



STATE OF UTAH  
 NATURAL RESOURCES  
 Utah Geological & Mineral Survey

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

BLOO981

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

August 17, 1983

Susan Prestwich  
 U.S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-76 for the months of June and July, 1983.

The Contract Management Summary Report for the months of June and July, 1983 is as follows:

Hours worked	1458	
Wages and Benefits		15,189.34
Overhead		3,744.07
Travel and Per Diem		395.15
Reproduction		1,181.28
Payment to Matt Davis		500.00
Chemistry Analysis		<u>1,161.02</u>
TOTAL		22,170.86

Sincerely,

Robert H. Klauk  
 Principle Investigator

RHK/co  
 Attachment

Project Status Report No. DOE/ER/28393-76  
Contract No. DE/AS07/77ET 28393  
Report Period: June and July, 1983

For the months of June and July, 1983, the following has been accomplished regarding Utah's geothermal assessment program.

- I Escalante Valley - in press.
- II Utah County - Part II is 95% complete.
- III Davis and Weber Counties - written report is 50% complete.
- IV Jordan Valley
  - A. Written report is 90% complete.
  - B. Meiji completed the gravity report.
- V Locomotive Springs and vicinity - first draft is presently being reviewed.
- VI Box Elder County - written report is 10% complete.



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

February 1, 1983

Susan Prestwich  
 U.S. Department of Energy-ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-71 for the months of December, 1982 and January, 1983.

The contract management Summary Report for the month of December is as follows:

Hours Worked	1039	
Wages and Benefits		7,128.50
Overhead		240.73
Travel and Per Diem		.00
Reproduction		310.56
Equipment		216.26
Supplies		191.28
Equipment Maintenance		60.20
Meiji (Geophysical Modeling)		2,500.00
Registration (GRC Well Workshop)		680.00
Total		13,489.53

Sincerely,

Robert H. Klauk  
 Principal Investigator

RHK/ay  
 Attachment

Board: Kenneth R. Poulsen, Chairman  
 Laurence H. Laffman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

Project Status Report No. DOE/ER/28393-71  
Contract No. DE/AS07/77ET/28393  
Report Period: December, 1982; January, 1983

For the months of December, 1982 and January, 1983 the following was accomplished regarding Utah's geothermal assessment program:

- I. Escalante Valley - The review comments have been received and incorporated into the report.
- II. Utah Valley - The gravity portion of the report has been completed and is currently being reviewed.
- III. Box Elder County - The data is presently being analyzed.
- IV. Jordan Valley
  - A. Meiji Resource Consultants is continuing to model the gravity data.
  - B. The remainder of the report is completed and awaiting the gravity report for incorporation.



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

November 17, 1982

Susan Prestwich  
 U. S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-69 for the month of October, 1982.

The contract management Summary Report for the month of October is as follows:

Hours worked	753.5	
Wages and Benefits		\$4,900.60
Overhead		1,831.39
Travel and per diem		1,283.07
Reproduction		237.15
Equipment		000.00
Supplies		55.72
Equipment maintenance		<u>215.58</u>
Total		\$8,523.51

Sincerely,

*Robert H. Klauk*  
 Robert H. Klauk

RHK/co

Board: Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Mutthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mairnickrodt  
 Elliot Rich

Project Status Report No. DOE/ER/28393-69

Contract No. DE/AS07/77ET/28393

Report Period: October, 1982

For the month of October, 1982, the following was accomplished regarding Utah's geothermal assessment program:

- I Escalante Valley - The report has been reviewed and minor changes are presently being made.
- II Jordan Valley
  - A. Meiji Resource Consultants has completed 10 preliminary gravity modeling profiles.
  - B. The final report is scheduled to be completed on December 1, 1982.
- III Box Elder, Davis, and Weber Counties
  - A. Equipment failure precluded completing temperature-depth profiling by November 1, 1982.
  - B. Profiling is continuing.
- IV Utah Valley - The gravity report is continuing to be written.



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Blackhawk Way • Salt Lake City, UT 84108 • 801-581-6831

December 8, 1982

Susan Prestwich  
U. S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

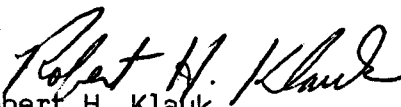
Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-70 for the month of November, 1982. Five copies of the Cache Valley Report are enclosed. Also as per our phone conversation, Chad Gourley and myself are attending the workshop on geothermal wells to be held in Reno, Nevada from January 31 to February 2, 1983.

The contract management Summary Report for the month of November is as follows:

Hours worked	608	
Wages and Benefits		\$3975.75
Overhead		1396.95
Travel and Per Diem		1050.84
Reproduction		7.50
Equipment		
Supplies		45.00
Equipment and Maintenance		
Total		<u>6476.04</u>

Sincerely,

  
Robert H. Klauk  
Principal Investigator

RHK/co

Board/Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

Project Status Report No. DOE/ER/28393-70

Contract No. DE/AS07/77ET/28393

Report Period: November, 1982.

For the month of November, 1982, the following was accomplished regarding Utah's geothermal assessment program:

- I Escalante Valley - The report has been submitted to the UGMS review board and UURI/ESL for review.
- II Utah Valley - The gravity portion of the report is scheduled to be completed and submitted for review by January 1, 1983.
- III Jordan Valley - Meiji Resource Consultants is continuing to model the gravity data.

RHK/co



20 9/30



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Geothermal Resources Administration  
1000 North State Street, Suite 200  
Salt Lake City, Utah 84119

100 Black Hawk Way • Salt Lake City, UT 84108 • 801-551-5100

September 24, 1982

Susan Prestwich  
U.S. Department of Energy-ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-67 for the months of July and August, 1982.

Results of an internal audit of the geothermal program through June 30, 1982 indicate the following:

Balance as of June 30, 1982	270,689.43
Total expenditure from July 1, 1982 through June 30, 1982	135,484.04
Balance as of July 1, 1982	135,205.39

The contract management Summary Report for the months of July and August, 1982 are as follows:

Hours worked	1338	
Wages and benefits		9,258.94
Overhead		4,656.34
Travel and per diem		1,440.75
Reproduction		109.30
Equipment		90.00
Supplies		9.50
Total		15,564.83

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/ay  
attachment

Board: Kenneth R. Peltola, Chairman  
Gordon L. Smith  
C. Allen Matheson



Director: Kenneth R. Peltola  
1000 North State Street, Suite 200  
Salt Lake City, Utah 84119

Project Status Report No: DOE/ER/28393-67  
Contract No: DE/AS07/77ET/28393  
Report Period: July and August, 1982

For the months of July and August, the following was accomplished regarding Utah's geothermal assessment program:

- I. Cache Valley - Report is in the process of being published.
- II. Escalante Valley - The report has been completed and is presently proceeding through the UGMS review process.
- III. Jordan Valley - Meiji Resource Consultants is continuing to model the gravity data.
- IV. Box Elder, Weber and Davis Counties
  - A. Chemistry sampling has been completed.
  - B. Temperature-depth measurements of holes of opportunity have commenced.
- V. Utah Valley
  - A. Gravity modeling has been completed.
  - B. The portion of the report pertinent to the gravity is presently being written.
- VI. Yellowstone Institute - as per prior DOE approval, the institute was attended from August 19 through August 29, 1982

R10/5



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

September 24, 1982

Susan Prestwich  
U.S. Department of Energy-ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-67 for the months of July and August, 1982.

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Equipment		90.00
Supplies		9.50
Total		15,564.83

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/ay  
attachment

Board Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

Project Status Report No: DOE/ER/28393-67  
Contract No: DE/AS07/77ET/28393  
Report Period: July and August, 1982

For the months of July and August, the following was accomplished regarding Utah's geothermal assessment program:

- I. Cache Valley - Report is in the process of being published.
- II. Escalante Valley - The report has been completed and is presently proceeding through the UGMS review process.
- III. Jordan Valley - Meiji Resource Consultants is continuing to model the gravity data.
- IV. Box Elder, Weber and Davis Counties
  - A. Chemistry sampling has been completed.
  - B. Temperature-depth measurements of holes of opportunity have commenced.
- V. Utah Valley
  - A. Gravity modeling has been completed.
  - B. The portion of the report pertinent to the gravity is presently being written.
- VI. Yellowstone Institute - as per prior DOE approval, the institute was attended from August 19 through August 29, 1982



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Anderson, Executive Director  
 General Services Administration

Robert H. Klauk, Wm. • Salt Lake City, UT 84116 • (801) 581-6831

July 14, 1982

*CAR -  
 got the extension?*

Susan Prestwich  
 U.S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached are copies of Project Status Report No. DOE/ER/28393-66. The contract Management Summary Report for the month of April is as follows:

Hours worked	597	
Wages and Benefits		\$3,892.79
Overhead		2,017.88
Travel and Per Diem		956.11
Reproduction		39.60
Equipment		00.00
Computer		38.73
Supplies		00.00
	<b>Total</b>	<b>\$6,945.11</b>

Thank you.

Sincerely,

ROBERT H. KLAUK  
 Principal Investigator

RHK/co  
 Attachment



PROJECT STATUS REPORT NO. DOE/ER/28393-66

CONTRACT NO. DE/AS07/77ET 28393

REPORT PERIOD: June, 1982

For the month of June, the following was accomplished regarding Utah's geothermal assessment:

- I Cache Valley - The report is being sent to DOE for approval.
- II Escalante Valley - The report is continuing to be written.
- III Geophysical modeling of the Wasatch Front - Meiji Resource Consultants are continuing to work on the project.
- IV Box Elder County - The chemistry sampling has been completed.
- V Weber and Davis counties - Chemistry samples are continuing to be collected.
- VI Contract Modification - Utah received contract modification A009 which is firm until March 31, 1983.

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STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

June 3, 1982

Susan Prestwich  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

Attached please find copies of Project Status Report No. DOE/ER/28393-65.

The contract Management Summary Report for the month of April is as follows:

Hours worked	715	
Wages and Benefits		\$4,472.31
Overhead		2,232.83
Travel and Per Diem		1,228.25
Reproduction		56.10
Equipment		0.00
Computer		0.00
Supplies		103.82
Registration for Yellowstone Institute		350.00
		<hr/>
	Total	\$8,443.31

Thank you.

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/co  
Attachment

Board: Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

PROJECT STATUS REPORT NO. DOE/ER/28393-65

CONTRACT NO. DE/AS07/77ET 28393

REPORT PERIOD: May, 1982

For the Month of May, the following was accomplished regarding Utah's geothermal assessment:

- I. Cache Valley - The report should be sent to DOE in June for approval.
- II. Escalante Valley
  - A. Additional data reduction was conducted.
  - B. The report is continuing to be written.
- III. Geophysical Bid Package
  - A. The contract with Meiji has been signed.
  - B. Deliverable date for the Jordan Valley is August 1, 1982.
  - C. Deliverable date for the remainder of the data is October 1, 1982.
- IV. Technology Transfer
  - A. Bruce Hill (consulting geologist) requested information on a geothermal well drilled in Box Elder County.
  - B. The name of the well was "Geothermal Kinetics Utah Steam Venture No. 1 Davis."
- V. Box Elder, Weber, and Davis counties
  - A. Chemistry sampling of Box Elder County is scheduled to be completed by July 1, 1982.
  - B. Chemistry sampling has commenced on Weber and Davis Counties.
- VI. Contract Modification - Word has not been received regarding the status of the contract modification proposal sent to DOE on April 28, 1982.



2618

ENERGY INSTITUTE

Box 3E1/Las Cruces, New Mexico 88003  
Telephone (505) 646-1745



June 3, 1982

Susan Prestwich, Program Manager  
Energy and Technology Division  
U.S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

The enclosed was inadvertently not included in the April, 1982 Project Status Report for Modification A005, Contract DE-AS07-78ID01717. Please attach it to the histogram already provided.

Also, please provide us with a replacement name for Bob Gray. His mail is being returned to us from DOE.

Thank you.

Sincerely,

*Arlene H. Starkey*  
Arlene H. Starkey  
Program Director

*SP has called in  
8 June 82*

cc FY 81-82 DE-AS07-78ID01717 File  
Fraser, DOE - 1 copy  
Jones, DOE - 1 copy  
Foley, UURI - 1 copy  
Laughlin, LANL - 1 copy

BUDGET AMOUNT \$236,480  
MONTHLY STATUS REPORT TO DOE

The following is a task by task description of the work performed through April 1982.

Task 1: Work is continuing on entry of geothermal data into HISS. A camera-ready technical paper and updated New Mexico bibliography was prepared and presented at the Roundup Conference in Salt Lake City. A comprehensive low-temperature geothermal resource assessment bibliography is being prepared for distribution by the State of New Mexico. Program administration and task coordination is continuing.

Task 2: The work at NOAA has been reinitiated on the New Mexico map. Draft of tectonics data is complete. Hydrology and gravity data sets are being drafted. The data obtained from Union Geothermal on the Baca Location #1 have been analyzed and forwarded to NOAA.

Task 3: Actual temperature and geotemperature data sets are being drafted. Magnesium corrections to the Na-K-Ca geotemperatures have been computed, all of which resulted in no change to the original data set. References for each of the data sets have been compiled and are being checked for completion.

Task 4: Final copy of location map is complete. Residual Bouguer gravity map has been inspected for errors and final corrections are being made. Tectonic map is in the final drafting process. Magnesium corrections to the Na-K-Ca geotemperatures have been computed, all of which resulted in no change to the original values. Substantial newspaper publicity covering the search for well locations has been obtained and has been valuable in locating new wells for logging. Six more wells have been logged, one on the southern edge of the Baca geothermal field had a bottom-hole temperature of 27.5°C at 47 meters with a gradient of 358°C/km. Field work continued on the Santa Ana Pueblo lands and the possibility of drilling a 300-ft gradient hole with State of New Mexico funds is being explored. Attempts are being made to have an electrical resistivity survey completed near the expected anomaly prior to siting the gradient well.

Task 5: The USGS aeromagnetic map making project was site visited. Work is proceeding smoothly with a scheduled completion date in early September.

X612



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

May 13, 1982

Susan Prestwich  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

Attached please find copies of Project Status Report No. DOE/ER/28393-64 for the month of April, 1982.

The Contract Management Summary Report for the month of April is as follows:

Hours worked	866	
Wages & Benefits		5,391.43
Overhead		2,546.58
Travel and Per Diem		539.60
Reproduction		56.30
Equipment		8.00
Computer		<u>66.44</u>
	<b>Total</b>	<b>8,608.35</b>
Error from April		
Wages & Benefits		1,000.00
Other		<u>18.23</u>
	<b>Total</b>	<b>1,018.23</b>

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/ay

Board: Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Berrick • Beriton Boyd  
Natalie A. Malinckrodt  
Elliot Rich

Project Status Report No. DOE/ER/28393-64  
Contract No. DE/AS07/77ET 28393  
Report Period: April, 1982

For the month of April, the following was accomplished regarding Utah's geothermal assessment:

- I. Cache Valley - the report is presently being reviewed.
- II. Escalante Valley - the report is being written.
- III. Geophysical Bid Package - Meiji has proceeded with the modeling of the Jordan Valley gravity and aeromagnetic data.
- IV. Technology Transfer - Canyon Meadows
  - A. A warm spring was sampled at the Canyon Meadows subdivision for analysis.
  - B. The water sample was sent to UURI/ESL for analysis.
  - C. The water temperature recorded was 24°C.
- V. Box Elder, Weber and Davis Counties
  1. Field work is to commence on May 15, 1982
  2. It is estimated that a maximum of 130 water samples will be collected for analysis.
- VI. Contract Modification
  1. The second contract modification was sent on April 28, 1982.
  2. A "No Cost" time extension was granted through June 30, 1982 to allow time for the appraisal of the proposed modification.



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

January 7, 1982

Roy Mink  
 U. S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Roy:

Attached please find copies of Project Status Report No. DOE/ER/28393-60 for the month of December 1981.

The Contract Management Summary Report for the month of December is as follows:

Hours worked	1065	
Wages and benefits		\$ 6,227.48
Overhead		3,271.04
Travel		608.12
DVM logging cable		2,776.04
Reproduction		200.80
Misc. supplies		35.54
		<hr/>
Total		\$13,119.02

Sincerely,

ROBERT H. KLAUK  
 Principal Investigator

RHK/co

Board: Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

January 7, 1982

Project Status Report No. DOE/ER/28393-60  
Contract No. DE/AS07/77ET 28393  
Report Period: December 1981

For the month of December, the following was accomplished regarding Utah's geothermal assessment program:

I. Utah Valley

- A. Chemistry analyses have been completed.
- B. Additional chemistry data have been retrieved from the USGS.
- C. An additional thermal gradient was logged, bringing the total to 15.

II Cache Valley - The report is being written.

III Milford-Beryl Area

- A. Chemistry analyses have been completed.
- B. The data are being reduced.

IV Contract modifications

- A. The contract modification was completed.
- B. The modification was sent on December 11, 1981.

V Technology transfer - No requests were received.



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

*Le/16*

February 3, 1982

Susan Prestwich  
 U. S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached please find copies of Project Status Report No. DOE/ER/28393-61 for the month of January, 1982.

The Contract Management Summary Report for the month of January is as follows:

Hours worked	744	
Wages and benefits		\$4559.88
Overhead		2198.75
Travel & Per Diem		1514.35
Computer		93.27
Reproduction & supplies		364.89
Chemistry		35.50
		-----
Total		\$8766.64

Sincerely,

*Robert H. Klauk*

ROBERT H. KLAUK  
 Principal Investigator

RHK/co

Board: Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

February 3, 1982

Project Status Report No. DOE/ER/28393-61  
Contract No. DE/AS07/77ET 28393  
Report Period: January, 1982

For the month of January, the following was accomplished regarding Utah's geothermal assessment program:

I Jordan Valley

- A. The 30 gradients logged for the Jordan Valley are presently being evaluated.
- B. The GEOTHERM forms for all wells 20°C or higher in the valley have been completed and are presently being checked for accuracy.

II Utah Valley

- A. Six profiles have been established for gravity modeling.
- B. Modeling is to proceed in February.

III Cache Valley

- A. Another well, adequate for gradient logging, has been located, bringing the total to 12.
- B. The first draft of the report is scheduled to be completed in February.

IV Milford - Beryl Area

- A. 35 thermal gradient logs are being evaluated.
- B. The first draft on the report is scheduled to be completed in February.

V Wasatch Front Gravity Modeling

- A. The "Request For Proposal" for gravity modeling of the Jordan Valley and selected hot springs along the Wasatch Front was advertised on January 25, 1982.
- B. A contractor is projected to be selected in February.

VI Technology Transfer

- A. No requests were received.





STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

X3/10

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

March 5, 1982

Susan Prestwich  
 U.S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached please find copies of Project Status Report No. DOE/ER/28393-62 for the month of February, 1982.

The Contract Management Summary Report for the month of January is as follows:

Hours worked	839.5	
Wages and Benefits		\$5048.99
Overhead		2524.12
Travel and Per Diem		346.66
Reproduction and Supplies		188.59
		<hr/>
Total		\$3108.36

Sincerely,

ROBERT H. KLAUK  
 Principal Investigator

RHK/co

Board Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

March 5, 1982

Project Status Report No. DOE/ER/28393/62

- I Jordan Valley
  - A. The gradient analysis has been completed.
  - B. A geothermal well is being drilled near the prison; UGMS hopes to run a gradient log, subsequent to completion, to add to the data base.
  
- II Utah Valley
  - A. Gravity modeling of the six designated profiles has been temporarily suspended; new density information regarding Utah Valley is being procured from Gulf Oil.
  - B. Upon arrival of this information, modeling will commence.
  
- III Cache Valley
  - A. The chemistry analysis was reviewed by UURI/ESL.
  - B. The first draft of the report has been reviewed.
  - C. Final revisions and drafting are being completed.
  
- IV Milford-Beryl Area
  - A. Data analysis has been completed.
  - B. The first draft of the report has commenced.
  
- V Wasatch Front Gravity Modeling
  - A. Bids were received from Meiji Resource Consultants and Ertec Western, Inc.
  - B. Bids were \$15,000 and \$19,000 respectively.
  - C. Meiji was tentatively chosen as the contractor, subject to DOE approval.
  
- VI GEOTHERM File - The entries for the Jordan Valley, Utah Valley and the Escalante Valley have been completed and are ready to be sent to the USGS.
  
- VI Technology Transfer
  - A. Paul Simmons requested assistance to evaluate a reported warm spring in Provo Canyon.
  - B. Michael Cox requested any additional information that may be available on Wasatch Warm Springs.
  - C. Scott Holmgren inquired about aid in evaluating the potential of Belmont (Udy) Hot Springs.

STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

1000 Park Row Way • Salt Lake City, UT 84108 • 801-581-6831

April 15, 1982

Susan Prestwich  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

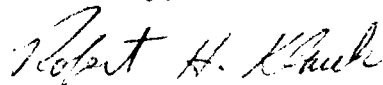
Dear Susan:

Attached please find copies of Project Status Report No. DOE/ER/28393-63 for the month of March 1982.

The Contract Management Summary Report for the month of January is as follows:

Hours worked	1010	
Wages and Benefits		\$5,013.48
Overhead		2,978.95
Travel and Per Diem		512.64
Registration for State Coupled		135.00
Reproduction		93.50
Computer		201.05
Supplies		17.94
Equipment		1,031.67
Chemistry analysis		142.00
TOTAL		\$10,108.29

Sincerely,



ROBERT H. KLAUK  
Principal Investigator

RHK/co

Board of Directors: Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matties



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

April 14, 1982

Project Status Report No. DOE/ER/28393-63  
Contract No. DE/AS07/77ET 28393  
Report Period: March 1982

For the month of March, the following was accomplished regarding Utah's geothermal assessment:

I Jordan Valley

- A. A geothermal well being drilled approximately one mile north of the Utah State Prison was completed to 1500 feet.
- B. The hole was not logged due to blockage at 40 feet.
- C. The driller (Paul Billings) reported that the hole was being abandoned due to lack of warm water.

II Utah Valley

- A. A gradient hole was relogged due to the possibility of error.
- B. The gradient log data are presently being reduced.

III Cache Valley

The report is in the final stages of review and should be completed in May.

IV Escalante Valley

The report is in the final writing stages and should be completed in May.

V Technology Transfer

- A. Greg Call (Real Estate agent) requested information regarding geothermal potential near the International Center on North Temple in the northwest portion of Salt Lake County.
- B. Nick Carling (Real Estate agent) requested information on warm wells located in the vicinity of Saltair Beach on the south shore of the Great Salt Lake.

X 3/2



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
State Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Blackhawk Way • Salt Lake City, UT 84108 • 801-537-6834

February 17, 1982

NOTE  
Contains summary  
of contract work and  
deliverables as of  
17 Feb 82.

John Hastings  
Department of Energy - ID  
800 Second Street  
Idaho Falls, ID 83401

Dear John:

As per a phone conversation with Susan Prestwich on February 17, 1982, I am requesting a no-cost time extension until April 30, 1982 to continue the State Coupled program. Hopefully this extension will provide enough time to evaluate the attached proposal for the modification of the existing investigation of Utah's low-temperature geothermal resources.

Sincerely,

Robert H. Klauk  
Principal Investigator

PHK:CO  
Enclosure  
cc: Duncan Foley  
Susan Prestwich

Board Members: R. Poulton, Chairman  
Louise H. Lattman  
Peter E. Mathies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

February 3, 1982

Susan Prestwich  
U. S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

On December 11, 1981, I sent a proposal for the modification of Contract No. DE-AS07-77ET 28393 A006 requested from Roy Mink as per a phone conversation on October 21, 1981. I understand that Roy has subsequently left DOE. I have, as of this date, not received a response to the proposal; however, as of January 1, 1982, I have been operating under that proposal. If there is some problem with this, I would appreciate hearing from you.

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/co

Board/Kenneth R. Poulson, Chairman  
Laurence H. Lehman  
Peter E. Matheson



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

December 11, 1981

Contract DE-AS07-77ET 28393  
Correspondence No. DOE/ER/28393-54

Roy Mink  
Department of Energy  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Enclosed, please find five copies of our proposal to modify the existing State Resource Assessment Contract No. DE-AS07-77ET 28393. Please be advised that included in the proposal are funds for two trips to Idaho Falls, Idaho for two people for possible progress meetings as well as one trip to Denver, Colorado for two people for a possible regional assessment team meeting, one trip to San Diego, California to present a paper at GRC and one trip for one person to Yellowstone Park, Wyoming to attend a geothermal short course.

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/ay  
enclosures



A PROPOSAL TO MODIFY THE EXISTING INVESTIGATION OF  
 UTAH'S LOW TEMPERATURE GEOTHERMAL RESOURCES (1981-82)

I. INTRODUCTION

Under contract with the U.S. Department of Energy (DOE), the Utah Geological and Mineral Survey (UGMS) has been conducting research to advance the utilization of low-temperature geothermal resources in the State of Utah. The original contract, designated as EG-77-S-1679 but later changed to DE-AS07-77ET 28393, commenced July 1, 1977. The current contracts (both State Coupled and MX) are to expire on February 28, 1982.

II. TASKS COMPLETED

The following tasks have been completed under previous modifications of the contract:

A. To accomplish a synthesis of data available concerning the distribution of potential low and moderate temperature geothermal resources in the State of Utah. This task was completed in the form of UGMS Report of Investigation No. 129 by Harry D. Goode in November, 1978.

B. To conduct preliminary field surveys of the following promising sites:

1. Crystal Hot Springs, Salt Lake County, Utah.

The Crystal Hot Springs report was completed as UGMS Report of Investigation No. 139, October, 1979. A subsequent report based on gravity and aeromagnetic modeling, as well as extension of the State Forestry Well (SF/1) and the drilling of the Utah State Prison well (USP/1) has been completed and is being published through the Utah Energy Office.

2. Warm Springs fault area, Salt Lake City, Utah

The Warm Springs fault geothermal area report was completed as UGMS Report of Investigation No. 140, October, 1979.

Board/Kenneth R. Poulsen, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich



3. Midway Hot Springs area, Wasatch County, Utah

The Midway Hot Springs area report was completed as UGMS Report of Investigation No. 142, June, 1979.

4. Utah Hot Springs, Weber and Box Elder Counties, Utah

5. Crystal (Madsen) Hot Springs, Box Elder County, Utah

6. Udy (Belmont) Hot Springs, Box Elder County, Utah

7. Little Mountain - South area, Weber County, Utah

The Utah Hot Springs, Crystal (Madsen) Hot Springs, Udy Hot Springs and Little Mountain-South geothermal area reports have been completed as UGMS Report of Investigation No. 141, October, 1979.

C. To submit over 650 entries to the GEOTHERM file pertaining to waters 20°C or greater. These entries have been submitted.

D. To submit approximately 1,600 records dealing with waters in the temperature range of 15.5 to 19.5°C. These records have been compiled but have not been submitted to GEOTHERM because the USGS subsequently decided this data is too voluminous and not necessarily of much value. A letter to this fact, from Jim Bliss, is attached.

### III. TASKS PRESENTLY BEING CONDUCTED

The following tasks are presently being conducted under contract modification A006:

A. Update new or overlooked data and submit to GEOTHERM.

B. Determine the source, distribution and potentially useful thermal energy in the Jordan Valley.

C. Determine the source, distribution and potentially useful thermal energy in Utah Valley.

D. Determine the source, distribution and potentially useful thermal energy in the Cache Valley.

E. Conduct a geothermal reconnaissance of the Milford-Beryl (formerly MX) area which consists of background research, aqueous chemistry, water temperatures and thermal gradient measurements.

F. Write addendums to UGMS Reports of Investigation Nos. 140 and 141 resulting from geophysical modeling of gravity and aeromagnetic surveys.

G. Publish a report on geothermal resources of the Wasatch Front area after completion of all foregoing deliverables.

#### IV. EQUIPMENT

The following equipment has been purchased under contract modification A006:

- 2 Specific ion meters
- 3 pH electrodes
- 1 Chloride electrode
- 1 Fluoride electrode
- 1 YSI SCT meter
- 1 Temp probe - DVM
  - 4,500' of cable
- 5 YSI temp probe heads
- 2 - 142 backflushing filter systems and related supplies

#### V. PROPOSED PROGRAM CHANGES

Inasmuch as the MX deployment area has been scrubbed, UGMS suggests that the balance of the money originally proposed for geothermal assessment in the Milford-Beryl area would better serve the State of Utah in some other area. Therefore, UGMS proposes to investigate geothermal potential in Davis and Weber Counties, in those areas not presently under investigation by UURI/ESL. In order to implement these changes and to complete the remaining deliverables for which UGMS is responsible, the following list of tasks are proposed to be completed by December 31, 1982 using those funds remaining from Modification A006:

- A. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Utah Valley and Jordan Valley.
- B. Collect thermal gradient measurements on selected wells in promising locations within the study area.
- C. Compile, and interpret where necessary, appropriate existing geological and geophysical data within the study area for use in area specific investigations.
- D. All existing gravity data from the previous year's work as well as some aeromagnetic data will be modeled. An integration of these models will be developed.
- E. The UGMS will furnish a report on the Jordan Valley, a report on Utah Valley, as well as addenda to the site specific report on Utah Hot Springs, Crystal Hot Springs and the Warm Springs Fault area, based on results of the geophysical modeling and of interpretation.
- F. The contractor shall revise data in the GEOTHERM file including (1) correction of data already submitted, and (2) updating with new overlooked data.
- G. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the

collection of water samples for chemical analysis in the Milford-Beryl area.

- H. Collect thermal gradient measurements on selected wells in promising locations in the Milford-Beryl area.
- I. The UGMS will furnish a resource assessment report on the Milford-Beryl area based on the limited study conducted.
- J. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Cache Valley.
- K. Collect thermal gradient measurements on selected wells in promising locations within the study area.
- L. The UGMS will furnish a report on the Cache Valley.
- M. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, the collection of water samples for chemical analysis as well as thermal gradient measurements on selected wells in Davis and Weber Counties.
- N. The UGMS will furnish a report on Davis, Weber, and Box Elder counties
- O. The UGMS will also furnish a report on the geothermal resources of the Wasatch Front area.

#### VI. WAYS AND MEANS

<u>Personnel</u>	<u>DOE</u>	<u>UTAH</u>
Project Manager (10% time)		
Wages & Benefits		4,269
Principal Investigator (90% time)		
Wages & Benefits	16,458	10,182
Geologist (10% time)		
Wages & Benefits		2,960
Geol. Tech. III (100% time)		
Wages & Benefits	20,542	
Geol. Techs. II (100% time)		
Wages & Benefits	46,150	
Draftsman		
Wages & Benefits	4,300	
<u>Overhead</u>		
39.1% Wages & Benefits	41,000	

<u>Registration</u>	500	
<u>Travel &amp; Per Diem</u>	18,000	
<u>Computer</u>	3,000	
<u>Subcontracts</u>		
Data Evaluation	20,000	
Chemistry	3,550	
Isotope Analysis	1,000	
Supplies and Reproduction	5,000	
Data Purchase	3,000	
Computer	3,000	
<u>Miscellaneous</u>	2,000	
<u>Publications</u>		10,000
<u>TOTAL</u>	\$ 184,500	\$28,569

*Genevieve Atwood*

GENEVIEVE ATWOOD  
Director

*Archie D. Smith*

ARCHIE D. SMITH  
Project Manager

*Robert H. Klauk*

ROBERT H. KLAUK  
Principal Investigator



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Branch of Resource Analysis  
345 Middlefield Road  
Menlo Park, California 94025

November 30, 1981

Mr. Robert Klauk  
Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

Dear Bob,

To include a spring or well in the GEOTHERM Information system where temperatures are near mean ambient air temperature for a given region presents problems. The general criteria is that a spring or well should have fluids which exceed the average ambient air temperature by at least 10°C. In Utah, the average ambient air temperatures are usually near 10°C. Obviously lower temperatures are present at higher elevations. Without additional criteria, we would generally find it inappropriate to include sites in GEOTHERM for Utah where the observed temperature of the fluid is less than 20°C. Therefore, wells with fluid temperatures between 15.5°C and 19.5°C would not meet this criteria. Where additional criteria is available and appropriate, sites not meeting the temperature can be included.

We look forward to any contributions you feel are appropriate to the GEOTHERM Information System. Please give me a call if you need further clarifications or any assistance.

Sincerely yours,

James Bliss  
Geologist  
GEOTHERM Information System

R/20



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

December 15, 1981

Roy Mink  
U. S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Attached please find copies of Project Status Report No. DOE/ER/28393-59 for the month of November, 1981.

The Contract Management Summary Report for the month of November is as follows:

Hours worked	901	
Wages and Benefits		\$ 6,363.60
Overhead		3,241.68
Travel		1,981.00
Chemistry Analysis - ESL		1,739.50
Equipment Repair		70.73
Reproduction		110.50
Computer		48.96
Misc. Supplies		313.98
		<hr/>
Total		\$ 13,779.95

Sincerely,

ROBERT H. KLAUK  
Principal Investigator

RHK/co

Board/Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich

December 15, 1981

Project Status Report No. DOE/ER/28393-59  
Contract No. DE/AS07/77ET 28393  
Report Period: November, 1981

For the month of November, the following was accomplished regarding Utah's geothermal assessment program:

I Jordan Valley

- A. Time was spent analyzing the 30 geothermal gradients previously logged

II Utah Valley

- A. The gravity countour map has been completed.
- B. Fourteen thermal gradients have been logged.

III Cache Valley

- A. The report is being written.

IV Milford-Beryl Area

- A. Fifty chemistry samples have been collected.
- B. Thirty-five thermal gradients have been logged.

V Contract Modifications

- A. Time was spent modifying the existing contract modification A006.

VI Technology Transfer

- A. No requests were received.

R 1/28



STATE OF UTAH  
NATURAL RESOURCES & ENERGY  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

December 15, 1981

Roy Mink  
U. S. Department of Energy - ID  
50 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Attached please find copies of Project Status Report No. DOE/ER/28393-58 for the month of October 1981.

The contract Management Summary Report for the month of October is as follows:

Hours worked	1199.5	
Wages and Benefits		\$ 6,581.86
Travel		3,101.87
Overhead		3,493.09
GRC registration		185.00
Equipment repair		78.00
Equipment purchase - 5 YSI Thermister Probes		435.10
		<hr/>
Total		\$ 13,874.92

Sincerely,

ROBERT H. KLAUK  
Principal Investigator

RHK/co

Board: Kenneth R. Poulson, Chairman  
Laurence H. Lattman  
Peter E. Matthies



Robert W. Bernick • Benton Boyd  
Natalie A. Mallinckrodt  
Elliot Rich



December 15, 1981

Project Status Report No. DOE/ER/28393-58  
Contract No. DE/AS07/77ET 28393  
Reporting Period: October, 1981

For the month of October, the following was accomplished on Utah's geothermal assessment program:

I Jordan Valley

- A. Time was spent reviewing gravity data to help determine those areas to be modeled.
- B. Isotope samples at UURI/ESL have been cataloged and located on a base maps.
- C. 30 gradients have been logged.

II Utah Valley

- A. The gravity countour map is 90% complete.
- B. 15 to 20 water wells look promising for gradient logging - 5 have been completed.

III Cache Valley

- A. Existing gravity reports have been reviewed and subsequently it has been determined that subcontracting for a limited survey would not best utilize the funds available.
- B. Water chemistry on 90 well samples has been completed and 12 thermal gradient holes have been logged.
- C. The report is in the process of being written.

IV Milford-Beryl Area

- A. 50 wells have been sampled.
- B. Gradient logging is presently being conducted.

V Technology Transfer

- A. No requests were received.

Archie Smith } UGMS

22 Oct '81

Bob Klauk } (SMITH REPLACES WALLY GWYNN ON TEAM.)

M-X STUDY AREA.

- WATER SAMPLING COMPLETE FOR NOW.
- WISH TO DO SOME GRADIENT WORK, THEN TIE-UP PROJECT (FOR NOW AT LEAST) AND PREPARE A FINAL REPORT, TIEING CHEMISTRY - THERMAL GRADIENT DATA TOGETHER.
- FUNDS LEFT OVER FROM M-X APPLIED TO MORE WORK IN OTHER AREAS. (NO PERSONNEL INCREASE ANTICIPATED). CONCENTRATE MORE EFFORT ON POPULOUS AREAS SUCH AS WASATCH FRONT, ETC. MAY NOT EVEN HAVE TO REPLACE HELP LOST BY ATTRICIAN. WANT TO FINISH UP WORK IN UTAH VALLEY AND JORDEN VALLEY.
- ATWOOD IS INTERESTED IN KEEPING SOMETHING GOING WITH GEOTHERMAL. HAS ASKED KLAUK TO PREPARE FULL BLOWN - MIDDLE-AND BARE BONES PROPOSAL / BUDGET.
- REMINDED UGMS THAT ESL SUPPORT GOES ONLY THROUGH SEPT. '82 BUT 100-150 WATER SAMPLES CAN BE DONE "FREEBIES". MORE REALISTIC LOOK AT THE NUMBER OF WATER SAMPLES NEEDED TO BE STATISTICALLY VALID.
- SELL TED WILSON THAT GEOTH. IN SL VALLEY MIGHT BE BENEFICIAL.
- UGMS will scope a Mod to present DOE contract. NO COST EXTENSIONS HAVE BEEN USED BY DOE TO USE UP THE LEFT-OVER MONIES, NONE TAKEN BACK YET BUT THIS COULD HAPPEN IF A STATE PROGRAM / PEOPLE CEASE TO FUNCTION.
- PULL IN EXCESS M-X APPROPRIATION - RESCOPE EXISTING SCP. SOW, INCLUDING M-X FUNDS THAT ARE LEFT OVER, LUMP IN TO ONE PACKAGE FOR CONTRACT MODIFICATION. PACKAGE READY FOR REVIEW (6 Nov 81 - 9 PM.)

~~A. Smith~~ } UGMS  
R. Klauk }

13 Nov '81

UTAH SCP: PROGRAM REVIEW:  
Proposal for contract extension. Mod. A7.

Add Report integrating all data, etc. ie; a  
Final Project Report at conclusion of work.

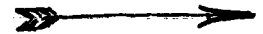
DATA FOR GEOTHERM FILE AND CHECK DATA  
FROM USGS (MARSHALL REED).

100 Water samples - will be paid for by UGMS.

40 " " Utah Valley. (Will be done by ESL?)

TOT 140 MAXIMUM.

(ELIZABETH HYSTER: DOE CONTRACT OFFICER) →



APPENDIX A7

For the Contract Period January 1, 1981, through December 31, 1982

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) As part of the continuing effort in Resource Assessment in Utah, Davis, <sup>as well as initial work in the Milford-Box area</sup> Weber, Box Elder, Salt Lake, and Cache counties, the following work will be performed by UGMS.

Task 1. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Utah Valley and Jordan Valley.

Task 2. Collect thermal gradient measurements on selected wells in promising locations within the study area.

Task 3. Compile, and interpret where necessary, <sup>appropriate</sup> ~~all~~ existing geological and geophysical data within the study area for use in area specific investigations.

Task 4. All existing gravity data from the previous year's work as well as some aeromagnetic data will be modeled. An integration of these models will be developed.

Task 5. The UGMS will publish a report on the Jordan Valley, a report on Utah Valley, as well as site specific report on Utah Hot Springs, Crystal Hot Springs and the Warm Springs Fault area based on results of the geophysical modeling and interpretation.

Task 6. The contractor shall revise data in the GEOTHERM file including (1) correction of data already submitted, (2) updating with new overlooked data, and (3) the submission of approximately 1,600 records dealing with waters in the temperature range of 15.5 to 19.5 degrees C.

Task 7. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Milford-Beryl area.

Task 8. Collect thermal gradient measurements on selected wells in promising locations in the Milford-Beryl area.

Task 9. The UGMS will publish a resource assessment report on the Milford-Beryl area based on the limited study conducted.

Task 10. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Cache Valley. [Draft to be ready by Dec.]

Task 11. Collect thermal gradient measurements on selected wells in

promising locations within the study area.

Task 12. The UGMS will publish a report on the Cache Valley.

Task 13.

Task 14. Summary Report; Integrate study results, etc. Publish as a "popular" report - Hot Water in Utah.

Article A-II - WAYS AND MEANS OF PERFORMANCE

<u>Personnel</u>	DOE	UTAH
<u>A. Smith/H. Doelling</u>		
<u>Wages &amp; Benefits</u>		<u>3,641</u>
<u>R. H. Klauk</u>		
<u>Wages &amp; Benefits</u>		<u>29,601</u>
<u>Geol. Tech. III</u>		
<u>Wages &amp; Benefits</u>	<u>20,542</u>	<u>2,892</u>
<u>Geol. Techs. II</u>		
<u>Wages &amp; Benefits</u>	<u>46,150</u>	
<u>Draftsman</u>		
<u>Wages &amp; Benefits</u>	<u>4,300</u>	
Overhead		
<u>39.1% Wages &amp; Benefits</u>	<u>40,768</u>	
Travel & Per Diem	<u>22,800</u>	
Computer	<u>3,000</u>	

Subcontracts

Data Evaluation 25,000

Chemistry 3,550

Isotope 1,000

Reproduction 3,000

Equip. Maintenance & Repair 1,000

Data Purchase 3,000

TOTAL \$ 174,110



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

September 16, 1981

Roy Mink  
U.S. Department of Energy-ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

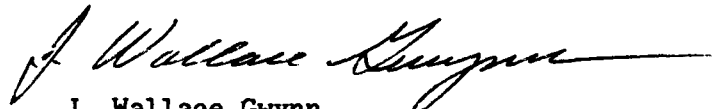
Attached, please find two copies of Project Status Report No. DOE/ER/28393-56 for the month of August, 1981.

Regarding the Contract Management Summary Report, I am sending the following information to you:

	DOE	DOE-MX
Man hours worked	735	0
Wages and benefits	4,226.14	0
Travel	624.38	0
Misc (post., computer, etc)	428.01	0
Printing and Reproduction	92.50	0
Contracts (UURI-ESLD)	425.26	0
Equipment	1,782.14*	0
Overhead	2,579.70	0
Totals	10,158.13	0

\*A portion of this amount may be transferred to the MX portion of the contract.

Sincerely,

  
J. Wallace Gwynn

JWG/ay





DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

September 16, 1981

Project Status Report No.: DOE/ER/28393-56  
Contract No.: DE/AS07/77ET28393  
Reporting Period: August, 1981

During the month of August, 1981, the following work was completed on Utah's geothermal assessment program:

1. Correspondence: Project Status Report No. DOE/ER/28393-55
2. Major Equipment Purchase: one conductivity meter, one specific ion meter plus the probes, and three down-hole temperature probe cable heads. In addition, the following items have been ordered: a) 4,500 feet of 4-conductor cable, b) multimeter, c) thermisters.
3. Jordan Valley Project: Still no comment has been received from DOE regarding our interim report. However, D. Foley from UURI-ESL has made some comments. Data continues to be assessed, gradients are being measured and chemistries are being run.
4. Crystal Hot Springs (prison) PON: Attempts are being made to obtain money for a flow test. Equipment purchases are being made (DOE money), personnel interviews have been held and Chad and Janet have been offered jobs. Both have accepted. At least one more position of the two remaining will be filled.
5. Utah and Cache Valleys, Utah: Water samples for chemical analyses are being collected. Janet deVries at USU is analyzing those samples from Logan and UURI is analyzing those from Utah Valley. Debbie continues to work on the gravity data from the Utah and Goshen valleys.
6. User Assistance Program: Reports have been completed for one area in the Jordan Valley and one area just south of Brigham City.
7. DOE-M-X: Very little time spent on the M-X phase of the DOE work.
8. Public Inquiries: During the month, seven public inquiries were received as follows:
  - a. Roger Smith - geothermal resources near Brigham City, Utah.
  - b. Joan Ennis (2) - geothermal resources at Midway, Utah.
  - c. Randy Hoskins - geothermal resources near Provo, Utah.
  - d. S. Shetland - geothermal info - Lawrence Livermore Lab.
  - e. J. Kalool - geothermal info near Beryl, Utah

J. Wallace Gwynn  
Project Manager

JWG/ay



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

October 23, 1981

Roy Mink  
 U.S. Department of Energy-ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Roy:

Attached please find five copies of Project Status Report No. DOE/ER/28393-57 for the month of September, 1981.

Regarding the Contract Management Summary Report, I have not been able to obtain these data from our administrative assistant; they will be forwarded as soon as they are obtained.

	<u>DOE</u>	<u>MX</u>
Man Hours Worked	717.5	79
Wages and Benefits		
Travel		
Misc (postage, computer, etc)		
Printing and Reproduction		
Contracts (UURI-ESL)		
Equipment		
Overhead		

Sincerely,

J. Wallace Gwynn  
 Project Manager

JWG/ay

Board/Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



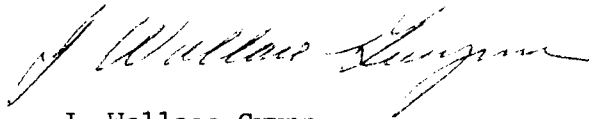
Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

October 23, 1981

Project Status Report No: DOE/ER/28393-57  
Contract No: DE/AS07/77ET28393  
Reporting Period: September, 1981

During the month of September, 1981, the following work was completed on Utah's geothermal assessment program:

1. Correspondence: Project Status Report No. DOE/ER/28393-56
2. Major equipment purchases: one specific ion meter plus probes; one pipette washing assembly.
3. Jordan Valley: Bob met with Dave Cole of UURI-ESL and discussed water chemistry and isotope analyses. Considerable time was also spent running thermal gradients where the last of the holes were available. About 3 to 4 holes are yet to be probed. Chemical analyses were at a standstill during the latter part of the month due to the lack of D.I. water.
4. Utah Valley: Debbie has progressed to the point in her gravity work of doing profile modeling; UGMS sampling of approximately 61 wells has been completed; contact has been made with the USGS to obtain chemical analyses on 60+ more holes in northern Utah Valley; thermal gradient measurements will start as soon as Greg gets on board.
5. Logan Valley: Time has been spent obtaining chemical and temperature gradient information in Cache Valley.
6. Crystal Hot Springs PON: Bob Klauk has kept in touch with Jeff Burks regarding a pump test at Crystal Hot Springs.
7. Considerable time has been spent in setting up and maintaining equipment, training personnel, conducting lab work and preparing for entry of Utah Valley data into the computer.
8. MX Geothermal Work: Most of the time was spent preparing people and equipment for water sampling in Milford-south area.
9. Public Inquiries: Jack Kaleel (contractor), Jim Byrne (Utah Energy Office), Noel Gibbs (developer), Wisc. Geol. Survey, G.E. Bettinger, Jan Bienik.



J. Wallace Gwynn  
Project Manager

JWG/ay



DONALD T. McMILLAN  
Director

UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

October 14, 1981

Roy Mink  
U.S. Dept. of Energy-ID  
550 Second Street  
Idaho Falls, Idaho 83401

Dear Roy:

A week ago or so I discussed with you the possibility of having the UURI-ESL chemical laboratory do complete analyses of our water samples from the "M-X" area in the southwestern part of the state. This work we would be charged for; the remaining "free" analyses that UGMS has coming from UURI-ESL we want to reserve for the state coupled work. You indicated that you saw no problem in this arrangement. Based on this discussion, I am proceeding, and will take our first group of samples to ESL's laboratory today.

Sincerely,

J. WALLACE GWYNN  
Research Section

JWG/co  
cc: D. Foley  
C. Warr



DONALD T. McMILLAN  
Director

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Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

August 12, 1981

Roy Mink  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Enclosed, please find two copies of Technical Progress Report No. DOE/ER/28393-56 for the time period of May - July, 1981. If you have any questions, please feel free to call me.

Sincerely,

J. WALLACE GWYNN  
Project Manager

JWG/co

Enclosure

cc: E. G. Jones  
N. W. Fraser  
R. Gray  
D. Foley



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

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GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

August 12, 1981

Technical Progress Report No. DOE/ER/28393-56  
Contract No. DE/AS07/77ET28393  
Reporting Period: May 01, 1981 through July 31, 1981

The Utah Geological and Mineral Survey, under contract with the U. S. Department of Energy (DOE), has been engaged in research to advance the utilization of low temperature resources in the State of Utah. The following quarterly Technical Progress Report summarizes the work in progress or completed since April, 1981.

### Contract Period

Contract Modification M006, dated March 01, 1981, extends the present contract period until February 28, 1982. Consideration is revised to increase the Support Ceiling by \$250,728 to a revised Support Ceiling of \$642,858. In as much as this contract was not officially received by UGMS until after June 01, 1981, a no-cost time extension will likely be requested at a later date.

### Summary of Contract Expenses: (DOE)

	<u>May</u>	<u>June</u>	<u>July</u>	<u>Total</u>
Man hours worked	397	481	728.5	1606.5
Wages and benefits	\$2,162.16	\$2,591.51	\$4,522.47	\$ 9,276.14
Travel	\$ 491.18	\$ 331.11	\$ 566.95	\$ 1,389.24
Miscellaneous*	\$ 47.92	\$ 57.56	\$ 639.38	\$ 744.86
Printing and Reproduction	\$ 88.02	\$ 149.72	----	\$ 237.74
Contracts	----	----	----	----
Equipment	----	----	\$1,408.85	\$ 1,408.85
Overhead	<u>\$1,835.77</u>	<u>\$1,799.26</u>	<u>\$1,526.01</u>	<u>\$ 5,161.04</u>
Totals	\$4,625.05	\$4,929.16	\$8,663.66	\$18,217.87

\*Includes computer charges and postage

Summary of Contract Expenses: (MX)

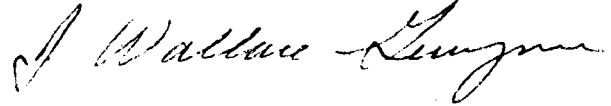
	<u>May</u>	<u>June</u>	<u>July</u>	<u>Total</u>
Man hours worked	----	----	94	94
Wages and benefits	----	----	\$260.80	\$260.80
Travel	----	----	----	----
Miscellaneous	----	----	----	----
Printing and Reproduction	----	----	----	----
Contracts	----	----	----	----
Equipment	----	----	----	----
Overhead	----	----	\$385.39	\$385.39
Totals			\$646.19	\$646.19

Summary of Contract Research - DOE

1. Jordan Valley: UGMS has still not received any comments from DOE on the Jordan Valley Progress Report that was sent out about three months ago. During the past three months, an evaluation of the in-house chemical data continues to be made and temperature gradients are being taken in a number of available wells. Data are being gathered and assembled for preparation of the final Jordan Valley report. To be included in this report will be an interpretation of the entire Jordan Valley gravity data set.
2. Utah Valley: Water chemistry and temperature data are currently being gathered. Water samples will be analyzed at UURI-ESLD. The gravity data for the Utah Valley area is being interpreted by D. Davis as part of an M.S. Thesis. As an outgrowth of a three week computer training course taken by R. Darling, it is anticipated that much of the Utah Valley data will be put on computer for data storage, retrieval and manipulation.
3. Cache Valley - Logan area work: During the past three months, J. de Vries has been obtaining water samples and running water chemistries at Utah State University laboratory facilities. This work is a cooperative effort between the Survey's DOE program and Ms de Vries, as part of a thesis program.
4. Utah State Prison PON program: A great deal of UGMS time has not been devoted to this program during the past three months.
5. Meeting: R. Klauk attended the May 4-6 meeting in Glenwood Springs, Colorado.
6. Geotherm File: Little effort has been expended on this work.
7. Public Inquiries: These have been reported in the Monthly Progress reports; about 12 have been received.

Summary of Contract Research - MX

Because of the uncertainties of the MX project and because of the delays in getting funding, little has been done on MX during the past three months. At present, UGMS is recruiting for two individuals to work in the MX area - gathering water temperatures, chemistries and water well gradients. Preparatory work has included pulling driller reports on wells in the Milford-Beryl area.



J. WALLACE GWYNN  
Project Manager

JWG/co

cc: E. G. Jones  
N. W. Fraser  
R. Gray  
D. Foley





DONALD T. McMILLAN  
Director

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GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

August 12, 1981

Roy Mink  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Attached, please find two copies of Project Status Report No. DOE/ER/28393-55 for the month of July, 1981. Copies are also being sent to R. Gray, M. Reed, and D. Foley.

Regarding the Contract Management Summary Report, I am providing the following information to you:

	<u>DOE</u>	<u>MX</u>
Man hours worked	728.50	94
Wages and benefits	\$4,522.47	\$260.00
Travel	\$ 566.95	
Misc. (postage, computer, etc.)	\$ 639.38	
Printing and reproduction		
Contracts		
Equipment	\$1,408.85	
Overhead	<u>\$1,526.01</u>	<u>\$385.39</u>
Totals	\$8,663.66	\$646.19

Sincerely,

J. WALLACE GWYNN  
Project Manager

JWG/co

Attachments

cc: E. G. Jones  
N. W. Fraser  
R. Gray  
D. Foley



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

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GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

August 12, 1981

Project Status Report No. DOE/ER/28393-55  
Contract No. DE/AS07/77ET28393  
Reporting Period: July, 1981

During the month of July, 1981, the following work was completed on Utah's geothermal assessment program:

1. Correspondence: Project Status Report No. DOE/ER/28393-54.
2. Major Equipment Purchases: Water filter, pump and filter papers. Other pieces of equipment are in the process of being ordered.
3. Jordan Valley: Assessment of in-house data continues. Thermal gradients are being taken throughout the valley.
4. Utah Valley and Logan area: Water samples for chemical analyses are being collected. Samples from Utah Valley will be submitted to UURI/ESLD for analysis; samples from Logan will be analyzed by Janet de Vries at the Utah State University laboratory facilities.
5. Utah State Prison PON assistance: Some time has been spent attending meetings and in document review.
6. Cheryl Prawl was hired and has been working on both DOE and MX work.
7. Riki Darling has attended the last week of a computer training course. It is expected that this training will be put to use in the Utah Valley resource evaluation.
8. User Assistance Program: Bob Klauk spent some time investigating and writing a report on the geothermal potential of a property west of the prison.
9. Public Inquiries: Inquiries regarding geothermal matters were received from A. J. Wiegand of Alternative Energy, Inc.; and J. Goeltz of Salt Lake City.
10. MX activities: UGMS is currently obtaining a hiring register through the state's employment office to hire two geologic interns to work in

the MX area. This process has been painfully slow. In-house MX work that has been completed has included filing and obtaining drillers logs for wells in the Milford-Beryl area.

A handwritten signature in cursive script, appearing to read "J. Wallace Gwynn".

J. W. GWYNN  
Project Manager

JWG/co

cc: E. G. Jones  
N. W. Fraser  
R. Gray  
D. Foley

# UURI

EARTH SCIENCE LABORATORY  
420 CHIPETA WAY, SUITE 120  
SALT LAKE CITY, UTAH 84108  
TELEPHONE 801-581-5283

## MEMORANDUM

30 July 1981

TO: Robert Klauk, UGMS

FROM: Duncan Foley

RE: Review of "Progress report on the geothermal assessment of the Jordan Valley, Salt Lake County, Utah"

I have reviewed the copy you provided of the above mentioned report and have several general comments to make. I would like to emphasize, however, *that these are my comments as a reviewer; they should not be taken as official DOE review of the draft report.*

I find three general areas of concern about this report. The first is that a lot of the supporting data you base your interpretations on are not included in the report. UGMS may wish to consider three additional publications or a major expansion of this report. The three supporting publications would be:

- 1) Gravity studies - a large scale detailed map presenting station numbers, and corrected values, with accompanying text and table presenting the principal facts. Such data would greatly enhance the presentation of your gravity interpretations and would allow other investigators to perform their own interpretations.
- 2) Geochemical studies - a map with sample locations accompanied by a table with all analytic results. At present, a reader would not be able to establish how you got to the displayed Piper diagram, what overlap might exist in chemical species among water types, and what other interpretations might be required.
- 3) Thermal studies - a more detailed map should be presented, with either map or tabular display of actual measurements. Well depth and flow rate data, where available, should also be displayed.

My second concern is that the data included are in some cases inadequately referenced (Murphy, 1979, p. 4, to the best of my recollection did not do any original seismic studies) or inadequately presented. In particular, I find not

only the scale of the plates hard to use, but as you have heard me comment, I feel that an up-to-date base map would be appropriate.

My third concern is perhaps the most crucial. UGMS is in a unique position to be able to draw upon many data sources and integrate these data into a unified interpretation of the geothermal occurrences in the valley. In this draft report, however, I do not find such an integration. Each data set is treated almost individually, and the integration into a unified package is lacking. For instance, you discuss in detail hydrologic sub-districts and aquifers, but I do not find integration of either the districts or the aquifers in your discussions of temperature and water quality. The temperature data are one case where you seek explanations in terms of geologic structures interpreted on the basis of the gravity data; inclusion of hydrologic, heat flow, thermal gradient, and lithologic parameters is missing. Perhaps the Utah Roses well in Sandy can provide the other data packages. Structural controls are important on controlling water geochemistry, but so are rock type, residence time, temperature, and other factors. These should be integrated into your models.

In reading reports such as this one on the Jordan Valley, I personally look for the authors presentation of hypothetical target models. I can infer tentative models based on your presentation of the data, but I would prefer to have you suggest at least one, or multiple if required, working models. I am left with the feeling that rather than following your suggestion 4 (p. 16) to collect more geochemical data, interpretation of the 238 existing points might be more fruitful.

I will be happy to discuss these and other points with you at your convenience.

        b/          
Duncan Foley

DF:gm

Bob Klauk  
Dunc  
Carl

UTAH STATE TEAM CONFERENCE 8/6/81  
JORDAN VALLEY REPORT REVIEW.  
USER ASSISTANCE PROJECTS.

~~USER ASSISTANCE~~ JORDAN VALLEY: REPORT

- Report was preliminary - Final volume will be much more detailed.
- Maps will be larger and more legible.
- Gravity data will be expanded. & map provided (will try for better base map or improvement of existing base map) - base map
- Geochemical: Studies are planned and will be included. Refer to Dave Cole.
- THERMAL: Same as geochemical.
- General comments on data gaps and interpretation & integration of aquifer, etc. data into geothermal aspects of region. - Especially water chemistry.  
→ Contracting to have Valley modeled - detail.



- ⊖ Physiographic Province a philosophical point.
- ⊖ Refer to Dale Ralston for hydrology information and suggestions.
- ⊖ Expand summary section - postulate some conclusions from data acquired.



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

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SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

June 17, 1981

Mr. Roy Mink  
Dept. of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Roy:

Attached, please find two copies of Project Status Report No. DOE/ER/28393-53 for the month of May, 1981. Copies are also being sent to R. Gray, M. Reed and D. Foley.

Regarding the Contract Management Summary Report, I am sending you the following information:

Man hours worked (5 persons)	397 hours
Wages & Benefits	\$2162.16
Travel	491.18
Misc. (postage, computer, etc.)	47.92
Printing & reproduction	88.02
Contracts	--
Equipment	--
Overhead	<u>1835.77</u>
Total	\$4625.05

J. Wallace Gwynn  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley

June 17, 1981

Project Status Report: DOE/ER/28393-53  
Contract No.: DE/AS07/77ET28393  
Reporting Period: May, 1981

During the month of May, the following work was completed on Utah's geothermal assessment program.

1. Correspondence: Project Status Report No. DOE/ER/28393-50; Technical Progress Report No. DOE/ER/28393-51 and Jordan Valley Progress Report (Draft Copy for Review) No. DOE/ER/28393-52.
2. Utah State Prison PON: Some time was spent in resource assessment review and in providing illustrations.
3. Jordan Valley work: Six draft copies of the Jordan Valley report were sent to DOE for review. As of this writing, no comments on the report have been received by UGMS. Additional work or information to be added to this report will include discussions of the Jordan Valley gravity interpretation, thermal gradients and geothermometry.
4. Other Wasatch Front Work: An interpretation of the Utah Valley gravity data is being started, and UGMS is working with Janet DeVries, a graduate student at U.S.U. in Logan. Janet will be doing a geothermal thesis project in the vicinity of Logan, Cache County, Utah.
5. M-X work: Other than looking through the air photos received from Fugro (Ertec), no M-X work was done during May.
6. Bob Klauk prepared for, attended and presented a talk at the May DOE meetings in Glenwood, Colorado on May 4-6.
7. Some work has been done towards entering the data collected last summer into the GEOTHERM file.
8. UGMS has received its contract with DOE.
9. Considerable time has been spent preparing field chemistry methodology for doing water chemistry during the coming field season. This is necessary in as much as UURI-ESL will no longer be able to do certain analyses such as  $SO_4$  and TDS.



J. Wallace Gwynn  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley



7



DONALD T. McMILLAN  
Director

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SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

May 14, 1981

Ms. M. A. Widmayer  
Dept. of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie:

Attached, please find two copies of Project Status Report No. DOE/ER/28393-50 for the month of April, 1981. Copies are also being sent to R. Gray, M. Reed and D. Foley.

Regarding the Contract Management Summary Report, I am sending you the following information:

Man Hours worked (6 persons)	568.5 hours
Wages and Benefits	\$2,812.69
Travel	220.00
Misc.(postage, computer, etc.)	359.99
Printing and Reproduction	166.50
Contracts (UURI-ESL)	504.85
Equipment	--
Overhead	2,428.32
Total	<u>\$6,492.35</u>

J. W. Gwynn  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley

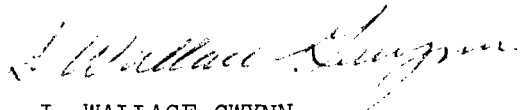
May 14, 1981

Project Status Report: DOE/ER/28393-50  
Contract No.: DE/ASO7/77ET28393  
Reporting Period: April, 1981

During the month of April, the following work was completed on Utah's geothermal assessment program.

1. Correspondence: Project Status Report No. DOE/ER/28393-48.
2. Utah State Prison PON: Review of Utah Energy Office report to DOE.
3. Jordan Valley Work: A draft copy of the Jordan Valley interim or annual report has been completed and will be sent to DOE for review within a day or so.
4. Utah Valley. A meeting was held with Greg Jorgensen to review his progress. Valley cross sections showing well perforations have been started as well as static water levels and artesian wells plotted. Work is progressing.
5. Very little M-X work has been conducted. Some data has been received from Fugro (ERTEC) - includes air photos.
6. Preparations are being made for the summer field season, mainly in the line of water chemistry. This work will be conducted mainly in Utah Valley and near Logan in Cache Valley. We are also making preparations for making interpretations of the gravity data in the Jordan Valley and in Utah Valley.
7. Bob Klauk made preparations for and presented a project review at the Glenwood Springs meeting during the May 05-6 meetings.
8. Public Inquiries
  - a. Grad. Student at U. of Utah.
  - b. Karl Schaefer - Green house info. - Park, PA
  - c. Grad. student of Utah State University
  - d. About 350+ requests for copies of the geothermal map - given to UGMS by Skip Theberge.

NOTE: As of now UGMS has not received a renewal of our State Coupled contract - with or without the M-X monies. Our current no cost-time extension ends on May 22, 1981. UGMS will be required to terminate the interns that are working on this project if a renewal is not negotiated on or before that date.



J. WALLACE GWYNN  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley



DONALD T. McMILLAN  
Director

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SCOTT M. MATHESON  
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GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

May 14, 1981

Ms. M. A. Widmayer  
Dept. of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie:

Please find enclosed two copies of Technical Progress Report No. DOE/ER/28393-51, covering the time period from February 01, 1981 through April 30, 1981.

Sincerely,

J. WALLACE GWYNN  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley

May 14, 1981

Technical Progress Report: DOE/ER/28393-51  
Contract No.: DE/ASO7/77ET28393  
Reporting Period: February 01, 1981 through April 30, 1981

The Utah Geological Survey, under contract with the U.S. Department of Energy (DOE), has been engaged in research to advance the utilization of low temperature resources in the State of Utah. The following Technical Progress Report discusses the work in progress as completed since January 31, 1981.

#### Contract Period

The ending date of this current contract was recently extended by a no-cost time extension, modification MO05 from February 28 through May 22, 1981. This was done to allow adequate time for DOE to draw up the new contract.

#### Summary of Contract Expenses:

	<u>February</u>	<u>March</u>	<u>April</u>	<u>Total</u>
Man hours worked	659.5	578	568.5	1806
Wages & benefits	3525.88	3766.08	2812.69	10104.65
Travel	815.41	365.15	220.00	1400.56
Miscellaneous*	247.40	359.36	359.99	966.75
Printing & reproduction	44.92	—	166.50	211.42
Contracts (UURI-ESL)			504.85	504.85
(Meiji)	6550.00	653.60	—	7303.60
Equipment				
Overhead	<u>2722.44</u>	<u>2312.96</u>	<u>2428.32</u>	<u>7463.72</u>
TOTALS	\$14,006.05	\$7,457.15	\$6,492.35	\$27,955.55

\*Includes computer charges and postage.

Major Equipment Purchases: None

#### Summary of Contract Research

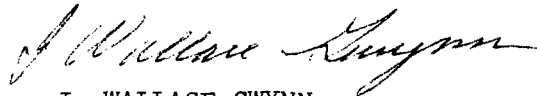
1. Jordan Valley work: Since the last Technical Progress Report, the majority of the available data that are available have been compiled, analyzed, interpreted and written up as a draft Progress report entitled "Progress Report on the Geothermal Assessment of the Jordan Valley, Salt Lake County, Utah", No. DOE/ET/28393-49. Copies are, at this writing, being distributed to DOE for review.
2. Other Wasatch Front Areas: Preparations are being made to collect and analyze water samples in both Utah Valley and in the Logan area of Cache Valley. In addition to these preparations, literature research and an analysis of other existing data on these areas are being concluded.
3. The principal facts (through complete Bouguer for Jordan Valley and through simple for Utah Valley) have all been received from contractors. Preparations are now being made to have the interpretations of these data made for the two areas.

4. M-X activity. Some data have been received by UGMS from Fugro (ERTEC), but little time has been spent by UGMS on this phase of the program. As the next contract between UGMS and DOE is completed, and as UGMS is assured of what area(s) are to be investigated, work will proceed.

5. Utah State Prison PON work: UGMS activity in this work has diminished greatly, and has mainly been concerned with reviewing the resource assessment report.

6. At this writing, Bob Klauk of UGMS attended the State Coupled meeting in Glenwood Springs, Colorado, and presented a paper covering the Jordan Valley program as it stands to date.

7. Approximately 29 public inquiries have been received regarding geothermal resources within the state during the past three months. In addition, numerous copies of the State geothermal map have been mailed out. UGMS currently has about 600 copies of the map remaining.



J. WALLACE GWYNN  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D/ Foley

20



DONALD T. McMILLAN  
Director

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SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

April 14, 1981

Ms. M.A. Widmayer  
Dept. of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie;

Attached, please find two copies of Project Status Report No. DOE/ER/28393 - 48 for the month of March. Copies are also being sent to R. Gray, M. Reed and D. Foley.

Regarding the Contract Management Summary Report, I am sending you the following information:

Man hours worked (7 persons)	578 hours
Wages & Benefits	\$3766.08
Travel	365.15
Mis. (postage, computer, etc.)	359.36
Printing & Reproduction	---
Contracts (UURE-ESL)	---
(Meiji)	653.60
Equipment	---
Overhead	<u>2312.96</u>
	\$7457.15

Sincerely,

J. W. GWYNN  
Project Manager

JWG/af

cc: R. Gray  
M. Reed  
D. Foley

April 15, 1981

Project Status Report: DOE/ER/28393-48  
Contract No: DE/AS07/77ET28393  
Reporting Period: March, 1981

During the month of March, the following work was completed on Utah's geothermal assessment program.

1. Correspondence: Correspondence No. 28393-47 (Project Status Report).
2. Utah State Prison (PON) work: UGMS has done very little on this project during the past month. Pete Murphy, now with Fugro, has been working on the PON resource assessment report with Jeff Burks of the Utah Energy Office.
3. Jordan Valley work: Data reduction and compilation are nearing completion; the gap in the chemical data, in the northwestern portion of the valley, has been filled. Maps depicting the various chemical and physical parameters are about ready for final review prior to drafting. No gradient work has been completed, but needs to be done.
4. We have received two copies each of the deliverables called for in our contract with UURI-ESL.
5. Utah Valley: Greg Jorgenson continues to extract data from well logs and is preparing a water sampling program for the coming summer.
6. M-X work: Due to the uncertainties with the DOE-M-X contract, little work, other than some literature research, has been done.
7. Geothermal Public Inquiries: John Diamond, Glen White (Dames & Moore), David Hill (California Energy Commission), Scott Spjute (Utah State University), DOE Technical Information Center, P.J. Murphy, (Fugro), John Naser, 6 unidentified public inquiries.

J. Wallace Gwynn  
Project Manager

JWG/ay

MEMORANDUM

March 2, 1981

TO: State Coupled Program Core Group

FROM: Duncan Foley

RE: Utah Resource Assessment Team Program review and proposal

Meeting: 11 February, 1981, Idaho Falls, ID

Attendees: Wally Gwynn, Bob Klauk, Utah Geological and Mineral Survey  
M.A. Widmayer, L.L. Mink, DOE/ID  
D. Foley, ESL/UURI

GENERAL AND BUSINESS

1. MX work in Utah will be accomplished as a modification to the State Coupled contract. This program will not take the place of the State Coupled work in the next year, but will be supplemental.
2. UGMS has identified that an employee falsified analytic results in a portion of the Jordan Valley project area. The employee has been terminated, and the data are being recompiled.

TECHNICAL

1. UGMS reviewed the project to date. Work was on 7 hot spring systems, with thermal gradient drilling, geophysics, and geologic studies. These studies have been published as UGMS Reports of Investigations 139, 140, 141, and 142.
2. The emphasis during the past year has been on Wasatch front valleys. Preliminary investigations were made at Utah Valley, Cache Valley, and in Box Elder, Weber, and Davis counties north of Salt Lake City.
3. Water chemistry and geophysical programs were carried out in the Jordan Valley (Salt Lake City area.) Six maps relating to the water studies are going to be produced. These are: location, depth, and definition of production zones within the valley fill sediments; water chemistry as a cation-anion map; trilinear plots; geothermal gradient; total dissolved solids; and temperature. The geophysical program has concentrated on collection and integration of gravity data. About 850 new stations have been occupied; this brings the total of stations in the Jordan Valley to about 2000. These have all been terrain



corrected at the University of Utah. The gravity data have not, however, been modeled and integrated with other geoscientific data sets.

4. Tasks identified for next year's work:
  - Model the existing gravity data. It was strongly suggested that this work could be done in the private sector.
  - New gravity data will be available from the southern Utah Valley, and may be run in the vicinity of Logan, if other existing geophysical data sets (e.g. seismic) are not found that could aid in interpretation of the hydrologic and structural interpretation of the range front.
  - Finish Wasatch Front and Cache Valley studies that have been started.
5. UGMS indicated an interest in carrying on the geothermal program on state monies, should the federal program go defunct. They would prefer, however, to keep working with the DOE, as this allows an accelerated program. UGMS intends to publish a comprehensive Wasatch Front geothermal report in several years.

#### ACTION ITEMS

1. UGMS needs to identify an updated base map for depicting the Jordan Valley gravity and geochemical maps.
2. UGMS is sending DOE/ID revised financial statements and suggested Statements of Work for MX. The MX material has been coordinated with ESL.

---

DF:jr

# RA & CD ACTIVITIES & PRODUCTS

UTAH TEAM (UGMS) [SINCE START IN 1977]

OCT '78 : "ENVIRONMENTAL ASSESSMENT OF PROPOSED SHALLOW TEMPERATURE GRADIENT HOLES, NORTHERN UTAH SITES, 1978"  
UGMS - P.J. MURPHY

OCT. '79 "GEOHERMAL INVESTIGATIONS AT CRYSTAL HOT SPRINGS SALT LAKE COUNTY, UTAH. UGMS # 139  
UGMS - P.J. MURPHY, J.W. GWYNN [DE-AS07-77ET28393]

OCT '79 "GEOHERMAL INVESTIGATION OF THE WARM SPRINGS FAULT GEOHERMAL SYSTEM. SALT LAKE COUNTY, UTAH"  
UGMS # 140 : P.J. MURPHY, J.W. GWYNN. [DE-AS07-77ET28393]

NOV '79 "GEOHERMAL INVESTIGATIONS AT SELECTED THERMAL SYSTEMS OF THE NORTHERN WASATCH FRONT. WEBER AND BOX ELDER COUNTIES, UTAH.  
UGMS # 141 : P.J. MURPHY, J.W. GWYNN [DE-AS07-77ET28393]

JUL '78 "SOUTHWEST REGIONAL GEOHERMAL DEVELOPMENT OPERATIONS RESEARCH PROJECT. ROCKY MOUNTAIN/ BASIN AND RANGE REGION". ANNUAL REPORT OF THE UTAH TEAM. APPENDIX J TO THE REPORT NME I 10.  
L. WARD WAGSTAFF, S. GREEN. [DOE-EG-77-S-0403992 SUBCONTRACT 3104-X8]

1980 STATE MAP OF GEOHERMAL RESOURCES (PUBLIC MAP)  
MONTHLY REPORTS



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

September 12, 1980

Ms. M.A. Widmayer  
Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie,

Please find enclosed two copies of Project Status Report  
No. DOE/ER/28393-30.

Regarding the Contract Management Summary Report, I am  
sending you the following data:

Man hours worked (9 people)		1086 hours
Wages and benefits		\$4805.77
Travel		1288.50
Misc.		224.83
Printing		--
Contracts	UURI-ESL	873.30
	Meiji	14520.00
Overhead		3062.75
Equipment		--
Total		<u>\$24,775.15</u>

Sincerely,

J. Wallace Gwynn  
Project Manager

JWG/af

Encl.

Project Status Report No. DOE/ER/28393-30  
Contract No. DE/AS07/28393  
Reporting Period: August, 1980

During the month of August, the following work was completed on Utah's geothermal resources assessment:

1. Correspondence

a. 2 copies of Project Status Report No. DOE/ER/28393-28 were sent to M.A. Widmayer on August 15, 1980. Copies were also sent to R. Gray, D. Foley and M. Reed.

b. Six copies of Technical Progress Report No. DOE/ER/28393-29 were sent to M.A. Widmayer on August 15, 1980.

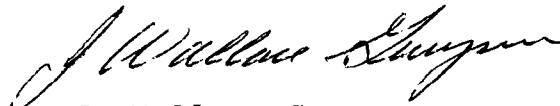
2. Utah State Prison PON work: A report on the gravity survey conducted in the vicinity of the prison was completed. A driller, Paul Billings, has been selected to deepen one hole near the prison and drill one hole. Drilling should start sometime during September. Pete Murphy attended one PON Selected meeting in Idaho Falls on August 27.

3. Jordan Valley Project: The water sampling program is nearly complete. Temperature gradient collection was terminated about mid-month due to Dave Postle leaving for summer camp and the loss of a portion of the downhole probe.

4. Gravity Survey by Meiji Resources. Data collection by Meiji is proceeding. To date, about 600 sites have been visited; surveying is somewhat below this level. This survey should be completed by October 05, 1980.

5. Well location and varification work is also nearly complete in Davis, Weber, Box Elder and Cache counties. Additional work in these areas is being planned and instituted as the first phase of the work is completed.

6. MX planning is progressing very well. Pete Murphy attended a planning meeting with Fugro on August 28. A tentative and very preliminary program plan - budget was submitted to DOE. A list of items we desire to obtain from Fugro was also drawn up and submitted to Duncan Foley.



J. Wallace Gwynn  
Project Manager

JWG/af



DONALD T. McMILLAN  
Director

UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

August 15, 1980

Ms. M.A. Widmayer  
Department of Energy  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie,

Please find enclosed two copies of Project Status Report  
No. DOE/ER/28393-28.

Regarding the Contract Management Summary Report, I am sending  
you the following data:

Man hours worked (9 people)	1190 hours
Wages and benefits	5345.81
Travel	1725.00
Misc. (Inc. computer)	501.79
Printing	225.48
Contracts (UURI-ESL)	2997.50
Overhead	3219.77
Equipment	354.08
Total	<u>14369.43</u>

Sincerely,

J.W. Gwynn  
Project Manager

JWG/af

cc: R. Gray (2)  
D. Foley (1)  
M. Reed (1)

Project Status Report No. DOE/ER/28393-28

Contract No. DE/AS07/28393

Reporting Period: July, 1980

During the month of July, the following work was completed on Utah's geothermal resources assessment:

1. Correspondence

a. Two copies of Project Status Report No. DOE/ER/28393-26 were sent to M.A. Widmayer on July 15, 1980. Copies were also sent to D. Foley, R. Gray and M. Reed.

b. Accompanying correspondence No. DOE/ET/28393-27 were the camera ready originals for UGMS Reports of Investigations No.'s 139, 140, 141 and 142. These were sent on July 18, 1980.

c. Correspondence related to the contract for geophysical services, sent to Mr. Joe Lee on July 22, 1980.

2. Utah State Prison PON work: Work has consisted of gravity modeling and work towards obtaining a driller. To date, only two bids have been received.

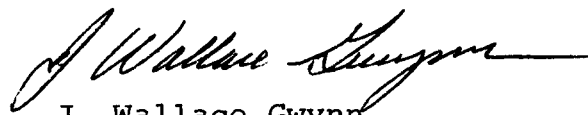
3. Jordan Valley Project: Almost all of the water well location and varification work has been completed, and work is progressing very well on obtaining water well temperatures and samples for water chemistry, temperature gradients are being obtained wherever possible.

4. Utah Valley work: Essentially all of the well location and varification work has been completed. Continuing work is being planned and implemented.

5. Northern Wasatch Front sites: The well location and varification work has been completed in Box Elder County; nearing completion in Weber and Davis Counties, and progressing in Cache County.

6. UGMS has contracted with Meiji Resource Consultants, as of August 04, to conduct a gravity survey within the Jordan Valley. Work on the contract should be completed by

7. UGMS has begun making plans for its involvement in the MX program in western Utah; both site specific and general geothermal resource assessments will be made.



J. Wallace Gwynn  
Project Manager

JWG/af

cc: R. Gray (2)  
D. Foley (1)  
M. Reed (1)



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

October 7, 1980

Ms. M. A. Widmayer  
Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie:

Please find enclosed two copies of Project Status Report No. DOE-ER-28393-32. Copies are also being sent to R. Gray, D. Foley and M. Reed.

Regarding the Contract Management Summary Reports, I am sending you the following information:

Man hours worked (8 people)	773 hours
Wages and benefits	\$ 3,055.93
Travel	793.20
Misc. (Postage & computer charges)	85.61
Printing & reproduction	7.50
Contracts (UURI-ESL)	760.71
Meiji	7,260.00
Equipment	.00
Overhead	2,360.58
Total	\$14,323.53

Sincerely,

J. Wallace Gwynn  
Project Manager

JWG/ay

cc: R. Gray (2)  
M. Reed (1)  
D. Foley (1)

Project Status Report No. DOE-ER-28393-32  
Contract No. DE-AS07-28393  
Reporting Period: September, 1980

During the month of September, the following work was completed on Utah's geothermal resources assessment.

1. Correspondence: Six copies of Project Status Report No. DOE-ER-28393-30 were distributed among yourself, D. Foley, R. Gray and M. Reed.
2. Utah State Prison PON work: Preparations have been made in anticipation of starting to drill the two test holes. Expected starting date is now October 2 or 3.
3. Jordan Valley Project: Water well sampling continues; samples being turned in to UURI-ESL for chemical analysis. Data is being analyzed. ESL has yet to replace cable head and thermistor on our down-hole temperature probe that they lost.
4. Utah Valley and Northern Wasatch Front Areas: Work in these areas continues, but has slowed down due to the starting of the school year.
5. The gravity contract work being done by Meiji is nearing completion. Data expected about October 15th. As the data is received, it will be routed to K.L. Ack via UURI-ESL for him to complete his data normalization-compilation contract work.
6. Considerable time has been spent working up a budget and statement of work for the pending MX task. A number of meetings have been attended and two filing cabinets have been purchased.



J. Wallace Gwynn  
Project Manager

JWG/ay

cc: R. Gray (2)  
D. Foley (1)  
M. Reed (1)





DONALD T. McMILLAN  
Director

UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

July 15, 1980

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

Ms. M.A. Widmayer  
Department of Energy, ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie,

Please find enclosed two copies of Project Status Report  
No. DOE/ER/28393-26.

Regarding the Contract Management Summary Report, I am  
providing you with the following data:

	June '79	July '79-June '80
Man hours worked (9 people)	1147 hours	
Wages & Benefits	\$4586.20	\$12,518.48
Travel	1238.23	3,647.56
Misc. (inc. computer)	1684.80	2,581.89
Printing	--	975.50
Contracts	--	33,956.00
Overhead	2787.94	14,598.06
Equipment	--	4,241.25
TOTAL	\$10297.23	\$72,518.74

Sincerely,

J. Wallace Gwynn  
Project Manager

JWG/af

Encl.

cc: R. Gray  
D. Foley  
M. Reed

Project Status Report No. DOE/ER/28393-26  
Contract No. DE/AS07/28393  
Reporting Period: June, 1980

During the month of June, 1980, the following work was completed on Utah's geothermal resources assessment:

1. Correspondence

Two copies of Project Status Report No. DOE/ER/28393-25 were sent to M.S. Widmayer on June 16, 1980. Copies were also sent to D. Foley, G. Brophy and M. Reed.

2. Utah State Prison PON. Drilling specifications to deepen one well and drill a test well were submitted to the Utah Department of Finance and advertised for bids. (At the date of this writing, no bids were received by the opening date of July 08, and the job will need to be rebid.)

3. Jordan Valley Work:

a. Specifications for a gravity survey within the valley have been drawn up and submitted to the Finance Dept. to be advertised for bids.

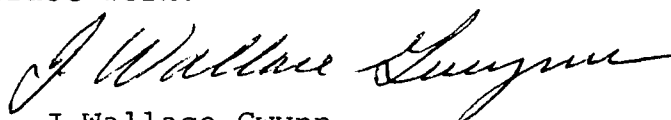
b. A good portion of the well search and varification has been completed. Approximately two townships remain.

c. The water chemistry portion of the program is now well under way. Samples are being submitted to UURI-ESC for total analysis. Samples for isotope analyses are also being collected for ESC.

d. Our downhole temperature probe is now operational and is being used to measure temperature gradients as wells become available.

4. Well location and varification work is also progressing very well in Utah Valley and in the northern Wasatch front areas.

5. The gravity compilation and normalization work being done by UURI-ESC is progressing very well. The first phase work has been completed and delivered to UGMS on the Jordan Valley, Utah Valley and northern Wasatch Front areas. As the new UGMS gravity study is completed (now out for bid), that data will be provided to UURI-ESC for incorporation into the existing Jordan Valley gravity network for the completion of the contract work.



J. Wallace Gwynn  
Project Manager

JWG/af

cc: R. Gray  
D. Foley  
M. Reed



DONALD T. McMILLAN  
Director

UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

July 15, 1980

Ms. M.A. Widmayer  
Department of Energy, ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Maggie,

Please find enclosed two copies of Project Status Report  
No. DOE/ER/28393-26.

Regarding the Contract Management Summary Report, I am  
providing you with the following data:

	June '79	July '79-June '80
Man hours worked (9 people)	1147 hours	
Wages & Benefits	\$4586.20	\$12,518.48
Travel	1238.23	3,647.56
Misc. (inc. computer)	1684.80	2,581.89
Printing	--	975.50
Contracts	--	33,956.00
Overhead	2787.94	14,598.06
Equipment	--	4,241.25
<b>TOTAL</b>	<b>\$10297.23</b>	<b>\$72,518.74</b>

Sincerely,

J. Wallace Gwynn  
Project Manager

JWG/af

Encl.

cc: R. Gray  
D. Foley  
M. Reed

Project Status Report No. DOE/ER/28393-26  
Contract No. DE/AS07/28393  
Reporting Period: June; 1980

During the month of June, 1980, the following work was completed on Utah's geothermal resources assessment:

1. Correspondence

Two copies of Project Status Report No. DOE/ER/28393-25 were sent to M.S. Widmayer on June 16, 1980. Copies were also sent to D. Foley, G. Brophy and M. Reed.

2. Utah State Prison PON. Drilling specifications to deepen one well and drill a test well were submitted to the Utah Department of Finance and advertised for bids. (At the date of this writing, no bids were received by the opening date of July 08, and the job will need to be rebid.)

3. Jordan Valley Work:

a. Specifications for a gravity survey within the valley have been drawn up and submitted to the Finance Dept. to be advertised for bids.

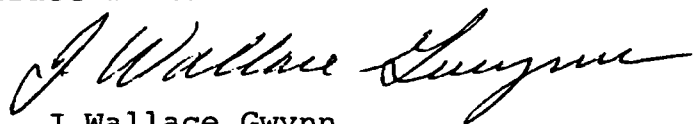
b. A good portion of the well search and varification has been completed. Approximately two townships remain.

c. The water chemistry portion of the program is now well under way. Samples are being submitted to UURI-ESC for total analysis. Samples for isotope analyses are also being collected for ESC.

d. Our downhole temperature probe is now operational and is being used to measure temperature gradients as wells become available.

4. Well location and varification work is also progressing very well in Utah Valley and in the northern Wasatch front areas.

5. The gravity compilation and normalization work being done by UURI-ESC is progressing very well. The first phase work has been completed and delivered to UGMS on the Jordan Valley, Utah Valley and northern Wasatch Front areas. As the new UGMS gravity study is completed (now out for bid), that data will be provided to UURI-ESC for incorporation into the existing Jordan Valley gravity network for the completion of the contract work.



J. Wallace Gwynn  
Project Manager

JWG/af

cc: R. Gray  
D. Foley  
M. Reed



DONALD T. McMILLAN  
Director

## UTAH GEOLOGICAL AND MINERAL SURVEY

606 BLACK HAWK WAY  
SALT LAKE CITY, UTAH 84108  
(801) 581-6831

SCOTT M. MATHESON  
Governor

GORDON E. HARMSTON  
Executive Director  
Department of Natural Resources

June 16, 1980

Ms. M. A. Widmayer  
Department of Energy - ID  
550 Second St.  
Idaho Falls, ID 83401

Dear Maggie,

Please find enclosed two copies of Project Status Report  
No. DOE/ER/28393-25.

Regarding the Contract Management Summary Report, I am provid-  
ing you with the following data:

Man hours worked (6 men)	819.5 hours
Wages and benefits	\$3253.21
Travel	1109.98
Misc. (includes computer)	311.45
Printing	638.89
Contracts	
Overhead	2211.92
Equipment	<u>782.22</u>
Total	\$8307.67

Sincerely,

J. Wallace Gwynn  
Project Manager

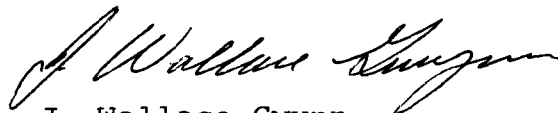
JWG/af

cc: G. Brophy  
D. Foley  
M. Reed

Project Status Report No. DOE/ER/28393-25  
Contract No. DE/AS07/28393  
Reporting Period: May, 1980

During the month of May, 1980, the following work was completed on Utah's geothermal resources assessment:

- 1) Correspondence
  - a. Two copies of project status report No. DOE/ET/28393-24 were sent to M.S. Widmayer on May 12, 1980. Copies were also sent to D. Foley, G. Brophy and M. Reed.
- 2) UGMS continues to give considerable time to the Utah State Prison PON, mostly in rewriting the specifications for the test hole drilling.
- 3) Jordan Valley Work: Three geologic aids are now working on this project; locating wells, and starting water temperature and water sampling.
- 4) We are nearing the point where the Jordan Valley gravity survey can be put out for bid. This survey will include stations to fill in gaps within the existing gravity grid as well as provide a number of detailed profiles - mainly in areas of known warm water.
- 5) State geothermal map. UGMS contributions to the map are complete: publication is expected in late August or mid September.
- 6) Work continues through UURI-ESC on the compilation and normalization of Jordan Valley gravity data.
- 7) Well location and verification, like that being done in the Jordan Valley, is also being conducted in Utah Valley and north along the Wasatch Front to Idaho.
- 8) At this writing, we now have six geologic aids working full time on geothermal assessment work.



J. Wallace Gwynn  
Project Manager

JWG/af

cc: G. Brophy  
D. Foley  
M. Reed



STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

506 Back Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

February 28, 1983

Susan Prestwich  
 U. S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-72 for the month of February, 1983.

The Contract Management Summary Report for the month of January 1983 is as follows:

Hours worked	555	
Wages and Benefits		\$3,871.22
Overhead		1,377.18
Travel and Per Diem		256.00
Supplies		159.80
Computer		718.88
Total		<u>\$6,383.08</u>

Sincerely,

Robert H. Klauk  
 Principal Investigator

RHK/co  
 Attachment

Board: Kenneth R. Pouison, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Malinckrodt  
 Elliot Rich

Project Status Report No. DOE/ER/28393-72

Contract No. DE/AS07/77ET 28393

Report Period: February, 1983

For the month of February, 1983, the following has been accomplished regarding Utah's geothermal assessment program:

I Escalante Valley - the report is in-press.

II Utah Valley

A. The gravity portion of the report has been written and is in the final review process.

B. The chemistry data and the temperature-depth data are presently being reduced.

III Box Elder County - the data are continuing to be reduced.

IV Jordan Valley - Meiji Resource Consultants is continuing to model the gravity data.





STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

656 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

April 4, 1983

Susan Prestwich  
 U. S. Department of Energy - ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-73 for the month of March 1983.

The Contract Management Summary Report for the month of February is as follows:

Hours worked	603	
Wages and Benefits		\$4,290.49
Overhead		1,462.47
Travel and Per Diem		954.03
Supplies		199.95
Computer		771.62
Less adjustment for overcharge		<u>- 105.51</u>
Total		\$7,753.05

Sincerely,

Robert H. Klauk  
 Principal Investigator

RHK/co

Board Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Beriton Boyd  
 Natalie A. Malinckrodt  
 Elliot Rich

Project Status Report No. DOE/ER/28393-73  
Contract No. DE/AS07/77ET 28393  
Report Period: March 1983

For the month of March 1983, the following has been accomplished regarding Utah's geothermal assessment program:

I Escalante Valley - the report is still in-press.

II Utah Valley

- A. The gravity portion of the report is in-press.
- B. The chemistry data and the temperature-depth data are presently being reduced.

III Box Elder County - the data are continuing to be reduced.

IV Jordan Valley

- A. Meiji Resource Consultants is to have the gravity report completed by the week of April 11, 1983.
- B. This report will be incorporated with the remainder of the report at that time.



Project Status Report No. DOE/ER/28393-74  
Contract No. DE/AS07/77ET 28393  
Report Period: April 1983

For the month of March 1983, the following has been accomplished regarding Utah's geothermal assessment program:

- I Escalante Valley - the report is still in-press.
- II Utah Valley
  - A. The gravity portion of the report is still in-press.
  - B. The chemistry and temperature-depth portions of the report are presently being written.
- III Box Elder County
  - A. Data reduction has been completed.
  - B. The final report is presently being written.
- IV Jordan Valley
  - A. Meiji Resource Consultants failed to deliver the completed report as specified.
  - B. The delivery date for the report is now June 1, 1983.
- V Blue Creek Valley - Chemistry sampling is 90% completed.

RHK/co



STATE OF UTAH  
NATURAL RESOURCES  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

June 17, 1983

Richard Fox  
Meiji Resource Consultants  
P.O. Box 250  
38 North Main  
Layton, Utah 84041

Dear Dick:

Don R. Mabey and I have reviewed the report entitled "Gravity Based Interpretive Bedrock Geology of the Jordan Valley, Salt Lake County, Utah" which was submitted by you as the final deliverable under the contract to perform modeling of gravity and aeromagnetic data with interpretive geology in selected areas along the Wasatch Front. Parts of the report have problems that need to be corrected or need further explanation before UGMS will consider all of the obligations of the contract completed. These problems are outlined as follows:

A-1 "To produce a depth to bedrock contour map (at a scale of 1:100,000) based on gravity, aeromagnetic, and geological information of the area shown on EXHIBIT "A." The following problems have been noted pertaining to this deliverable:

1. An average density of 2.65 gm/cc for Tertiary Salt Lake Formation to Precambrian is too much a simplification of actual conditions.
2. A density of 2.45 gm/cc is too low for the Cottonwood stock.
3. The following list of logs of drill hole information and the depth to bedrock indicated on the logs do not agree with the depth to bedrock contours these holes are located within.

- a. UR-2
- b. (1)
- c. MWD-1
- d. (10)
- e. (8)
- f. (4)
- g. (18)
- h. (28)
- i. (30)
- j. TR-6

4. The following list of logs do not agree lithologically with the units they are associated with on the map:

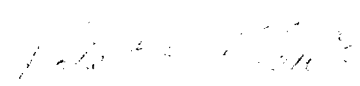
- a. PF-1
- b. PF-2
- c. ASR-1
- d. ASR-2

A-2 "To provide a more in-depth structural interpretation of areas A, C, D, E, and F, also presented in EXHIBIT "A." The following problems pertaining to this deliverable have been noted:

- 1. No profiles were modeled for areas D (Kearns to Holladay) and E (Sandy) to aid with a more in-depth structural interpretation.
- 2. Cross-section E-E' through the Draper area (area F on EXHIBIT A) shows no indication of the normal faulting along the Wasatch fault which could be significant relative to the warm water occurrences there.

Your satisfactory response is expected on all of the above discrepancies before final payment can be made.

Sincerely,

  
Robert H. Klauk  
Principal Investigator

RHK/co  
cc: Anne Stirba  
Don R. Mabey  
Duncan Foley



STATE OF UTAH  
NATURAL RESOURCES  
Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
Temple A. Reynolds, Executive Director  
Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

June 17, 1983

Susan Prestwich  
U.S. Department of Energy - ID  
550 Second Street  
Idaho Falls, ID 83401

Dear Susan:

Attached is Project Status Report No. DOE/ER/28393-75 for the month of May, 1983.

The Contract Management Summary Report for the month of May is as follows:

Hours worked	532	
Wages and Benefits		\$3,749.17
Overhead		1,271.41
Travel and Per Diem		238.72
Supplies		45.00
Computer		602.39
	TOTAL	<u>\$5,906.69</u>

Sincerely,

Robert H. Klauk  
Principal Investigator

RHK/co

Project Status Report No. DOE/ER/28393-75  
Contract No. DE/AS07/77ET 28393  
Report Period: May 1983

For the month of May, 1983, the following has been accomplished regarding Utah's geothermal assessment program:

I Utah Valley

- A. Part I (the gravity portion of the report is enclosed).
- B. Part II is continuing to be written.

II Escalante Valley - the report has been completed but is not yet available for distribution.

III Jordan Valley

- A. Meiji Resource Consultants delivered the report of June 1, 1983.
  - 1. Problems were noted with the report.
  - 2. A letter has been sent to Meiji, outlining the problem areas.
- B. The remainder of the report is being completed without the Meiji data.
- C. Hopefully, the Meiji data, when corrected, can be included as an addendum.

IV Box Elder County - The final report is continuing to be written.

V Blue Creek Valley

- A. The chemistry sampling has been completed.
- B. Temperature-depth logging has commenced.

VI Weber and Davis Counties - data reduction has commenced.

RLK/co





STATE OF UTAH  
 NATURAL RESOURCES & ENERGY  
 Utah Geological & Mineral Survey

Scott M. Matheson, Governor  
 Temple A. Reynolds, Executive Director  
 Genevieve Atwood, State Geologist

606 Black Hawk Way • Salt Lake City, UT 84108 • 801-581-6831

Correspondence No. DOE/ET/28393-56  
 Contract No. DOE/AS07/77ET28393  
 Date: December 15, 1982

Susan Prestwich  
 US Department of Energy-ID  
 550 Second Street  
 Idaho Falls, ID 83401

Dear Susan:

Attached, please find a copy of a thesis proposal from Matthew C. Davis, a graduate student at Utah State University. As was discussed with you in a previous phone conversation, the Utah Geological and Mineral Survey (UGMS) would like to support this thesis with existing funds in our DOE contract numbered DOE/AS07/77ET28393. It is current UGMS policy to support theses with \$1500.00 stipends. I propose to also fund the chemical analyses of the 50 or so water samples to be collected. Carl Ruscetta quoted me an approximate price of \$40.00 per sample which would total \$2000.00 if 50 were collected. Having the analyses conducted at UURI/ESL would make the chemistry data compatible with other data already analyzed for the Wasatch Front and will also expedite the report. The total amount from the contract to support this study would be \$3500.00.

Presently, the contract is scheduled to terminate on March 31, 1983. I am requesting a "No Cost Time Extension" until September 30, 1983 to allow for the completion of this study. I am very well aware that the final report must be submitted to DOE prior to this date. This time extension will also allow for the completion of other deliverables which, due to unforeseen problems, will not be completed by March 31, 1983.

*DF - on proposal*

- remote area, but extends known studies
- DF suggests going further south, to include

*Locomotive springs - a major discharge point in the valley*

Sincerely,

*Robert H. Klauk*  
 Robert H. Klauk  
 Principal Investigator

Board: Kenneth R. Poulson, Chairman  
 Laurence H. Lattman  
 Peter E. Matthies



Robert W. Bernick • Benton Boyd  
 Natalie A. Mallinckrodt  
 Elliot Rich

Evaluation of Low-Temperature Geothermal Potential  
in North-central Box Elder Co., Utah

by

Matthew C. Davis  
Department of Geology  
Utah State University

Statement of Thesis Problem

Introduction

In an attempt to fully estimate the potential energy resources in Utah, the Utah Geological and Mineral Survey (UGMS) is in the process of assessing Utah's potential for geothermal energy development. The research that I propose will be conducted in north-central Box Elder Co., Utah, between T13N and the Utah-Idaho border and between Ranges 7 and 11W. Included in this area are parts of both Curlew and Hansel Valleys, Utah. From the water samples taken in this area, a comprehensive body of chemical data will be obtained and also an attempt will be made to explain any occurrences of warm water.

Previous Work

Many general studies of mineralized and thermal waters in Utah and the United States have been made in the past 30 years (White and Williams, 1975). Only a small part of this information is pertinent to the hydrology and geothermal occurrences of north-central Box Elder Co., Utah.

Mundorff (1970) published a study on most of the major thermal springs in Utah, including information on water temperature and general geologic settings. He found that waters in northwestern Utah had low dissolved solid contents, relatively low temperatures, and were probably of local meteoric origin. Heylman (1966) and Goode (1978) also located many occurrences of thermal waters in Utah and found similar results.

In more specific studies, Doelling (1980) described some of the springs in Box Elder Co., as having high radioactivity and high concentrations of chloride. Of the few springs which are found outside the Wasatch geothermal area, only Coyote Spring (SWNW33-14N-10W) falls within the proposed study area, but Doelling did not report its temperature.

Hood (1971) performed a hydrologic reconnaissance of Hansel Valley and northern Rozel Flat, both of which are within the proposed study area. He collected data on numerous wells, including owners, locality, year in which the well was drilled, depth of well, flow rate, chemical composition and temperature. Most of the water was found to be between 13°-24°C.

Baker (1974) conducted an extensive study of the water resources of the Curlew Valley drainage basin, Utah and Idaho, and collected data on many well sites. He noted that most of the water was between 10°-24° C, but that Coyote Spring was at 44.3°C. From this information, Baker suggested that at least the western half of Curlew Valley might be underlain with hot saline water, and that the geothermal gradient for this area might be abnormally high.

The proposed research will attempt to add further insight into such geothermal occurrences in north-central Box Elder Co., Utah, and hopefully locate other areas of thermal activity.

#### Objectives

The objectives of the proposed research include: (1) the collection of 3 water samples from each of approximately 50 water wells and springs in the study area; (2) the on-site determination of pH, electrical conductivity, bi-

carbonate alkalinity, temperature, and Eh at each sample site; (3) the analysis for  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{++}$ ,  $\text{Ca}^{++}$ , Si, Fe,  $\text{SO}_4^{=}$ ,  $\text{Cl}^-$ ,  $\text{F}^-$  and total dissolved solids from the water samples using laboratory techniques; (4) the calculation of reservoir temperatures using Na-K-Ca geothermometry (Fournier and Truesdell, 1973) and  $\text{SiO}_2$  geothermometry (Fournier and Rowe, 1966); (5) the measurement of geothermal gradients from temperature profiles; and (6) an attempt to explain any occurrence of warm water found within the proposed area of study.

#### Procedures

In order to evaluate geothermal occurrences, a detailed chemical analysis of the water samples must be performed. This analysis will include both laboratory tests and field work. All sampling and laboratory analyses will be done in accordance with UGMS procedures (Kroneman, 1981; Darling, 1981; de Vries, 1982).

The field work will involve the collection of water samples from approximately 50 water wells and springs in the proposed area. Samples will be collected as close as possible to the wellhead or mouth of the spring to avoid errors associated with water not directly from the desired source. Because mineral solubilities are easily affected by changes in conditions after collection, on-site analyses will be performed at each sample location and will include pH, alkalinity, electrical conductivity, Eh, and temperature. If any samples are collected from cold source waters, they will be kept cold by refrigeration because the solubilities could be affected by temperature changes.

A final on-site analysis will be the measurement of thermal gradients using a thermistor probe. This procedure will be done if unused water wells, preferably deeper than 300m, are found in the study area.

After performing the on-site analyses, three 570 ml polyethylene bottles will be filled with water which has been filtered by pressure filtration through a 0.45 micron membrane. Prefiltration using a coarser filter will be done if the amount of suspended solids necessitates its use. The first bottle will be acidified with reagent grade  $\text{HNO}_3$  to a final concentration of 20%  $\text{HNO}_3$  for later analysis of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{++}$ , and  $\text{Fe}$ . The second bottle will be acidified with concentrated  $\text{HCl}$  to a final concentration of 1%  $\text{HCl}$  for analysis of  $\text{Ca}^{++}$  and  $\text{SO}_4^{=}$ . The third bottle of filtered water will contain no additives and will be used for the analysis of  $\text{Si}$ ,  $\text{Cl}^-$  and  $\text{F}^-$  and also to determine the total amount of dissolved solids. Acidification of the samples prevents the precipitation of sulfate and metals before analyses can be performed.

If chemical analyses of water samples are performed at Utah State University, the following techniques will be employed:

1. atomic absorption spectrophotometry (Perkin-Elmer model 303) for analysis of  $\text{Na}$ ,  $\text{K}$ ,  $\text{Ca}$ ,  $\text{Mg}$ ,  $\text{Si}$ , and  $\text{Fe}$ .
2. specific ion electrodes for the analysis of  $\text{Cl}^-$  and  $\text{F}^-$
3. UV-visible spectrophotometry for the analysis of  $\text{SO}_4^{=}$ .
4. evaporation of 50 ml of untreated, filtered water sample to dryness and weighing the residue for the determination of total amount of dissolved solids

Water analyses performed by ESL for the UGMS will be by their own techniques.

In an attempt to evaluate the geothermal potential of the study area, several chemical geothermometers will be employed. The silica geothermometer (Fournier and Rowe, 1966) and the Na-K-Ca geothermometer (Fournier and Truesdell, 1973; Fournier and Potter, 1978) can aid in the estimation of the

last water-rock interaction temperatures. The accuracy of each of these geothermometers is based on several important assumptions. One such assumption is that temperature-dependent reactions occur at depth, with all involved constituents sufficiently abundant. Another assumption is that no mixing of thermal reservoir waters with shallower waters occurs prior to collection. These and other conditions should be kept in mind and should be considered as possible limitations on the effectiveness of the geothermometer.

A GeoFilter peristaltic pump, Model #004, on loan from the UGMS, will be used for the collection and pressure filtration of the water in the field. A pH-temperature meter is available in the Department of Geology, but conductivity and temperature gradient equipment will also be borrowed from the UGMS. The resulting data and conclusions will be presented as a report to the UGMS and in thesis form.

REFERENCES

- Baker, C. H., 1974, Water resources of the Curlew Valley drainage basin, Utah and Idaho: Utah Dept. of Natural Resources Tech. Pub. no. 45, 91 p.
- Darling, R., 1981, Field water sampling procedures. Utah Geol. and Mineral Survey, internal memorandum, 14 p.
- de Vries, J. L., 1982, Evaluation of low-temperature geothermal potential in Cahce Valley, Utah (unpub. M.S. thesis): Logan, Utah, Utah State University, 105 p.
- Doelling, H. H., 1980, Geology and mineral resources of Box Elder County, Utah: Utah Geol. and Mineral Survey Bulletin no. 115, 251 p.
- Fournier, R. O. and Potter, R. W., 1978, A magnesium correction for the Na-K-Ca chemical geothermometer: U. S. Geol. Survey Open-file report 78-986, 24 p.
- \_\_\_\_\_ and Rowe, R. J., 1966, Estimation of underground temperatures from the silica content of water from hot spring and wet-water wells: Am. Jour. Sci., v. 264, p. 685-697.
- \_\_\_\_\_ and Truesdell, A. H., 1973, An empirical Na-K-Ca geothermometer for natural waters: Geochim. et Cosmochim. Acta, v. 37, p. 1255-1275.
- Goode, H. D., 1978, Thermal waters of Utah: Utah Geol. and Mineral Survey Report of Investigation no. 129, 183 p.
- Heylman, E. B., 1966, Geothermal power potential in Utah: Utah Geol. and Mineral Survey Special Studies 14.
- Hood, J. W., 1971, Hydrologic reconnaissance of Hansel Valley and northern Rozel Flat, Box Elder County, Utah: Utah Dept. of Natural Resources Tech. Pub. no. 33, 41 p.
- Kroneman, R. L., 1981, Guide to water sampling: Earth Science Laboratory, University of Utah Research Institute, Salt Lake City, Utah, 10 p.
- Mundorff, J. C., 1970, Major thermal springs of Utah: Utah Geol. and Mineral Survey Water-Resources Bull. no. 13, 60 p.
- White D. E. and Williams, D. L., 1975, Assessment of geothermal resources of the United States: U. S. Geological Survey circular no. 726, 155 p.

UTAH

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COPY DOCUMENTS  
AS SHOWN :

Need copy of Mod ~~6~~



*J. Griffith  
S. E. Branch*

78-5037 *new file*

Contract No. EG-77-S-07-1679

*File m2.9*

CONTRACT BETWEEN

STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY  
DEPARTMENT OF NATURAL RESOURCES  
and  
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

THIS AGREEMENT, entered into the 19th day of August 1977, effective as of the 1st day of July 1977, by and between the UNITED STATES OF AMERICA (hereinafter referred to as the "Government"), acting through the ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION (hereinafter referred to as "ERDA"), and the UTAH GEOLOGICAL AND MINERAL SURVEY, an agency of the State of Utah, Department of Natural Resources, existing under the laws of the State of Utah, with principal offices in Salt Lake City, Utah (hereinafter referred to as the "Contractor");

WITNESSETH THAT:

WHEREAS, ERDA desires to have the Contractor perform certain research work, as hereinafter provided; and

WHEREAS, this agreement is authorized by the Energy Reorganization Act of 1974 (P. L. Law 93-438), and other applicable laws;

NOW, THEREFORE, the parties hereto agree as follows:

ARTICLE I - THE RESEARCH TO BE PERFORMED

The Contractor shall, to the best of its ability, furnish personnel, facilities, equipment, materials, supplies, and services, except such as are furnished by the Government, necessary for the performance of the research provided for in Appendix A hereto, and shall perform the research and report thereon pursuant to the provisions of this contract. It is understood that Appendix A, a guide to the performance of this contract, may be deviated from by the Contractor subject to the specific requirements of this contract.

ARTICLE II - THE PERIOD OF PERFORMANCE

The period of performance under this contract shall commence on July 1, 1977 and expire on June 30, 1978. Performance may be extended for additional periods by the mutual written agreement of the parties.

**CONFIRMED COPY**

ARTICLE III - CONSIDERATION

(a) In full consideration of the Contractor's performance hereunder, ERDA shall furnish the equipment, supplies, materials, and services, if any, listed in Article A-II(b), and pay the Contractor the sum of Ninety-Three Thousand Six Hundred Thirty Dollars (\$93,630.00), hereinafter called the "Support Ceiling", which sum shall be subject to adjustment as hereinafter provided.

(b) Payments to the Contractor shall equal the "Cumulative Support Cost" of the performance of this contract, as the term "Cumulative Support Cost" is defined in Article B-XXVIII; Provided, however, and notwithstanding any other provisions of this contract, that the Government's monetary liability under this contract shall not exceed the Support Ceiling specified in (a) above. ERDA shall not pay more than the Support Ceiling or an amount equal to the Cumulative Support Cost, whichever is less. The Contractor shall be obligated to perform under this contract throughout the agreed-upon period of performance, and to bear all costs which ERDA has not agreed to pay; Provided, however, that the Contractor shall have the right to cease to perform the research provided for in this contract, upon written notice to ERDA to that effect, at any time when or after the Cumulative Support Cost equals or exceeds the Support Ceiling.

(c) The Support Ceiling specified in (a) above may be increased unilaterally by ERDA by written notice to the Contractor and may be increased or decreased by written agreement of the parties (whether or not by formal modification to this contract). In the event the stated period of contract performance is extended, the Support Ceiling may be revised to reflect any increased ERDA support for the extended period or periods.

(d) Upon termination, or expiration of the total period of performance, the Contractor shall promptly refund to ERDA (or make such disposition as ERDA may in writing direct) any sums paid by ERDA to the Contractor under this contract, through direct payment or under letter of credit, in excess of the Cumulative Support Cost incurred in performance under the contract.

ARTICLE IV - GOVERNMENT PROPERTY

The following items of property procured or fabricated by the Contractor are hereby listed as "Government property":

None

**ARTICLE V - ADDITIONAL CONTRACT PROVISIONS**

Appendix B attached hereto and made a part hereof, sets forth additional general contract provisions of this contract.

IN WITNESS WHEREOF, the parties hereto have executed this document as of the day and year first above written.

THE UNITED STATES OF AMERICA

BY THE ENERGY RESEARCH AND DEVELOPMENT  
ADMINISTRATION

By /s/ W. C. Kendall  
W. C. Kendall, Acting Director  
Contracts and Procurement Division  
Idaho Operations Office  
Contracting Officer

Witnesses as to signature  
of Contractor:

STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

/s/ J. Wallace Gwynn  
Bountiful, Utah  
(Address)

By /s/ Donald T. McMillan  
Title Director

/s/ Peter J. Murphy  
Bountiful, Utah  
(Address)

Salt Lake City, Utah  
(Business Address)

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_ of the Contractor named under this document, that \_\_\_\_\_, who signed this document on behalf of the Contractor, was then \_\_\_\_\_ of said Contractor; that said document was duly signed for and in behalf of said Contractor by authority of its governing body, and is within the scope of its legal powers.

IN WITNESS WHEREOF, I have hereunto affixed my hand and the seal of said Contractor this \_\_\_\_\_ day of \_\_\_\_\_, 1977.

(SEAL)

\_\_\_\_\_

CONTRACTOR: State of Utah  
Utah Geological and Mineral Survey

APPENDIX A

For the Contract Period July 1, 1977 through June 30, 1978

Article A-I RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) The scope of the work under this contract is unclassified, and the Contractor under this agreement with the Energy Research and Development Administration will perform research to advance the utilization of low temperature geothermal heat in the State of Utah, which in general will consist of the following:

- ✓ 1. Accomplish a preliminary synthesis of the data presently available concerning the distribution of the potential low and moderate temperature geothermal resources in the State of Utah.
- ✓ 2. Conduct preliminary field surveys of promising sites identified on the basis of existing information. This initial study phase at each site may include any or all of the following activities: geologic mapping, recording water and soil temperatures, profiling well temperatures, measuring electrical resistivity and the drilling of 70 to 100 meter geothermal gradient holes.
- ✓ 3. Subcontract for preliminary environmental assessments of areas being examined as potential reservoir confirmation sites.
- ✓ 4. Provide a project coordinator who will be responsible for the integration of related State and Federal geoscience research projects potentially contributing to the low and moderate temperature geothermal resource inventory.

(b) The scope of work shall include such other studies, investigations, and services as may be mutually agreed upon.

Article A-II WAYS AND MEANS OF PERFORMANCE

(a) Items for which support will be provided as indicated in A-III below:

1. Project Manager	-0-
2. Principal Investigator	\$15,000.00
3. Project Geologist	-0-
4. Geologic Aide	8,000.00

5. Employee Benefits	\$1,600.00
6. Travel	5,175.00
7. Per diem	2,075.00
8. Maps and Airphotos	2,000.00
9. Power Auger	250.00
10. Down-hole Thermometer, Reel and Cable	3,000.00
11. Drafting and Reproduction	2,200.00
12. Computer Time	500.00
13. Thermal Gradient Holes (20 @ \$2,000 each)	40,000.00
14. Water Analyses	2,330.00
15. Environmental Analysis	7,000.00
16. Overhead	<u>4,500.00</u>
TOTAL	<u>\$93,630.00</u>

(b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

(c) Time or effort of Principal Investigator(s) including indirect costs and fringe benefits contributed by the Contractor but excluded from computation of Support Cost and consideration in proportioning costs:

\$28,440.00 for time of Project Manager, Principal Investigator, and Project Geologist, plus fringe benefits.

Article A-III FUNDING

The total estimated cost of items under A-II(a) above, for the contract period stated in this Appendix A, is \$93,630.00. ERDA will pay 100% of the actual costs of these items incurred during the contract period stated in this Appendix A, subject to the provisions of Article III and Article B-XXVIII. The estimated ERDA Support Cost for the contract period stated in this Appendix A is \$93,630.00.

The estimated ERDA Support Cost is funded as follows:

- (a) Estimated unexpended balance from prior period(s) \$ - 0 -
- (b) New funds for the current period \$93,630.00

Article A-IV ADMINISTRATION AND REPORTS

(a) Principal Investigator - J. W. Gwynn

ERDA Program Manager - Clayton R. Nichols - ERDA HQ.  
Division of Geothermal Energy

The Principal Investigator shall direct the work as outlined in discussions and in periodic letters from the Program Manager.

(b) Reports

1. General - General reporting requirements for ERDA/DGE contractors are presented in ERDA-76/72, "Requirements and Procedures for Reporting Geothermal Information", dated July 1976. Reports should be prepared for this contract as follows:

	<u>Frequency</u>	Draft to Program Manager for Concurrence	<u>Distribution</u> Program Manager	TIC
Administrative Letter Report	-----	N/A	10	N/A
Technical Progress Report	-----	3 weeks after end of report- ing period	10	1 camera- ready copy
Final Report	Completion of contract effort	3 weeks after end of reporting period	10	1 camera- ready copy
Topical Reports	As required	As agreed with Program Manager	10	1 camera- ready copy

NOTE: One (1) copy of the Final Report is to be submitted to the Contracting Officer.

2. Reports Formats

The following will apply to all technical progress reports, topical reports and final reports:

- a. The cover page will be supplied by ERDA/DGE unless the Contractor intends to use its corporate cover.

- b. Reports under this contract will all carry the number prescribed by the Program Manager. Report numbers will be assigned sequentially.
- c. The distribution category for reports prepared under this contract will be UC-66A as defined on page 16 of ERDA-76/72.

3. Content of Reports

Administrative Letter Reports -- Progress memo to Program Manager on personnel and fiscal matters, including such information as rate of expenditures, equipment ordering/availability/receipt, loss or gain of personnel, etc.

Technical Progress Reports -- Full account of progress, problems encountered, plans for future reporting periods, and an assessment of prospects for future progress, identifying clearly all facts with both positive and negative impact on expectations for completely achieving task objectives on schedule and within contract funds, should include, as appropriate, accounts of activities aimed at utilization of task results.

Final Report -- Comprehensive report of objectives, results and conclusions of task effort, should identify accomplishments, problems encountered and solutions applied, conclusions reached and recommendations for applications of results. The final report will also include: (1) statewide review and geologic analysis of the potential areas in Utah for exploitation of low and moderate temperature geothermal reservoirs for direct heat applications; (2) a prioritized list of the candidate sites examined during phase one which evaluates their apparent potential and recommends specific sites for future drilling, if any; and (3) a preliminary environmental assessment.

RECEIVED

FEB 14 1978

*J. L. Griffith*  
Modification No. A001  
Supplemental Agreement to *file C 3.5*  
Contract No. EG-77-S-07-1679 # 1679  
*FU 4m29*

SUPPLEMENTAL AGREEMENT

GEOHERMAL ENERGY  
BRANCH

THIS SUPPLEMENTAL AGREEMENT, entered into the 9th day of February 1978, (effective as of the 1st day of December 1977) by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), acting through the DEPARTMENT OF ENERGY (hereinafter called "DOE")(formerly the Energy Research and Development Administration "ERDA"), and UTAH GEOLOGICAL AND MINERAL SURVEY, an agency of the State of Utah, Department of Natural Resources with its principal office at Salt Lake City, Utah (hereinafter called the "Contractor");

WITNESSETH THAT:

WHEREAS, on August 19, 1977, effective as of the 1st day of July 1977, the Government and the Contractor entered into Contract No. EG-77-S-07-1679 for the Contractor to perform certain research work; and

WHEREAS, the parties desire to modify said contract as hereinafter provided; and

WHEREAS, DOE certifies that this Supplemental Agreement is authorized by and executed under Section 302(c)(5) and (15) of the Federal Property and Administrative Services Act of 1949, as amended, and the Department of Energy Organization Act of 1977 (Public Law 95-91), and other applicable laws;

NOW, THEREFORE, said contract is hereby amended as follows:

A. ARTICLE II, "THE PERIOD OF PERFORMANCE," is amended as follows:

"The period of performance for the research set forth in Appendix A is hereby extended from June 30, 1978 to December 31, 1978. The period of performance may be further extended by mutual written agreement of the parties."

B. ARTICLE III, "CONSIDERATION," is hereby revised to increase the contract Support Ceiling to a total of One Hundred Seventy-Five Thousand One Hundred Thirty Dollars (\$175,130).

C. APPENDIX A is hereby revised as follows:

(1) Article A-II, "WAYS AND MEANS OF PERFORMANCE," is revised by adding the following two new paragraphs:

CONFORMED COPY



"(d) Items for which support will be provided as indicated in Article A-III of Appendix A is as follows:

1. Geologic Aids	\$ 4,300
2. Employee Benefits	950
3. Travel (6000 mi at .25)	1,500
4. Per Diem (60 days at \$25)	1,500
5. Mercury Detection Survey	3,500
6. Thermal Gradient Holes- (15 holes, 300 ft. deep at \$4,500)	67,500
7. Overhead	<u>2,250</u>
Total	\$81,500

(e) Time of effort including indirect costs and fringe benefits as listed below are contributed by the Contractor and excluded from computation of above Support Costs.

\$14,950 for Project Manager, Principal Investigator and Project Geologist."

(2) Article A-III, "FUNDING," is revised to read as follows:

"The total estimated cost of items under A-II(a) and A-II(d) of Appendix A, for the contract period is \$175,130.00. DOE will pay 100% of the actual costs of these items incurred during the contract period subject to the provisions of Article III and Article B-XXVIII. The estimated DOE Support Cost for the contract period is \$175,130.00.

The estimated DOE Support Cost is funded as follows:

(a) Estimated unexpended balance from prior period(s)	\$ <u>-0-</u>
(b) New funds for the current period	\$ <u>81,500.00"</u>

Except only to the extent modified by this Supplemental Agreement or to the extent rendered inconsistent herewith, all of the terms and provisions of said Contract EG-77-C-07-1679 shall remain unchanged and continue in full force and effect.

Modification No. A001 (Cont'd)  
Supplemental Agreement to  
Contract No. EG-77-S-07-1679

IN WITNESS WHEREOF, the parties hereto have executed this Supplemental Agreement as of the day and year first above written.

THE UNITED STATES OF AMERICA

BY THE DEPARTMENT OF ENERGY

By /s/ W. C. Kendall  
W. C. Kendall, Chief, Contracts Branch  
Contracts and Procurement Division  
Idaho Operations Office  
Contracting Officer

UTAH GEOLOGICAL AND MINERAL SURVEY

Witnesses as to signature of  
Contractor:

/s/ Alice E. Fisher  
(Signature)

Alice E. Fisher  
Name (typed)

4676 S. Deer Creek Rd., SLC, UT  
(Address)

By /s/ Donald T. McMillan

Donald T. McMillan  
Name (typed)

Title Director  
606 Black Hawk Way  
Salt Lake City, Utah 84108  
(Business Address)

/s/ Helen D. Laney  
(Signature)

Helen D. Laney  
Name (typed)

752 N. 900 W., Apt. 302, SLC, UT 84116  
(Address)

Modification No. A001 (Cont'd)  
Supplemental Agreement to  
Contract No. EG-77-S-07-1679

I, \_\_\_\_\_, certify that I am the \_\_\_\_\_  
Secretary of the corporation named as Contractor  
herein; that \_\_\_\_\_, who signed this  
Supplemental Agreement on behalf of the Contractor, was then \_\_\_\_\_  
of said corporation; that said Supplemental  
Agreement was duly signed for and in behalf of said corporation by  
authority of its governing body, and is within the scope of its legal  
powers.

\_\_\_\_\_  
Secretary

(SEAL)

APR 23 1979

Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

Attention: Donald T. McMillan, Director

Subject: CONTRACT NO. DE-AS07-77ET28393 (FORMERLY NO. EG-77-S-07-1679)

Gentlemen:

As requested in your letters dated March 13, 1979 and March 20, 1979, the following changes are authorized to the subject contract:

1. The completion date for work under the contract is hereby extended from March 31, 1979 to May 31, 1979.
2. The contractor is authorized to use \$1000.00 of the \$13,000.00 designated for gravity surveys, for magnetic surveys.

If you have any questions, please contact J. O. Lee of my staff.

Very truly yours,

Original signed By

R. E. Simonds

R. E. Simonds, Director

Contracts Management Division

bcc: L. L. Mink

CAB

JOLee:ahb

JPAnderson

4/20/79

M

CEWilliams

CMD

RESimonds

*Handwritten signatures and initials:*  
JOLee:ahb  
JPAnderson  
4/20/79  
CEWilliams  
RESimonds

*M. Widmayer*  
*E:T file*  
*M.2.9*

JUL 6 1979

RECEIVED  
JUL 1979  
GEOTHERMAL ENERGY  
BRANCH

Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

Attention: Donald T. McMillan, Director

Subject: MODIFICATION NO. A002, CONTRACT NO. DE-AS07-77ET28393  
(FORMERLY NO. EG-77-S-07-1679)

Gentlemen:

Enclosed are three copies of the subject modification which I have signed on behalf of DOE. If this modification is acceptable to you, please have three copies signed by an authorized official and return two copies to the attention of J. O. Lee of my staff. The third copy is for your files.

Very truly yours,

Signed By  
*R. E. Simonds*  
R. E. Simonds, Director  
Contracts Management Division

Enclosure:  
As stated above

bcc: M. A. Widmayer

CAB  
JOLee:ahb  
JPAnderson  
7/6/79

CMD  
RESimonds

Modification No. A002  
Supplemental Agreement to  
Contract No. DE-AS07-77ET28393

SUPPLEMENTAL AGREEMENT

THIS SUPPLEMENTAL AGREEMENT, entered into this 7/12/79 day of                      1979, (effective as of May 31, 1979), by and between the UNITED STATES OF AMERICA (hereinafter called the "Government"), acting through the DEPARTMENT OF ENERGY (hereinafter called "DOE") (formerly the Energy Research and Development Administration "ERDA") and UTAH GEOLOGICAL AND MINERAL SURVEY, an agency of the State of Utah, Department of Natural Resources with its principal office at Salt Lake City, Utah (hereinafter called the "Contractor");

WITNESSETH THAT:

WHEREAS, on August 19, 1977, effective as of the 1st day of July 1977, the Government and the Contractor entered into Contract No. DE-AS07-77ET28393 for the Contractor to perform certain research work; and

WHEREAS, the parties desire to modify said contract as hereinafter provided; and

WHEREAS, DOE certifies that this Supplemental Agreement is authorized by and executed under Section 302(c)(5) and (15) of the Federal Property and Administrative Services Act of 1949, as amended, and the Department of Energy Organization Act of 1977 (public Law 95-91), and other applicable laws;

NOW, THEREFORE, said contract is hereby amended as follows:

A. This contract is changed from a "Special Research Support Agreement" to a "Special Research Contract." Wherever the words "Special Research Support Agreement," are used they shall mean "Special Research Contract."

B. ARTICLE I, "THE RESEARCH TO BE PERFORMED," is amended by adding a new paragraph as follows:

"Appendix A2, attached to this Supplemental Agreement and made a part hereof, provides for the research to be performed by the Contractor during the contract period specified therein."

C. ARTICLE II, "THE PERIOD OF PERFORMANCE," is amended as follows:

"The period of performance for the research set forth in Appendix A2 is hereby extended from May 31, 1979 to May 31, 1980. The period of performance may be further extended by mutual written agreement of the parties."

060579  
br:L-A-5

Modification No. A002 (Cont'd)  
Supplemental Agreement to  
Contract No. DE-AS07-77ET28393

D. ARTICLE III, "CONSIDERATION," is revised to increase the contract Support Ceiling to a total of Three Hundred Eighty-Two Thousand One Hundred Thirty (\$382,130.00). This includes \$93,630.00 authorized by the original contract, \$81,500.00 authorized by Modification No. A001 and \$207,000.00 authorized by this modification No. A002.

E. ARTICLE IV, "GOVERNMENT PROPERTY" is amended as follows:

"The following items of property procured or fabricated by the Contractor are listed as Government Property:"

1. PH selective ion meter and probes including replacement cable, and temperature probe.
2. Pygmy current meter.
3. Water sampling pump and filter.


Except only to the extent modified by this Supplemental Agreement or to the extent rendered inconsistent herewith, all of the terms and provisions of said Contract No. DE-AS07-77ET28393 as previously amended, shall remain unchanged and continue in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Supplemental Agreement as of the day and year first above written.

THE UNITED STATES OF AMERICA

BY THE DEPARTMENT OF ENERGY

By

  
R. E. Simonds, Director  
Contracts Management Division  
Idaho Operations Office  
Contracting Officer

Modification No. A002 (Cont'd)  
Supplemental Agreement to  
Contract No. DE-AS07-77ET28393

UTAH GEOLOGICAL AND MINERAL SURVEY

By




Donald T. McMillan

(Name Typed)

Title

Director

Witnesses as to signature of  
Contractors:

  
(Signature)

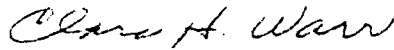
Doris A. Watkins

Name (typed)

3467 South Westwood Drive  
Salt Lake City, Utah 84109

(Address)

606 Black Hawk Way, Salt Lake City, UT 84108  
(Business Address)



(Signature)

Clara H. Warr

Name (typed)

3075 Teton Drive  
Salt Lake City, Utah 84109

(Address)



CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

APPENDIX A2

For the Contract Period May 31, 1979, through May 31, 1980.

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) The scope of the work under this contract is unclassified and the Contractor under this contract with the Department of Energy will perform the following:

1. Determine the source, distribution, and potentially useful thermal energy of geothermal resources in the Jordan Valley by performing the following research:
  - a. Compile all existing geological and geophysical data. Expected time required will be one man month.
  - b. Compile all existing water data including analyses, temperatures and pertinent well records. Expected time required will be three man months.
  - c. Collect water samples and prepare them for analysis, collect water temperatures and gradient information. Expected time required is four man months.
  - d. Plan, contract for, and interpret gravity and ground magnetic surveys as needed to supplement existing work. Expected time required is two man months.
  - e. Plan, contract for flying, and interpret aeromagnetic surveys to assist in structural interpretation (approximately 450 square miles). Expected time required is one man month.
  - f. Contract for drilling three to four deep (to 1,000 feet) temperature gradient holes. Expected time required is three man months.
2. Conduct gravity and aeromagnetic surveys to help define the structural controls beneath the alluvium at Utah Hot Springs, Crystal Madsen Hot Springs, Little Mountain South and Udy Hot Springs. The time expected to plan, conduct, and interpret the surveys is two man months.
3. The Contractor has submitted over 650 entries to the GEOTHERM file of the USGS under contract DE-AS07-77ET28393. All of the records pertain to waters 20°C. or greater. The greater portion of all published water data within this temperature range has been entered. The Contractor

shall revise data in the GEOTHERM file including (1) correction of data already submitted, (2) updating with new or overlooked data, and (3) the submission of approximately 1,600 records dealing with waters in the temperature range of 15.5 to 19.5°C. The time expected to complete the work is two man months.

(b) The scope of work shall include such other studies investigations and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

(a) Items for which support may be provided as indicated in Article A-III below:

PERSONNEL:		DOE	UGMS
J. W. Gwynn, Ph.D. - 40% time - 5 months			\$10,123.00
P. J. Murphy -100% time - 12 months			16,680.00
P. A. Sturm - 10% - 1 month			1,530.00
Benefits - 25%			7,083.00
Geologic Aide - 8 months	\$6,000.00		
Benefits - 10%	600.00		
Total personnel costs -26 months	\$6,600.00	\$35,416.00	

TRAVEL: 8,000 mi @ 0.25/mile  
 PER DIEM: 30 days @ \$27.50/day

EQUIPMENT:

PH - selective ion meter and probes, etc.	\$2,000.00
Replaement cable, temp. probe	1,200.00
Pygmy current meter	650.00
Water sampling pump and filter	570.00
	<u>\$4,420.00</u>

MISCELLANEOUS SUPPLIES (maps, pipe, photos, etc.): 1,008.00

PRINTING, REPRODUCTION, DRAFTING, ETC. 2,500.00

CONTRACTED OR PURCHASED SERVICES:

Drilling - 3500' @ \$25/foot	87,500.00
Aeromagnetic and reduction - 2,500 line miles @ \$8.00/line mile	20,000.00

Gravity and reduction - 1500 stations @ \$40/station	60,000.00	
Computer services	500.00	
Water chemistry - 40 samples @ \$100/sample	4,000.00	
OVERHEAD: (42% x \$42,016 - total Salaries, Wages & Benefits)	17,647.00	
	<u>\$207,000.00</u>	<u>\$35,416.00</u>

(b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

(c) Time or effort of Contractor personnel contributed by the Contractor but excluded from computation of Support Cost and consideration in proportioning costs:

\$35,416.00 for time of J. W. Gwynn, P. J. Murphy, and P. A. Sturm plus fringe benefits.

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above, for the contract period stated in this Appendix A1 is \$242,416.00. DOE \$207,000.00 of the actual costs of these items incurred during the contract period stated in this Appendix A1, subject to the provisions of Article III and Article B-XXVIII. The total DOE share of \$207,000.00 is subject to downward adjustment based upon overhead rate that is approved by Department of Interior, Office of Inspector General, Sacramento, California.

The estimated DOE Support Cost is funded as follows:

(a) Estimated unexpended balance from prior period(s)	\$	<u>-0-</u>
(b) New funds for the current period	\$	<u>207,000.00</u>

Article A-IV - ADMINISTRATION AND REPORTS

(a) Project Manager - J. W. Gwynn  
Principal Investigator - P. J. Murphy

Modification No. A002 (Cont'd)  
Contract No. DE-AS07-77ET28393  
Appendix A2, Page 4

DOE Program Officer - L. L. Mink, Resource Definition Branch  
U.S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, Idaho 83401

(b) All Project Information Reports, as required by DOE Uniform Contractor Reporting System, Volume 1, dated September 1978, and as indicated on the attached DOE Form CF-537, shall be submitted to the DOE Program Officer in accordance with the special instructions.

U. S. DEPARTMENT OF ENERGY  
REPORTING REQUIREMENTS CHECKLIST

DOE Form CR-517  
(1-78)

(See Instructions on Reverse)

FORM APPROVED  
OMB NO. 38R-0190

1. IDENTIFICATION DE-AS07-77ET28393	2. OBLIGATION INSTRUMENT: PR-07-79ET28393.501
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REPORTING REQUIREMENTS

A. PROJECT MANAGEMENT	Frequency	B. TECHNICAL INFORMATION REPORTING	Frequency
1. <input type="checkbox"/> Management Plan		1. <input checked="" type="checkbox"/> Notice of Energy RD&D Project (SSIE)	Q
2. <input type="checkbox"/> Milestone Schedule & Status Report		2. <input checked="" type="checkbox"/> Technical Progress Report	Q
3. <input type="checkbox"/> Cost Plan		3. <input checked="" type="checkbox"/> Topical Report	Y
4. <input type="checkbox"/> Manpower Plan		4. <input checked="" type="checkbox"/> Final Technical Report	F
5. <input checked="" type="checkbox"/> Contract Management Summary Report	M	<b>C. PMS/MINI-PMS</b> 1. Cost Performance Report <input type="checkbox"/> Format 1 WBS <input type="checkbox"/> Format 2 Functional <input type="checkbox"/> Format 3 Baseline <input type="checkbox"/> Format 5 Problem Analysis 2. <input type="checkbox"/> Cost/Schedule Status Report 3. <input type="checkbox"/> Management Control System Description 4. <input type="checkbox"/> Summary System Description 5. <input type="checkbox"/> WBS Dictionary	
6. <input checked="" type="checkbox"/> Project Status Report	M		
7. <input type="checkbox"/> Cost Management Report			
8. <input type="checkbox"/> Manpower Management Report			
9. <input checked="" type="checkbox"/> Conference Record	A		
10. <input checked="" type="checkbox"/> Hot Line Report	A		

<b>FREQUENCY CODES:</b> A - As Required C - Contract Change F - Final (End of Contract) M - Monthly O - One Time (Soon After Contract Award)	Q - Quarterly S - Semi-Annually X - Mandatory for Delivery with Proposals/Bid Y - Yearly or Upon Contract Renewal
---	--

**SPECIAL INSTRUCTIONS**

Submit all reports to the DOE Program Officer at Idaho Operations Office (IO) as indicated below:

- 5 and 6 - Six copies are due at IO within fifteen days after end of the calendar month.
- 7 - Two copies are due at IO within fifteen days after Cooperative Agreement Award.
- 2 - Six copies are due at IO within fifteen days after end of the calendar quarter.
- 3 - Six copies are due not less than forty-five days prior to completion of the yearly term.
- 4 - Submit in draft forty-five days prior to completion date of Cooperative Agreement. After thirty days for DOE review, submit eleven copies including one camera-ready copy.

ATTACHED HEREWITH:

Report Distribution List

WBS Reporting Category

6. PREPARED BY (Signature and date)	7. REVIEWED BY (Signature and date) <i>J. H. [Signature]</i> 7-5-81
-------------------------------------	--

## REPORTING REQUIREMENTS CHECKLIST

### PURPOSE

A checklist to identify and communicate additional reporting requirements which are not otherwise set forth in the General Purpose clauses of DOE contracts and agreements. It will be included as part of the contract or agreement. This form will be completed for each proposed contract or agreement and can be modified as required in Special Instructions to adapt it to a specific situation.

### INSTRUCTIONS

*Item 1* - Enter the title as indicated in the Procurement Request, Interagency Agreement, or initiating memorandum.

*Item 2* - Enter the identification number of the Procurement Request or Interagency Agreement, the date of the memorandum, and contract number after award.

*Item 3* - Check spaces to indicate plans and reports required. For each reporting requirement checked, indicate frequency of delivery in column provided using one of the frequency codes shown.

- 3.A.1 Management Plan** - The contractor's plan to manage the effort described in the statement of work or similar document. It will contain management methodologies, control systems, and procedures he will use. Includes milestones and other planning schedules, organizational identification and descriptions, and special and critical plans, such as test plans, plans for handling of Government owned property. Work breakdown structures, key personnel identification, and methods for monitoring progress toward objectives may be required.
- 3.A.2 Milestone Schedule and Status Report** - The contractor's milestone schedule for all work breakdown structure items, line items, or deliverables specified in the contract. Updated periodically (usually monthly) with status, progress toward completion, and percent completion of each line item and of the total contract.
- 3.A.3 Cost Plan** - A baseline plan for incurring costs on a contract or agreement to measure progress in terms of cost; update and forecast contract fund requirements; plan funding changes; and develop fund requirements and budget estimates.
- 3.A.4 Manpower Plan** - A baseline plan to allocate manpower to each reporting category identified in the contract or agreement.
- 3.A.5 Contract Management Summary Report** - A single-page graphic presentation of integrated cost, major milestones, and manpower for rapid visual analysis and trend forecasting.
- 3.A.6 Project Status Report** - A periodic report to communicate to DOE management an assessment of contract status, to explain variances and problems, and to discuss any other areas of concern or achievements.
- 3.A.7 Cost Management Report** - A periodic report of the status of costs compared to the Cost Plan. Data is used to: report actual and projected incurred costs; evaluate performance against plan; identify actual and potential problem areas; construct cost experience for projects and budgeting efforts; and, to verify the reasonableness of contractors' invoices.
- 3.A.8 Manpower Management Report** - A periodic report of the status of actual and projected manpower expenditure against the Manpower Plan. Data is used to evaluate performance against plan; identify actual and potential problem areas; and to construct manpower experience for projections and planning efforts.
- 3.A.9 Conference Record** - Documentation of the contractor's understanding of significant decisions, direction or restriction or required actions resulting from any meeting with DOE representatives.
- 3.A.10 Hot Line Report** - A hardcopy report by the fastest means available (FAX, etc) documenting critical problems, emergency situations, and important technical breakthroughs.

**3.B.1 Notice of Energy R&D Project** - A formatted, two-page report to provide information on unclassified DOE R&D projects for dissemination to the scientific, technical, and industrial communities and to the public. Also provides information to the Smithsonian Scientific Information Exchange.

**3.B.2 Technical Progress Report** - A formal, structured technical report, submitted periodically to communicate project results for dissemination to Government agencies, the scientific, technical and industrial communities and the public.

**3.B.3 Topical Report** - A special technical report prepared when a project has reached a point at which a major milestone or a significant phase has been completed, when unexpected results have been achieved, when it is logical to summarize results achieved, or when a new scientific or technological finding is deemed to warrant prompt publication.

**3.B.4 Final Technical Report** - Technical Progress Report reporting final results of DOE supported R&D and scientific projects.

### 3.C PMS/Mini-PMS

#### 1) Cost Performance Report (PMS Application)

**Format 1** - Reports current period and cumulative budget, actual costs and earned value data by work breakdown structure elements. Identifies cost and schedule variances and provides contractor's estimate to complete comparisons to budgets.

**Format 2** - Reports current period and cumulative budget, actual costs, and earned value data by contractor functional elements.

**Format 3** - Provides periodic updating to the established performance measurement baseline. Incorporates authorized contract changes and internal re-planning into the performance measurement baseline.

**Format 5** - Provides a narrative analysis of contract variances.

**2) Cost/Schedule Report (Mini-PMS Application)** - Periodic, usually monthly, report of cumulative budget, actual costs and earned value by summary work breakdown structure elements. Identifies cost and schedule variances and provides contractor's estimate to complete comparisons to budgets.

**3) System Description (PMS Application)** - Contractor's description of the management control system to be used in performing contract work. Must address all elements of the PMS criteria.

**4) Summary System Description (Mini-PMS Application)** - Contractor's summarized description of the management control system to be used in performing contract work.

**5) WBS Dictionary** - Lists and defines work breakdown structure. For more detailed instructions see PMS Manual.

**Frequency Codes** - Each code must have an identified time period (e. g. As Required - 5 days after event occurrence). These time periods are suggested in the solicitation and negotiated at contract award.

*Item 4* - Identify any special reporting requirements not indicated in Item 3 and/or qualifiers to those selected. (Use additional sheets as necessary.)

*Item 5* - Check appropriate blocks.

**Report Distribution List** - A comprehensive informative listing of reports by frequency of submission, addresses and number of copies for each addressee.

**Reporting Categories (level of detail)** - An identification by WBS level of task elements for which reporting will be required by DOE.

*Item 6* - Signature of person or persons preparing the checklist and the date prepared. Preparation is by person or persons responsible for preparation of Procurement Request or Statement of Work.

*Item 7* - Signature of the person reviewing the checklist and date reviewed.

STATE AND LOCAL DEPARTMENT/AGENCY  
INDIRECT COST NEGOTIATION AGREEMENT

DATE: August 30, 1979

INSTITUTION: State of Utah  
Department of Natural Resources  
Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

FILING REF.: This replaces  
Negotiation Agreement  
dated Initial

The indirect cost rate(s) contained herein are for use on grants and contracts with the Federal Government to which Federal Management Circular 74-4 applies subject to the limitations contained in the Circular and in Section II A below. The rate(s) were negotiated by the Utah Geological and Mineral Survey and the U.S. Department of Interior, Office of Inspector General in accordance with the authority contained in Attachment A, Section J.J. of the Circular.

SECTION I: Rates

<u>Type</u>	<u>Effective Period</u>		<u>Rate*</u>	<u>Locations</u>	<u>Applicable to</u>
	<u>From</u>	<u>To</u>			
Fixed carry-forward	7/1/79	6/30/80	39.1%	All	U.S. Geological Survey contracts

\*Base: Total direct salaries/wages plus consultant fees billed to U.S. Geological Survey

Treatment of fringe benefits: Fringe benefits applicable to direct salaries and wages are treated as direct costs.

A. LIMITATIONS: Use of the rate(s) contained in this agreement is subject to any applicable statutory limitations. Acceptance of the rate(s) agreed to herein is predicated upon the conditions: (1) that no costs other than those incurred by the grantee/contractor were included in its indirect cost rate proposal and that such costs are legal obligations of the grantee/contractor, (2) that the same cost that have been treated as indirect costs have not been claimed as direct costs, and (3) that similar types of costs have been accorded consistent treatment.

B. AUDIT: Adjustments to amounts resulting from audit of the cost allocation plan upon which the negotiation of this agreement was based will be compensated for in a subsequent negotiation.

C. CHANGES: If a fixed or predetermined rate(s) is contained in this agreement it is based on the organizational structure and the accounting system in effect at the time the proposal was submitted. Changes in the organizational structure or changes in the method of accounting for costs which affect the amount of reimbursement resulting from use of the rates in this agreement, require the prior approval of the authorized representative of the responsible negotiation agency. Failure to obtain such approval may result in subsequent audit disallowances.

D. THE FIXED RATE(S): Contained in this agreement is based on an estimate of the costs which will be incurred during the period for which the rate applies. When the actual costs for such period have been determined, an adjustment will be made in the negotiation following such determination to compensate for the difference between that cost used to establish the fixed rate and that which would have been used were the actual costs known at the time.

E. BILLING RATES: In accordance with the agreement allocating costs of central services provided by others, adjustments have been made to properly reflect costs of central services billed and also allocated to this department.

F. NOTIFICATION OF FEDERAL AGENCIES: Copies of this document may be provided to other Federal offices as a means of notifying them of the agreement contained herein.

G. SPECIAL REMARKS:

By the State Department Agency  
Donald T. McMillan /s/  
Name  
Director, Utah Geological & Mineral  
Title Survey  
August 27, 1979  
Date

ACCEPTANCE

By the Responsible Agency  
For the Federal Government  
Gerald W. Hicks /s/  
Name Gerald W. Hicks  
Regional Audit Manager  
Western Region  
Title U.S. Department of the Interior  
Office of Inspector General  
Agency

Date August 30, 1979  
Negotiated by Robert A. Fitzhugh  
Telephone (916) 484-4768



1. AMENDMENT/MODIFICATION NO. <b>M003</b>	2. EFFECTIVE DATE	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO. (If applicable)
5. ISSUED BY U. S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401		6. ADMINISTERED BY (If other than GPO) <span style="float: right;">CODE</span>  <div style="text-align: right; font-size: 2em; font-weight: bold;">M.2.9</div>	

7. CONTRACTOR NAME AND ADDRESS  State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, UT 84108  Attention: J. Wallace Gwynn	8. AMENDMENT OF SOLICITATION NO. _____ DATED _____ (See block 9)  MODIFICATION OF CONTRACT/ORDER NO. <b>DE-AS07-77ET28393</b> DATED <b>8-19-77</b> (See block 11)
--	---

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above referenced solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning \_\_\_\_\_ copies of this amendment (b) By acknowledging receipt of this amendment on each copy of the offer submitted or (c) By teletype (letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation date, etc.) set forth in block 12.

(c)  This Supplemental Agreement is entered into pursuant to authority of mutual agreement of the parties.  
It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

A. Appendix A2 attached to Modification No. A002 is revised to read as stated in Appendix A3 attached to this Modification No. M003. There is no increase in the support ceiling for this revision.

B. The "Period of Performance" set forth under Article II for work performed under Appendix A3 shall be completed during the period from May 31, 1979, through December 31, 1980.

C. The "Government Property" listed under Article IV is revised to read as follows:

1. PH selective ion meter and probes including replacement cable, and temperature probe (\$2,160).
2. Pygmy current meter (\$630).
3. Water sampling pump and filter (\$514).

whereas aforesaid herein, all terms and conditions of the documents referenced in block 3, as herebefore changed, remain unchanged and in full force and effect.

CONTRACTOR/OFFERER IS NOT REQUIRED TO SIGN THIS DOCUMENT  CONTRACTOR/OFFERER IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 3 COPIES TO ISSUING OFFICE

16. NAME OF CONTRACTOR/OFFERER <i>[Signature]</i> Signature of person authorized to sign	17. UNITED STATES OF AMERICA <i>[Signature]</i> Signature of Contracting Officer
18. NAME AND TITLE OF SIGNER (Type or print) <i>[Signature]</i>	19. DATE SIGNED <b>5/30/80</b>
20. NAME OF CONTRACTING OFFICER (Type or print) J. P. Anderson, Chief Contract Administration Branch	21. DATE SIGNED



4. Determine the source, distribution, and potentially useful thermal energy of geothermal resources in the Utah Valley, which is south of the Jordan Valley, and that portion of the Wasatch Front which lies north of the Jordan Valley to the Utah-Idaho state line by performing the following research:
  - a. Examine state well log records, and plot locations of wells on 7.5 minute quadrangle maps and on 1:100,000 scale maps.
  - b. Verify location, well status, ownership, water temperature, and collect water chemistry samples for analysis as part of a field reconnaissance study.
  - c. Initiate thermal gradient work on selected wells in promising locations within the study area.

(b) The scope of work shall include such other studies investigations and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

(a) Items for which support may be provided as indicated in Article A-III below:

PERSONNEL:	<u>DOE</u>	<u>UGMS</u>
J. W. Gwynn, Ph.D. - 40% time - 5 months		\$10,123.00
P. J. Murphy - 100% time - 12 months		16,680.00
P. A. Sturm - 10% - 1 month		1,530.00
Benefits - 29.03%		8,225.00
5 Geologic Aid - \$950/mo. for 8 months	\$38,000.00	
Benefits - 7.33%	2,804.00	
Total personnel costs	<u>\$40,804.00</u>	<u>\$36,558.00</u>
TRAVEL: 50,500 mi @ 0.30/mile	15,150.00	
PER DIEM: 30 days @ \$35.00/day	835.00	
 EQUIPMENT:		
PH - selective ion meter and probes, etc.	\$1,164.00	
Replaement cable, temp. probe	396.00	
Pygmy current meter	530.00	
Water sampling pump and filter	514.00	
	<u>\$3,304.00</u>	
 MISCELLANEOUS SUPPLIES (maps, pipe, photos, conductivity meters, cable heads, water level indicators, etc.)		
	2,748.00	

PRINTING, REPRODUCTION, DRAFTING, ETC.	2,500.00	-
CONTRACTED OR PURCHASED SERVICES:		
Replacement of trees & grass	1,500.00	
Aeromagnetic and reduction - 734 line miles @ \$15.00/line mile	11,010.00	
Gravity - 1,578 stations @ \$50/station	78,900.00	
Computer services (12 hours)	6,000.00	
Water chemistry - 40 samples @ \$100/sample	4,000.00	
Reduction of gravity data	10,000.00	
OVERHEAD: (39.1% x total Salaries, Wages & Benefits)	30,249.00	
TOTALS	<u>\$207,000.00</u>	<u>\$36,558.00</u>

(b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

(c) Time or effort of Contractor personnel contributed by the Contractor but excluded from computation of Support Cost and consideration in proportioning costs:

\$36,558.00 for time of J. W. Gwynn, P. J. Murphy, and P. A. Sturm plus fringe benefits.

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above, for the contract period stated in this Appendix A3 is \$243,558.00. DOE will pay \$207,000.00 of the actual costs of these items incurred during the contract period stated in this Appendix A3, subject to the provisions of Article III and Article B-XXVIII.

The estimated DOE Support Cost is funded as follows:

(a) Estimated unexpended balance from prior period(s)	\$	<u>-0-</u>
(b) New funds for the current period	\$	<u>207,000.00</u>

Article A-IV - ADMINISTRATION AND REPORTS

(a) Project Manager - J. W. Gwynn

Principal Investigator - P. J. Murphy

DOE Program Officer - M. A. Widmayer, Resource Definition Branch  
U.S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, Idaho 83401

(b) All Project Information Reports, as required by DOE Uniform Contractor Reporting System, Volume 1, dated September 1978, shall be submitted to the DOE Program Officer in accordance with the special instructions set forth in DOE Form CR-537 included with Modification No. A002.

M. 2. 9

JAN 9 1981

RECEIVED

JAN 13 1981

GEOTHERMAL ENERGY  
BRANCH

State of Utah  
Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

ATTENTION: J. Wallace Gwynn

SUBJECT: MODIFICATION NO. AG04 TO CONTRACT NO.  
DE-AS07-77ET28393

Gentlemen:

Enclosed for your files is one fully executed copy of the subject contract modification.

Very truly yours,

ORIGINAL SIGNED BY  
NELL W. FRASER

Nell W. Fraser  
Contracting Officer  
Director, Contracts Management Division

Enclosure

bcc: M. A. Widmayer, w/enc ✓  
Mary Parks, w/enc  
E. G. Jones, w/enc

R&DCB  
KRHastings:gn  
1-8-81

CM  
NWFraser

1. AMENDMENT/MODIFICATION NO. <b>AC04</b>	2. EFFECTIVE DATE <b>12-31-80</b>	3. REQUISITION/PURCHASE REQUEST NO. <b>07-81ET28393.501</b>	4. PROJECT NO. (If applicable)
5. ISSUED BY U. S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401		6. ADMINISTERED BY (If other than block 5)	

7. CONTRACTOR NAME AND ADDRESS  (Street, city, county, state, and ZIP Code) State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, Utah 84108  Attention: J. Wallace Gwynn	8. AMENDMENT OF SOLICITATION NO. _____ DATED _____ (See block 9) MODIFICATION OF CONTRACT/ORDER NO. <b>DE-AS07-77ET28393</b> DATED <b>8-19-77</b> (See block 11)
---	---

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended.  is not extended.

Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning \_\_\_\_\_ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
 The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

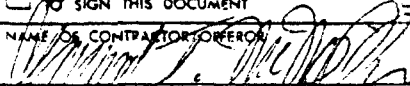
(c)  This Supplemental Agreement is entered into pursuant to authority of mutual agreement of the parties.  
 It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

1. Article I - The Research To Be Performed, is amended by adding a new paragraph as follows:  
  
 "Appendix A4 attached to this Supplemental Agreement and made a part hereof, provides for additional research to be performed by the Contractor."
2. Article II - The Period of Performance is amended as follows:  
  
 "The period of performance of the research under this contract is extended to February 28, 1981."
3. Article III - Consideration is revised to increase the Support Ceiling by Ten Thousand Dollars (\$10,000.00) to a revised Support Ceiling of Three Hundred Ninety-Two Thousand One Hundred Thirty Dollars (\$392,130.00).

--continued

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13. <input type="checkbox"/> CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT		<input checked="" type="checkbox"/> CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>3</u> COPIES TO ISSUING OFFICE	
14. NAME OF CONTRACTOR/OFFEROR BY  (Signature of person authorized to sign)		17. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)	
15. NAME AND TITLE OF SIGNER (Type or print) Donald T. McMillan, Director	16. DATE SIGNED 1-5-81	18. NAME OF CONTRACTING OFFICER (Type or print) N. W. Fraser	19. DATE SIGNED JAN 8 1981

CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

APPENDIX A4

For the Contract Period January 1, 1981, through February 28, 1981

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

(a) The scope of the work under this contract is unclassified and the Contractor, under this contract with the Department of Energy, will perform the following:

The Contractor will prepare a planning exercise and proposal to DOE-ID outlining the direction and scope of work to be performed in the State of Utah for geothermal resource assessment as it relates to the Department of Defense MX missile program. Coordination of these planning efforts will be maintained with DOE-ID and other national agencies/organizations, as designated by DOE-ID, for the furthering of the MX project.

(b) The scope of work shall include such other studies, investigations, and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

(a) Items for which support may be provided as indicated in Article A-III below:

	DOE
1 - Geologist (21) for 3 months	34,250
Benefits @ 29.03%	1,234
Overhead @ 39.1%	2,144
Out-of-State Travel	
2 trips Idaho Falls @ \$152 each	304
2 trips Reno, NV @ \$202 each	404
1 trip Los Angeles @ \$304 each	304
Per Diem - 10 days @ \$35 each	350
Mileage: 3,000 miles @ .30/mile	900
Long distance telephone charges	75
Miscellaneous	35

TOTAL \$10,000

(b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None



CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

(c) Time or effort of Contractor personnel contributed by the Contractor but excluded from computation of Support Cost and consideration in proportioning costs:

None

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above, for the contract period stated in this Appendix A4 is \$10,000.00. DOE will pay \$10,000.00 of the actual costs of these items incurred during the contract period stated in this Appendix A4, subject to the provisions of Article III and Article B-XXVIII.

The estimated DOE Support Cost is funded as follows:

(a) Estimated unexpended balance from prior period(s)	\$	<u>-0-</u>
(b) New funds for the current period	\$	<u>10,000.00</u>

Article A-IV - ADMINISTRATION AND REPORTS

(a) Project Manager - J. W. Gwynn

Principal Investigator - J. W. Gwynn

DOE Program Officer - M. A. Widmayer, Resource Definition Branch  
U. S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, Idaho 83401  
(208) 526-1466

(b) The Contractor shall prepare and submit the report and proposal identified in the Statement of Work.

M.2.9

FEB 27 1981

State of Utah  
Utah Geological and Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

ATTENTION: J. Wallace Dwyne

SUBJECT: MODIFICATION NO. A005 TO CONTRACT NO. DE-AS07-77ET00000

Re: [unclear]

You are hereby authorized effective March 1, 1981 to begin work and incur costs up to a maximum of \$50,000 under the proposed contract modification pending execution of the formal modification. Work is to be performed in accordance with your proposals submitted to this office dated December 4, 1980 and February 24, 1981.

The resulting modification will include the following article:

"Date of Incurrence of Costs - The contractor shall be entitled to reimbursement for costs incurred in an amount not to exceed \$50,000 or or after March 1, 1981 which, if incurred after this modification had been entered into, would have been reimbursable under the provisions of this contract."

In the event Utah and the Government are unable to reach an agreement and a contract is not executed, the Government shall not be liable for any obligations arising out of this letter.

Please indicate your acceptance of this action by signing in the space indicated below and returning one copy to this office.

State of Utah

-2-

FEB 26 1951

If you have any questions, please contact Kent R. Hastings of my staff at telephone (208) 525-1510.

Very truly yours,

(sed.) William C. Drake

William C. Drake  
Contracting Officer  
Chief, R&D Contracts Branch  
Contracts Management Division

bcc: M. A. Widmayer ✓  
F. C. Smith  
E. G. Jones

ACCEPTANCE

Name \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

R&DCB  
KRHastings  
2-26-51

E&T  
MWWidmayer  
LLHink

P&B  
FSSmith

FTD  
EGJones

R&DCB  
WCDrake

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. AMENDMENT/MODIFICATION NO. A006	2. EFFECTIVE DATE 3-1-81	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO. (If applicable)
---------------------------------------	-----------------------------	-------------------------------------	--------------------------------

5. ISSUED BY U. S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401	6. ADMINISTERED BY (If other than block 5)
--	--

7. CONTRACTOR NAME AND ADDRESS State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, Utah 84108 Attn: J. Wallace Gwynn	8. AMENDMENT OF SOLICITATION NO. DATED _____ (See block 9) MODIFICATION OF CONTRACT/ORDER NO. DE-AS07-77ET28393 DATED 8-19-77 (See block 11)
---	---

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended. Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning \_\_\_\_\_ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
 The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c)  This Supplemental Agreement is entered into pursuant to authority of mutual agreement of the parties.  
 It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

1. Article I - The Research To Be Performed, is amended by adding a new paragraph as follows:  
 "Appendix A6 attached to this Supplemental Agreement and made a part hereof, provides for additional research to be performed by the Contractor."

2. Article II - The Period of Performance is amended as follows:  
 "The period of performance of the research under this contract is extended to February 28, 1982."

3. Article III - Consideration is revised to increase the Support Ceiling by Two Hundred Fifty Thousand Seven Hundred Twenty-Eight Dollars (\$250,728.00) to a revised Support Ceiling of Six Hundred Forty-Two Thousand Eight Hundred Fifty-Eight Dollars (\$642,858.00).

-----Continued-----

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13.  CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT  CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN 3 COPIES TO ISSUING OFFICE

14. NAME OF CONTRACTOR/OFFEROR Donald T. McMillan	17. UNITED STATES OF AMERICA Nell W. Fraser
BY (Signature of person authorized to sign)	BY (Signature of Contracting Officer)

15. NAME AND TITLE OF SIGNER (Type or print) Donald T. McMillan	16. DATE SIGNED 6/8/81	18. NAME OF CONTRACTING OFFICER (Type or print) Nell W. Fraser	19. DATE SIGNED JUN 15 1981
--	---------------------------	---	--------------------------------

4. Article IV - Government Property is modified to add the following items:

Two Temperature Probes

5. Article VI is added to the contract to read as follows:

Date of Incurrence of Costs - The contractor shall be entitled to reimbursement for costs incurred in an amount not to exceed \$50,000 on or after March 1, 1981 which, if incurred after this modification had been entered into, would have been reimbursable under the provisions of this contract.

CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

APPENDIX A6

For the Contract Period March 1, 1981, through February 28, 1982.

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

- (a) As part of a continuing effort in Resource Assessment in Utah, Davis, Weber, Box Elder, Salt Lake, and Cache counties, the following work will be performed by UGMS.
- Task 1. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Utah Valley and Jordan Valley.
  - Task 2. Collect thermal gradient measurements on selected wells in promising locations with the study area.
  - Task 3. Compile, and interpret where necessary, all existing geological and geophysical data within the study area for use in area specific investigations.
  - Task 4. Generate gravity surveys in promising geothermal locations within the study area, as needed. All existing gravity data from previous year's work plus newly generated gravity data will be modeled. An integrated interpretation of these models will be developed.
  - Task 5. Prepare and distribute reports as outlined in the reporting requirements of this contract. The final report for this work done under this Modification No. A006 will include all data and preliminary interpretations of work performed during the contract period. The UGMS will also publish a report on the Jordan Valley and a report on geothermal resources of the Wasatch Front Area.
- (b) As part of a continuing agreement with the Department of Defense to cooperate with resource alternatives evaluation for the proposed MX project in Utah and Nevada, the Contractor will perform the following geothermal resource assessment evaluations:
- Task 6. Existing Data Review. All applicable data collected by Fugro will be acquired through ESL and evaluated. This, in conjunction

with data available in the literature, will result in the identification of additional data and procedures necessary to complete an efficient geothermal exploration program. Exploration plans will be established for the Milford OB site and Delta ASC site. The implementation of these plans will be contingent on additional funding in FY 1981 and/or suitable funding in FY 1982.

- Task 7. Thermal Gradients and Fluid Chemistry. In addition to test holes which are presently open in the deployment area, a number of additional drill holes are planned as part of Fugro's geotechnical evaluation. Thermal gradients will be measured in those holes and water samples collected where available. The water samples will be analyzed chemically to aid in the geothermal evaluation.
- Task 8. Data Transmittal. Data and analysis of above efforts will be transmitted to ESL.
- Task 9. Planning Assistance. UGMS will provide planning assistance to ESL and the Joint Task Group through DOE-ID. This will include preparation for briefings and participation in briefings when requested.
- (c) The scope of work shall include such other studies investigations and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

(a) Items for which support may be provided as indicated in Article A-III below:

	<u>Basic</u>		<u>MX</u>	
	<u>DOE</u>	<u>Utah</u>	<u>DOE</u>	<u>Utah</u>
<u>Personnel:</u>				
J. W. Gwynn		6,326		12,728
P. J. Murphy		5,838		
P. A. Strum		1,530		
R. H. Klauk				10,382
H. H. Doelling				3,000
Geologist				16,403
FB - 29.3%		3,975		12,456
Geologist	17,000		14,146	
FB - 29.3%	4,981		4,145	
Interns	22,000		18,270	
FB - 7.35%   7.39	1,617		1,343	
<u>Total</u>	<u>45,598</u>	<u>17,669</u>	<u>37,904</u>	
<u>Travel &amp; Per Diem</u>	8,835		21,500	
<u>Equipment &amp; Supplies</u>				
Temp Probes	5,500		5,500	
Other items	1,660		2,200	
Supplies	3,500		2,800	
Printing/Repro	2,500		3,000	
Computer	5,000		1,000	
<u>Subcontracts</u>				
Water Chem	500			
Gravity Compilation	7,015			
Gravity Survey	24,500			
Asr Photos			1,000	
<u>Other</u>				
Phone	600		2,000	
Data Purchase			28,276	
OH 39.1% W+FB	24,737		14,820	21,493
	<u>\$129,945</u>	<u>\$17,669</u>	<u>\$120,000</u>	<u>\$76,462</u>
<u>TOTAL</u>	<u>DOE \$249,945</u>		<u>Utah \$94,131</u>	



- (b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

- (c) Time or effort of Contractor personnel contributed by the Contractor but excluded from computation of Support Cost and consideration in proportioning costs:

\$94,131 for time of J. W. Gwynn, P. J. Murphy, P. A. Strum, R. H. Klauk, H. H. Doelling, and a geologist plus applicable fringe benefits.

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above, for the contract period stated in this Appendix A6 is \$344,076. DOE will pay \$249,945 of the actual costs of these items incurred during the contract period stated in this Appendix A6, subject to the provisions of Article III and Article B-XXVIII. The estimated DOE Support Cost is funded as follows:

- (a) Estimated unexpended balance from prior period(s)      \$ (783)  
(b) New funds for the current period                                      \$250,728

Article A-IV - ADMINISTRATION AND REPORTS

- (a) Project Manager: J. W. Gwynn  
Principal Investigator: P. J. Murphy  
DOE Program Officer: L. L. Mink  
U. S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, Idaho 83401
- (b) Project information reports shall be submitted in accordance with the attached DOE Form CR-537 and Report Distribution List.

**U. S. DEPARTMENT OF ENERGY  
REPORTING REQUIREMENTS CHECKLIST**

DOE Form CR-537  
(1-78)

*(See Instructions on Reverse)*

FORM APPROVED  
OMB NO. 38R-0190

1. IDENTIFICATION Modification No. A006 - Contract No. DE-AS07-77ET28393	2. OBLIGATION INSTRUMENT:
---	---------------------------

**3. REPORTING REQUIREMENTS**

A. PROJECT MANAGEMENT	Frequency	B. TECHNICAL INFORMATION REPORTING	Frequency
1. <input type="checkbox"/> Management Plan 2. <input type="checkbox"/> Milestone Schedule & Status Report 3. <input type="checkbox"/> Cost Plan 4. <input type="checkbox"/> Manpower Plan 5. <input checked="" type="checkbox"/> Contract Management Summary Report 6. <input checked="" type="checkbox"/> Project Status Report 7. <input type="checkbox"/> Cost Management Report 8. <input type="checkbox"/> Manpower Management Report 9. <input type="checkbox"/> Conference Record 10. <input type="checkbox"/> Hot Line Report	M M	1. <input type="checkbox"/> Notice of Energy RD&D Project (SSIE) 2. <input type="checkbox"/> Technical Progress Report 3. <input checked="" type="checkbox"/> Topical Report 4. <input checked="" type="checkbox"/> Final Technical Report  C. PMS/MINI-PMS 1. Cost Performance Report <input type="checkbox"/> Format 1 WBS <input type="checkbox"/> Format 2 Functional <input type="checkbox"/> Format 3 Baseline <input type="checkbox"/> Format 5 Problem Analysis 2. <input type="checkbox"/> Cost/Schedule Status Report 3. <input type="checkbox"/> Management Control System Description 4. <input type="checkbox"/> Summary System Description 5. <input type="checkbox"/> WBS Dictionary	A Y

**FREQUENCY CODES:**

A - As Required	Q - Quarterly
C - Contract Change	S - Semi-Annually
F - Final (End of Contract)	X - Mandatory for Delivery with Proposals/Bid
M - Monthly	Y - Yearly or Upon Contract Renewal
O - One Time (Soon After Contract Award)	

**4. SPECIAL INSTRUCTIONS**

A.5. and 6. - These reports are due by the 15th day of the month following the reporting period.

B.3. - These reports are identified in the research to be performed and are due as work is completed.

B.4. - This report is due at contract completion. Submit in draft forty-five days prior to completion date and allow thirty days for DOE review.

**5. ATTACHED HEREWITH:**

<input checked="" type="checkbox"/> Report Distribution List	<input type="checkbox"/>
<input type="checkbox"/> WBS/Reporting Category	<input type="checkbox"/>

6. PREPARED BY (Signature and date):	7. REVIEWED BY (Signature and date):
--------------------------------------	--------------------------------------



AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. AMENDMENT/MODIFICATION NO. M008	2. EFFECTIVE DATE 4/30/82	3. REQUISITION/PURCHASE REQUEST NO.	4. PROJECT NO. (If applicable)
5. ISSUED BY U. S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401	CODE	6. ADMINISTERED BY (If other than block 5)	CODE UTAH NCTE 6/30/82

7. CONTRACTOR NAME AND ADDRESS State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, Utah 84108 Attn: Robert H. Klauk	CODE	FACILITY CODE	8. AMENDMENT OF SOLICITATION NO. DATED _____ (See block 9) MODIFICATION OF CONTRACT/ORDER NO. De-AS07-77ET2839 DATED 8/19/77 (See block 11)
--	------	---------------	--

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended. Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning \_\_\_\_\_ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted, or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

to  This Change Order is issued pursuant to \_\_\_\_\_  
The Changes set forth in block 12 are made to the above numbered contract/order.

The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

This Supplemental Agreement is entered into pursuant to authority of Mutual agreement of the parties.  
It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

Article II - THE PERIOD OF PERFORMANCE is amended as follows:

"The period of performance of the research under this contract is extended to June 30, 1982.

*5/10  
New Mod coming with  
NCTE TO 12/31/82*

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13. <input type="checkbox"/> CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT		<input checked="" type="checkbox"/> CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>2</u> COPIES TO ISSUING OFFICE	
14. NAME OF CONTRACTOR/OFFEROR BY <i>Robert H. Klauk</i> (Signature of person authorized to sign)	17. UNITED STATES OF AMERICA BY <i>Kent R. Hastings</i> (Signature of Contracting Officer)	15. NAME AND TITLE OF SIGNER (Type or print) 1/30/82	18. NAME OF CONTRACTING OFFICER (Type or print) Kent R. Hastings
		19. DATE SIGNED 4/29/82	

M2.9

UTAH  
MOD 9  
REC'D 7/9/82  
TE TO 3/31/83

JUL 02 1982

State of Utah  
Utah Geological & Mineral Survey  
606 Black Hawk Way  
Salt Lake City, Utah 84108

ATTENTION: Robert H. Klauk

SUBJECT: MODIFICATION NO. A009 TO CONTRACT NO. DE-AS07-77ET28393

Gentlemen:

We are enclosing three copies of the subject modification which have been signed on behalf of DOE. Please have all three copies signed by an authorized official and return two fully executed copies to this office. The third fully executed copy is for your retention.

Should you have any questions, please contact me on (208) 526-1510.

Very truly yours,

Original Signed By:  
Kent R. Hastings

Kent R. Hastings,  
Contracting Officer  
R&D Contracts Branch  
Contracts Management Division

Enclosure (3)

bcc: Sue Prestwich, w/enc. ✓

R&DCB  
KRHastings:db  
6/29/82

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. AMENDMENT/MODIFICATION NO. A009	2. EFFECTIVE DATE 7/1/82	3. REQUISITION/PURCHASE REQUEST NO. 07-82ET28393.502	4. PROJECT NO. (If applicable)
5. ISSUED BY U.S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, ID 83401		6. ADMINISTERED BY (If other than block 5)	

7. CONTRACTOR NAME AND ADDRESS State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, Utah 84108 Attn: Robert H. Klauk	8. AMENDMENT OF SOLICITATION NO. MODIFICATION OF CONTRACT/ORDER NO. DE-AS07-77ET28393
--	--

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:

(a) By signing and returning \_\_\_\_\_ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)

No Additional Funds

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS

(a)  This Change Order is issued pursuant to \_\_\_\_\_  
The Changes set forth in block 12 are made to the above numbered contract/order.

(b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.

(c)  This Supplemental Agreement is entered into pursuant to authority of mutual agreement of the parties.  
It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION

1. The work associated with MX in Modification No. A006 to the Contract is deleted from the contract and the funds identified for that work are assigned to the revised statement of work in this modification.

2. Article I - The Research To Be Performed, is amended by adding a new paragraph as follows:  
"Appendix A9 attached to this Supplemental Agreement and made a part hereof, provides for additional research to be performed by the Contractor."

3. Article II - The Period Of Performance is amended as follows:  
"The period of performance of the research under this contract is extended to March 31, 1983."

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13. <input type="checkbox"/> CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT		<input checked="" type="checkbox"/> CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>2</u> COPIES TO ISSUING OFFICE	
14. NAME OF CONTRACTOR/OFFEROR BY _____ (Signature of person authorized to sign)	17. UNITED STATES OF AMERICA Original Signed By: Kent R. Hastings (Signature of Contracting Officer)	15. NAME AND TITLE OF SIGNER (Type or print)	16. DATE SIGNED
		Kent R. Hastings	
18. NAME OF CONTRACTING OFFICER (Type or print)	19. DATE SIGNED		

CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

APPENDIX A9

For the Contract Period through March 31, 1983.

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

- (a) As part of a continuing effort in Resource Assessment in Utah, the following work will be performed by UGMS:
- Task 1. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Utah Valley and Jordan Valley.
  - Task 2. Collect thermal gradient measurements on selected wells in promising locations within the study area.
  - Task 3. Compile, and interpret where necessary, appropriate existing geological and geophysical data within the study area for use in area specific investigations.
  - Task 4. All existing gravity data from the previous year's work as well as some aeromagnetic data will be modeled. An integration of these models will be developed.
  - Task 5. Furnish a report on the Jordan Valley, a report on Utah Valley, as well as addenda to the site specific report on Utah Hot Springs, Crystal Hot Springs and the Warm Springs Fault area, based on results of the geophysical modeling and of interpretation.
  - Task 6. Revise data in the GEOTHERM file including (1) correction of data already submitted, and (2) updating with new overlooked data.
  - Task 7. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Milford-Beryl area.
  - Task 8. Collect thermal gradient measurements on selected wells in promising locations in the Milford-Beryl area.
  - Task 9. Furnish a resource assessment report on the Milford-Beryl area based on the limited study conducted.

- Task 10. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Cache Valley.
- Task 11. Collect thermal gradient measurements on selected wells in promising locations within the study area.
- Task 12. Furnish a report on the Cache Valley.
- Task 13. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, the collection of water samples for chemical analysis as well as thermal gradient measurements on selected wells in Davis and Weber Counties.
- Task 14. Furnish a report on Davis, Weber, and Box Elder counties.
- Task 15. Furnish a report on the geothermal resources of the Wasatch Front area.

(b) The scope of work shall include such other studies, investigations and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

(a) Items for which support may be provided as indicated in Article A-III below:

	<u>DOE</u>	<u>UGMS</u>
Wages and Benefits	\$ 68,863	\$ 10,953
Overhead	31,096	
Printing and Reproduction	19,188	10,000
Travel and Per Diem	11,949	
Geophysical Modeling	15,000	
Supplies and Equipment Repair	4,000	
Computer Time	5,000	
Registration at Conference	350	
Total Estimated Cost of work	<u>\$155,446</u>	<u>\$ 20,953</u>

(b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

(c) Time or effort of Contractor personnel contributed by the Contractor



but excluded from computation of Support Cost and consideration in proportioning costs:

\$20,953 for time of UGMS employees and for printing and reproduction

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above is \$176,399. DOE will pay \$155,446 of the actual costs of these items incurred during the contract period stated in this Appendix A9, subject to the provisions of Article III and Article B-XXVIII. The estimated DOE Support Cost is funded as follows:

- |   |           |
|---|-----------|
| (a) Estimated unexpended balance from prior period(s) | \$155,446 |
| (b) New funds for the current period                  | -0-       |

Article A-IV - ADMINISTRATION AND REPORTS

- |                             |                            |
|-----------------------------|----------------------------|
| (a) Principal Investigator: | Robert H. Klauk            |
| DOE Program Officer:        | Susan M. Prestwich         |
|                             | U. S. Department of Energy |
|                             | Idaho Operations Office    |
|                             | 550 Second Street          |
|                             | Idaho Falls, ID 83401      |
- (b) Project information reports shall be submitted in accordance with the attached DOE Form CR-537 and Report Distribution List.

REPORTING REQUIREMENTS CHECKLIST

DOE Form CR-537  
(1-78)

(See Instructions on Reverse)

FORM APPROVED  
OMB NO. 38R-0190

1. IDENTIFICATION    Modification No. A009 Contract No. DE-AS07-77ET28393	2. OBLIGATION INSTRUMENT:
--	---------------------------

3. REPORTING REQUIREMENTS

A. PROJECT MANAGEMENT	Frequency	B. TECHNICAL INFORMATION REPORTING	Frequency
1. <input type="checkbox"/> Management Plan 2. <input type="checkbox"/> Milestone Schedule & Status Report 3. <input type="checkbox"/> Cost Plan 4. <input type="checkbox"/> Manpower Plan 5. <input checked="" type="checkbox"/> Contract Management Summary Report 6. <input checked="" type="checkbox"/> Project Status Report 7. <input type="checkbox"/> Cost Management Report 8. <input type="checkbox"/> Manpower Management Report 9. <input type="checkbox"/> Conference Record 10. <input type="checkbox"/> Hot Line Report	M M	1. <input type="checkbox"/> Notice of Energy RD&D Project (SSIE) 2. <input type="checkbox"/> Technical Progress Report 3. <input checked="" type="checkbox"/> Topical Report 4. <input checked="" type="checkbox"/> Final Technical Report  C. PMS/MINI-PMS 1. Cost Performance Report <input type="checkbox"/> Format 1   WBS <input type="checkbox"/> Format 2   Functional <input type="checkbox"/> Format 3   Baseline <input type="checkbox"/> Format 5   Problem Analysis 2. <input type="checkbox"/> Cost/Schedule Status Report 3. <input type="checkbox"/> Management Control System Description 4. <input type="checkbox"/> Summary System Description 5. <input type="checkbox"/> WBS Dictionary	A Y

FREQUENCY CODES:

A - As Required C - Contract Change F - Final (End of Contract) M - Monthly O - One Time (Soon After Contract Award)	Q - Quarterly S - Semi-Annually X - Mandatory for Delivery with Proposals/Bid Y - Yearly or Upon Contract Renewal
--	--

4. SPECIAL INSTRUCTIONS

A.5 and 6 - These reports are due by the 15th day of the month following the reporting period.

B.3 - These reports are identified in the research to be performed and are due as work is completed.

B.4 - This report is due at contract completion. Submit in draft forty-five days prior to completion date and allow thirty days for DOE review.

5. ATTACHED HEREWITH:

<input checked="" type="checkbox"/> Report Distribution List	<input type="checkbox"/>
<input type="checkbox"/> WBS/Reporting Category	<input type="checkbox"/>

6. PREPARED BY (Signature and date):	7. REVIEWED BY (Signature and date):
--------------------------------------	--------------------------------------



Deliverables

	<u>Estimated Completion</u>
1. Report on the Jordan Valley	11/15/82
2. Report on Utah Valley	
3. Special Addenda on Utah Hot Springs, Crystal Hot Springs, and Warm Springs Fault Area	11/15/82
4. Update Geothermal File	12/15/82
5. Report on Milford-Beryl to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradient of selected wells 3. resource assessment report	11/15/82
6. Report on Cache Valley to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradients of selected wells 3. resource assessment report	11/15/82
7. Report on Davis, Weber, and Box Elder Counties to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradients of selected wells 3. resource assessment report	11/15/82
8. Report on Wasatch Front to include: 1. geophysical mapping 2. surface manifestation depiction 3. resource assessment report	11/15/82
9. Final Report - Geothermal Resource Assessment in Utah	

Draft Final - 12/1/82

Final - 12/31/82

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

Recorded 7/15/82  
 PAGE 1 OF 1  
 CR

1. AMENDMENT/MODIFICATION NO. A009		2. EFFECTIVE DATE 7/1/82	3. REQUISITION/PURCHASE REQUEST NO. 07-82ET28393.502	4. PROJECT NO. (If applicable)
5. ISSUED BY U.S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, ID 83401		6. ADMINISTERED BY (If other than block 5)		
7. CONTRACTOR NAME AND ADDRESS State of Utah Utah Geological and Mineral Survey 606 Black Hawk Way Salt Lake City, Utah 84108 Attn: Robert H. Klauk		8. AMENDMENT OF SOLICITATION NO. <input type="checkbox"/> AMENDMENT OF SOLICITATION NO. _____ DATED _____ (See block 9) <input checked="" type="checkbox"/> MODIFICATION OF CONTRACT/ORDER NO. DE-AS07-77ET28393 DATED 8-19-77 (See block 11)		

9. THIS BLOCK APPLIES ONLY TO AMENDMENTS OF SOLICITATIONS  
 The above numbered solicitation is amended as set forth in block 12. The hour and date specified for receipt of Offers  is extended,  is not extended.  
 Offerors must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation, or as amended, by one of the following methods:  
 (a) By signing and returning \_\_\_\_\_ copies of this amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE ISSUING OFFICE PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If, by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided such telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

10. ACCOUNTING AND APPROPRIATION DATA (If required)  
 No Additional Funds

11. THIS BLOCK APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS  
 (a)  This Change Order is issued pursuant to \_\_\_\_\_  
 The Changes set forth in block 12 are made to the above numbered contract/order.  
 (b)  The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation data, etc.) set forth in block 12.  
 (c)  This Supplemental Agreement is entered into pursuant to authority of mutual agreement of the parties.  
 It modifies the above numbered contract as set forth in block 12.

12. DESCRIPTION OF AMENDMENT/MODIFICATION  
 1. The work associated with MX in Modification No. A006 to the Contract is deleted from the contract and the funds identified for that work are assigned to the revised statement of work in this modification.  
 2. Article I - The Research To Be Performed, is amended by adding a new paragraph as follows:  
 "Appendix A9 attached to this Supplemental Agreement and made a part hereof, provides for additional research to be performed by the Contractor."  
 3. Article II - The Period Of Performance is amended as follows:  
 "The period of performance of the research under this contract is extended to March 31, 1983."

Except as provided herein, all terms and conditions of the document referenced in block 8, as heretofore changed, remain unchanged and in full force and effect.

13. <input type="checkbox"/> CONTRACTOR/OFFEROR IS NOT REQUIRED TO SIGN THIS DOCUMENT <input checked="" type="checkbox"/> CONTRACTOR/OFFEROR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>2</u> COPIES TO ISSUING OFFICE			
14. NAME OF CONTRACTOR/OFFEROR BY <u>Genevieve Atwood</u> (Signature of person authorized to sign)		17. UNITED STATES OF AMERICA BY <u>Kent R. Hastings</u> (Signature of Contracting Officer)	
15. NAME AND TITLE OF SIGNER (Type or print) Genevieve Atwood, Director	16. DATE SIGNED 7/7/82	18. NAME OF CONTRACTING OFFICER (Type or print) Kent R. Hastings	19. DATE SIGNED 7/1/82

CONTRACTOR: STATE OF UTAH  
UTAH GEOLOGICAL AND MINERAL SURVEY

APPENDIX A9

For the Contract Period through March 31, 1983.

Article A-1 - RESEARCH TO BE PERFORMED BY CONTRACTOR

- (a) As part of a continuing effort in Resource Assessment in Utah, the following work will be performed by UGMS:
- Task 1. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Utah Valley and Jordan Valley.
  - Task 2. Collect thermal gradient measurements on selected wells in promising locations within the study area.
  - Task 3. Compile, and interpret where necessary, appropriate existing geological and geophysical data within the study area for use in area specific investigations.
  - Task 4. All existing gravity data from the previous year's work as well as some aeromagnetic data will be modeled. An integration of these models will be developed.
  - Task 5. Furnish a report on the Jordan Valley, a report on Utah Valley, as well as addenda to the site specific report on Utah Hot Springs, Crystal Hot Springs and the Warm Springs Fault area, based on results of the geophysical modeling and of interpretation.
  - Task 6. Revise data in the GEOTHERM file including (1) correction of data already submitted, and (2) updating with new overlooked data.
  - Task 7. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Milford-Beryl area.
  - Task 8. Collect thermal gradient measurements on selected wells in promising locations in the Milford-Beryl area.
  - Task 9. Furnish a resource assessment report on the Milford-Beryl area based on the limited study conducted.

- Task 10. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, and the collection of water samples for chemical analysis in the Cache Valley.
  - Task 11. Collect thermal gradient measurements on selected wells in promising locations within the study area.
  - Task 12. Furnish a report on the Cache Valley.
  - Task 13. Complete the compilation and verification of locations, well status, ownership, water temperature measurements, the collection of water samples for chemical analysis as well as thermal gradient measurements on selected wells in Davis and Weber Counties.
  - Task 14. Furnish a report on Davis, Weber, and Box Elder counties.
  - Task 15. Furnish a report on the geothermal resources of the Wasatch Front area.
- (b) The scope of work shall include such other studies, investigations and services as may be mutually agreeable to the parties.

Article A-II - WAYS AND MEANS OF PERFORMANCE

- (a) Items for which support may be provided as indicated in Article A-III below:

	<u>DOE</u>	<u>UGMS</u>
Wages and Benefits	\$ 68,863	\$ 10,953
Overhead	31,096	
Printing and Reproduction	19,188	10,000
Travel and Per Diem	11,949	
Geophysical Modeling	15,000	
Supplies and Equipment Repair	4,000	
Computer Time	5,000	
Registration at Conference	350	
Total Estimated Cost of work	<u>\$155,446</u>	<u>\$ 20,953</u>

- (b) Items, if any, significant to the performance of this contract, but excluded from computation of Support Cost and from consideration in proportioning costs:

None

- (c) Time or effort of Contractor personnel contributed by the Contractor

but excluded from computation of Support Cost and consideration in proportioning costs:

\$20,953 for time of UGMS employees and for printing and reproduction

Article A-III - FUNDING

The total estimated cost of items under A-II(a) above is \$176,399. DOE will pay \$155,446 of the actual costs of these items incurred during the contract period stated in this Appendix A9, subject to the provisions of Article III and Article B-XXVIII. The estimated DOE Support Cost is funded as follows:

- |   |           |
|---|-----------|
| (a) Estimated unexpended balance from prior period(s) | \$155,446 |
| (b) New funds for the current period                  | -0-       |

Article A-IV - ADMINISTRATION AND REPORTS

- (a) Principal Investigator: Robert H. Klauk  
DOE Program Officer: Susan M. Prestwich  
U. S. Department of Energy  
Idaho Operations Office  
550 Second Street  
Idaho Falls, ID 83401
- (b) Project information reports shall be submitted in accordance with the attached DOE Form CR-537 and Report Distribution List.



## REPORTING REQUIREMENTS CHECKLIST

DOE Form CR-537  
(1-78)

(See Instructions on Reverse)

FORM APPROVED  
OMB NO. 38R-0190

1. IDENTIFICATION Modification No. A009 Contract No. DE-AS07-77ET28393		2. OBLIGATION INSTRUMENT:	
3. REPORTING REQUIREMENTS			
A. PROJECT MANAGEMENT		B. TECHNICAL INFORMATION REPORTING	
1. <input type="checkbox"/> Management Plan 2. <input type="checkbox"/> Milestone Schedule & Status Report 3. <input type="checkbox"/> Cost Plan 4. <input type="checkbox"/> Manpower Plan 5. <input checked="" type="checkbox"/> Contract Management Summary Report 6. <input checked="" type="checkbox"/> Project Status Report 7. <input type="checkbox"/> Cost Management Report 8. <input type="checkbox"/> Manpower Management Report 9. <input type="checkbox"/> Conference Record 10. <input type="checkbox"/> Hot Line Report		Frequency    M M	Frequency    A Y
		C. PMS/MINI-PMS 1. Cost Performance Report <input type="checkbox"/> Format 1 WBS <input type="checkbox"/> Format 2 Functional <input type="checkbox"/> Format 3 Baseline <input type="checkbox"/> Format 5 Problem Analysis 2. <input type="checkbox"/> Cost/Schedule Status Report 3. <input type="checkbox"/> Management Control System Description 4. <input type="checkbox"/> Summary System Description 5. <input type="checkbox"/> WBS Dictionary	
FREQUENCY CODES: A - As Required C - Contract Change F - Final (End of Contract) M - Monthly O - One Time (Soon After Contract Award)			
Q - Quarterly S - Semi-Annually X - Mandatory for Delivery with Proposals/Bid Y - Yearly or Upon Contract Renewal			
4. SPECIAL INSTRUCTIONS			
A.5 and 6 - These reports are due by the 15th day of the month following the reporting period.  B.3 - These reports are identified in the research to be performed and are due as work is completed.  B.4 - This report is due at contract completion. Submit in draft forty-five days prior to completion date and allow thirty days for DOE review.			
5. ATTACHED HEREWITH:			
<input checked="" type="checkbox"/> Report Distribution List <input type="checkbox"/> WBS/Reporting Category			
6. PREPARED BY (Signature and date):		7. REVIEWED BY (Signature and date):	



ID F-129 (Rev. 08-79)  
 Ref. DOE 13302  
 (use with DOE CR-537)

U.S. DEPARTMENT OF ENERGY  
 IDAHO OPERATIONS OFFICE  
**REPORT DISTRIBUTION LIST**

Contract No.  Modification No. A009 Contract No. DE-AS07-77ET28393	Milestone Schedule & Status Report Management Plan Contract Management & Status Report Cost Plan Manpower Plan Project Status Report Cost Management Summary Report Manpower Management Report Notice of Energy RD&D Project (SSIE) Conference Record Hol Line Report Technical Progress Report (SSIE) Final Technical Report Topical Report* Cost/Schedule Status Report Summary System Description WBS Dictionary
---	---

Addressees	Number of Report Copies									
U.S. Department of Energy Idaho Operations Office 550 Second Street Idaho Falls, Idaho 83401										
Attn: S. M. Prestwich E&T Division				5	5				5	
Attn: E. G. Jones FM Division				1	1					
Attn: K. R. Hastings CM Division				1	1				1	1
U.S. Department of Energy DGE MS 334 Federal Building 12th & Penn., N.W. Washington, D.C. 20461 Attn: Bob Gray				1	1				1	1
UURI 420 Chipeta Way Suite 120 Salt Lake City, Utah 84108 Attn: Duncan Foley				1	1				1	1

Special Instructions  
 \*Topical reports as noted in Article A-1 and Summnerized on the attached "Deliverables"

## Deliverables

	<u>Estimated Completion</u>
1. Report on the Jordan Valley	11/15/82
2. Report on Utah Valley	
3. Special Addenda on Utah Hot Springs, Crystal Hot Springs, and Warm Springs Fault Area	11/15/82
4. Update Geothermal File	12/15/82
5. Report on Milford-Beryl to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradient of selected wells 3. resource assessment report	11/15/82
6. Report on Cache Valley to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradients of selected wells . 3. resource assessment report	11/15/82
7. Report on Davis, Weber, and Box Elder Counties to include: 1. well location, status, ownership, temperature, and water chemical analysis 2. thermal gradients of selected wells 3. resource assessment report	11/15/82
8. Report on Wasatch Front to include: 1. geophysical mapping 2. surface manifestation depiction 3. resource assessment report	11/15/82
9. Final Report - Geothermal Resource Assessment in Utah	

Draft Final - 12/1/82

Final - 12/31/82