr>
<td>1. Dam</td>
<td>$6,381,350.00</td>
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<td>2. Access Road</td>
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<td>3. Diversion &amp; Sediment Control</td>
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<td>5. Outlet Works</td>
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<td>6. Spillway</td>
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<td>7. County Road Relocation</td>
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<td>9. Canal Enlargement</td>
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<td>11. Boat Ramp</td>
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<td>10% Construction Engineering</td>
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<td>Land Acquisition, Royalties, and Evanston MOA Gaging Stations</td>
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<td>Subtotal</td>
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</table>

**ITEMS INCLUDED IN LAND ACQUISITION:**

- **A.** Borrow Area Royalty | $180,000.00 |
- **B.** Bear River Pipeline ROW | $50,000.00 |
- **C.** Reservoir ROW (offers) | $336,000.00 |
- **D.** Sulfur Creek MOA Gaging Stations | $234,000.00 |
- **E.** Interruption of storage water | $100,000.00 |

**TOTAL** | $900,000.00 |
AXIS RAISED
SULPHUR CREEK

USE EXISTING ACCESS ROAD
GRADE AND COVERED WITH A MINIMUM OF 6 INCHES OF GRAVEL BASE COURSE AGGREGATE
6 OF EXISTING SERVICE SPILLWAY & "Y" EXISTING OUTLET WORKS

EXISTING NORMAL HIGH WATER LEVEL EL. THR.T

THE SPECIFICATION FOR WYOMING HIGHWAY DEPARTMENT GRADE AGGREGATE

NEW PORTIONS OF ACCESS ROAD COVERED WITH ENERDAYS OF GRAVEL BASE COURSE AGGREGATE
6 OF EXISTING SERVICE SPILLWAY & "Y" EXISTING OUTLET WORKS

OUTLET WORKS
CHANNEL

ABUTMENT AREA TO BE EXCAVATED TO A FLATTER SLOPE.

COUNTY ROAD TO BE REALLOCATED ALONG SOUTH LINE OF SECTION.
THE ACCESS ROAD WILL FOLLOW AN EXISTING ACCESS ROAD [JULY 1973] FROM HIGHWAY 20 TO THE JAM SITE.

NOTES:
1. ALL STRUCTURES LOCATED BELOW EL. 2000 SHALL BE REMOVED, INCLUDING ALL BORDERS, FENCES, Etc.
2. THE ORIGINAL BASE PLAN IS A BASE MAP FOR THIS DRAWING WHICH WAS DEVELOPED BY W.I. CHAPMAN IN JUNE 1973.
3. THE ACCESS ROAD WILL FOLLOW AN EXISTING ACCESS ROAD [JULY 1973] FROM HIGHWAY 20 TO THE JAM SITE.