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State Cooperative Reservoir Analysis Program Quarterly Report

April 1 - June 30, 1990

by

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DOE-SCF
1988-1992

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August 15, 1990



INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending June 30, 1990. Project budgets are updated to the end of the quarter.

PRE-1988 GRANTS

All pre-1988 Grants have been completed and closed out. One deliverable remains outstanding, as noted below.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE. Final drafting is underway which will permit a black and white map to be printed instead of one with color overlays. The preparation of colored overlays has been one hold up in completing this deliverable.

1988 GRANTS

New data acquisition has been completed for all but three of the 1988 grants, and the emphasis is now on data interpretation, integration and reporting. Final reports have been received from three teams, the State of Washington — Department of Natural Resources, the Utah Geological and Mineral Survey, and the University of Nevada—Division of Earth Sciences. A final report has also been received from Idaho — Department of Water Resources, for Task 2, the Boise geothermal aquifer study. Draft final reports have been received from Alaska — Geophysical Institute and Idaho — Department of Water Resources, and these are being revised as final reports.

New principal investigators were named in past quarters for New Mexico (Patrick Rodriquez), Idaho (Paul Castelin), and Nevada — Desert Research Institute (Elizabeth Jacobson) grants. Eleven state teams have requested no-cost-time-extensions (NCTE) and/or contract modifications. Michael Korosec, P. I. for the recently completed Washington — DNR grant, is not longer employed at that agency.

Major delays have been encountered by two state teams, Hawaii-DBED and Oregon-DOGAMI. The silica treatment studies on Hawaii require fluids and on-stream flow from well HGP-A in the East Rift Zone. This well has been shut down for servicing after nearly eight years of continuous production. Excessive H₂S emissions caused threats of legal actions by neighbors to the research geothermal facility, so the well has been shut down until workover is completed and near term startup is considered unlikely. A contract modification will extend the silica treatment to North American geothermal Systems.

Comments

Significant new technical results from the 1988 Grants are forthcoming from several teams. The Washington-DNR study has further delineated the Southern Washington Cascade temperature anomaly, and provided some estimates of production rates for Cascade volcanism. The Utah-UGMS study has provided a broad data base for the totally blind Newcastle geothermal resource which should be of interest to industry exploring for both moderate- and high-temperature reservoirs in the Basin and Range province. The Boise geothermal aquifer study is the most complete study of the resource to date. It quantifies future water level declines under likely development scenarios.

The University of Nevada—Division of Earth Sciences completed an integrated study on the genesis of geothermal fluids in the Great Basin, and developed significant new information about the roles of Lake Lahontan and Lake Bonneville as sources of recharge.

With presently defined contract extensions, five grants will continue beyond September 30, 1990. These are Alaska-DGGS (1-31-91), Hawaii (6-30-91), Nevada-DRI (11-30-90), Wyoming-DGG (10-31-90), and Oregon-DOGAMI (10-15-92).

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 9/30/89:	\$22,999
	Total Funds Remaining	\$ -0-

Project Period: 1-31-89 (NCTE to 7/01/89)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades-WA-DNR-Korosec	4/17/89
10. 4 samples, OR Cascades-DOGAMI-Priest	7/12/89

Current Issues:
Final samples delivered this quarter. Grant closed out.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 10/31/89:	\$158,579
	Total Funds Remaining:	\$ -0-

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues: Grant close out.

3. Montana-MCMS&T

Grant Number DE-FG07-84ID12525

Financial:

Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ -0-

Project Period: 6-31-88

Deliverables:

Date Received

1. Final Report, Geophysical Research on
Geothermal Resources in Montana

1a) "Three Dimensional Gravity Modeling
Techniques with Application to the Ennis
Geothermal Area" by D. Semmens

12/23/87

1b) "A Controlled Source Audiomagnetotelluric
Investigation of the Ennis Hot Springs
Geothermal Area, Ennis, Montana"
by G. R. Emilsson

7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI

Grant Number DE-FG07-84ID12546

Financial:

Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ -0-

Project Period: 6-15-88

Deliverables:

Date Received

1. Final Report: 1a) Southcentral New Mexico study (NMSU)

6/9/88

1b) Animas Valley (Lightning Dock Geothermal)

6/9/88

1c) Orgrande geothermal resource assessment
(Lightning Dock Geothermal)

6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial:

Total Funding Authorized: \$359,357
 Invoices Through 4/30/89: \$358,473
 Total Funds Remaining: \$ -0-

Project Period: 10-31-88

Deliverables:

Date Received

Original Grant

Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
Invoices Through 9/1/88: \$115,790
Total Funds Remaining: \$ -0-

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues: All deliverables received and Grant closed out. Additional funding was provided by a EG&G Purchase Order to further update the heat flow database. This work has also been completed.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial: Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ -0-

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 July 1990

1988

1989

1990

1991

STATE TEAM SCHEDULES
1988 GRANTS
Short Form Summary, 1 April 1990
1989

Team	1988				1989				1990				1991		
	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.
AK-DGGS	A 11									A 11				J (NCTE) 31	
AK-GI	A 11						O 11			(NCTE) 11	A 11	A 11			
HI-DBED		J 20									J 20			J (NCTE) 20	
ID-DWR	M 21									M 21 (NCTE)		O 30			
NV-DRI		J 1								A 30 (NCTE)		N 30			
NV-DES	A 1					A 1			F 1 (NCTE)	J 1	Completed				
NM-NMRDI	S 1									M 1 (NCTE)		S 30			
ND-MMRI	A 1									M 31 (NCTE)		S 30			
OR-DOGAMI							J 27							→ 10/15/92 (mod.A001)	
UT-UGMS			J 1			A 1 (NCTE)	N 1		M 31	Completed					
WA-DNR	A 1					M 31	A 31	D 31	Completed (NCTE)						
WY-DGG			J 1			A 1 (NCTE)	S 1		M 31			O (NCTE) 31			

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 6/30/90: \$52,112
Total Funds Remaining: \$19,888

Project Period: 1-31-91 (24 months+ 7 mo. NCTE)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geysers Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geysers Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geysers Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:
A draft final report of geothermal studies of the Geysers Bight area, Umnak Island, has been reviewed is being revised. Diversion of staff efforts away from task 4.2 Geothermal Resources Map of the Aleutian Islands-Alaska Peninsula Region, has resulted in a NCTE, to 1/31/91.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through:6/30/90: \$53,131
Total Funds Remaining: \$ 2,462

Project Period: 8-11-90 (24 months + 4 mo. NCTE)

Deliverables: Date Received

1. Geologic map of Geysers Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study
3. Final report on Geysers Bight geothermal area study (Task 4.1.3)

Current Issues:
Field work at Geysers Bight area has been completed. Age dating and rock chemistry analytical work has also been completed. The final report is being written in cooperation with Alaska-DGGS. A draft report has been reviewed and delivery of the final report is expected soon.

3. Hawaii-Dept. Business and Grant Number
 Economic Development DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
 Invoices Through: 6/30/90: \$ 83,126
 Total Funds Remaining: \$ 4,047

Project Period: 6-20-91 (24 months;+ 12 mo. NCTE)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:

- a. Silica polymerization studies
- b. Low-temperature brine treatment
- c. Fabrication of pilot scale treatment system
- d. Fluid characterization
- e. Preliminary design of pilot scale system
- f. By-product characterization.

Current Issues:

The HGP-A well was closed down in December 1989 due to excessive H₂S emissions. The design of a brine treatment plant and a successful series of experiments for reducing silica deposition have been completed. A contract modification has been submitted which will extend the study to high silical brines of North American geothermal systems. A billing adjustment is in progress. The termination date of this grant has been extended to June 20, 1991.

4. Idaho - Dept. of Water Resources Coop. Agreement No.
 DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
 Invoices Through: 06/30/90: \$149,004
 Total Funds Remaining: \$ 5,084

Project Period: 10-30-90 (24 months + 7 mo. NCTE)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)

2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0) 02/06/90

3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

2. Technical data base submitted to GEOTHERM

Current Issues:

Technical study is completed, and the final report was received June 4, 1990. Preliminary results presented at 1989 GRC meeting. Excellent study-final report suitable for multiple publications.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$126,267
Invoices Through: 07/10/90: \$ 70,924
Total Funds Remaining: \$ 55,343

Project Period: 9-30-90 (18 months; + 6 mo. NCTE)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Patrick Rodriguez replaced Larry Icerman as NMRDI Principal Investigator in September. Jim Witcher, NMSU continues as the technical Principal Investigator. Radon detectors have been retrieved from all areas, and all laboratory results have been received. Drilling to test radon anomalies has been completed. Drilling on radon anomaly has discovered a hidden hydrothermal system. Final report due by September 30.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized: \$194,814
Invoices Through: 06/30/90: \$156,533
Total Funds Remaining: \$ 38,281

Project Period: 9 -30-90 (24 mo. + 6 mo. NCTE)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues:

Contract modification was requested to extend project 6 months and to change drilling to 8 holes in South Dakota, 2 holes in North Dakota. Amendment signed 11/08/89. Dr. Gosnold gave two major presentations in 1989. Draft final report in preparation. Paper accepted for presentation at 1990 GRC meeting.

9. State of Oregon Grant Number
 Dept. of Geology and Mineral Industries DE-FG079ID12834

Financial: Total Funding Authorized: \$200,000
 Invoices Through 06/30/90: \$ 16,338
 Total Funds Remaining: \$183,662

Project Period: 10-15-92 (40 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. 7/15/89
2. Phase II final technical report on drilling, lithologic temperature studies; drill logs, interpretation.

Current Issues:

Unsolicited proposal from DOGAMI. Agreement between DOGAMI and DOE/ID to fund in two phases. Phase I included environmental checklist, permitting, and site selection (completed). Oxbow Geothermal Company contributed \$100 K to drilling project, Phase II. Phase II awarded 10/17/89. Santiam Pass drill hole 77-24 drilled to 460 feet, cemented, cased in November. Drilling will resume in August 1990.

+ 8/31/90
 Inv. #188
 \$2,337.76
 Σ Inv. 18,675.58
 left 181,324.42
 p.12

10. Utah Geological and Mineral Survey Grant Number
 DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
 Invoices Through: 05/18/90: \$61,641
 Total Funds Remaining: \$ -0-

Project Period: 11-1-89 (20 months; + 4 mo. NCTE)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9) 04/04/90
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3) 04/04/90

Current Issue:

UGMS has completed a radon survey at no additional cost. Project period extended 6 months. Paper presented at 1989 GRC annual meeting. Final report received 04/04/90. Grant being closed out.

11. State of Washington
Dept. of Natural Resources

Grant Number
DE-FG07-88ID12740

Financial: Total Funding Authorized: \$170,776
Invoices Through: 01/31/90: \$170,776
Total Funds Remaining: \$ -0-

Project Period: 8-31-89 (12 months + 5 mo. NCTE)

Deliverables:	Date Received
1. Final technical report for drilling project and heat flow results (Task 4.1)	7/10/89
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)	12/4/89

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. Final report on drilling received 7/10/89. Final Report on age dating and stratigraphy received 12/4/89. Grant being closed out.

12. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID12738

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 06/30/90: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 10-31-90 (19 months + 9 mo. NCTE)

Deliverables:	Date Received
1. Final technical report describing: a. Computer algorithms developed b. New temperature data from the Cody or Thermopolis hydrothermal system c. Finite-difference model for system studied d. Numerical methods and test results	

Current Issues:

Mathematics and algorithms have been largely developed. Delayed due to computer change over and bug in system software, which was corrected. Field work to complete project expected in June-August 1990.



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**State Cooperative Reservoir Analysis
Program
Quarterly Report**

January 1 - March 31, 1988
April 1 - June 30, 1988

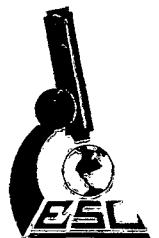
by

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September 1, 1988



ESL-88040-PR
DOE/ID/12489-34

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
January 1 - March 31, 1988
April 1 - June 30, 1988

September 1, 1988

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the two quarters ending March 31 and June 31, 1988.

The status of State Team activities and grants has been in a constant state of flux during this period, with the conclusion of several grants, and the negotiation and awarding of grants for several new studies. The status of both old and new grants is indicated separately on summary sheets which make up the bulk of this report. These sheets are updated to September 1, 1988, with some of the new grants still unsigned.

PRE-1988 GRANTS

Final report deliverables were received during the first quarter from the Alaska - Division of Geological and Geophysical Surveys, and from the Idaho - Department of Water Resources. In the second quarter final deliverables were received from Montana - MCMS&T; New Mexico - NMRDI; and Southern Methodist University. These grants have since been closed out by DOE-ID with the exception of the Idaho - DWR grant. The status of active grants is discussed below.

University of Arizona - Department of Geosciences

Fourteen K/Ar dates remain to be completed under this grant. Four dates will be completed in support of George Priest's existing grant for mapping in the Oregon Cascades. The remaining 10 dates have been allocated to the new (1988) Washington DNR grant for work in the Washington Cascades. These dates should be completed and the grant closed out before the end of 1988.

Idaho - Department of Water Resources

Final report deliverables have been received from the Idaho - DWR and from one subcontractor, Boise State University (Dr. C. Waag). Closeout of this grant has been delayed because of the late delivery of a subcontractor's (USGS) report. The report has been available to ID-DWR and to DOE in draft form for several months. The report appears to have completed the lengthy review process and now awaits final editing and printing. Another no cost time extension will be required for formal closeout of this grant.

Oregon - Department of Geology and Mineral Industries

Several major deliverables, including quadrangle geologic maps and a science plan for Cascade studies, have previously been completed and delivered under this grant. Work appears to be on schedule for completion of the remaining deliverables by the revised contract closeout date of 10-31-88.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports substantial progress after a very busy academic year. Dr. Gosnold continues to be one of the most productive scientists funded by the DOE SCP and provides good exposure for the results of this program.

1988 GRANTS

Negotiations were completed and agreements signed for ten grants and one cooperative agreement during the first two quarters of 1988 as a result of the 1987 DOE-ID SCP solicitation. One additional grant (New Mexico - NMRDI) awaits final signing. Contract activities continue for one grant resulting from an unsolicited proposal (Oregon - DOGAMI). It is uncertain if funds are available to support the last proposal in the competitive range of the 1987 solicitation.

Most state teams already report progress on compilations, contracting, sampling, analyses, and mapping activities related to the 1988 grants. Some future contract modifications have already been identified, but no major problems with these grants have been identified to date.

COMMENTS

The deliverables resulting from the pre-1988 grants included several high quality studies which are significant contributions to the geothermal resource database or basic geology of the states involved. The studies funded by the 1988 grants include diverse topics such as: sophisticated algorithm development, monitoring and numerical modeling of hydrothermal systems, some of which may be in danger of overdevelopment; geothermal fluid genesis; geochemical studies; and basic drilling and temperature gradient studies. We look forward to the technical data and interpretations which will result from these studies.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 September 1988

Team	1 9 8 8						1 9 8 9	
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	
Az-K/Ar	----- (NCTE)			-----			-----31	
ID-DWR	-----29 F m8		(NCTE needed)					
ND-MMRR	----- (map due - grant			losed out)				
OR-DOGAMMI	Q-----			-Q---			31	

Q: Quarterly Report	m: Grant Mod. No.
F: Final Report	NCTE: No Cost Time Ext.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial: Total Funding Authorized \$29,999
 Invoices Through 9/1/88: \$19,250
 Total Funds Remaining \$10,749

Project Period: 1-31-89

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88

Current Issues:
 14 samples remain to be completed; Washington State (DNR) has been allocated 10 dates for the 1988 grant. DOGAMI has been allocated the remaining four samples for their old grant. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial: Total Funding Authorized: \$158,579
 Invoices Through 9/1/88: \$125,000#
 Total Funds Remaining: \$ 33,579#

Project Period: 8-29-88

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	Overdue

Current Issues:
 USGS report has completed Geologic Names review and is in final editing. It has been assigned a high priority for printing, but delivery date to IDWR is still uncertain. One more NCTE may be required.

\$ figures may not be current with DOE/ID.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables: Date Received

1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens 12/23/87
 - 1b) "A Controlled Source Ausiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson 7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 9/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables: Date Received

1. Final Report
 - 1a) South-central New Mexico study (NMSU) 6/9/88
 - 1b) Animas Valley (Lightning Dock Geothermal) 6/9/88
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal) 6/9/88

Current Issues:

All deliverables received and Grant closed out.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 6/1/88: \$279,066#
Total Funds Remaining: \$ 80,291#

Project Period: 10-31-88

Deliverables: Date Received

Original Grant

Task 1.1	Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
	Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
	Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2	Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3	Project Management and Reporting	Quarterly

Mod. M-001

Task 1.1	Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2	Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	
Task 1.3	Project Management and Reporting	Quarterly

Mod. A-002

Task I. Geologic map, approx. 15 sq. mi. centered
on CTG drill site, Sec.28,T8S,R8E,
E/2 Breitenbush 15'topo quad.

Task II. Raw data and analyses, well core, CTG drill
hole. (archival storage at UURI)

Task III. CTG well study: comprehensive report with
geologic and geothermal implications
and geologic models.

Current Issues: Appears to be on schedule with revised
contract close date of 10/31/88.

\$ figures probably not current with DOE/ID

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
Invoices Through 9/1/88: \$115,790
Total Funds Remaining: \$ 0

Project Period: 5-31-88

Deliverables: Date Received

1. Annual Data Report (GRC Trans., v.11) 3/14/88
2. Final Tech. Report on Cascades heat flow 7/1/88
studies and the Heat Flow Map of North America
"U.S. Geothermal Database and Oregon Cascade
Thermal Studies", by D.D. Blackwell, J. L.
Steele, L. Carter.

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial: Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ 0

Project Period: Closed Out

Deliverables: Date Received

1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000) overdue
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr. 8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 September 1988

Team	1988				1989				1990			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	
AK-DGGS	A 11									A 11		
AK-GI	A 11							0 11				
HI-DBED			J 20									J 20
ID-DWR	M 21									M 21		
NV-DRI			J 1							A 30		
NV-UNLV			A 1					A 1				
NM-NMRDI			S 1					S 1(?)				
ND-MRRI	A 1									M 31		
OR-DOGAMI				?								?
UT-UGMS			J 1					A 1				
WA-DNR	A 1							M 31				
WY-DGG			J 1					J 1				

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number
DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 9/1/88 \$ 0
Total Funds Remaining: \$72,000

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

Compilations and field work underway.

2. Univ. of Alaska - Geophysical Institute Grant Number
DE-FG07-88ID127 42

Financial: Total Funding Authorized: \$55,593
Invoices Through: 9/1/88: \$ 0
Total Funds Remaining: \$55,593

Project Period: 10-11-89 (18 months)

Deliverables: Date Received

1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)

Current Issues:

Field work underway.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 9/1/88: \$ 0
Total Funds Remaining: \$ 87,173

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:
Studies underway.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 9/1/88: \$ 0
Total Funds Remaining: \$154,088

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:
All field studies underway. IDWR RFP for consultant reservoir engineer go will out in September. Contract modification in SOW (Task 2) will be submitted soon.

7. New Mexico Research and Development Inst. Grant Number

Financial: Total Funding Authorized: \$129,267
Invoices Through: 9/1/88: \$ 0
Total Funds Remaining: \$129,267

Project Period: (not yet determined)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Contract should be signed by September 1. Copies not yet available.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 9/1/88 \$ 0
Total Funds Remaining: \$194.814

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been identified, and drilling is underway by South Dakota Geological Survey.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries

Financial: Total Funding Authorized \$
Invoices Through 9/1/88 \$
Total Funds Remaining \$

Project Period:

Deliverables:

Date Received

Current Issues:

Unsolicited proposal from DOGAMI. Contract not yet signed.

10. Utah Geological and Mineral Survey

Grant Number

DE-FG07-88ID12756

Financial:

Total Funding Authorized: \$61,641

Invoices Through: 9/1/88 \$ 0

Total Funds Remaining: \$61,641

Project Period:

8-1-89 (14 months)

Deliverables:

Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)

2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issues: Project well underway.

11. State of Washington

Grant Number

Dept. of Natural Resources

DE-FG07-88ID12740

Financial:

Total Funding Authorized: \$170,776

Invoices Through: 9/1/88 \$ 0

Total Funds Remaining: \$170,776

Project Period:

3-31-89 (12 months)

Deliverables:

Date Received

1. Final technical report for drilling project and heat flow results (Task 4.1)

2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

BLM requirements for blow out preventers on 1000 ft. gradient holes, and competition for drilling contractors may result in higher per foot drilling costs, reduced depths, rotary instead of core, and other changes to program.

12. State of Washington
State Energy Office

Grant Number

Financial: Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID17382

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 9/1/88: \$ 0
Total Funds Remaining: \$ 45,511

Project Period: 7-1-89 (12 months)

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Contract signed 7-1-88, project now underway.



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State Cooperative Reservoir Analysis Program Quarterly Report

July 1 - September 30, 1988

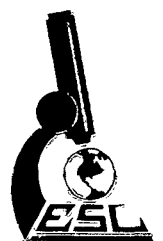
by

Howard P. Ross

Earth Science Laboratory

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(801) 524-3422

November 4, 1988



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ESL-88046-PR
DOE/ID/12489-38b

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
July 1 - September 30, 1988

November 4, 1988

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending September 30, 1988. Significant events which occurred during October are noted to bring the status current to a reporting date of November 1. Project budgets are updated to November 1, 1988.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

Fourteen K/Ar dates remain to be completed under this grant. Four dates will be completed in support of George Priest's existing grant for mapping in the Oregon Cascades. The remaining 10 dates have been allocated to the new (1988) Washington DNR grant for work in the Washington Cascades. These dates should be completed and the grant closed out before the end of 1988.

Idaho - Department of Water Resources

Final report deliverables have been received from the Idaho - DWR and from one subcontractor, Boise State University (Dr. C. Waag). Closeout of this grant has been delayed because of the late delivery of a subcontractor's (USGS) report. The report has been available to ID-DWR and to DOE in draft form for several months. The report now awaits printing. Another no cost time extension will be required for formal closeout of this grant.

Oregon - Department of Geology and Mineral Industries

Final report deliverables were received October 31. These included: a geologic map of the McKenzie Bridge quadrangle; a geologic map of the Breitenbush - Austin Hot Springs area; the CTGH-1 data, analysis and well study; and a final technical report summarizing all work completed under this grant.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports substantial progress after a very busy academic year. Dr. Gosnold continues to be one of the most productive scientists funded by the DOE SCP and provides good exposure for the results of this program.

1988 GRANTS

Negotiations were completed and agreements signed for the New Mexico - NMRDI grant. Contract activities continue for one grant resulting from an unsolicited proposal (Oregon - DOGAMI).

Most state teams already report progress on compilations, contracting, sampling, analyses, and mapping activities related to the 1988 grants. A substantial portion of the field programs have been completed by four SCP teams: the University of Alaska - Geophysical Institute; Alaska - Division of Geological and Geophysical Surveys; the Utah Geological and Mineral Survey; and the Washington - Department of Natural Resources. Some future contract modifications have already been identified, but no major problems with these grants have been identified to date.

COMMENTS

The deliverables resulting from the pre-1988 grants included several high quality studies which are significant contributions to the geothermal resource database or basic geology of the states involved. The studies funded by the 1988 grants include diverse topics such as: sophisticated algorithm development, monitoring and numerical modeling of hydrothermal systems, some of which may be in danger of overdevelopment; geothermal fluid genesis; geochemical studies; and basic drilling and temperature gradient studies. We look forward to the technical data and interpretations which will result from these studies.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 November, 1988

Team	1 9 8 8						1 9 8 9
	Jul	Aug	Sept	Oct	Nov	Dec	Jan
Az-K/Ar	----- (NCTE)			-----			-----31
ID-DWR	-----29 F m8 (NCTE needed)			-----			
ND-MMRRI	----- (map due - grant			----- closed out)			
OR-DOGAMMI	Q-----			-Q---31 F(rec)			

Q: Quarterly Report
F: Final Report

m: Grant Mod. No.
NCTE: No Cost Time Ext.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial: Total Funding Authorized \$29,999
 Invoices Through 11/1/88: \$19,250
 Total Funds Remaining \$10,749

Project Period: 1-31-89

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88

Current Issues:

14 samples remain to be completed; Washington State (DNR) has been allocated 10 dates for the 1988 grant. DOGAMI has been allocated the remaining four samples for their old grant. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial: Total Funding Authorized: \$158,579
 Invoices Through 11/1/88: \$125,000
 Total Funds Remaining: \$ 33,579

Project Period: 8-29-88 (NCTE required to 12/31/88)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	Overdue

Current Issues:

USGS report has completed Geologic Names review and is now awaiting printing. A delivery date to IDWR is still uncertain. One more NCTE will be required.

3. Montana-MCMS&T

Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables: Date Received

- 1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens 12/23/87
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson 7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI

Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables: Date Received

- 1. Final Report
 - 1a) South-central New Mexico study (NMSU) 6/9/88
 - 1b) Animas Valley (Lightning Dock Geothermal) 6/9/88
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal) 6/9/88

Current Issues:

All deliverables received and Grant can be closed out. Final invoice received by DOE/ID 10/18/88. Approved for final payment on 11/03/88.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial:

Total Funding Authorized: \$359,357
Invoices Through 11/1/88: \$330,874
Total Funds Remaining: \$ 28,483

Project Period: 10-31-88

Deliverables:

Date Received

Original Grant

Task 1.1	Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
	Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
	Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2	Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3	Project Management and Reporting	Quarterly

Mod. M-001

Task 1.1	Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2	Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3	Project Management and Reporting	Quarterly

Mod. A-002

Task I.	Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II.	Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III.	CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III.	Final Technical Report	10/31/88

Current Issues: All work completed and deliverable received. DOGAMI is awaiting final billings by subcontractors before submitted final invoice (expected by 11/30/88). The Grant can be closed out after final payment.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
Invoices Through 9/1/88: \$115,790
Total Funds Remaining: \$ 0

Project Period: 5-31-88

Deliverables: Date Received

1. Annual Data Report (GRC Trans., v.11) 3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America 7/1/88
"U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.

Current Issues:
All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial: Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ 0

Project Period: Closed Out

Deliverables: Date Received

1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000) overdue
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr. 8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 September 1988

Team	1988				1989				1990			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	
AK-DGGS	A 11									A 11		
AK-GI	A 11							0 11				
HI-DBED			J 20									J 20
ID-DWR	M 21									M 21		
NV-DRI			J 1							A 30		
NV-UNLV			A 1				A 1					
NM-NMRDI				S 1				S		M 1		
ND-MRRI	A 1									M 31		
OR-DOGAMI				?								?
UT-UGMS			J 1					A 1				
WA-DNR	A 1						M 31					
WY-DGG			J 1					J 1				

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number
DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 11/1/88 \$ 0
Total Funds Remaining: \$72,000

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

Compilations underway and field work at Geyser Bight area, Umnak Island, is completed.

2. Univ. of Alaska - Geophysical Institute Grant Number
DE-FG07-88ID127 42

Financial: Total Funding Authorized: \$55,593
Invoices Through: 11/1/88: \$31,607
Total Funds Remaining: \$23,986

Project Period: 10-11-89 (18 months)

Deliverables: Date Received

1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)

Current Issues:

Invoices #1-4 received. Field work at Geyser Bight area

has been completed. Principal Investigator Don Turner will be on leave much of time November - February 1988 and Dr. Christopher Nye will cover for him. Field operations cost more than expected.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 11/1/88:\$ 0
Total Funds Remaining: \$ 87,173

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii is just now being signed. No progress yet on technical work.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 11/1/88:\$ 15,127
Total Funds Remaining: \$138,961

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

All field studies underway. IDWR RFP for consultant reservoir engineer should go out in November after numerous delays.

5. Desert Research Institute
University of Nevada System

Grant Number
DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
Invoices Through: 11/1/88: \$ 0
Total Funds Remaining: \$140,639

Project Period: 4/30/90 (22 months)

Deliverables: Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Field work and planning for monitoring studies are underway. Communication has been established with LBL reservoir engineering group. Dr. Elizabeth Jacobson approved by DOE/ID as temporary Project Director (8-1-88 to 6-30-89).

6. Division of Earth Sciences
Univ. of Nevada-Las Vegas

Grant Number
DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
Invoices Through: 11/1/88: \$ 0
Total Funds Remaining: \$157,114

Project Period: 8/1/89 (12 months)

Deliverables: Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Data compilation underway. Renegotiating agreements for sampling geothermal fluid with industry groups.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$129,267
Invoices Through: 11/1/88: \$ 0
Total Funds Remaining: \$129,267

Project Period: 3-01-90 (18 months)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Contract signed on September 2. Subcontract with New Mexico State University has been executed. Field work now underway.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 11/1/88 \$ 41,357
Total Funds Remaining: \$153,457

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been identified, and drilling is underway by South Dakota Geological Survey.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries

Financial: Total Funding Authorized \$ 0
Invoices Through 11/1/88 \$ 0
Total Funds Remaining \$ 0

Project Period:

Deliverables:

Date Received

Current Issues:

Unsolicited proposal from DOGAMI. Contract not yet signed.

10. Utah Geological and Mineral Survey

Grant Number

DE-FG07-88ID12756

Financial:

Total Funding Authorized: \$61,641

Invoices Through: 11/1/88 \$ 0

Total Funds Remaining: \$61,641

Project Period:

8-1-89 (14 months)

Deliverables:

Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)

2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issues: Project well underway.

11. State of Washington

Grant Number

Dept. of Natural Resources

DE-FG07-88ID12740

Financial:

Total Funding Authorized: \$170,776

Invoices Through: 11/1/88 \$ 10,592

Total Funds Remaining: \$160,184

Project Period:

3-31-89 (12 months)

Deliverables:

Date Received

1. Final technical report for drilling project and heat flow results (Task 4.1)

2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

BLM requirements for blow out preventers on 1000 ft. gradient holes, and competition for drilling contractors resulted in higher per foot drilling costs, reduced depths, rotary instead of core, and other changes to program. Eight holes will be drilled to 500 ft. deep. Contract modification is required.

12. State of Washington
State Energy Office

Grant Number

Financial: Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID17382

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 11/1/88: \$ 22,000
Total Funds Remaining: \$ 23,511

Project Period: 7-1-89 (12 months)

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics has been largely developed. Now programming algorithms so complex 3-D models can be run on PC's. Delayed due to computer change over.



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State Cooperative Reservoir Analysis Program
Quarterly Report

September 30 - December 31, 1988

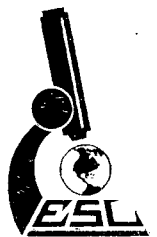
by

Howard P. Ross

Earth Science Laboratory

University of Utah Research Institute
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January 31, 1989



ESL-89007-PR
DOE/ID/12489-46

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
September 30 - December 31, 1988

January 31, 1989

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending December 31, 1988. Significant events which occurred during January are noted to bring the status current to a reporting date of February 1, 1989. Project budgets are updated to February 1, 1988.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

Ten K/Ar dates remain to be completed under this grant. Four dates will be completed in support of George Priest's existing grant for mapping in the Oregon Cascades. The remaining 6 dates have been allocated to the new (1988) Washington DNR grant for work in the Washington Cascades. These dates should be completed and the grant closed out before the end of February 1989. A no cost time extension may be required.

Idaho - Department of Water Resources

Final report deliverables have been received from the Idaho - DWR and from one subcontractor, Boise State University (Dr. C. Waag). Closeout of this grant has been delayed because of the late delivery of a subcontractor's (USGS) report. The report has been available to ID-DWR and to DOE in draft form for several months. The report still awaits printing. Another no cost time extension will be required for formal closeout of this grant.

Oregon - Department of Geology and Mineral Industries

Final report deliverables were received October 31. These included: a geologic map of the McKenzie Bridge quadrangle; a geologic map of the Breitenbush - Austin Hot Springs area; the CTGH-1 data, analysis and well study; and a final technical report summarizing all work completed under this grant. Closeout of the grant awaits final invoicing by DOGAMI.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports substantial progress after a very busy academic year. Dr. Gosnold continues to be one of the most productive scientists funded by the DOE SCP and provides good exposure for the results of this program.

1988 GRANTS

Contract activities continued for one grant resulting from an unsolicited proposal (Oregon - DOGAMI).

Most state teams already report progress on compilations, contracting, sampling, analyses, and mapping activities related to the 1988 grants. A substantial portion of the field programs have been completed by four SCP teams: the University of Alaska - Geophysical Institute; Alaska - Division of Geological and Geophysical Surveys; the Utah Geological and Mineral Survey; and the Washington - Department of Natural Resources. Some future contract modifications have already been identified, but no major problems with these grants have been identified to date.

COMMENTS

The deliverables resulting from the pre-1988 grants included several high quality studies which are significant contributions to the geothermal resource database or basic geology of the states involved. The studies funded by the 1988 grants include diverse topics such as: sophisticated algorithm development, monitoring and numerical modeling of hydrothermal systems, some of which may be in danger of overdevelopment; geothermal fluid genesis; geochemical studies; and basic drilling and temperature gradient studies. We look forward to the technical data and interpretations which will result from these studies.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 November, 1988

Team	1 9 8 8						1 9 8 9		
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
Az-K/Ar	----- (NCTE)			-----			-----31		
ID-DWR	-----29----- F m8 (NCTE needed)			-----			-----		
ND-MMRR I	----- (map due - grant			----- closed out)			-----		
OR-DOGAMMI	Q-----			-Q---31--- F(rec)			-----		
<p>Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.</p>									

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial: Total Funding Authorized \$29,999
 Invoices Through 1/31/89: \$22,250
 Total Funds Remaining \$ 7,749

Project Period: 1-31-89

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 Samples, WA Cascades - WA-DNR-Korosec	12/31/88

Current Issues:

14 samples remain to be completed; Washington State (DNR) has been allocated 10 dates for the 1988 grant, 4 of which have been completed. DOGAMI has been allocated the remaining four samples for their old grant. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial: Total Funding Authorized: \$158,579
 Invoices Through 1/31/89: \$125,000
 Total Funds Remaining: \$ 33,579

Project Period: 8-29-88 (NCTE required to 3/31/89)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	Overdue

Current Issues:

USGS report is still awaiting printing. A delivery date to IDWR is still uncertain. One more NCTE will be required.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables: Date Received

1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens 12/23/87
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson 7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables: Date Received

1. Final Report
 - 1a) South-central New Mexico study (NMSU) 6/9/88
 - 1b) Animas Valley (Lightning Dock Geothermal) 6/9/88
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal) 6/9/88

Current Issues:

All deliverables received and Grant can be closed out. Final invoice received by DOE/ID 10/18/88. Approved for final payment on 11/03/88.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 1/31/89: \$354,709
Total Funds Remaining: \$ 4,648

Project Period: 10-31-88

Deliverables: Date Received

Original Grant

Task 1.1 Geologic Map, Breitenbush River Area 8/7/87
(1:62,500; GMS-46, 1987)

Geologic Map, Crescent Mountain Area 8/7/87
(1:62,500; GMS-47, 1987)

Geologic Map, NW/4 of Broken Top 15' 8/7/87
(1:24,000; Spec. Paper 21)

Task 1.2 Temperature Data Collection 8/7/87
Geothermal-Gradient Data for Oregon

(1982-1984); Open File Rep. 0-86-2

Task 1.3 Project Management and Reporting Quarterly

Mod. M-001

Task 1.1 Feasibility Study/Scientific Plan for 8/7/87
Research (Open File Rep. 0-86-3)

Task 1.2 Geologic Map, McKenzie Bridge 15' Quad.,
with data, interp., description. 10/31/88

Task 1.3 Project Management and Reporting Quarterly

Mod. A-002

Task I. Geologic map, approx. 15 sq. mi. centered 10/31/88
on CTG drill site, Sec.28,T8S,R8E,
E/2 Breitenbush 15'topo quad.

Task II. Raw data and analyses, well core, CTG drill 10/31/88
hole. (archival storage at UURI)

Task III. CTG well study: comprehensive report with 10/31/88
geologic and geothermal implications
and geologic models.

Tasks 1, I, II, III. Final Technical Report 10/31/88

Current Issues: All work completed and deliverable received. DOGAMI is awaiting final billings by subcontractors before submitted final invoice (expected by 2/28/89). The Grant can be closed out after final payment.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
Invoices Through 9/1/88: \$115,790
Total Funds Remaining: \$ 0

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues: All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial: Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ 0

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 February 1989

Team	1 9 8 8				1 9 8 9				1 9 9 0		
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul
AK-DGGS		A 11								A 11	
AK-GI		A 11						0 11			
HI-DBED			J 20								J 20
ID-DWR	M 21									M 21	
NV-DRI			J 1							A 30	
NV-UNLV			A 1					A 1			
NM-NMRDI			S 1					S		M 1	
ND-MRRI	A 1									M 31	
OR-DOGAMI				?							?
UT-UGMS			J 1							A 1	
WA-DNR	A 1						M 31				
WY-DGG			J 1					J 1			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number
DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 1/31/89 \$ 0
Total Funds Remaining: \$72,000

Project Period: 4-11-90 (24 months)

Deliverables:	Date Received
1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)	
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)	
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)	
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)	
5. Tables of fluid geochemistry (Task 4.2.2)	
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)	

Current Issues:
Compilations underway and field work at Geyser Bight area, Umnak Island, is completed.

2. Univ. of Alaska - Geophysical Institute Grant Number
DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 1/31/89: \$38,097
Total Funds Remaining: \$17,496

Project Period: 10-11-89 (18 months)

Deliverables:	Date Received
1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)	
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study	
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)	

Current Issues:
Invoices #1-4 received. Field work at Geyser Bight area has been completed. Principal Investigator Don Turner will

be on leave much of time November - February 1988 and Dr. Christopher Nye will cover for him. Field operations cost \$17,000 more than expected and supplemental funding has been requested.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 1/31/89:\$ 0
Total Funds Remaining: \$ 87,173

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized early in this quarter.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 1/31/89:\$ 15,127
Total Funds Remaining: \$138,961

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

Data compilation underway. Renegotiating agreements for sampling geothermal fluid with industry groups.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$129,267
Invoices Through: 1/31/89: \$ 0
Total Funds Remaining: \$129,267

Project Period: 3-01-90 (18 months)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Permitting for radon soil-gas surveys has been approved by US BLM. Soil-depth surveys initiated in December, area surveys began in January.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 1/31/89 \$ 46,399
Total Funds Remaining: \$148,415

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been identified, and drilling is underway by South Dakota Geological Survey.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries

Financial: Total Funding Authorized \$ 0
Invoices Through 1/31/89 \$ 0
Total Funds Remaining \$ 0

Project Period:

Deliverables:

Date Received

Current Issues:

Unsolicited proposal from DOGAMI. Agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection.

10. Utah Geological and Mineral Survey

Grant Number

DE-FG07-88ID12756

Financial:

Total Funding Authorized: \$61,641

Invoices Through: 1/31/89 \$ 0

Total Funds Remaining: \$61,641

Project Period:

8-1-89 (14 months)

Deliverables:

Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issues: Project well underway.

11. State of Washington

Grant Number

Dept. of Natural Resources

DE-FG07-88ID12740

Financial:

Total Funding Authorized: \$170,776

Invoices Through: 1/31/89 \$ 15,398

Total Funds Remaining: \$155,378

Project Period:

3-31-89 (12 months)

Deliverables:

Date Received

1. Final technical report for drilling project and heat flow results (Task 4.1)
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. A contract modification will reflect this change from the original statement of work. A least four drill holes show a stabilized temperature gradient exceeding 50°C/km.

12. State of Washington Grant Number
State Energy Office
Financial: Total Funding Authorized: \$ 51,435
***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming Grant Number
Dept. Geology and Geophysics DE-FG07-88ID17382
Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 1/31/89: \$ 25,000
Total Funds Remaining: \$ 20,511

Project Period: 7-1-89 (12 months)

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics has been largely developed. Now programming algorithms so complex 3-D models can be run on PC's. Delayed due to computer change over.



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State Cooperative Reservoir Analysis Program
Quarterly Report

January 1 - March 31, 1989

by

Howard P. Ross

Earth Science Laboratory

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May 1, 1989



ESL-89024-PR
DOE/ID/12489-58

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
January 1 - March 31, 1989

May 1, 1989

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending March 31, 1989. Project budgets are updated to May 1, 1989.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

Ten K/Ar dates remain to be completed under this grant. Four dates will be completed in support of George Priest's Phase I work for the Santiam Pass drill hole in the Oregon Cascades. The remaining 6 dates have been allocated to the 1988 Washington DNR grant for work in the Washington Cascades. These dates should be completed and the grant closed out before July 1, 1989. A no cost time extension to July 1, 1989 has been granted.

Idaho - Department of Water Resources

Final report deliverables have been received from the Idaho - DWR and from one subcontractor, Boise State University (Dr. C. Waag). Closeout of this grant has been delayed because of the late delivery of a subcontractor's (USGS) report. The report has been available to ID-DWR and to DOE in draft form for several months. The report has been printed. A no cost time extension to June 1, 1989 has been granted.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports substantial progress after a very busy academic year. Dr. Gosnold continues to be one of the most productive scientists funded by the DOE SCP and provides good exposure for the results of this program.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 May 1989

Team	1 9 8 8			1 9 8 9			Jul		
	Oct	Nov	Dec	Jan	Feb	Mar		Apr	May
Az-K/Ar	-----			(NCTE)			-----		1 Fm2
ID-DWR	-----			(NCTE)			-----		1 Fm9
ND-MMRRI	-----			(map due - grant closed out)					
Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.									

1988 GRANTS

Most state teams already report progress on compilations, contracting, sampling, analyses, and mapping activities related to the 1988 grants. A substantial portion of the field programs have been completed by four SCP teams: the University of Alaska - Geophysical Institute; Alaska - Division of Geological and Geophysical Surveys; the Utah Geological and Mineral Survey; and the Washington -Department of Natural Resources.

The University of Wyoming reports substantial progress in the development of three-dimensional modeling programs for combined conductive/convective heat transport. Two of five heat flow holes have been drilled in South Dakota and the remaining three, plus five holes in North Dakota, will be drilled this summer. Radon soil-gas depth profiles were completed in the New Mexico study, and radon detectors are in place at all three study areas.

The two Nevada programs, Desert Research Institute and Division of Earth Sciences, appear to be approximately one quarter behind schedule and no cost time extensions (NCTE) can be anticipated. The Hawaii DBED study got off to a slow start because of formalities in completing a contract with the University of Hawaii (subcontractor) and the study is two quarters behind schedule. A NCTE with the Washington-DNR extends this grant to May 31, 1989. The Utah-UGMS will probably request a NCTE.

COMMENTS

The deliverables resulting from the pre-1988 grants included several high quality studies which are significant contributions to the geothermal resource database or basic geology of the states involved. The studies funded by the 1988 grants include diverse topics such as: sophisticated algorithm development, monitoring and numerical modeling of hydrothermal systems, some of which may be in danger of overdevelopment; geothermal fluid genesis; geochemical studies; and basic drilling and temperature gradient studies. We look forward to the technical data and interpretations which will result from these studies.

Contract personnel at DOE/ID are finalizing a grant to the State of Oregon-DOGAMI in response to an unsolicited proposal. Phase I of this grant will include siting and environmental assessment work for a proposed drill hole at Santiam Pass.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial: Total Funding Authorized \$29,999
 Invoices Through 4/30/89: \$22,250
 Total Funds Remaining \$ 7,749

Project Period: 1-31-89 (NCTE to 7/01/89 in progress)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 Samples, WA Cascades - WA-DNR-Korosec	12/31/88

Current Issues:

10 samples remain to be completed; Washington State (DNR) has been allocated 10 dates for the 1988 grant, 4 of which have been completed. DOGAMI has been allocated the remaining four samples for their old grant. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial: Total Funding Authorized: \$158,579
 Invoices Through 4/30/89: \$125,000
 Total Funds Remaining: \$ 33,579

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	Overdue- 5/05/89

Current Issues:

USGS report has been printed and delivered to ID-DWR. Delivery to DOE and final payments will allow closeout of this grant.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables: Date Received

1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens 12/23/87
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson 7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables: Date Received

1. Final Report
 - 1a) South-central New Mexico study (NMSU) 6/9/88
 - 1b) Animas Valley (Lightning Dock Geothermal) 6/9/88
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal) 6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
 Invoices Through 4/30/89: \$358,473
 Total Funds Remaining: \$ 884

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting	Quarterly
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting	Quarterly
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out but final payment has not been completed.

6. Southern Methodist Univ.

Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
 Invoices Through 9/1/88: \$115,790
 Total Funds Remaining: \$ 0

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial:	Total Funding Authorized:	\$47,000
	Invoices Through 6/1/88:	\$47,000
	Total Funds Remaining:	\$ 0

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 May 1989

Team	1988				1989				1990		
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul
AK-DGGS		A 11	-----	-----						A 11	
AK-GI		A 11	-----	-----				0 11			
HI-DBED			J 20	-----							J 20
ID-DWR	M 21	-----	-----	-----					M 21		
NV-DRI			J 1	-----						A 30	
NV-UNLV			A 1	-----				A 1			
NM-NMRDI				S 1	-----					M 1	
ND-MRRI	A 1	-----	-----	-----						M 31	
OR-DOGAMI				?	-----						?
UT-UGMS			J 1	-----				A 1			
WA-DNR	A 1	-----	-----	-----			M 31				
WY-DGG			J 1	-----							J 1
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul

(NCTE-M001)

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number
DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 4/30/89 \$38,034
Total Funds Remaining: \$33,966

Project Period: 4-11-90 (24 months)

Deliverables:	Date Received
1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)	
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)	
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)	
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)	
5. Tables of fluid geochemistry (Task 4.2.2)	
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)	

Current Issues:

Compilations underway and field work at Geyser Bight area, Umnak Island, is completed. After problems with fluid chemistry analyses, samples have been submitted to UURI. Isotope analyses underway at SMU.

2. Univ. of Alaska - Geophysical Institute Grant Number
DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 4/30/89: \$38,188
Total Funds Remaining: \$17,405

Project Period: 10-11-89 (18 months)

Deliverables:	Date Received
1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)	
2. Management, logistical, technical support for Alaska DGGs fluid chemistry study	
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)	

Current Issues:

Field work at Geyser Bight area has been completed. Field operations cost \$17,000 more than expected and supplemental funding has been requested. Age dating is complete for 20 samples; rock chemistry is underway.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 4/30/89:\$ 0
Total Funds Remaining: \$ 87,173

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. A NCTE will be required to complete project.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 4/30/89:\$ 15,127
Total Funds Remaining: \$138,961

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)

- e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Data compilation underway. Renegotiating agreements for sampling geothermal fluid with industry groups. A NCTE may be required.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

V
6 →

Financial: Total Funding Authorized: \$129^b,267
Invoices Through: 4/30/89: \$ 0
Total Funds Remaining: \$129^b,267

Project Period: 3-01-90 (18 months)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Soil-depth surveys initiated in December, area surveys began in January. Preliminary results expected May 1989.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 5/01/89 \$ 53,964
Total Funds Remaining: \$140,850

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been logged. Two heat flow holes have been completed by South Dakota Geological Survey.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries

Financial: Total Funding Authorized \$ 0
Invoices Through 4/30/89 \$ 0
Total Funds Remaining \$ 0

Project Period:

Deliverables: Date Received

Current Issues:

Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection. Contracting still underway.

10. Utah Geological and Mineral Survey Grant Number
DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
Invoices Through: 4/30/89 \$ 0
Total Funds Remaining: \$61,641

Project Period: 8-1-89 (14 months)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issues: Project well underway. UGMS may include additional survey data at no additional cost, but will probably request a NCTE.

11. State of Washington Grant Number
Dept. of Natural Resources DE-FG07-88ID12740

Financial: Total Funding Authorized: \$170,776
Invoices Through: 4/30/89 \$148,160
Total Funds Remaining: \$ 22,616

Project Period: 5-31-89 (12 months + 2 mo. NCTE).

Deliverables: Date Received

1. Final technical report for drilling project and heat flow results (Task 4.1)
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. At least four drill holes show a stabilized temperature gradient exceeding 50°C/km. The grant period is extended to 5/31/89.

12. State of Washington Grant Number
State Energy Office

Financial: Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming Grant Number
Dept. Geology and Geophysics DE-FG07-88ID17382

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 4/30/89: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 7-1-89 (12 months)

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics has been largely developed. Now programming algorithms so complex 3-D models can be run on PC's. Delayed due to computer change over and bug in system software.



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391 CHIPETA WAY, SUITE C
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State Cooperative Reservoir Analysis Program
Quarterly Report

January 1 - March 31, 1990

by

Howard P. Ross

Earth Science Laboratory

University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, Utah 84108
(801) 524-3422

May 24, 1990



ESL-90023-PR
DOE/ID/12489-109

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
January 1 - March 31, 1990

May 24, 1990

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending March 31, 1990. Project budgets are updated to May 18, 1990.

PRE-1988 GRANTS

All pre-1988 Grants have been completed and closed out. One deliverable remains outstanding, as noted below.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE. Final drafting is underway which will permit a black and white map to be printed instead of one with color overlays. The preparation of colored overlays has been the main hold up in completing this deliverable.

1988 GRANTS

New data acquisition is completed or nearing completion for most of the 1988 grants, and for these state teams the emphasis is now on data interpretation, integration and reporting. Final reports have been received from two teams, the State of Washington — Department of Natural Resources and the Utah Geological and Mineral Survey. A final report has also been received from Idaho — Department of Water Resources, for Task 2, the Boise geothermal aquifer study. Draft final reports have been received from Alaska — Geophysical Institute, Nevada — Division of Earth Sciences, and Idaho — Department of Water Resources, and these are in review or final corrections.

New principal investigators were named in past quarters for New Mexico (Patrick Rodriquez), Idaho (Paul Castelin), and Nevada — Desert Research Institute (Elizabeth Jacobson) grants. Ten state teams have requested no-cost-time-extensions (NCTE) and one more team, Hawaii-DBED, can be expected to request a NCTE. Michael Korosec, P. I. for the recently completed Washington — DNR grant, is not longer employed at that agency.

Major delays have been encountered by two state teams, Hawaii-DBED and Oregon-DOGAMI. The silica treatment studies on Hawaii require fluids and on-stream flow from well HGP-A in the East Rift Zone. This well has been shut down for servicing after nearly eight years of continuous production. Excessive H₂S emissions caused threats of legal actions by neighbors to the research geothermal facility, so the well has been shut down until workover is completed. P.I. Don Thomas expects the well will go on line, producing power for Ormat, in October 1990, but we believe this is unlikely. Some change in the technical content of the grant is anticipated, and a minimum 6-month NCTE can be expected which will carry the grant termination date to about December 1990. Drilling of the DOGAMI Santiam Pass Scientific borehole will resume after snowmelt, sometime in the third quarter, FY-90.

Comments

Significant new technical results from the 1988 Grants are forthcoming from several teams. The Washington-DNR study has further delineated the Southern Washington Cascade temperature anomaly, and provided some estimates of production rates for Cascade volcanism. The Utah-UGMS study has provided a broad data base for the totally blind Newcastle geothermal resource which should be of interest to industry exploring for both moderate- and high-temperature reservoirs in the Basin and Range province. The Boise geothermal aquifer study is the most complete study of the resource to date. It quantifies future water level declines under likely development scenarios.

Several state teams have indicated that they have good ideas for new geothermal projects if a new geothermal solicitation should be funded by DOE. We have explained that new funding will require congressional support for additional funding for hydrothermal resource assessment, research, and development, and would not be available until FY-91 at the earliest.

With presently defined contract extensions, five grants will continue beyond September 30, 1990. These are Alaska-DGGS (1-31-91), Hawaii (1-31-91?), Nevada-DRI (11-30-90), Wyoming-DGG (10-30-90), and Oregon-DOGAMI (10-15-92).

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 9/30/89:	\$22,999
	Total Funds Remaining	\$ -0-

Project Period: 1-31-89 (NCTE to 7/01/89)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades-WA-DNR-Korosec	4/17/89
10. 4 samples, OR Cascades-DOGAMI-Priest	7/12/89

Current Issues:
Final samples delivered this quarter. Grant closed out.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 10/31/89:	\$158,579
	Total Funds Remaining:	\$ -0-

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues: Grant close out.

3. Montana-MCMS&T

Grant Number DE-FG07-84ID12525

Financial:

Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ -0-

Project Period: 6-31-88

Deliverables:

Date Received

1. Final Report, Geophysical Research on
Geothermal Resources in Montana

1a) "Three Dimensional Gravity Modeling
Techniques with Application to the Ennis
Geothermal Area" by D. Semmens

12/23/87

1b) "A Controlled Source Audiomagnetotelluric
Investigation of the Ennis Hot Springs
Geothermal Area, Ennis, Montana"
by G. R. Emilsson

7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI

Grant Number DE-FG07-84ID12546

Financial:

Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ -0-

Project Period: 6-15-88

Deliverables:

Date Received

1. Final Report: 1a) Southcentral New Mexico study (NMSU)

6/9/88

1b) Animas Valley (Lightning Dock Geothermal)

6/9/88

1c) Orgrande geothermal resource assessment
(Lightning Dock Geothermal)

6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial:

Total Funding Authorized: \$359,357
Invoices Through 4/30/89: \$358,473
Total Funds Remaining: \$ -0-

Project Period: 10-31-88

Deliverables:

Date Received

Original Grant

Task 1.1 Geologic Map, Breitenbush River Area 8/7/87
(1:62,500; GMS-46, 1987)

Geologic Map, Crescent Mountain Area 8/7/87
(1:62,500; GMS-47, 1987)

Geologic Map, NW/4 of Broken Top 15' 8/7/87
(1:24,000; Spec. Paper 21)

Task 1.2 Temperature Data Collection 8/7/87

Geothermal-Gradient Data for Oregon
(1982-1984); Open File Rep. 0-86-2

Task 1.3 Project Management and Reporting Quarterly

Mod. M-001

Task 1.1 Feasibility Study/Scientific Plan for 8/7/87
Research (Open File Rep. 0-86-3)

Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., 10/31/88
with data, interp., description.

Task 1.3 Project Management and Reporting Quarterly

Mod. A-002

Task I. Geologic map, approx. 15 sq. mi. centered 10/31/88
on CTG drill site, Sec.28,T8S,R8E,
E/2 Breitenbush 15'topo quad.

Task II. Raw data and analyses, well core, CTG drill 10/31/88
hole. (archival storage at UURI)

Task III. CTG well study: comprehensive report with 10/31/88
geologic and geothermal implications
and geologic models.

Tasks 1, I, II, III. Final Technical Report 10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial: Total Funding Authorized: \$115,790
Invoices Through 9/1/88: \$115,790
Total Funds Remaining: \$ -0-

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues: All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI Grant Number DE-FG07-84ID12606

Financial: Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ -0-

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES
1988 GRANTS
Short Form Summary, 1 April 1990
1989

Team	1988				1989				1990				1991		
	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.
AK-DGGS	A 11	---	---	---	---	---	---	---	A 11	---	---	---	(NCTE) 31	J	
AK-GI	A 11	---	---	---	---	---	O 11	---	(NCTE) 11	A	---	A 11	---	---	---
HI-DBED	---	J 20	---	---	---	---	---	---	---	---	J 20	---	---	---	?
ID-DWR	M 21	---	---	---	---	---	---	---	---	M	---	J 21	---	---	---
NV-DRI	---	J 1	---	---	---	---	---	---	---	A	---	---	N 30	---	---
NV-DES	A 1	---	---	---	---	A 1	---	---	F 1	---	J 1	---	---	---	---
NM-NMRDI	S 1	---	---	---	---	---	---	---	---	M	---	---	S 30	---	---
ND-MMRI	A 1	---	---	---	---	---	---	---	---	M	---	---	S 30	---	---
OR-DOGAMI	---	---	---	---	---	---	J 27	---	---	---	---	---	---	10/15/92 (mod.A001)	---
UT-UGMS	---	---	J 1	---	---	A 1	---	N 1	M 31	---	---	---	Completed	---	---
WA-DNR	---	A 1	---	---	---	M 31	A 31	D 31	Completed (NCTE)	---	---	---	---	---	---
WY-DGG	---	---	J 1	---	---	A 1	---	S 1	M 31	---	---	---	(NCTE) 31	O 31	---

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 5/18/90: \$52,112
Total Funds Remaining: \$19,888

Project Period: 1-31-91 (24 months+ 7 mo. NCTE)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

A final report of geothermal studies of the Geyser Bight area, Umnak Island, is in the draft stage, and will soon be available for review by DOE. Diversion of staff efforts away from task 4.2 Geothermal Resources Map of the Aleutian Islands-Alaska Peninsula Region, has resulted in a NCTE, to 1/31/91.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 5/18/90: \$51,944
Total Funds Remaining: \$ 3,649

Project Period: 8-11-90 (24 months + 4 mo. NCTE)

Deliverables: Date Received

1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGGS fluid chemistry study
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)

Current Issues:

Field work at Geyser Bight area has been completed. Age dating and rock chemistry analytical work has also been completed. The final report is being written in cooperation with Alaska-DGGGS and a draft is expected soon.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
 Invoices Through: 5/18/90: \$ 78,725
 Total Funds Remaining: \$ 8,448

Project Period: 6-20-90 (24 months; NCTE needed)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system completed. The HGP-A well was closed down due to excessive H₂S emissions and a minimum 6 month delay is expected before the silica treatment studies can continue. A NCTE will be required to complete project, but has not yet been requested. An adjustment of approximately \$13,000 to reduce invoices to DOE is in progress.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
 Invoices Through: 05/18/90: \$142,397
 Total Funds Remaining: \$ 11,691

Project Period: 6-21-90 (24 months + 3 mo. NCTE)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0) 02/06/90
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Final report submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage. Paul Castelin, Senior Hydrogeologist with DWR has replaced Leah Street as P.I. A no-cost contract modification changing P.I.'s was signed 10/23/89.

5. Desert Research Institute
University of Nevada System

Grant Number
DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
Invoices Through: 05/18/90: \$ 75,242
Total Funds Remaining: \$ 65,397

Project Period: 11/30/90 (22 months + 7 mo. NCTE)

Deliverables: Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson was approved by DOE/ID as Permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. A 13 month monitoring period concluded in January 1990. A conceptual model has been developed for the Moana geothermal system and a numerical model is being formulated.

6. Division of Earth Sciences
Univ. of Nevada-Las Vegas

Grant Number
DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
Invoices Through: 05/18/90: \$144,821
Total Funds Remaining: \$ 12,293

Project Period: 6/1/90 (12 months + 10 mo. NCTE)

Deliverables: Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Technical study is completed, and draft final report received April 4, 1990. Preliminary results presented at 1989 GRC meeting. Excellent study-final report suitable for multiple publications.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$126,267
Invoices Through: 05/18/90: \$ 46,341
Total Funds Remaining: \$ 79,926

Project Period: 9-30-90 (18 months; + 6 mo. NCTE)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Patrick Rodriguez replaced Larry Icerman as NMRDI Principal Investigator in September. Jim Witcher, NMSU continues as the technical Principal Investigator. Radon detectors have been retrieved from all areas, and all laboratory results have been received. Drilling to test radon anomalies nears completion. NMSU presented preliminary radon results at a meeting at UURI; Dec. 7, 8, 1989. Drilling on radon anomaly has discovered a hidden hydrothermal system.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized: \$194,814
Invoices Through: 05/18/90: \$156,533
Total Funds Remaining: \$ 38,281

Project Period: 9 -30-90 (24 mo. + 6 mo. NCTE)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues:

Contract modification was requested to extend project 6 months and to change drilling to 8 holes in South Dakota, 2 holes in North Dakota. Amendment signed 11/08/89. Dr. Gosnold gave two major presentations in 1989. Final drilling expected June 1990.

9. State of Oregon Grant Number
 Dept. of Geology and Mineral Industries DE-FG079ID12834

Financial: Total Funding Authorized: \$200,000
 Invoices Through 05/18/90: \$ 13,690
 Total Funds Remaining: \$186,310

Project Period: 10-15-92 (40 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. 7/15/89
2. Phase II final technical report on drilling, lithologic temperature studies; drill logs, interpretation.

Current Issues:
 Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I included environmental checklist, permitting, and site selection (completed). Oxbow Geothermal Company contributed \$100 K to drilling project, Phase II. Phase II awarded 10/17/89. Santiam Pass drill hole 77-24 drilled to 460 feet, cemented, cased in November. Drilling will resume 3rd quarter FY-90.

10. Utah Geological and Mineral Survey Grant Number
 DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
 Invoices Through: 05/18/90: \$61,641
 Total Funds Remaining: \$ -0-

Project Period: 11-1-89 (20 months; + 4 mo. NCTE)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9) 04/04/90
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3) 04/04/90

Current Issue:
 UGMS has completed a radon survey at no additional cost. Project period extended 6 months. Paper presented at 1989 GRC annual meeting. Final report received 04/04/90. Grant being closed out.

11. State of Washington
Dept. of Natural Resources

Grant Number
DE-FG07-88ID12740

Financial: Total Funding Authorized: \$170,776
Invoices Through: 01/31/90: \$170,776
Total Funds Remaining: \$ -0-

Project Period: 8-31-89 (12 months + 5 mo. NCTE)

Deliverables:	Date Received
1. Final technical report for drilling project and heat flow results (Task 4.1)	7/10/89
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)	12/4/89

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. Final report on drilling received 7/10/89. Final Report on age dating and stratigraphy received 12/4/89. Grant being closed out.

12. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID12738

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 05/18/90: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 10-31-90 (19 months + 9 mo. NCTE)

Deliverables:	Date Received
1. Final technical report describing: a. Computer algorithms developed b. New temperature data from the Cody or Thermopolis hydrothermal system c. Finite-difference model for system studied d. Numerical methods and test results	

Current Issues:

Mathematics and algorithms have been largely developed. Delayed due to computer change over and bug in system software, which has now been corrected. Field work to complete project expected in June-August 1990.



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State Cooperative Reservoir Analysis Program
Quarterly Report

April 1 - June 30, 1989

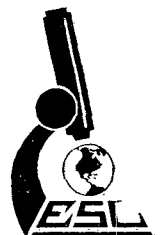
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July 20, 1989



ESL-89040-PR
DOE/ID/12489-72

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
April 1 - June 30, 1989

July 20, 1989

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending June 30, 1989. Project budgets are updated to July 1, 1989.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

Four K/Ar dates remain to be completed under this grant, all in support of George Priest's Phase I work for the Santiam Pass drill hole in the Oregon Cascades. These dates should be completed and the grant closed out before July 31, 1989. A no cost time extension to July 1, 1989 has been granted. Problems with incorrect age dates supplied to Washington-DNR have been corrected.

Idaho - Department of Water Resources

All final report deliverables have now been received for this grant and the grant was closed out during this quarter.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports substantial progress after a very busy academic year. Dr. Gosnold continues to be one of the most productive scientists funded by the DOE SCP and provides good exposure for the results of this program.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 July 1989

Team	Jan.	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug.	Sep.
Az-K/Ar	----- (NCTE)			-----			1 Fm2	-----	-----
ID-DWR	----- (NCTE)			-----			1 Fm9	-----	-----
ND-MMRRI	----- (Map due - grant closed out)			-----			-----	-----	-----
Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.									

1988 GRANTS

All state teams have completed compilation and contract activities and are well into drilling, monitoring, sampling, analyses, and mapping activities related to the 1988 grants. A substantial portion of the field programs have been completed by six SCP teams: the University of Alaska - Geophysical Institute; Alaska - Division of Geological and Geophysical Surveys; the Utah Geological and Mineral Survey; Washington -Department of Natural Resources; Idaho-Department of Water Resources, and Nevada-Desert Research Institute.

The University of Wyoming reports substantial progress in the development of three-dimensional modeling programs for combined conductive/convective heat transport. Two of five heat flow holes have been drilled in South Dakota and the remaining three, plus five holes in North Dakota, will be drilled this summer. Radon soil-gas depth profiles were completed in the New Mexico study, and preliminary results have been received from survey areas.

Several programs have slipped behind schedule and no cost time extensions (NCTE) have been or will be requested. Extensions have already been granted to the Washington-DNR, Wyoming-DGG, and Nevada-DES teams. Future requests for NCTE's may be expected from the Hawaii and Nevada-DRI teams. Final deliverables should be received from the Washington-DNR and Wyoming-DGG teams during the next quarter.

COMMENTS

The deliverables resulting from the pre-1988 grants included several high quality studies which are significant contributions to the geothermal resource database or basic geology of the states involved. The studies funded by the 1988 grants include diverse topics such as: sophisticated algorithm development, monitoring and numerical modeling of hydrothermal systems, some of which may be in danger of overdevelopment; geothermal fluid genesis; geochemical studies; and basic drilling and temperature gradient studies. We look forward to the technical data and interpretations which will result from these studies.

Contract personnel at DOE/ID finalized a grant to the State of Oregon-DOGAMI in response to an unsolicited proposal. Phase I of this grant will include siting and environmental assessment work for a proposed drill hole at Santiam Pass. Phase II will provide funds for drilling if all environmental requirements are met. Oxbow Geothermal Company will contribute \$100 K to this project.

Two technical papers have been completed by state team members and submitted to the GRC annual meeting. "Recharge of Geothermal Fluids in the Great Basin " was written by Paul Buchanan of the University of Nevada-Division of Earth Sciences. Robert Blackett and Mike Shubat of the Utah-Geologic and Mineral Survey submitted a paper which describes a case study of the Newcastle, Utah geothermal resource.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 6/30/89:	\$26,750
	Total Funds Remaining	\$ 3,249

Project Period: 1-31-89 (NCTE to 7/01/89 in progress)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades - WA-DNR-Korosec	4/17/89

Current Issues:

4 samples remain to be completed; all in support of the DOGAMI Santiam Pass drill hole. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 6/30/89:	\$158,579
	Total Funds Remaining:	\$ 0

Project Period: 8-29-88 (NCTE to 6/01/89)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues:

Final payment to contractor and grant closed out during quarter.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables: Date Received

1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson

12/23/87

7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables: Date Received

1. Final Report 1a) South-central New Mexico study (NMSU)
 - 1b) Animas Valley (Lightning Dock Geothermal)
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal)

6/9/88

6/9/88

6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 6/30/89: \$359,357
Total Funds Remaining: \$ 0

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial:	Total Funding Authorized:	\$115,790
	Invoices Through 9/1/88:	\$115,790
	Total Funds Remaining:	\$ 0

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI

Grant Number DE-FG07-84ID12606

Financial:	Total Funding Authorized:	\$47,000
	Invoices Through 6/1/88:	\$47,000
	Total Funds Remaining:	\$ 0

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 6/30/89: \$ 7,114
Total Funds Remaining: \$ 80,059

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. A NCTE will be required to complete project.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 6/30/89: \$ 67,932
\$ 87,156

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

All field studies underway. Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Interim report reviewing data submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage.

5. Desert Research Institute
University of Nevada System

Grant Number
DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
Invoices Through: 6/30/89: \$ 53,248
Total Funds Remaining: \$ 87,391

Project Period: 4/30/90 (22 months)

Deliverables: Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson approved by DOE/ID as permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. Monthly monitoring continues and model calibrations underway. Expenditures ahead of schedule due to problems with graduate student help. May be necessary to reduce the number of wells being monitored. A NCTE may be required.

6. Division of Earth Sciences
Univ. of Nevada-Las Vegas

Grant Number
DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
Invoices Through: 6/30/89: \$ 100,291
Total Funds Remaining: \$ 56,823

Project Period: 1/1/90 (12 months, NCTE)

Deliverables: Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Data compilation completed and agreements for sampling geothermal fluid with industry groups renegotiated. First set of fluid and isotope analyses completed. Project period extended by 5 months. Paper submitted to 1989 GRC meeting.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$129,267
Invoices Through: 6/30/89: \$ 0
Total Funds Remaining: \$129,267

Project Period: 3-01-90 (18 months)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Soil-depth surveys initiated in December, area surveys began in January. Preliminary results being analyzed. Change in Principal Investigator and/or institution will be forthcoming.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized: \$194,814
Invoices Through: 6/30/89: \$ 63,410
Total Funds Remaining: \$131,404

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been logged. Two heat flow holes have been completed by South Dakota Geological Survey. Five holes to be drilled by North Dakota Geological Survey this summer. Considerable interest in resource development in North Dakota.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries DE-FG07-89ID12834

Financial: Total Funding Authorized: \$15,860
Invoices Through 6/30/89: \$ 0
Total Funds Remaining: \$15,860

Project Period: 6/26/91 (24 months)

- | | |
|--|---------------|
| Deliverables: | Date Received |
| 1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. | |
| 2. Phase II final technical report on drilling, lithologic and temperature studies, drill logs, interpretation. | |

Current Issues:
 Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection. Phase I nearing completion. Oxbow Geothermal Company will contribute \$100 K to drilling project, Phase II. Phase II grant in progress.

10. Utah Geological and Mineral Survey	Grant Number DE-FG07-88ID12756
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Financial:	Total Funding Authorized:	\$61,641
	Invoices Through: 6/30/89:	\$35,356
	Total Funds Remaining:	\$26,384

Project Period: 11-1-89 (17 months; NCTE)

- | | |
|--|---------------|
| Deliverables: | Date Received |
| 1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9) | |
| 2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3) | |

Current Issues: Project well underway. UGMS will include additional radon survey at no additional cost. Project period extended 3 months. Paper submitted to 1989 GRC annual meeting.

11. State of Washington Dept. of Natural Resources	Grant Number DE-FG07-88ID12740
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Financial:	Total Funding Authorized:	\$170,776
	Invoices Through: 6/30/89:	\$148,160
	Total Funds Remaining:	\$ 22,616

Project Period: 5-31-89 (12 months + 2 mo. NCTE).

- | | |
|--|---------------|
| Deliverables: | Date Received |
| 1. Final technical report for drilling project and heat flow results (Task 4.1) | 7/10/89 |
| 2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2) | |

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. At least four drill holes show a stabilized temperature gradient exceeding 50°C/km. The grant period is extended to 5/31/89. Final report on drilling received 7/10/89. Report on age dating and stratigraphy in progress. NCTE needed to 9/1/89.

12. State of Washington
State Energy Office

Grant Number

Financial: Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID17382

Financial: Total Funding Authorized: \$ 45,511
Invoices Through:6/30/89: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 9-1-89 (14 months NCTE).

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics has been largely developed. Now programming algorithms so complex 3-D models can be run on PC's. Delayed due to computer change over and bug in system software, which has now been corrected. NCTE to 9/1/89.



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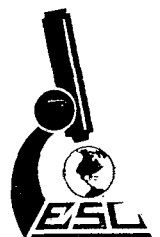
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ESL-89040-PR
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ID-DWR	----- (NCTE)			-----			1 Fm9		
ND-MMRRI	----- (Map due - grant closed out)								
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All state teams have completed compilation and contract activities and are well into drilling, monitoring, sampling, analyses, and mapping activities related to the 1988 grants. A substantial portion of the field programs have been completed by six SCP teams: the University of Alaska - Geophysical Institute; Alaska - Division of Geological and Geophysical Surveys; the Utah Geological and Mineral Survey; Washington - Department of Natural Resources; Idaho - Department of Water Resources, and Nevada-Desert Research Institute.

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6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades - WA-DNR-Korosec	4/17/89

Current Issues:

4 samples remain to be completed; all in support of the DOGAMI Santiam Pass drill hole. This will complete the Arizona K/Ar dating grant.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 6/30/89:	\$158,579
	Total Funds Remaining:	\$ 0

Project Period: 8-29-88 (NCTE to 6/01/89)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues:

Final payment to contractor and grant closed out during quarter.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ 0

Project Period: 6-31-88

Deliverables:	Date Received
1. Final Report, Geophysical Research on Geothermal Resources in Montana	
1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens	12/23/87
1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson	7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ 0

Project Period: 6-15-88

Deliverables:	Date Received
1. Final Report 1a) South-central New Mexico study (NMSU)	6/9/88
1b) Animas Valley (Lightning Dock Geothermal)	6/9/88
1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal)	6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 6/30/89: \$359,357
Total Funds Remaining: \$ 0

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial:	Total Funding Authorized:	\$115,790
	Invoices Through 9/1/88:	\$115,790
	Total Funds Remaining:	\$ 0

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI

Grant Number DE-FG07-84ID12606

Financial:	Total Funding Authorized:	\$47,000
	Invoices Through 6/1/88:	\$47,000
	Total Funds Remaining:	\$ 0

Project Period: Closed Out

Deliverables:	Date Received
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	<u>overdue</u>
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 July 1989
1988

Team	1988				1989				1990			
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
AK-DGGS	A 11										A 11	
AK-GI	A 11							O 11				
HI-DBED		J 20									J 20	
ID-DWR	M 21											M 21
NV-DRI			J 1								A 30	
NV-UNLV			A 1				A 1 (NCTE)		J 1			
NM-NMRDI			S 1								M 1	
ND-MMRI	A 1										M 31	
OR-DOGAMI							J 27					▶ 6/26/91
UT-UGMS			J 1				A 1 (NCTE)	N 1				
WA-DNR	A 1						M 31 (NCTE-M001)					
WY-DGG			J 1				A 1 (NCTE)	S 1				
	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
 Invoices Through: 6/30/89 \$38,034
 Total Funds Remaining: \$33,966

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:
 Compilations underway and field work at Geyser Bight area, Umnak Island, is completed. After problems with fluid chemistry analyses, samples were submitted to UURI, and analyses have been completed. Isotope analyses underway at SMU.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
 Invoices Through 6/30/89: \$38,304
 Total Funds Remaining: \$17,287

Project Period: 10-11-89 (18 months)

Deliverables: Date Received

1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGs fluid chemistry study
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)

Current Issues:
 Field work at Geyser Bight area has been completed. Field operations cost \$17,000 more than expected and supplemental funding has been requested. Age dating is complete for 20 samples; rock chemistry is underway.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 6/30/89: \$ 7,114
Total Funds Remaining: \$ 80,059

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. A NCTE will be required to complete project.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 6/30/89: \$ 67,932
\$ 87,156

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0)
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

All field studies underway. Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Interim report reviewing data submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage.

5. Desert Research Institute
University of Nevada System

Grant Number
DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
Invoices Through: 6/30/89: \$ 53,248
Total Funds Remaining: \$ 87,391

Project Period: 4/30/90 (22 months)

Deliverables: Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson approved by DOE/ID as permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. Monthly monitoring continues and model calibrations underway. Expenditures ahead of schedule due to problems with graduate student help. May be necessary to reduce the number of wells being monitored. A NCTE may be required.

6. Division of Earth Sciences
Univ. of Nevada-Las Vegas

Grant Number
DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
Invoices Through: 6/30/89: \$ 100,291
Total Funds Remaining: \$ 56,823

Project Period: 1/1/90 (12 months, NCTE)

Deliverables: Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Data compilation completed and agreements for sampling geothermal fluid with industry groups renegotiated. First set of fluid and isotope analyses completed. Project period extended by 5 months. Paper submitted to 1989 GRC meeting.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$129,267
Invoices Through: 6/30/89: \$ 0
Total Funds Remaining: \$129,267

Project Period: 3-01-90 (18 months)

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Soil-depth surveys initiated in December, area surveys began in January. Preliminary results being analyzed. Change in Principal Investigator and/or institution will be forthcoming.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized: \$194,814
Invoices Through: 6/30/89: \$ 63,410
Total Funds Remaining: \$131,404

Project Period: 3-31-90 (24 months)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

New wells for heat flow have been logged. Two heat flow holes have been completed by South Dakota Geological Survey. Five holes to be drilled by North Dakota Geological Survey this summer. Considerable interest in resource development in North Dakota.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries DE-FG07-89ID12834

Financial: Total Funding Authorized: \$15,860
Invoices Through 6/30/89: \$ 0
Total Funds Remaining: \$15,860

Project Period: 6/26/91 (24 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment.
2. Phase II final technical report on drilling, lithologic and temperature studies, drill logs, interpretation.

Current Issues:

Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection. Phase I nearing completion. Oxbow Geothermal Company will contribute \$100 K to drilling project, Phase II. Phase II grant in progress.

10. Utah Geological and Mineral Survey Grant Number
DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
Invoices Through: 6/30/89: \$35,356
Total Funds Remaining: \$26,384

Project Period: 11-1-89 (17 months; NCTE)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issues: Project well underway. UGMS will include additional radon survey at no additional cost. Project period extended 3 months. Paper submitted to 1989 GRC annual meeting.

11. State of Washington Grant Number
DE-FG07-88ID12740
Dept. of Natural Resources

Financial: Total Funding Authorized: \$170,776
Invoices Through: 6/30/89: \$148,160
Total Funds Remaining: \$ 22,616

Project Period: 5-31-89 (12 months + 2 mo. NCTE).

Deliverables: Date Received

1. Final technical report for drilling project and heat flow results (Task 4.1) 7/10/89
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. At least four drill holes show a stabilized temperature gradient exceeding 50°C/km. The grant period is extended to 5/31/89. Final report on drilling received 7/10/89. Report on age dating and stratigraphy in progress. NCTE needed to 9/1/89.

12. State of Washington Grant Number
State Energy Office

Financial: Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming Grant Number
Dept. Geology and Geophysics DE-FG07-88ID17382

Financial: Total Funding Authorized: \$ 45,511
Invoices Through:6/30/89: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 9-1-89 (14 months NCTE).

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics has been largely developed. Now programming algorithms so complex 3-D models can be run on PC's. Delayed due to computer change over and bug in system software, which has now been corrected. NCTE to 9/1/89.



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HR

ESL-89049-PR
DOE/ID/12489-78

State Cooperative Reservoir Analysis Program Quarterly Report

July 1 - September 30, 1989

by

Howard P. Ross

Earth Science Laboratory

University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, Utah 84108
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October 30, 1989



ESL-89049-PR
DOE/ID/12489-78

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
July 1 - September 31, 1989

October 30, 1989

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending September 30, 1989. Project budgets are updated to October 31, 1989.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

The last four K/Ar dates were completed under this grant in June and the results received by George Priest in July. The grant was closed out during this quarter.

Idaho - Department of Water Resources

This grant was closed out during the previous quarter.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports that the map is about ready for printing, but ND-MMRRRI is having difficulty in arranging printing of the color overlays.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 November 1989

Team	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.
Az-K/Ar	----- (NCTE)			-----			1 Fm2	Grant closed out	
ID-DWR	----- (NCTE)			----- 1 Fm9			Grant ready for close out		
ND-MMRRI	----- (Map due — grant closed out)			-----			-----		
<p>Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.</p>									

1988 GRANTS

New data acquisition is completed or nearing completion for most of the 1988 grants, and for these state teams the emphasis is now on data interpretation, integration and reporting. A draft final report has been submitted by one team, the State of Washington — Department of Natural Resources, and final changes are now being made to the report. Two state teams, Nevada—Division of Earth Sciences and the Utah Geologic and Mineral Survey, presented papers describing their SCP studies at the annual meeting of the Geothermal Resources Council in early October.

New principal investigators were named for the New Mexico (Patrick Rodriguez) and Idaho (Paul Castelin) grants, and Elizabeth Jacobson will continue as the P.I. for the remainder of the Nevada — Desert Research Institute grant. Five state teams have requested no-cost-time-extensions (NCTE) and two more teams, Hawaii-DBED and Nevada-DRI can be expected to request NCTEs.

Major delays have been encountered by two state teams, Hawaii-DBED and Oregon-DOGAMI. The silica treatment studies on Hawaii require fluids and on-stream flow from well HGP-A in the East Rift Zone. This well has been shut down for servicing after nearly eight years of continuous production. Excessive H₂S emissions caused threats of legal actions by neighbors to the research geothermal facility, so the well has been shut down until workover is completed. P.I. Don Thomas expects the well will go on line, producing power for Ormat, in about six months. No substantial change in the technical content of the grant is anticipated, but a minimum 6-month NCTE can be expected which will carry the grant termination date to about December 1990.

Phase I studies were completed by DOGAMI on the Santiam Pass deep temperature gradient study. This phase included completion of site selection, environmental studies, and award of permits for drilling. A finding of no significant environmental impact (FONSI) was reached in July and transmitted to DOE. Final review by DOE in Washington delayed the beginning of drilling until it became obvious that drilling could not be completed before winter. DOGAMI hopes to begin drilling, with \$100 K support from Oxbow Geothermal, in 1990.

Comments

Significant new technical results from the 1988 Grants are forthcoming from several teams. The Washington-DNR study has further delineated the Southern Washington Cascade temperature anomaly, and provided some estimates of production rates for Cascade volcanism. The Utah-UGMS study has provided a broad data base for the totally blind Newcastle geothermal resource which should be of interest to industry exploring for both moderate- and high-temperature reservoirs in the Basin and Range province.

Several state teams have inquired about the possibilities of additional funding for present projects, or a new geothermal solicitation when present grants are completed. We have explained that new funding will require congressional support for additional funding for hydrothermal resource assessment, research, and development, and would not be available in FY-90.

New contract modifications extending the contract period should now be in place for: Nevada, UN-LV-DES; and North Dakota-NDMMRI. NCTE's have been requested and are needed by: Utah-UGMS; Washington-DNR; and Wyoming- UWY-DGG.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 9/30/89:	\$22,999
	Total Funds Remaining	\$ -0-

Project Period: 1-31-89 (NCTE to 7/01/89)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades-WA-DNR-Korosec	4/17/89
10. 4 samples, OR Cascades-DOGAMI-Priest	7/12/89

Current Issues:
Final samples delivered this quarter. Grant closed out.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 10/31/89:	\$158,579
	Total Funds Remaining:	\$ -0-

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues:
Ready for final payment to contractor and grant close out.

3. Montana-MCMS&T

Grant Number DE-FG07-84ID12525

Financial:

Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ -0-

Project Period: 6-31-88

Deliverables:

Date Received

1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson

12/23/87

7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI

Grant Number DE-FG07-84ID12546

Financial:

Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ -0-

Project Period: 6-15-88

Deliverables:

Date Received

1. Final Report:
 - 1a) Southcentral New Mexico study (NMSU)
 - 1b) Animas Valley (Lightning Dock Geothermal)
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal)

6/9/88

6/9/88

6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI

Grant Number DE-FG07-84ID12526

Financial:

Total Funding Authorized: \$359,357
Invoices Through 4/30/89: \$358,473
Total Funds Remaining: \$ -0-

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad, with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial:	Total Funding Authorized: \$115,790
	Invoices Through 9/1/88: \$115,790
	Total Funds Remaining: \$ -0-

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI

Grant Number DE-FG07-84ID12606

Financial:

Total Funding Authorized: \$47,000

Invoices Through 6/1/88: \$47,000

Total Funds Remaining: \$ -0-

Project Period: Closed Out

Deliverables:

1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.

Date Received
overdue

8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 October 1989

Team	1988				1989				1990			
	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.
AK-DGGS	11	A	---	---	---	---	---	---	---	A	11	---
AK-GI	11	A	---	---	---	---	11	O	---	A	11	(NCTE)
HI-DBED	---	J	---	---	---	---	---	---	---	(Will require NCTE)	J	20
ID-DWR	21	M	---	---	---	---	---	---	---	M	21	---
NV-DRI	---	J	---	---	---	---	---	---	---	A	30	---
NV-UNLV	---	A	---	---	---	---	A	1	(NCTE)	F	1	---
NM-NMRDI	---	S	---	---	---	---	---	---	---	M	1	---
ND-MMRI	1	A	---	---	---	---	---	---	---	M	31	(NCTE) 30
OR-DOGAMI	---	---	---	---	---	---	J	27	---	---	---	10/15/92 (mod.A001)
UT-UGMS	---	---	J	1	---	A	1	(NCTE)	N	1	J	31 (NCTE needed)
WA-DNR	---	A	---	---	---	M	A	D	31	31	31	(NCTE needed)
WY-DGG	---	---	J	1	---	A	1	(NCTE)	S	1	J	31 (NCTE needed)

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 10/31/89 \$52,112
Total Funds Remaining: \$10,888

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geyser Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geyser Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

Compilations underway and field work at Geyser Bight area, Umnak Island, is completed. After problems with fluid chemistry analyses, samples have been submitted to UURI. Isotope analyses were completed at SMU. A draft report for the Geyser Bight geochemical study is in preparation.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 10/31/89: \$39,329
Total Funds Remaining: \$16,264

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Geologic map of Geyser Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGs fluid chemistry study
3. Final report on Geyser Bight geothermal area study (Task 4.1.3)

Current Issues:

Field work at Geyser Bight area has been completed. Age dating is complete for all 25 samples. Rock chemistry results have been delayed due to analytical problems at U.C. Santa Cruz. A NCTE has been granted to 4/11/90.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 10/31/89: \$ 7,114
Total Funds Remaining: \$ 80,059

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. The HGP-A well has been closed down due to excessive H₂S emissions and a 6 month delay is expected before the silica treatment studies can continue. A NCTE will be required to complete project.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 10/31/89: \$ 82,435
Total Funds Remaining: \$ 71,653

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary

- and interpretation (Task 2.0)
 3. Final technical report, geochemical studies of
 Wood River geothermal systems (Task 3.0)

Current Issues:

All field studies underway. Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Interim report reviewing data submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage. Paul Castelin, Senior Hydrogeologist with DWR has replaced Leah Street as P.I. A no-cost contract modification changing P.I.'s was signed 10/23/89.

5. Desert Research Institute
 University of Nevada System

Grant Number
 DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
 Invoices Through: 10/31/89: \$ 75,242
 Total Funds Remaining: \$ 65,397

Project Period: 4/30/90 (22 months)

Deliverables:

Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson approved by DOE/ID as Permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. Monthly monitoring continues and model calibration underway. A conceptual model has been developed for the Moana geothermal system and a numerical model is being formulated. A NCTE may be required.

6. Division of Earth Sciences
 Univ. of Nevada-Las Vegas

Grant Number
 DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
 Invoices Through: 10/31/89: \$126,325
 Total Funds Remaining: \$ 30,789

Project Period: 2/1/90 (12 months; 5 months NCTE)

Deliverables:

Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Isotope and fluid chemistry studies in advanced stage. Preliminary results presented at 1989 GRC meeting. A five month NCTE has been requested.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$126,267
Invoices Through: 10/31/89: \$ 46,341
Total Funds Remaining: \$ 79,926

Project Period: 3-01-90 (18 months)

Deliverables:

Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Patrick Rodriguez replaced Larry Icerman as NMRDI Principal Investigator in September. Jim Witcher, NMSU continues as the technical Principal Investigator. Radon detectors have been retrieved from all areas, and most laboratory results have been received. Drilling to test radon anomalies should begin in November.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 10/31/89 \$108,231
Total Funds Remaining: \$ 86,583

Project Period: 9 -30-90 (30 months; NCTE)

Deliverables:

Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)

2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

Contract modification was requested to extend project 6 months and to change drilling to 8 holes in South Dakota, 2 holes in North Dakota. Amendment signed 11/08/89.

9. State of Oregon
Dept. of Geology and Mineral Industries

Grant Number
DE-FG079ID12834

Financial: Total Funding Authorized \$200,000
Invoices Through 11/14/89 \$ 5,327
Total Funds Remaining \$194,673

Project Period: 10-15-92 (40 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. 7/15/89
2. Phase II final technical report on drilling, lithologic temperature studies; drill logs, interpretation.

Current Issues:

Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection. Phase I completed. Oxbow Geothermal Company will contribute \$100 K to drilling project, Phase II. Phase II grant awaited final DOE approval of FONSI in Washington. Phase II awarded 10/17/89.

10. Utah Geological and Mineral Survey

Grant Number
DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
Invoices Through: 10/31/89 \$57,802
Total Funds Remaining: \$ 3,839

Project Period: 11-1-89 (20 months; NCTE to 1-31-90 requested)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issue

UGMS has completed a radon survey at no additional cost. Project period extended 6 months. Paper presented at 1989 GRC annual meeting. Now working on draft final report.

11. State of Washington
Dept. of Natural Resources

Grant Number
DE-FG07-88ID12740

Financial:

Total Funding Authorized: \$170,776
Invoices Through: 10/31/89 \$170,776
Total Funds Remaining: \$ 22,616
(holding final payment)

Project Period: 8-31-89 (12 months + 5 mo. NCTE; new NCTE needed)

Deliverables:

Date Received
7/10/89

1. Final technical report for drilling project and heat flow results (Task 4.1)
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. Final report on drilling received 7/10/89. Report on age dating and stratigraphy needs significant revision before becoming final. NCTE needed to 12/31/89.

12. State of Washington
State Energy Office

Grant Number

Financial:

Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID12738

Financial:

Total Funding Authorized: \$ 45,511
Invoices Through: 10/31/89: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 1-31-90 (19 months; NCTE)

Deliverables:

Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics and algorithms have been largely developed. Delayed due to computer change over and bug in system software, which has now been corrected. NCTE to 1/31/90 has been requested, and a contract modification is in progress.



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State Cooperative Reservoir Analysis Program
Quarterly Report

July 1 - September 30, 1989

by

Howard P. Ross

Earth Science Laboratory

University of Utah Research Institute
391 Chipeta Way, Suite C
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October 30, 1989



ESL-89049-PR
DOE/ID/12489-78

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
July 1 - September 31, 1989

October 30, 1989

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending September 30, 1989. Project budgets are updated to October 31, 1989.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

The last four K/Ar dates were completed under this grant in June and the results received by George Priest in July. The grant was closed out during this quarter.

Idaho - Department of Water Resources

This grant was closed out during the previous quarter.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE, but is expected shortly. Dr. Wil Gosnold, P. I. is reminded periodically of the overdue deliverable and reports that the map is about ready for printing, but ND-MMRI is having difficulty in arranging printing of the color overlays.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 November 1989

Team	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.
Az-K/Ar	----- (NCTE)			-----			1 Fm2	Grant closed out	
ID-DWR	----- (NCTE)			-----			1 Fm9	Grant ready for close out	
ND-MMRI	----- (Map due — grant closed out)			-----			-----		
<p>Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.</p>									

1988 GRANTS

New data acquisition is completed or nearing completion for most of the 1988 grants, and for these state teams the emphasis is now on data interpretation, integration and reporting. A draft final report has been submitted by one team, the State of Washington — Department of Natural Resources, and final changes are now being made to the report. Two state teams, Nevada-Division of Earth Sciences and the Utah Geologic and Mineral Survey, presented papers describing their SCP studies at the annual meeting of the Geothermal Resources Council in early October.

New principal investigators were named for the New Mexico (Patrick Rodriguez) and Idaho (Paul Castelin) grants, and Elizabeth Jacobson will continue as the P.I. for the remainder of the Nevada — Desert Research Institute grant. Five state teams have requested no-cost-time-extensions (NCTE) and two more teams, Hawaii-DBED and Nevada-DRI can be expected to request NCTEs.

Major delays have been encountered by two state teams, Hawaii-DBED and Oregon-DOGAMI. The silica treatment studies on Hawaii require fluids and on-stream flow from well HGP-A in the East Rift Zone. This well has been shut down for servicing after nearly eight years of continuous production. Excessive H₂S emissions caused threats of legal actions by neighbors to the research geothermal facility, so the well has been shut down until workover is completed. P.I. Don Thomas expects the well will go on line, producing power for Ormat, in about six months. No substantial change in the technical content of the grant is anticipated, but a minimum 6-month NCTE can be expected which will carry the grant termination date to about December 1990.

Phase I studies were completed by DOGAMI on the Santiam Pass deep temperature gradient study. This phase included completion of site selection, environmental studies, and award of permits for drilling. A finding of no significant environmental impact (FONSI) was reached in July and transmitted to DOE. Final review by DOE in Washington delayed the beginning of drilling until it became obvious that drilling could not be completed before winter. DOGAMI hopes to begin drilling, with \$100 K support from Oxbow Geothermal, in 1990.

Comments

Significant new technical results from the 1988 Grants are forthcoming from several teams. The Washington-DNR study has further delineated the Southern Washington Cascade temperature anomaly, and provided some estimates of production rates for Cascade volcanism. The Utah-UGMS study has provided a broad data base for the totally blind Newcastle geothermal resource which should be of interest to industry exploring for both moderate- and high-temperature reservoirs in the Basin and Range province.

Several state teams have inquired about the possibilities of additional funding for present projects, or a new geothermal solicitation when present grants are completed. We have explained that new funding will require congressional support for additional funding for hydrothermal resource assessment, research, and development, and would not be available in FY-90.

New contract modifications extending the contract period should now be in place for: Nevada, UN-LV-DES; and North Dakota-NDMMRI. NCTE's have been requested and are needed by: Utah-UGMS; Washington-DNR; and Wyoming- UWY-DGG.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 9/30/89:	\$22,999
	Total Funds Remaining	\$ -0-

Project Period: 1-31-89 (NCTE to 7/01/89)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades-WA-DNR-Korosec	4/17/89
10. 4 samples, OR Cascades-DOGAMI-Priest	7/12/89

Current Issues:
Final samples delivered this quarter. Grant closed out.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 10/31/89:	\$158,579
	Total Funds Remaining:	\$ -0-

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues:
Ready for final payment to contractor and grant close out.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ -0-

Project Period: 6-31-88

Deliverables:	Date Received
1. Final Report, Geophysical Research on Geothermal Resources in Montana	
1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens	12/23/87
1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson	7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ -0-

Project Period: 6-15-88

Deliverables:	Date	Received
1. Final Report: 1a) Southcentral New Mexico study (NMSU)		6/9/88
1b) Animas Valley (Lightning Dock Geothermal)		6/9/88
1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal)		6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 4/30/89: \$358,473
Total Funds Remaining: \$ -0-

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial:	Total Funding Authorized: \$115,790
	Invoices Through 9/1/88: \$115,790
	Total Funds Remaining: \$ -0-

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI

Grant Number DE-FG07-84ID12606

Financial:

Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ -0-

Project Period: Closed Out

Deliverables:

1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.

Date Received
overdue

8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 October 1989

Team	1988				1989				1990			
	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.
AK-DGGS	A 11	---	---	---	---	---	---	---	---	A 11	---	---
AK-GI	A 11	---	---	---	---	---	O 11	---	---	A (NCTE) 11	---	---
HI-DBED	---	J 20	---	---	---	---	---	---	---	(Will require NCTE)	J 20	---
ID-DWR	M 21	---	---	---	---	---	---	---	---	M 21	---	---
NV-DRI	---	J 1	---	---	---	---	---	---	---	A 30	---	---
NV-UNLV	A 1	---	---	---	---	A 1 (NCTE)	---	---	F 1	---	---	---
NM-NMRDI	---	S 1	---	---	---	---	---	---	---	M 1	---	---
ND-MMRI	A 1	---	---	---	---	---	---	---	M 31 (NCTE)	---	S 30	---
OR-DOGAMI	---	---	---	---	---	---	J 27	---	---	---	10/15/92 (mod.A001)	---
UT-UGMS	---	---	J 1	---	---	A 1 (NCTE)	N 1	---	---	J 31 (NCTE needed)	---	---
WA-DNR	---	A 1	---	---	---	M 31	A 31	D 31	---	---	---	(NCTE needed)
WY-DGG	---	---	J 1	---	---	A 1 (NCTE)	S 1	---	---	J 31 (NCTE needed)	---	---

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 10/31/89 \$52,112
Total Funds Remaining: \$10,888

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geysers Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geysers Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geysers Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

Compilations underway and field work at Geysers Bight area, Umnak Island, is completed. After problems with fluid chemistry analyses, samples have been submitted to UURI. Isotope analyses were completed at SMU. A draft report for the Geysers Bight geochemical study is in preparation.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 10/31/89: \$39,329
Total Funds Remaining: \$16,264

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Geologic map of Geysers Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study
3. Final report on Geysers Bight geothermal area study (Task 4.1.3)

Current Issues:

Field work at Geyser Bight area has been completed. Age dating is complete for all 25 samples. Rock chemistry results have been delayed due to analytical problems at U.C. Santa Cruz. A NCTE has been granted to 4/11/90.

3. Hawaii-Dept. Business and Economic Development Grant Number DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
Invoices Through: 10/31/89: \$ 7,114
Total Funds Remaining: \$ 80,059

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. The HGP-A well has been closed down due to excessive H₂S emissions and a 6 month delay is expected before the silica treatment studies can continue. A NCTE will be required to complete project.

4. Idaho - Dept. of Water Resources Coop. Agreement No. DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
Invoices Through: 10/31/89: \$ 82,435
Total Funds Remaining: \$ 71,653

Project Period: 3-21-90 (24 months)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary

- and interpretation (Task 2.0)
 3. Final technical report, geochemical studies of
 Wood River geothermal systems (Task 3.0)

Current Issues:

All field studies underway. Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Interim report reviewing data submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage. Paul Castelin, Senior Hydrogeologist with DWR has replaced Leah Street as P.I. A no-cost contract modification changing P.I.'s was signed 10/23/89.

5. Desert Research Institute
 University of Nevada System

Grant Number
 DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
 Invoices Through: 10/31/89: \$ 75,242
 Total Funds Remaining: \$ 65,397

Project Period: 4/30/90 (22 months)

Deliverables:

Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson approved by DOE/ID as Permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. Monthly monitoring continues and model calibration underway. A conceptual model has been developed for the Moana geothermal system and a numerical model is being formulated. A NCTE may be required.

6. Division of Earth Sciences
 Univ. of Nevada-Las Vegas

Grant Number
 DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
 Invoices Through: 10/31/89: \$126,325
 Total Funds Remaining: \$ 30,789

Project Period: 2/1/90 (12 months; 5 months NCTE)

Deliverables:

Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model
2. Technical data base submitted to GEOTHERM

Current Issues:

Isotope and fluid chemistry studies in advanced stage. Preliminary results presented at 1989 GRC meeting. A five month NCTE has been requested.

7. New Mexico Research and Development Inst.

Grant Number

DE-FG07-88ID12794

Financial:

Total Funding Authorized: \$126,267

Invoices Through: 10/31/89: \$ 46,341

Total Funds Remaining: \$ 79,926

Project Period: 3-01-90 (18 months)

Deliverables:

Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Patrick Rodriguez replaced Larry Icerman as NMRDI Principal Investigator in September. Jim Witcher, NMSU continues as the technical Principal Investigator. Radon detectors have been retrieved from all areas, and most laboratory results have been received. Drilling to test radon anomalies should begin in November.

8. North Dakota Mining and Mineral Res. Inst.

Grant Number

DE-FG07-88ID12736

Financial:

Total Funding Authorized \$194,814

Invoices Through: 10/31/89 \$108,231

Total Funds Remaining: \$ 86,583

Project Period: 9-30-90 (30 months; NCTE)

Deliverables:

Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)

2. Presentations of results at state and national meetings (Task 4.9)

Current Issues;

Contract modification was requested to extend project 6 months and to change drilling to 8 holes in South Dakota, 2 holes in North Dakota. Amendment signed 11/08/89.

9. State of Oregon
Dept. of Geology and Mineral Industries

Grant Number
DE-FG079ID12834

Financial: Total Funding Authorized \$200,000
Invoices Through 11/14/89 \$ 5,327
Total Funds Remaining \$194,673

Project Period: 10-15-92 (40 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. 7/15/89
2. Phase II final technical report on drilling, lithologic temperature studies; drill logs, interpretation.

Current Issues:

Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I will include environmental checklist, permitting, and site selection. Phase I completed. Oxbow Geothermal Company will contribute \$100 K to drilling project, Phase II. Phase II grant awaited final DOE approval of FONSI in Washington. Phase II awarded 10/17/89.

10. Utah Geological and Mineral Survey

Grant Number
DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
Invoices Through: 10/31/89 \$57,802
Total Funds Remaining: \$ 3,839

Project Period: 11-1-89 (20 months; NCTE to 1-31-90 requested)

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issue

UGMS has completed a radon survey at no additional cost. Project period extended 6 months. Paper presented at 1989 GRC annual meeting. Now working on draft final report.

11. State of Washington
Dept. of Natural Resources

Grant Number
DE-FG07-88ID12740

Financial:

Total Funding Authorized: \$170,776
Invoices Through: 10/31/89 \$170,776
Total Funds Remaining: \$ 22,616
(holding final payment)

Project Period: 8-31-89 (12 months + 5 mo. NCTE; new NCTE needed)

Deliverables:

	Date Received
1. Final technical report for drilling project and heat flow results (Task 4.1)	7/10/89
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)	12/04/89

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. Final report on drilling received 7/10/89. Report on age dating and stratigraphy needs significant revision before becoming final. NCTE needed to 12/31/89.

12. State of Washington
State Energy Office

Grant Number

Financial:

Total Funding Authorized: \$ 51,435

***** Monitoring/Reporting by Ben Lunis, EG&G *****

13. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID12738

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 10/31/89: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 1-31-90 (19 months; NCTE)

Deliverables: Date Received

1. Final technical report describing:
 - a. Computer algorithms developed
 - b. New temperature data from the Cody or Thermopolis hydrothermal system
 - c. Finite-difference model for system studied
 - d. Numerical methods and test results

Current Issues:

Mathematics and algorithms have been largely developed. Delayed due to computer change over and bug in system software, which has now been corrected. NCTE to 1/31/90 has been requested, and a contract modification is in progress.



**EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108
(801) 524-3422**

State Cooperative Reservoir Analysis Program
Quarterly Report

October 1 - December 31, 1989

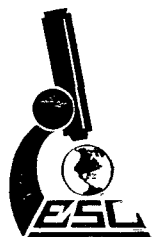
by

Howard P. Ross

Earth Science Laboratory

University of Utah Research Institute
391 Chipeta Way, Suite C
Salt Lake City, Utah 84108
(801) 524-3422

February 21, 1990



UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

February 22, 1990

Kenneth Taylor
SCP Coordinator
DOE/ID
785 DOE Place
Idaho Falls ID 83402

Dear Ken:

Enclosed please find 3 copies of the State Cooperative Program progress report for the quarter ending December 31, 1989. Copies are enclosed for yourself, Peggy Brookshier, and Kenneth Osborne. A separate copy is being sent to Marshall Reed at DOE/GTD.

Please call me with any questions you may have about this report.

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

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Sincerely,



Howard P. Ross
Project Manager

cc: Marshall Reed (w/encl.)

HPR:kr

ESL-90006-PR
DOE/ID/12489-86

STATE COOPERATIVE
RESERVOIR ANALYSIS PROGRAM
QUARTERLY REPORT
October 1 - December 31, 1989

February 21, 1990

by

Howard P. Ross

Earth Science Laboratory
University of Utah Research Institute

INTRODUCTION

This report presents a brief description of State Cooperative Reservoir Analysis Program (SCP) activities by State Teams and by the Department of Energy during the quarter ending December 31, 1989. Project budgets are updated to February 1, 1990.

PRE-1988 GRANTS

University of Arizona - Department of Geosciences

The last four K/Ar dates were completed under this grant in June 1989. Final invoices are in review at DOE/ID.

North Dakota - Mining and Minerals Resource Research Institute

This grant was closed out in 1987 following delivery of the principal deliverable, a final technical report. An important part of this report, the "Geothermal Resources Map of South Dakota" has not yet been delivered to DOE. Final drafting is underway which will permit a black and white map to be printed instead of one with color overlays. The preparation of colored overlays has been the main hold up in completing this deliverable.

STATE TEAM SCHEDULES

PRE-1988 GRANTS

Short Form Summary, 1 November 1989

Team	1989						1990		
	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Az-K/Ar	1 Fm2	(NCTE)						Final Payment	
ND-MMRRI	(Map due — grant closed out)								
Q: Quarterly Report m: Grant Mod. No. F: Final Report NCTE: No Cost Time Ext.									

1988 GRANTS

New data acquisition is completed or nearing completion for most of the 1988 grants, and for these state teams the emphasis is now on data interpretation, integration and reporting. A draft final report has been received from one team, the State of Washington — Department of Natural Resources. A final report has also been received from Idaho — Department of Water Resources, for Task 2, the Boise geothermal aquifer study. Draft final reports are expected from Alaska (Geophysical Institute), Nevada (Division of Earth Sciences), Utah (UGMS) and Wyoming teams in the second quarter, FY90.

New principal investigators were named in past quarters for the New Mexico (Patrick Rodriguez) and Idaho (Paul Castelin) grants, and Elizabeth Jacobson will continue as the P.I. for the remainder of the Nevada — Desert Research Institute grant. Six state teams have requested no-cost-time-extensions (NCTE) and five more teams, Hawaii-DBED, Alaska-DGGS, Idaho-DWR, New Mexico-NMRDI and Nevada-DRI can be expected to request NCTEs.

Major delays have been encountered by two state teams, Hawaii-DBED and Oregon-DOGAMI. The silica treatment studies on Hawaii require fluids and on-stream flow from well HGP-A in the East Rift Zone. This well has been shut down for servicing after nearly eight years of continuous production. Excessive H₂S emissions caused threats of legal actions by neighbors to the research geothermal facility, so the well has been shut down until workover is completed. P.I. Don Thomas expects the well will go on line, producing power for Ormat, in about six months. No substantial change in the technical content of the grant is anticipated, but a minimum 6-month NCTE can be expected which will carry the grant termination date to about December 1990. Drilling of the DOGAMI Santiam Pass Scientific borehole will resume after snowmelt, sometime in the third quarter, FY-90.

Comments

Significant new technical results from the 1988 Grants are forthcoming from several teams. The Washington-DNR study has further delineated the Southern Washington Cascade temperature anomaly, and provided some estimates of production rates for Cascade volcanism. The Utah-UGMS study has provided a broad data base for the totally blind Newcastle geothermal resource which should be of interest to industry exploring for both moderate- and high-temperature reservoirs in the Basin and Range province. The Boise geothermal aquifer study is the most complete study of the resource to date. It quantifies future water level declines under likely development scenarios.

Several state teams have indicated that they have good ideas for new geothermal projects if a new geothermal solicitation should be funded by DOE. We have explained that new funding will require congressional support for additional funding for hydrothermal resource assessment, research, and development, and would not be available until FY-91 at the earliest.

Even with presently defined contract extensions, only two grants will continue beyond September 30, 1990. These are Hawaii, with a probably completion in FY-91, and Oregon-DOGAMI with grant completion scheduled for October 15, 1992.

STATE TEAM STATUS - PRE 1988 GRANTS

1. Arizona - K/Ar Dating Grant Number DE-FG07-86ID12622

Financial:	Total Funding Authorized	\$29,999
	Invoices Through 9/30/89:	\$22,999
	Total Funds Remaining	\$ -0-

Project Period: 1-31-89 (NCTE to 7/01/89)

Deliverables:	Date Received
1. 2 samples, Cerro Prieto -Moore/Reed	4/2/87
2. 2 samples, OR Cascades- DOGAMI-Priest	9/16/87
3. 6 samples, Ascension- UURI- Nielson	9/16/87
4. 4 samples, OR Cascades- DOGAMI- Priest	2/4/88
5. 6 samples, Los Azufres- Moore/Reed	4/4/88
6. 5 samples, OR Cascades- DOGAMI- Priest	4/18/88
7. 1 sample, Ascension- UURI- Nielson	5/4/88
8. 4 samples, WA Cascades - WA-DNR-Korosec	12/31/88
9. 6 samples, WA Cascades-WA-DNR-Korosec	4/17/89
10. 4 samples, OR Cascades-DOGAMI-Priest	7/12/89

Current Issues:
Final samples delivered this quarter. Grant closed out.

2. Idaho Dept. Water Resources Grant Number DE-FG07-84ID12549

Financial:	Total Funding Authorized:	\$158,579
	Invoices Through 10/31/89:	\$158,579
	Total Funds Remaining:	\$ -0-

Project Period: 8-29-88 (NCTE to 6/01/89 in progress)

Deliverables:	Date Received
1. "Geothermal Resource Analysis in Twin Falls County, Idaho": IDWR Final Report	1/11/88
2. "Evaluation of the Boise Geothermal System": Boise State Univ. Final Report	1/11/88
3. "The Hydrothermal System in Central Twin Falls County, Idaho": USGS Final Report (as a subcontractor to IDWR)	5/04/89

Current Issues:
Ready for final payment to contractor and grant close out.

3. Montana-MCMS&T Grant Number DE-FG07-84ID12525

Financial: Total Funding Authorized: \$93,421
Invoices Through 9/1/88: \$93,421
Total Funds Remaining: \$ -0-

Project Period: 6-31-88

Deliverables: Date Received

- 1. Final Report, Geophysical Research on Geothermal Resources in Montana
 - 1a) "Three Dimensional Gravity Modeling Techniques with Application to the Ennis Geothermal Area" by D. Semmens 12/23/87
 - 1b) "A Controlled Source Audiomagnetotelluric Investigation of the Ennis Hot Springs Geothermal Area, Ennis, Montana" by G. R. Emilsson 7/5/88

Current Issues:

All deliverables received and Grant closed out.

4. New Mexico-NMRDI Grant Number DE-FG07-84ID12546

Financial: Total Funding Authorized: \$109,970
Invoices Through 11/1/88: \$109,970
Total Funds Remaining: \$ -0-

Project Period: 6-15-88

Deliverables: Date Received

- 1. Final Report: 1a) Southcentral New Mexico study (NMSU) 6/9/88
 - 1b) Animas Valley (Lightning Dock Geothermal) 6/9/88
 - 1c) Orgrande geothermal resource assessment (Lightning Dock Geothermal) 6/9/88

Current Issues:

All deliverables received and Grant is closed out.

5. Oregon-DOGAMI Grant Number DE-FG07-84ID12526

Financial: Total Funding Authorized: \$359,357
Invoices Through 4/30/89: \$358,473
Total Funds Remaining: \$ -0-

Project Period: 10-31-88

Deliverables:	Date Received
Original Grant	
Task 1.1 Geologic Map, Breitenbush River Area (1:62,500; GMS-46, 1987)	8/7/87
Geologic Map, Crescent Mountain Area (1:62,500; GMS-47, 1987)	8/7/87
Geologic Map, NW/4 of Broken Top 15' (1:24,000; Spec. Paper 21)	8/7/87
Task 1.2 Temperature Data Collection Geothermal-Gradient Data for Oregon (1982-1984); Open File Rep. 0-86-2	8/7/87
Task 1.3 Project Management and Reporting Quarterly	
Mod. M-001	
Task 1.1 Feasibility Study/Scientific Plan for Research (Open File Rep. 0-86-3)	8/7/87
Task 1.2 Geologic Map, McKenzie Bridge 15' Quad., with data, interp., description.	10/31/88
Task 1.3 Project Management and Reporting Quarterly	
Mod. A-002	
Task I. Geologic map, approx. 15 sq. mi. centered on CTG drill site, Sec.28,T8S,R8E, E/2 Breitenbush 15'topo quad.	10/31/88
Task II. Raw data and analyses, well core, CTG drill hole. (archival storage at UURI)	10/31/88
Task III. CTG well study: comprehensive report with geologic and geothermal implications and geologic models.	10/31/88
Tasks 1, I, II, III. Final Technical Report	10/31/88

Current Issues: All work completed and deliverables received. The Grant is closed out.

6. Southern Methodist Univ. Grant Number DE-FG07-84ID12623

Financial:	Total Funding Authorized: \$115,790
	Invoices Through 9/1/88: \$115,790
	Total Funds Remaining: \$ -0-

Project Period: 5-31-88

Deliverables:	Date Received
1. Annual Data Report (GRC Trans., v.11)	3/14/88
2. Final Tech. Report on Cascades heat flow studies and the Heat Flow Map of North America "U.S. Geothermal Database and Oregon Cascade Thermal Studies", by D.D. Blackwell, J. L. Steele, L. Carter.	7/1/88

Current Issues:

All deliverables received and Grant closed out. Additional funding provided by a EG&G Purchase Order to further update the heat flow database.

7. North Dakota-NDMMRI

Grant Number DE-FG07-84ID12606

Financial:

Total Funding Authorized: \$47,000
Invoices Through 6/1/88: \$47,000
Total Funds Remaining: \$ -0-

Project Period: Closed Out

Deliverables:

	<u>Date Received</u> <u>overdue</u>
1. Task 5. Geothermal resource map of South Dakota (scale 1:1,000,000)	
2. Task 7. Final report, "Geothermal Resource Assessment of South Dakota", by W. D. Gosnold, Jr.	8/28/87

Current Issues: Dr. Gosnold continues to work on the final map, which is nearing completion. No date has been set for printing and delivery.

STATE TEAM SCHEDULES

1988 GRANTS

Short Form Summary, 1 February 1990

Team	1988				1989				1990				
	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Jul.	Oct.	
AK-DGGS	A 11	---	---	---	---	---	---	---	---	A 11	---	---	(NCTE needed)
AK-GI	A 11	---	---	---	---	---	---	O 11	---	A 11	---	---	(NCTE)
HI-DBED	---	J 20	---	---	---	---	---	---	---	---	J 20	---	(Will require NCTE)
ID-DWR	---	---	---	---	---	---	---	---	---	---	M 21	---	(NCTE needed)
NV-DRI	---	J 1	---	---	---	---	---	---	---	---	A 30	---	(NCTE needed)
NV-UNLV	A 1	---	---	---	---	---	A 1	---	---	F 1	M 1	---	(NCTE)*
NM-NMRDI	---	---	---	---	---	---	---	---	---	---	M 1	S 30	(NCTE)*
ND-MMRI	A 1	---	---	---	---	---	---	---	---	---	M 31	S 30	(NCTE)
OR-DOGAMI	---	---	---	---	---	---	J 27	---	---	---	---	---	10/15/92 (mod.A001)
UT-UGMS	---	---	J 1	---	---	---	A 1	N 1	---	---	M 31	---	(NCTE)*
WA-DNR	---	A 1	---	---	---	---	M 31	A 31	D 31	---	---	---	Grant in close out (NCTE)
WY-DGG	---	---	J 1	---	---	---	A 1	S 1	---	---	M 31	---	(NCTE)*

*NCTE in progress at DOE/ID

STATE TEAM STATUS - 1988 GRANTS

1. Alaska - Dept. of Natural Resources Grant Number DE-FG07-88ID12744

Financial: Total Funding Authorized: \$72,000
Invoices Through: 1/31/90 \$52,112
Total Funds Remaining: \$19,888

Project Period: 4-11-90 (24 months; will need a NCTE)

Deliverables: Date Received

1. Contributions to GI-UAK geologic map of Geyser Creek Valley area (Task 4.1.1)
2. Report on fluid geochemistry, Geysers Bight KGRA (Task 4.1.2)
3. Contributions to GI-UAK final report on Geysers Bight KGRA study (Task 4.1.3)
4. Geothermal resource map of Aleutian Islands-Alaska Peninsula Region (Task 4.2.1)
5. Tables of fluid geochemistry (Task 4.2.2)
6. Descriptive circular to accompany Geothermal Resource Map (Task 4.2.3)

Current Issues:

A final report of geothermal studies of the Geysers Bight area, Umnak Island, is in the draft stage, and will soon be available for review by DOE. Diversion of staff efforts away from task 4.2 Geothermal Resources Map of the Aleutian Islands-Alaska Peninsula Region, will result in a need for a NCTE, perhaps to 9/30/90.

2. Univ. of Alaska - Geophysical Institute Grant Number DE-FG07-88ID12742

Financial: Total Funding Authorized: \$55,593
Invoices Through: 1/31/90: \$43,083
Total Funds Remaining: \$12,510

Project Period: 4-11-90 (24 months)

Deliverables: Date Received

1. Geologic map of Geysers Creek Valley area at 1:25,000 scale (Task 4.1.1)
2. Management, logistical, technical support for Alaska DGGS fluid chemistry study
3. Final report on Geysers Bight geothermal area study (Task 4.1.3)

Current Issues:

Field work at Geysers Bight area has been completed. Age dating and rock chemistry analytical work has also been completed. The final report is being written in cooperation with Alaska-DGGS and a draft is expected soon.

3. Hawaii-Dept. Business and Grant Number
 Economic Development DE-FG07-88ID12741

Financial: Total Funding Authorized: \$ 87,173
 Invoices Through: 1/31/90: \$ 53,553
 Total Funds Remaining: \$ 33,620

Project Period: 6-20-90 (24 months)

Deliverables: Date Received

1. Final technical report which describes in detail the following studies:
 - a. Silica polymerization studies
 - b. Low-temperature brine treatment
 - c. Fabrication of pilot scale treatment system
 - d. Fluid characterization
 - e. Preliminary design of pilot scale system
 - f. By-product characterization.

Current Issues:

Subcontract between HI-DBED and Univ. of Hawaii was finalized December 1988. Preliminary design of pilot brine treatment system nearing completion, and technician has been hired for experimental work. The HGP-A well has been closed down due to excessive H₂S emissions and a minimum 6 month delay is expected before the silica treatment studies can continue. A NCTE will be required to complete project, but has not yet been requested. Quarterly technical reports are overdue.

4. Idaho - Dept. of Water Resources Coop. Agreement No.
 DE-FC07-88ID12748

Financial: Total Funding Authorized: \$154,088
 Invoices Through: 02/15/90: \$ 93,036*
 Total Funds Remaining: \$ 61,052
 (*December invoice in error, will be resubmitted)

Project Period: 3-21-90 (24 months; will need another NCTE)

Deliverables: Date Received

1. Final technical report, all new studies, Twin Falls County Geothermal Systems (Task 1.0)
2. Final technical report, Boise geothermal aquifer study, to include all new monitoring results, Consultant's report, and IDWR summary and interpretation (Task 2.0) 02/06/90
3. Final technical report, geochemical studies of Wood River geothermal systems (Task 3.0)

Current Issues:

Berkeley Group, Inc. was awarded the contract for numerical model study of Boise geothermal aquifer (Task 2) in April. Final report submitted to IDWR by BGI, and approved by IDWR. Wood River study now in draft report stage. Paul Castelin, Senior Hydrogeologist with DWR has replaced Leah Street as P.I. A no-cost contract modification changing P.I.'s was signed 10/23/89. A NCTE will be required.

5. Desert Research Institute
University of Nevada System

Grant Number
DE-FG07-88ID12757

Financial: Total Funding Authorized: \$140,639
Invoices Through: 01/31/90: \$ 75,242
Total Funds Remaining: \$ 65,397

Project Period: 4/30/90 (22 months)

Deliverables: Date Received

1. Final technical report for the Moana system studies, including monitoring results, interpretation, models (Tasks 4.1-4.5)
2. User's manual for reservoir model, and any new software developed in project (Task 4.5)

Current Issues:

Dr. Elizabeth Jacobson was approved by DOE/ID as Permanent Project Director in June. Task II - Data collection (monitoring and fluid sampling) started about 2 months late. A 13 month monitoring period concluded in January 1990. A conceptual model has been developed for the Moana geothermal system and a numerical model is being formulated. A NCTE will be requested when the amount of additional time has been identified.

6. Division of Earth Sciences
Univ. of Nevada-Las Vegas

Grant Number
DE-FG07-88ID12784

Financial: Total Funding Authorized: \$157,114
Invoices Through: 01/31/90: \$142,510
Total Funds Remaining: \$ 14,604

Project Period: 2/1/90 (12 months; NCTE to 5/1/90 in progress)*

Deliverables: Date Received

1. Final technical report which describes:
 - a. Fluid chemistry study, Great Basin
 - b. Geothermal reservoir rock data
 - c. Glacial ice study
 - d. Archaeological isotope/age date study
 - e. Data base summary
 - f. Description of sampling and analyses
 - g. Great Basin fluid genesis model

2. Technical data base submitted to GEOTHERM

Current Issues:

Technical study is almost completed, but DES is still awaiting some analytical results. Preliminary results presented at 1989 GRC meeting, draft final report in preparation. A NCTE to May 1, 1990 has been requested and is in progress.

7. New Mexico Research and Development Inst. Grant Number
DE-FG07-88ID12794

Financial: Total Funding Authorized: \$126,267
Invoices Through: 01/31/90: \$ 46,341
Total Funds Remaining: \$ 79,926

Project Period: 3-01-90 (18 months; NCTE to 9/30/90 in progress)*

Deliverables: Date Received

1. Final technical report describing soil-depth radon gas surveys; Tortugas Mountain survey; Radium Springs survey; Rincon survey; final evaluation and interpretations.

Current Issues:

Patrick Rodriguez replaced Larry Icerman as NMRDI Principal Investigator in September. Jim Witcher, NMSU continues as the technical Principal Investigator. Radon detectors have been retrieved from all areas, and most laboratory results have been received. Drilling to test radon anomalies should begin in January. NMSU presented preliminary radon results at a meeting at UURI; Dec. 7, 8, 1990. A NCTE is in progress.

8. North Dakota Mining and Mineral Res. Inst. Grant Number
DE-FG07-88ID12736

Financial: Total Funding Authorized \$194,814
Invoices Through: 01/31/90 \$114,692
Total Funds Remaining: \$ 80,122

Project Period: 9 -30-90 (30 months; NCTE)

Deliverables: Date Received:

1. Detailed final technical report including all new data, maps, tables (Tasks 4.1-4.8)
2. Presentations of results at state and national meetings (Task 4.9)

Current Issues:

Contract modification was requested to extend project 6 months and to change drilling to 8 holes in South Dakota, 2 holes in North Dakota. Amendment signed 11/08/89. Dr. Gosnold gave two major presentations in 1989.

9. State of Oregon Grant Number
Dept. of Geology and Mineral Industries DE-FG079ID12834

Financial: Total Funding Authorized \$200,000
Invoices Through 01/31/90 \$ 8,736
Total Funds Remaining \$191,264

Project Period: 10-15-92 (40 months)

Deliverables: Date Received

1. Phase I final report to include: geologic map at 1:62,500 of Santiam Pass area; drill site identification and description; plan of operations; drilling permits and environmental assessment. 7/15/89
2. Phase II final technical report on drilling, lithologic temperature studies; drill logs, interpretation.

Current Issues:

Unsolicited proposal from DOGAMI. Verbal agreement between DOGAMI and DOE/ID to fund in two phases. Phase I included environmental checklist, permitting, and site selection (completed). Oxbow Geothermal Company contributed \$100 K to drilling project, Phase II. Phase II awarded 10/17/89. Santiam Pass drill hole 77-24 drilled to 460 feet, cemented, cased in November. Drilling will resume 3rd quarter FY-90.

10. Utah Geological and Mineral Survey Grant Number
DE-FG07-88ID12756

Financial: Total Funding Authorized: \$61,641
Invoices Through: 01/31/90 \$57,802
Total Funds Remaining: \$ 3,839

Project Period: 11-1-89 (20 months; NCTE to 3-31-90 in progress)*

Deliverables: Date Received

1. Final technical report, which will include all new geological, geochemical, and geological data (Tasks 4.1-4.9)
2. Geological map of the Newcastle geothermal area (scale 1:24,000) (Tasks 4.2, 4.3)

Current Issue:

UGMS has completed a radon survey at no additional cost. Project period extended 6 months. Paper presented at 1989 GRC annual meeting. Now working on draft final report.

11. State of Washington
Dept. of Natural Resources

Grant Number
DE-FG07-88ID12740

Financial: Total Funding Authorized: \$170,776
Invoices Through: 01/31/90 \$170,776
Total Funds Remaining: \$ -0-

Project Period: 8-31-89 (12 months + 5 mo. NCTE)

Deliverables:	Date Received
1. Final technical report for drilling project and heat flow results (Task 4.1)	7/10/89
2. Final technical report, volcanology study, models of Cascade volcanism (Task 4.2)	12/4/89

Current Issues:

Eight thermal gradient holes were drilled to depths of 500 ft. and preliminary temperature gradients have been determined. Contract modification M001 reflects this change from the original statement of work. Final report on drilling received 7/10/89. Final Report on age dating and stratigraphy received 12/4/89. Grant being closed out.

12. University of Wyoming
Dept. Geology and Geophysics

Grant Number
DE-FG07-88ID12738

Financial: Total Funding Authorized: \$ 45,511
Invoices Through: 01/31/90: \$ 35,000
Total Funds Remaining: \$ 10,511

Project Period: 1-31-90 (19 months; NCTE to 3/31/90 in progress)*

Deliverables:	Date Received
1. Final technical report describing: a. Computer algorithms developed b. New temperature data from the Cody or Thermopolis hydrothermal system c. Finite-difference model for system studied d. Numerical methods and test results	

Current Issues:

Mathematics and algorithms have been largely developed. Delayed due to computer change over and bug in system software, which has now been corrected. NCTE to 3/31/90 has been requested, and a contract modification is in progress.



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