STATUS REPORT
To The
WYOMING LEGISLATURE
On The
UPPER GREEN LEVEL II
FEASIBILITY PROJECT

By
Wyoming Water Development Commission

January 11, 1983
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INTRODUCTION

The original purpose of the Level II Upper Green project as described in the Governor's Water Bill was to provide storage for "late season supplemental irrigation water supplies". However, the final version as outlined in H.B. 105 included three additional major items in Section 4, item (d):

i. To measure and quantify historical and current volumetric flows in the Green River Basin;

ii. To identify current usage and unallocated waters in the basin;

iii. To assess the amount of water available in the basin for development to meet both in-basin and out-of-basin needs.

As a result of the incorporation of these additional items to the Upper Green project, it was divided into two separate and distinct studies: "Upper Green Storage Development" and "Green River Basinwide Assessment". The Basinwide Assessment portion of the study involves
very complex and comprehensive water planning type efforts. The costs associated with obtaining both the Basinwide Assessment data and the Storage Development analysis exceeded the $500,000.00 appropriation provided by the Legislature for the project. Therefore, the W.D.C. earmarked funds from the Commission's Water Planning Budget so that the Upper Green Project could proceed uninterrupted. The following table illustrates the total amount of funds committed to the Upper Green Project and the contracted entities:

**UPPER GREEN RIVER STORAGE DEVELOPMENT**

<table>
<thead>
<tr>
<th>FIRM</th>
<th>WDC CONTRACT PRICE</th>
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<th>TOTAL COMMITTED</th>
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**GREEN RIVER BASINWIDE ASSESSMENT STATUS**

<table>
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<tr>
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**FUNDS COMMITTED**

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<tr>
<td>W.D.C. Water Planning funds</td>
<td>$137,036</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$637,036</strong></td>
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The following narrative describes the work accomplished to date on the above contracts.

**UPPER GREEN RIVER STORAGE DEVELOPMENT STATUS**

On August 9, 1982, the Water Development Commission selected the firm of ARIX, a professional corporation, of Riverton, Wyoming as the prime contractor for the Upper Green River Study. In addition to ARIX, the project team consists of the following four subcontractors:

- **LEONARD RICE CONSULTING ENGINEERS** - Hydrology and Water Rights;
- **EARTH SCIENCES ASSOCIATES** - Geotechnical;
- **BROWN, BORTZ, AND CODDINGTON** - Economics;
- **KIRKLAND AND ELLIS** - Legal.

Since selection, the Consultant has investigated seven potential reservoir sites identified by the project sponsor, the Big Piney Conservation District, as having project potential. These are:

- Sixty-Seven Reservoir enlargement or replacement,
- McNinch Wash,
- Fish Creek,
- Snyder Basin,
- South Cottonwood,
- LaBarge Meadows,
- Sand Hill.

*See Figure I*
UPPER GREEN STORAGE DEVELOPMENT RESERVOIR SITES

1. South Cottonwood
2. McNinch Wash
3. 67 Res. Enlargement
4. Sand Hill
5. Fish Creek
6. Snider Basin
7. LaBarge Meadows

LEGEND
- Forest Boundary
- County Boundary
- Creek or River
- Paved Road
- Potential Dam Site

WYOMING RANGE POTENTIAL STORAGE SITES
GREEN RIVER BASIN
Wyoming

FIGURE I
All water rights on the study streams have been completed and tabulated for input to the Wyoming Integrated River System Operations Study (WIRSOS), which incorporates the Basin Hydrology and Water Rights to simulate river administration under the appropriation doctrine. Schematic diagrams showing all water rights have been completed and are being drafted. Available diversion records have been reviewed and used, along with information from the local Water Commissioner, to estimate diversion patterns for each project area.

The consultants established communications with the special project offices of the Wyoming Game and Fish, the United States Forest Service Bridger Teton National Forest, Wyoming Recreation Commission, Sublette County Historical Society, and the Soil Conservation Service. Input from the above named agencies will be included in the final pre-feasibility report due January 12, 1983.

As of October 29, 1982 the ARIX project team has billed the WWDC for a total of $61,232.00 of the total $218,700.00 contract price.

Following is the schedule of reports and hearings on the Upper Green River Project:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DATE DUE</th>
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<tbody>
<tr>
<td>Draft Legislative Status Report to WWDC</td>
<td>November 15, 1982</td>
</tr>
<tr>
<td>Final Legislative Status Report to WWDC</td>
<td>December 1, 1982</td>
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Primary purpose for the Green River Basinwide Assessment study is to delineate consumptive use data and patterns for the Green River Basin pursuant to H.B. 105 and as it applies to the Upper Colorado River Basin Compact. The existing consumptive data has limited usefulness because the data is 15 years old and deals confusion about needs in the basin and the available water supply remaining under the Upper Colorado River Compact. This problem is typical of all the Colorado River Basin states. Quoting from a position paper dated March 11, 1982, from the Executive Director's Office of the Upper Colorado River Commission, "Even the data developed during the compact negotiations (of 1949) has become suspect and must be updated and refined."

To properly and accurately evaluate the consumptive use in the Green River Basin, the Water Development Commission has assembled a team
of highly qualified experts in the field of aerial photography, remote sensing, streamgaging, and evapotranspiration or consumptive use.

The following narrative briefly describes the subcontractors to the commission, their specific function in regard to the basinwide study, and the status of their work to date.

AERIAL PHOTOGRAPHY

The Water Development Commission contracted with the firm of Markhurd Aerial Surveys, Inc. from Minneapolis, Minnesota on July 12, 1982 to obtain new color infrared aerial photography at a scale of 1 to 24,000, quad centered photo images. This photography will be used for the manual interpretation of existing irrigated lands, naturally occurring riparian and phreatophyte vegetation, and all man made riparian and phreatophyte vegetation. All irrigated lands will be identified on 7 ½ minute USGS quadrangles and be used for comparison with the satellite digital data obtained by the Engineering and Research Center of the Bureau of Reclamation office in Denver, Colorado. Markhurd has completed approximately 90% of the project with total expenditures as of December 1, 1982, amounting to $61,358.00. The balance of the contract will be completed during the 1983 irrigation season.

STREAMGAGING

The Water Development Commission contracted with the United States Geological Survey, Water Resources Division on August 12, 1982 for the
installation and operation of streamgages located on the following drainages in the Upper Green River Basin:

1. North Horse Creek
2. South Horse Creek
3. Horse Creek near Daniel
4. South Cottonwood Creek
5. North Pine Creek
6. LaBarge Creek

Streamgages were necessary to obtain existing streamflow information for both the Upper Green Storage Development Project and the Basinwide Assessment. Although it will be necessary to operate and maintain these gages for a two year period the current contract is for federal fiscal year 1982. The total cost of fiscal year 1982 installation, operation, and maintenance is $97,770.00, with 50% matching funds provided by the United States Department of the Interior.

By October 15, 1982 all continuous recording streamgages were installed and the gages are currently collecting streamflow data.

BUREAU OF RECLAMATION - ENGINEERING AND RESEARCH CENTER AGREEMENT

On August 12, 1982, the Commission entered into a Memorandum of Agreement with the Bureau of Reclamation to inventory and identify the irrigated lands, crop types, phreatophytes, and riparian
vegetation throughout the entire Green River drainage. The Bureau of
Reclamation and the Water Development Commission share a need to assess
the consumptive use of water in the Green River basin. The remote
sensing section of the Bureau's Engineering and Research Center is
providing the necessary technical resources and capability to perform
image processing, satellite digital processing, and aerial photo
interpretation.

During the week of July 20, 1982 representatives from the Bureau of
Reclamation, the Water Development Commission and the State Engineer's
Office traveled to the Upper Green River Basin to collect ground truth
information concurrent with acquisition of remote sensing data.

Locations of irrigated lands and phreatophytes were noted on 7 1/2
minute quad sheets, 35 millimeter slides were taken to record and
observe field conditions, and hand held radiometer measurements were
made to establish spectral signatures of key land cover types. During
this same week color infrared aerial photos of the basin were obtained
under WDC contract and NASA's Landsat III satellite passed over,
obtaining multi spectral digital imagery. Nine days later, a NASA
aircraft obtained multi-spectral digital imagery of the Horse Creek
Drainage near Daniel. This imagery is expected to be of value in
mapping the vegetation of the drainage because it is of the same
spectral and spatial resolution as the new generation sensor on Landsat
IV (thematic mapper). The Horse Creek Drainage is getting special
attention since it is the site of detailed Lysimeter and streamflow
monitoring required for the inflow - outflow vegetative consumptive use
study.
On October 22, 1982 the remote sensing section met with Professors Robert Burman and Larry Pochop of the University of Wyoming Department of Agricultural Engineering, and discussed the manner in which the irrigated lands inventory and other spatial data sets generated by the Remote Sensing Section might contribute to the basinwide modeling of evapotranspiration.

Nearly all image data have been received and image interpretation is underway. Manual photo interpretation on a quad by quad basis will be initiated by the Water Development Commission staff, with all irrigated lands and significant stands of phreatophytes delineated. The remote sensing section is now identifying the same classes through digital imagery of the basin obtained from June 29 and August 22 of 1981 as well as season 1982.

The total amount of the Bureau of Reclamation Memorandum of Agreement is $100,000.00 over a two year period. As of December 1, 1982, the total expenditure of funds amounts to $15,600.00. As a result of further refinement of the Scope of Work and budget for this portion of the project the Commission expects the project to be completed for less than the budgeted amount.

UNIVERSITY OF WYOMING'S WATER RESOURCES CENTER AGREEMENT

On the August 9, 1982 the Water Development Commission entered into a Memorandum of Agreement with the Water Resources Center in cooperation with the Agricultural Engineering Division of the University of Wyoming.
to develop technical data and models on evapotranspiration for the Upper Green River Basin. More specifically the objectives are:

1. To develop grass and alfalfa reference crop coefficients at Farson and Fontenelle, Wyoming.

2. To develop grass and alfalfa reference crop coefficients, and crop coefficients for mountain meadow grasses at Daniel, Wyoming.

3. To collect solar radiation, wind, humidity, temperature, and precipitation data from a network of seven sites in the Upper Green River Basin.

4. To develop methods for transferring crop coefficients from location to location.

5. To use existing evapotranspiration models to estimate consumptive use of agriculture, reservoir, and phreatophyte use within the Upper Green River Basin.

6. To develop a basinwide model for consumptive use.

7. To develop existing evapotranspiration data applicable to the Upper Green River Basin.

All lysimeter sites in the Horse Creek, Farson, and Seedskadee areas have been located. Six lysimeters have been installed in the Horse Creek area and two lysimeters have been installed near Farson. Work is progressing on gathering historic data for the study area and a manual for collection of data for the 1983 irrigation season is being prepared.
A total estimated budget for this portion of the Basinwide assessment amounts to $248,200.00. The Water Development Commission is funding $136,420.00. The Water Resources Center is funding the balance, of $111,780.00. Total expenditures to the Water Development Commission as of December 1, 1982, amount to $10,050.00.

GAME & FISH COMMISSION AQUATIC AND TERRESTRIAL ANALYSIS

The Water Development Commission contracted with the Game & Fish Commission to conduct the aquatic and terrestrial analysis associated with each water development project. The total amount of the aquatic and terrestrial analysis budget for the Upper Green River Project is $63,300.00.

Any questions regarding the status of the Upper Green Project or any of the individual contracts involved in the project may be referred to Michael Reese, Administrator, or Michael O'Grady, Project Manager, Water Development Commission.
STATUS REPORT
TO
THE WYOMING WATER DEVELOPMENT COMMISSION
ON
LEVEL II FEASIBILITY STUDY
FOR
UPPER GREEN RIVER DRAINAGE AREA
DECEMBER 1, 1982

A Professional Corporation
Engineers Architects Planners
609 East Madison
Suite 1
Riverton, Wyoming 82501
307 856 6505
December 1, 1982

Wyoming Water Development Commission
4th Floor, Barrett Building
Cheyenne, Wyoming 82002

Attention Mr. Michael Reese, Administrator

Gentlemen:

Submitted herein, for your consideration, is the Status Report on the Level II Feasibility Study for the Upper Green River Drainage Area. A draft report was submitted to the Commission Staff for review and approval prior to the publishing of this final copy.

The ARIX project team would like to express it's appreciation for the outstanding assistance given by the Commission Staff Project Officer, Mr. Michael O'Grady. His direction and assistance have helped to make these first phases of the study an efficient and effective effort.

We believe that you will find our progress on the Upper Green Study to be satisfactory. The project is taking shape very nicely and shows excellent potential for realizing the original purpose of the endeavor, that of developing feasible water resources.

If you desire any further clarification of this report or have any questions, please feel free to call me.

Respectfully,

ARIX, A Professional Corporation

Dean L. Swartz
Project Manager

DLS/Iv
PROJECT CONTRACTOR

ARIX, A Professional Corporation, of Riverton, Wyoming is the Prime Contractor for the Upper Green Study. In addition to ARIX, the project team consists of four subcontractors selected for utilization by the specific needs of the project. These subcontractors are as follows: Leonard Rice Consulting Water Engineers (LRCWE) - Hydrology & Water Rights; Earth Sciences Associates (ESA) - Geotechnical; Browne, Bortz & Coddington (BBC) - Economics; and Kirkland and Ellis (K&E) - Legal.

SYNOPSIS OF WORK ACCOMPLISHED - TOUR OF PROJECT SITES

The contract between ARIX and the Wyoming Water Development Commission, (WWDC), was executed on October 15, 1982. Prior to that time, and subsequent to the selection of ARIX on August 9, 1982, the project team had begun work on the hydrologic and water rights and analyses in addition to establishing contacts with the Wyoming Game and Fish and local officials in the Big Piney/ Pinedale area.

A project site tour was taken on September 10, 1982. Participating in the tour were the following individuals: Mr. Willard Rhoades - WWDC Commissioner, Mr. Chuck McIlvaine - Mayor of Pinedale and the local Water Commissioner, Mr. Bruce Pederson - Hydrographer from Big Piney, Mr. Gary Windolph - Vice President - ARIX, Mr. Dean Swartz - Project Manager - ARIX, Mr. Robert Boekenkamp - Senior Engineer - ARIX, Mr. Leonard Rice - President - LRCWE, Mr. Dale Book - Project Manager - LRCWE, Mr. Roger Hail - Manager - ESA.
The team visited each of the seven sites in an effort to broaden familiarity with the site characteristics and gather initial reconnaissance information. Sufficient time was spent at each site to determine possible dam locations and elevations, extent of inundation, obvious geotechnical considerations, and other site characteristics such as the presence of potential archaeological and cultural resource conflicts, (as in the case of those sites traversed by the Lander Cut-off of the Oregon Trail) and initial concerns raised by the Wyoming Game and Fish.

While on the tour, the project team identified some additional sites that might warrant investigation, if the seven sites under consideration all became unfeasible for one reason or another. Two additional sites were noted in particular. These were on the Middle Piney Creek on Dan Budd's land and the North Piney Creek. Both of the sites exhibited good potential for water storage development. Later investigation raised some concern with the slope of the Middle Piney location and the resulting limitations to the amount of storage available. The North Piney site proved to have critical geotechnical constraints revealed in later investigations by ESA, the team's geotechnical consultant.

Additional observations associated with each site were noted on the tour and are recorded as follows:

1. Sixty-Seven Reservoir: The enlargement of this reservoir will entail a complete analysis of the existing dam and dike's structural stability. Seepage was noted at the base of the dam. The north eastern dike is a very rambling one that would require extensive re-build or relocation to effect a significant elevation change allowing for increased storage volume.
Other concerns with Sixty-Seven Reservoir were the physical and legal availability of the necessary additional water to fill up an expanded capacity.

2. McNinch Wash: Overall, the site showed good storage capabilities. The dam embankment would necessarily be quite large to reach an elevation that would close the gap in the terrain and accommodate the required water volume to make this project worthwhile. Serious concern was expressed with regard to the extensive transportation system that would be required to bring the water to the McNinch site. This appears to be a considerable obstacle that could make the site untenable.

3. Sand Hill: This site also showed good storage volume characteristics. Geotechnically, there was some concern raised with the pervious nature of the area which could hamper its water retaining abilities. Water availability to the site appeared to be more accessible from the South and Middle Piney Creeks via some ditch works already in existence. Significant concerns with this site are the numerous oil and gas installations that are established in the basin. There are several major pipelines that traverse the area as well as numerous oil and gas wells that would have to be dealt with. This is not to speak of the fact that the highway goes through the middle of the site and would have to be relocated.

4. Snider Basin: Snider Basin exhibits excellent storage capabilities if the dam site is moved further downstream to include the waters from Coal Creek and Porcupine Creek. Geotechnically, the proposed dam site as originally specified in the scope of services lends itself to some considerable problems with unstable abutment material.
Relocating down stream would allow the placement of a dam where geotechnical considerations are very good and the amount of embankment is lessened by nearly half of what would be required at the original site. By relocating the dam and capturing the additional waters, it appears feasible to achieve the storage of more than twice that which is possible at the three lower sites. Negative aspects of water storage development at the Snider Basin site would be the impacts upon the Lander Cut-off of the Oregon Trail and the associated historical sites such as the emigrant grave sites located in the basin.

5. LaBarge Meadows: This site has good volume capacity potential but considerably less water availability due to the limited drainage area that contributes to it. Geotechnically, the site exhibits poor abutment characteristics on the left abutment and the site in general coincides with a major fault line of the area. Additionally, the nature of the base materials appear to be weak in water retainage capabilities.

The Lander Cut-off of the Oregon Trail also traverses this site and would be negatively impacted by the development of a reservoir. There does seem to be less impacts of this site on the cultural resources of the area than at the Snider Basin Site. Game and Fish concerns have to do with the negative impacts upon the mule deer winter range in the area.

6. Fish Creek: Although this site exhibits good geotechnical prospects for dam development the storage availability is somewhat limited by the slope of the area and the narrowness of the valley. Physical availability of water appears to be considerably less than the other upper sites due to the smaller contributary drainage area upstream. There do not appear to be any negative archaeological or cultural resources impacts at the site. The Wyoming Game
and Fish have expressed considerable concern about the negative impacts on the Big Horn Sheep herd recently transplanted in the area and the elimination of elk calving areas associated with the site.

7. Cottonwood Creek: Field inspection of this site lead to the conclusion that if optimal water volume is to be retained, the dam site should be placed below the confluence of Bare Creek and Cottonwood Creek. Geotechnically, the site exhibits good characteristics but in order to place the dam where storage area would be optimized, an embankment of enormous proportions and length would have to be built.

The overall storage capabilities of this site compare to those of the Snider Basin site but the sites differ tremendously in the size of the estimated embankment requirements. Differences also exist in the impacts upon cultural resources for there appears to be minimal negative impacts at the Cottonwood Creek site in comparison to the Snider Basin site. Game and Fish concerns at the Cottonwood site appear to be minimal.

SYNOPSIS OF WORK ACCOMPLISHED - TASK 1 - WATER RIGHTS ANALYSIS

Leonard Rice Consulting Water Engineers (LRCWE) has had primary responsibility for completion of Tasks 1 and 3 of the prime contract which include the water rights and hydrology analyses and determination of storable flow for the seven reservoir sites identified in the RFP. Work has progressed on schedule and the Phase I prefeasibility report should be completed as scheduled. To date, no major problems have surfaced which would delay the completion of LRCWE's part of the prefeasibility study.

The primary objective for LRCWE during the prefeasibility phase is determination of physical and legal supply available to the seven reservoir sites. This determination will be made with the use of the Wyoming Integrated River System Operation Study (WIRSOS) computer model which incorporates the basin hydrology and
water rights to simulate river administration under the appropriation doctrine. It was decided that detailed modeling of Cottonwood, North, Middle and South Piney and LaBarge Creeks would be necessary to accurately determine available supply at the seven sites located on these streams. In addition, the main stem of the Green River from Warren Bridge to Fontenelle Reservoir will be modeled to identify any impacts which could result from increased storage on the tributaries. A study period of 1972-1981 has been selected for the prefeasibility phase. This period includes the dry year of record, 1977. Analyses will also be made for the long-term average runoff conditions.

Project work began with compilation of data and a field trip to visit the reservoir sites. Information obtained has included SCS and Bureau reports previously completed for the Green River Basin, maps of irrigated areas on the study streams, State Engineer's computer printouts of water rights, both permitted and certificated, ditch diversion data from the Water Commissioner and available plans and operating procedures for existing reservoirs including Fontenelle Reservoir. During the September 10, 1982 field trip to the reservoir sites information on the administration of water rights was obtained from the Water Commissioner.

The specific progress on Task Item #1 as listed in the contract is summarized as follows:

All water rights on the study streams have been completed and tabulated for input to Program WIRSOS. Schematic diagrams showing all water rights have been compiled and are being drafted. The available diversion records have been reviewed and, along with information from the Water Commissioner, used to estimate diversion patterns for the project area. Coordination with
legal counsel, Ray Petros of Kirkland and Ellis, on significant water rights issues has been initiated. The working paper referenced in the contract will be submitted as part of the prefeasibility report.

SYNOPSIS OF WORK ACCOMPLISHED - TASK 2 - CONFER WITH WYOMING GAME AND FISH

The ARIX Project Team has established communications with the Special Project Officers of the Wyoming Game and Fish. Mr. Bill Rudd is the contact for the terrestrial concerns and Mr. Glenn Dunning is the contact for fishery concerns. ARIX and others of the project team have made periodic reports to the Game and Fish to keep the contact personnel abreast of our findings and ongoing work. The Game and Fish are preparing their own interim report for submittal to the WWDC under separate contract so their progress will not be detailed here.

ARIX has also identified other agencies with concerns in the study area and has contacted them for review and input. The additional agencies contacted are as follows: The United States Forest Service - Bridger-Teton National Forest (Both Big Piney and Jackson Offices), The Wyoming Recreation Commission, the Sublette County Historical Society and the Soils Conservation Service office in Marbelton, Wyoming. Input from these various agencies is expected to be included in the pre-feasibility report.

SYNOPSIS OF WORK ACCOMPLISHED - TASK 3 - HYDROLOGIC ANALYSIS

Runoff values for all streams for which detailed modeling will be performed, as well as for the reservoir sites, have been generated for the study period. U. S. Geological Survey gauge records in the vicinity have been extended to cover the study period through correlation analyses. All streams in the study have gauge records available for some time during the past fifty years. The runoff analysis is essentially complete at this time.

Work is progressing toward completion of the data base for program
When operating, the program will provide the available supply at each of the reservoir sites, assuming new 1982 storage rights are obtained. The results of this investigation will be used in assessing the prefeasibility of the seven sites.

During the study several issues have surfaced which need to be addressed during determination of the storable flow.

1. The minimum flows at the reservoir sites must be specified. It is possible that such requirements could potentially limit storable flow at the sites during the winter months when no irrigation calls would be in effect. This determination will also be critical at the diversion points for the off-stream reservoirs.

2. Administration of surplus irrigation rights for pre-1945 permit holders must be addressed. The storable flow at the reservoir sites may be reduced if users can call for double rights (2 cfs/70 acres) during the spring runoff season.

These issues will be discussed with the Wyoming State Engineer and the Commission staff so that reasonable assumptions will be used for this study.

Concerning the proposed Snider Basin site, it appears that from a hydrologic standpoint, a better site would be below Coal Creek. With a diversion to capture Porcupine Creek, the available runoff at the proposed site would be approximately 40 percent of that which would be available below Coal Creek. Inclusion of Porcupine Creek by diversion to the proposed site would provide approximately 80 percent of the runoff available below Coal Creek. Irrigation diversion records for the study area are sparse and assumptions have had to be made concerning irrigation efficiencies, diversion characteristics and historical use. These assumptions will be documented and verified as such as is practical. Presently, all water rights on record are being included in the study without regard for non-use of some rights.
The storable flow analysis will be completed by approximately December 1. LRCWE will submit a draft report on water rights and hydrology for inclusion in the prefeasibility report by December 15.

ACCOUNTING FOR ALL PROJECT COSTS

Attached as Exhibit A is an accounting for project costs expended through October 29, 1982. The ARIX project team has currently billed the WWDC for a total of $61,232.00. Costs to date are in line with percentage of work completed.

UPDATE OF PROJECT SCHEDULE

An updated project schedule for the Upper Green Project appears as Exhibit B. Progress to date has been in accord with established schedule and current expectation is for no deviation from schedule as published herein.
EXHIBIT A
UPPER GREEN RIVER PROJECT
COSTS THROUGH OCTOBER 29, 1982

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<th>CONTRACT ITEM</th>
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TOTAL: $218,700 $61,232.00

(Project is approximately 28% complete).
EXHIBIT B

UPPER GREEN RIVER PROJECT

Updated Detailed Project Schedule

December 29, 1982 - Submittal of Draft Pre-Feasibility Report to WWDC

January 12, 1983 - Submittal of Final Pre-Feasibility Report to WWDC

January 28, 1983 - First Public Hearing on Results of Pre-Feasibility Phase in Big Piney/Pinedale

February 5, 1983 - Start Feasibility Phase

September 25, 1983 - Submittal of Draft Feasibility Report to WWDC

November 1, 1983 - Submittal of Final Feasibility Report to WWDC
APPENDIX

B
Mr. Nelson E. Wren, Jr.
Chairman, Water Development Commission
Barrett Building
Cheyenne, WY 82002

Dear Mr. Wren:

Enclosed please find a copy of our status report for the inventory of irrigated lands in the Upper Green River Basin. This report was prepared by the Remote Sensing Section in keeping with the terms of Memorandum of Agreement R08022 between the Bureau of Reclamation and the Water Development Commission, which was transmitted to you August 24, 1982.

Sincerely yours,

L. O. Timblin, Jr.
Chief
Applied Sciences Branch

Enclosure
Status Report on the Inventory of Irrigated Lands in the Upper Green River Basin

Submitted by:
Bureau of Reclamation
Division of Research
Remote Sensing Section
Denver, Colorado

to:
State of Wyoming
Water Development Commission
Cheyenne, Wyoming

November 1, 1982
Although it is early in the life of the project, significant progress has already been made in conducting an inventory of the irrigated lands in the Upper Green River Basin.

A meeting of interested parties was held to identify specific information needs to be met by the study. Attendees represented the Bureau of Reclamation Remote Sensing Section, the Bureau of Reclamation UC (Upper Colorado) Regional Office, the Upper Colorado River Basin Commission, the Wyoming SEO (State Engineer's Office), the University of Wyoming, and the Wyoming WDC (Water Development Commission). Discussion centered mainly on the data sets to be employed and the format in which results will be reported.

A review of recent studies of this nature was carried out by referring to technical journals and available project reports. This effort included contacting agencies with inventories of irrigated lands currently underway. Telephone interviews were held with representatives of the USGS (U.S. Geological Survey) Phoenix Office, the Arizona Department of Water Resources, and the USGS at Ames Research Center in California. In addition, Robert Hansen, Head of the Remote Sensing Section, attended the 3-day final review of the Irrigated Lands Assessment for Water Management Joint Research Project presented by NASA (National Aeronautics and Space Administration) and the University of California, September 21 through 23, 1982.

During the week of July 20, 1982, James Verdin of the Remote Sensing Section Traveled with Michael O'Grady (WDC) and John Buyok (SEO) to the Green River to collect ground truth information concurrent with acquisition of remote sensing data. Locations of irrigated lands and phreatophytes were noted on 7.5' quad sheets, 35 mm color slides were taken to record observed field conditions, and hand-held radiometer measurements were made to establish spectral signatures of key land cover types. During this same week, color infrared aerial photographs of the basin were obtained under WDC contract, and Landsat 3 passed over, obtaining multispectral digital imagery.

On July 29, 1982, a NASA aircraft obtained multispectral digital imagery of the Horse Creek Drainage near Daniel. This imagery is expected to be of value in mapping the vegetation of the drainage since it is of the same spectral and spatial resolution as that of the new generation sensor on Landsat 4 (Thematic Mapper), which is still in the research stage. Pixels represent areas that are 30 meters square and seven specially selected bands of the electromagnetic spectrum are monitored. The Horse Creek Drainage is getting special attention since it is the site of detailed lysimeter and streamflow studies of vegetation consumptive use.

On October 22, 1982, James Verdin met with Professors Robert Burman and Larry Pochop of the University of Wyoming Department of Agricultural Engineering. They discussed the manner in which the irrigated lands inventory, as
well as other potential spatial data sets generated by the Remote Sensing Section, might contribute to the basin-wide modeling of evapotranspiration.

Now that nearly all image data have been received, image interpretation can get underway. Manual photointerpretation on a quad-by-quad basis will begin at the WDC, with all irrigated lands and significant stands of phreatophytes delineated. These same classes will be identified in digital imagery of the Green River Basin from June 29 and August 22, 1981. Digital image processing will be carried out in the laboratory of the Remote Sensing Section in coordination with the photointerpretation efforts of the WDC.

Approximate Expenditure of Funds to Date:

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APPENDIX

C
Dear Mike:

I am enclosing a copy of our first progress report under the research project titled "Development of Evapotranspiration Crop Coefficients, Climatic Data and Evapotranspiration Models for the Upper Green River."

You will note that in the progress report that we should take delivery of the automated weather stations within the next month. We plan to set at least one of the stations up in the Laramie vicinity and operate it on a shake down basis for a considerable period of time. I will keep you informed as to when we will receive the equipment and when it is set up and when it is in use.

We are very interested in showing you this equipment sometime when you are passing through Laramie. We are quite excited about obtaining this equipment and feel that it will be a tremendous boost to our research project and our Department in general.

Sincerely,

Robert D. Burman
Professor
Agricultural Engineering

Enclosure:

We offer our programs and facilities to all people without regard to race, color, sex, political belief or national origin.
First Progress Report
CALIBRATION OF CONSUMPTIVE USE COEFFICIENTS
UPPER GREEN RIVER
to the
WYOMING WATER DEVELOPMENT COMMISSION
by
the Agricultural Engineering Division
University of Wyoming

R. D. Burman
J. Borrelli
L. O. Pochop

November 16, 1982
INTRODUCTION

This report covers work on the project from its beginning about September 1, 1982 to November 1, 1982. The following specific items are being reported.

1. The seven microprocessor controlled climatological stations plus some spare equipment have been ordered from Campbell Scientific Company in Logan, Utah. Delivery is anticipated about the middle of November, 1982. The climatological stations will be assembled and checked as soon as possible. Quite a bit of assembly work will be required. At least one of the units will be operated on a routine basis near Laramie for at least a month so that experience may be gained and operational difficulties might be uncovered.

2. All lysimeter sites in the Horse Creek, Farson and Seedskadee areas have been located. Six lysimeters have been installed in the Horse Creek area and two lysimeters have been installed near Farson. Inclement weather prevented further installations.

3. All 14 lysimeters have been fabricated and received from a sheet metal fabricator in Laramie. The fabricator was slow in delivering the lysimeters and this factor along with inclement weather prevented completion of the field lysimeter installation during the fall of 1982.

4. A graduate student in Water Resources, Joan Schumacher, has been selected to work on the project effective at the beginning of the fall semester of 1982.

5. Work is progressing on gathering historic data for the study area. A manual for the collection of data for the summer season of 1983 is being prepared.

A map of lysimeter locations in the Horse Creek area follows: