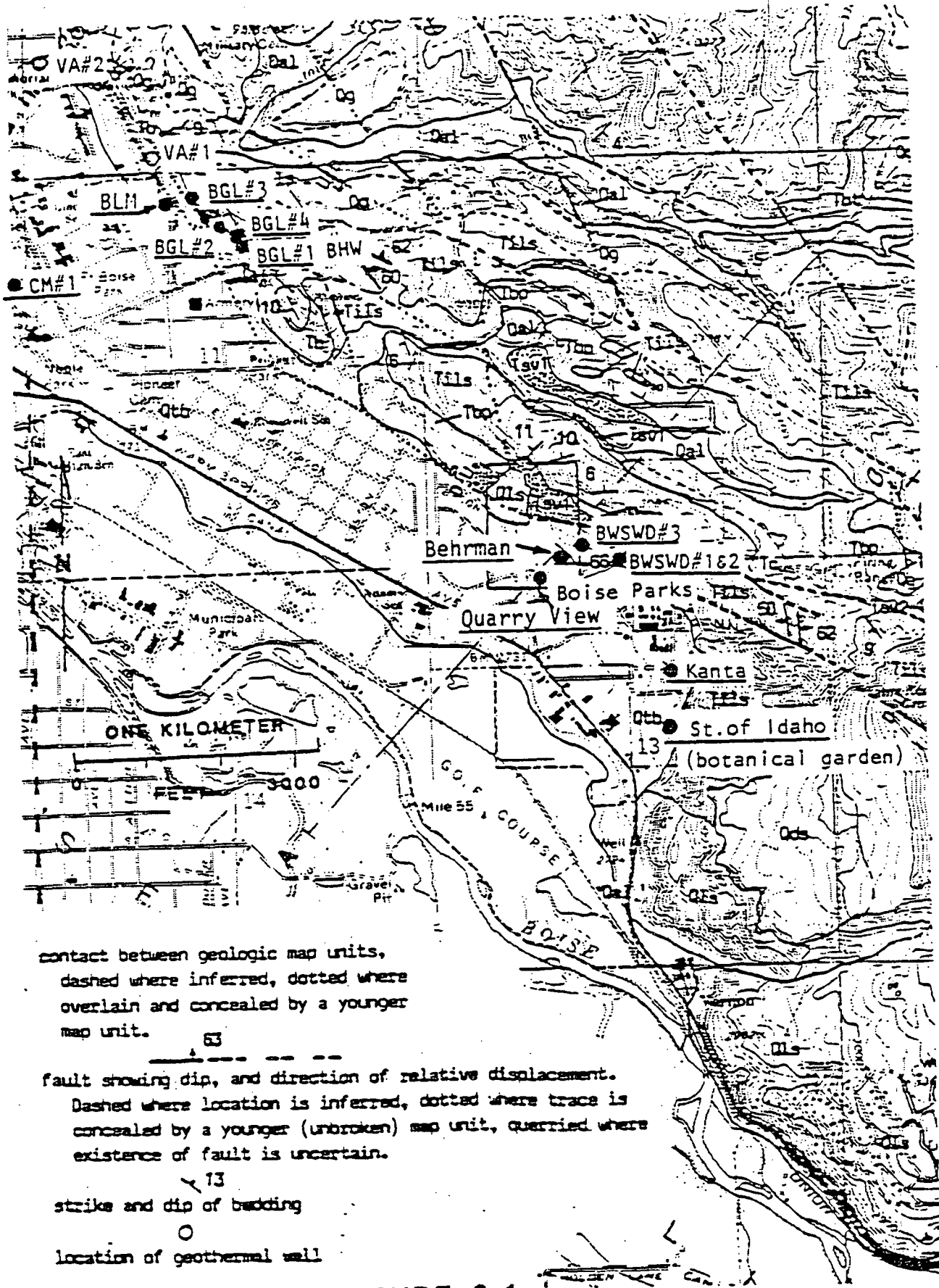


TABLE I
GEOHERMAL WELLS IN THE BOISE VICINITY

<u>WELL NAME</u>	<u>TOTAL DEPTH (FEET)</u>	<u>FORMATION IN WHICH TERMINATED OR COMPLETED</u>	<u>GEOLOGIC SETTING</u>
Behrman	?	?	?
BGL No. 1	2,000	IDAVADA	Type I (Fault Zone)
BGL No. 2	880	IDAVADA	Type I (Fault Zone)
BGL No. 3	1,897	IDAVADA	Type I (Fault Zone)
BGL No. 4	1,103	IDAVADA	Type I (Fault Zone)
BHW	1,281	?	Type I (Fault Zone)
BLM (BEH)	1,224	Basaltic Tuff	Type I (?) (Proximal to Fault Zone?)
BWSWD No. 1 & 2	410	IDAVADA	Type I (Fault Zone)
BWSWD No. 3	595	IDAVADA	Type I (Fault Zone)
CM No. 1	2,152	IDAVADA	Type II (Fractured Rhyolite)
CM No. 2	3,030	IDAVADA	Type II (Fractured Rhyolite)
Edwards Greenhouse	1,195	?	Type I (Fault Zone?)
Harris	690 (approx)	Idaho Batholith & Idaho Group?	Type III (Fractured Granite?)
Kanta	1,105	IDAVADA	Type II (Fractured Rhyolite)
Koch	1,143	?	?
Milstead	?	?	?
Quarry View	865	IDAVADA	Type II (Fractured Rhyolite)
State of Idaho (Botanical Garden)	875	Idaho Group of IDAVADA	Type II (?) Fractured Rhyolite
State of Idaho Veterans	487	IDAVADA	Type II (?)
Administration (test)	1,847	IDAVADA	Type I (Fault Zone)
(production)	1,666	IDAVADA	Type I (Fault Zone)
(Injection)	2,312	IDAVADA	Type I (Fault Zone)

1:30 p.m. Ken Taylor
~~2:00 p.m.~~



contact between geologic map units,
 dashed where inferred, dotted where
 overlain and concealed by a younger
 map unit.

fault showing dip, and direction of relative displacement.
 Dashed where location is inferred, dotted where trace is
 concealed by a younger (unbroken) map unit, quarried where
 existence of fault is uncertain.

strike and dip of bedding
 location of geothermal well

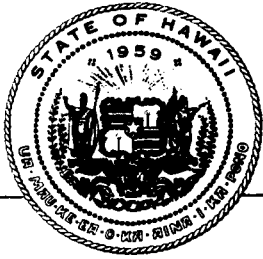
BWSWD - Kanta = 1675 ft.

FIGURE 2-1

HYDROLOGIC SETTING AND DATA GATHERING
BOISE WARM SPRINGS WATER DISTRICT (BWSWD) WELLS 1 and 2

*Drawn
by [unclear]
P. [unclear]
Most
[unclear] need
Remarking
on [unclear]
[unclear]
[unclear]*

Boise Warm Springs Water District pumping well, (BWSWD) Wells Nos. 1 and 2, and an observation well, BWSWD No. 3, are shown in Figure 2-1. Wells 1 and 2 are 30 feet apart and are both drilled into a fracture zone which strikes approximately N70°W, dips steeply southwest and is downthrown to the southwest. Well No. 2 is the principal pumping well for the district. Usually No. 1 is pumped only when No. 2 cannot supply the demand on the system. Figures 2-²/₂ and ²/₂-3 show drawdown versus time in wells 2 and 1, respectively, plotted with combined production in gallons per minute (gpm) from the system. The periods for the plots are 6/11/85 to 6/11/86. The data for the plots were provided by the Boise Warm Springs Water District Engineer, Mr. Robert Griffiths. Water-level measurements are made using an airline in each well. Flow-rate measurements are calculated from a Sparling cumulative flow meter installed in a common pipe served by both wells. Water levels and the Sparling meter are read once per day, usually in the morning between 8 a.m. and 10 a.m., or occasionally in late morning or afternoon. The readings reflect the water level only at the time of reading and are somewhat skewed toward levels at a time of day when domestic demand is high. However, during the peak heating season, even random readings commonly reflect a maximum drawdown.



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

JOHN WAIHEE
Governor

MURRAY E. TOWILL
Director

BARBARA KIM STANTON
Deputy Director

RICK EGGED
Deputy Director

TAKESHI YOSHIHARA
Deputy Director

ENERGY DIVISION, 335 MERCHANT ST., RM. 110, HONOLULU, HAWAII 96813 PHONE: (808) 587-3800 FAX: (808) 587-3820

July 8, 1992

*Rec. 7/13/92
HPP*

Ms. Ginger Sandwina
U.S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

Dear Ms. Sandwina:

Enclosed are five copies of the final technical report, "Silica Recovery and Control in Hawaiian Geothermal Fluids," prepared under DOE Grant DE-FG07-88ID-12741. One copy is for the Contracting Office and four copies are for Mr. Kenneth J. Taylor, the DOE Project Officer.

This completes the State of Hawaii's commitment under the grant.

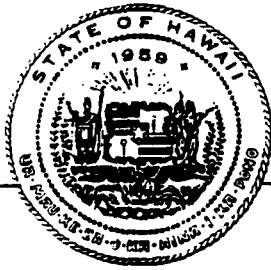
Sincerely,

Maurice H. Kaya
Energy Program Administrator

MHK/GOL:js:386

Enclosures

cc: Marshall Reed
Howard Ross



DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

ENERGY DIVISION, 335 MERCHANT ST., RM. 110, HONOLULU, HAWAII 96813 PHONE: (808) 548-4080 FAX: (808) 531-5243

JOHN WAIHEE
Governor
MURRAY E. TOWILL
Director
BARBARA KIM STANTON
Deputy Director
RICK EGGED
Deputy Director
TAKESHI YOSHIHARA
Deputy Director

January 10, 1992

Ms. Mary Wilcox
U.S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

Dear Ms. Wilcox:

It has recently come to our attention that we have not submitted Quarterly Technical Progress Reports during 1991 for Grant No. DE-FG07-88ID-12741, "Silica Control and Recovery in Geothermal Fluids." Because the Federal portion of this project expired in June 1991, we are submitting the reports (attached) for the two quarters ending March 31 and June 30, 1991.

Actual costs through March 31, 1991 were \$80,295.01 chargeable to USDOE and \$31,414.26 chargeable to the State of Hawaii; and through June 30, 1991 (or the end of the Federal portion of the project) they were \$87,073.00 for USDOE and \$38,925.88 for the State of Hawaii.

The Project Investigator, Dr. Donald M. Thomas, did not provide us with any interim technical reports during the first half of 1991. However, he did submit a draft final technical report which we forwarded to you by our letter dated December 6, 1991. We hope that you agree that no useful purpose would be served now, to reconstruct interim technical reports from the Project Investigator for the first two quarters of calendar year 1991.

Unless otherwise advised by you, we will not be submitting any further periodic progress reports relating to this grant. We will submit a Final Technical Report after we have received your comments on the draft submitted to us on December 6, 1991.

Sincerely,

Maurice H. Kaya
Energy Program Administrator

MHK/GOL:js:282
cc: Howard Ross
Marshall Reed
Earl Jones
Kenneth J. Taylor

**U.S. DEPARTMENT OF ENERGY
FEDERAL ASSISTANCE MANAGEMENT SUMMARY REPORT**

1. Program/Project Identification No. DE-FG07-88ID-12741	2. Program/Project Title Silica Control & Recovery in Geothermal Fluids	3. Reporting Period 01/01/91 through 03/31/91
4. Name and Address State of Hawaii Department of Business, Economic Development & Tourism Post Office Box 2359, Honolulu, Hawaii 96813		5. Program/Project Start Date 06/20/88
		6. Completion Date 06/20/91

7. FY 1988- 1991	8. Months or Quarters Quarters	Fiscal Year: Quarters:	88	89	89	89	89	90	90	90	90	91	91	91			
			4	1	2	2	4	1	2	3	4	1	2	3			
9. Cost Status a. Dollars Expressed in Thousands			b. Dollar Scale ↓														
10. Cost Chart																	
Fund Source		Quarter FY 1991													Cum. to Date	Tot. Plan	
U.S. DOE	P	0													0	87	87
	A	0													1	80	
State of HI	P	0													0	57	57
	A	0														31	
Univ. of HI	P	0													0	11	11
	A	0														1	
	P																
	A																
Total P		0	0	155	155												
Total A		0	1	112													
Variance			1	(43)													
P = Planned A = Actual			11. Major Milestone Status														
Total Planned Costs for Program/Project			Planned	1	5	30	60	115	130	140	155	155	155	155	155		
			Actual	0	3	4	41	48	89	100	102	111	111	112			
			Variance	(1)	(2)	(26)	(19)	(67)	(41)	(40)	(53)	(44)	(44)	(43)			

11. Major Milestone Status	Units Planned	
	Units Complete	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	
	P	
	C	

12. Remarks

13. Signature of Recipient and Date *Shard Luperance for Maurice H. Kaya* **14. Signature of DOE Reviewing Representative and Date** *1/10/92*

U.S. DEPARTMENT OF ENERGY
NOTICE OF FINANCIAL ASSISTANCE AWARD
(See Instructions on Reverse)

Under the authority of Public Law PL 93-410 and
subject to legislation, regulations and policies applicable to (cite legislative program title):
Geothermal Energy Research, Development, and Demonstration Act of 1974

1. PROJECT TITLE Silica Control and Recovery in Hawaiian Geothermal Fluids		2. INSTRUMENT TYPE <input checked="" type="checkbox"/> GRANT <input type="checkbox"/> COOPERATIVE AGREEMENT	
3. RECIPIENT (Name, address, zip code, area code and telephone no.) State of Hawaii Department of Business and Economic Development P.O. Box 2359, Honolulu, HI 96804		4. INSTRUMENT NO. DE-FG07-88ID12741	5. AMENDMENT NO.
8. RECIPIENT PROJECT DIRECTOR (Name and telephone No.) Dr. Donald Thomas (808) 948-6482		6. BUDGET PERIOD FROM: 6/20/88 THRU: 6/20/89	7. PROJECT PERIOD FROM: 6/20/88 THRU: 6/20/90
9. RECIPIENT BUSINESS OFFICER (Name and telephone No.) Gerald O. Lesperance (808) 548-4020 <i>new geothermal number → (808) 586-2352 6/17/89</i>		10. TYPE OF AWARD <input checked="" type="checkbox"/> NEW <input type="checkbox"/> CONTINUATION <input type="checkbox"/> RENEWAL <input type="checkbox"/> REVISION <input type="checkbox"/> SUPPLEMENT	
11. DOE PROJECT OFFICER (Name, address, zip code, telephone No.) Kenneth J. Taylor (208) 526-9063 U.S. DOE/Idaho Operations Office 785 DOE Place, Idaho Falls, Idaho 83402		12. ADMINISTERED FOR DOE BY (Name, address, zip code, telephone No.) Trudy A. Thorne (208) 526-9519 U.S. Department of Energy Idaho Operations Office 785 DOE Place Idaho Falls, Idaho 83402	

13. RECIPIENT TYPE

<input checked="" type="checkbox"/> STATE GOV'T	<input type="checkbox"/> INDIAN TRIBAL GOV'T	<input type="checkbox"/> HOSPITAL	<input type="checkbox"/> FOR PROFIT ORGANIZATION	<input type="checkbox"/> INDIVIDUAL
<input type="checkbox"/> LOCAL GOV'T	<input type="checkbox"/> INSTITUTION OF HIGHER EDUCATION	<input type="checkbox"/> OTHER NONPROFIT ORGANIZATION	<input type="checkbox"/> C <input type="checkbox"/> P <input type="checkbox"/> SP	<input type="checkbox"/> OTHER (Specify)

14. ACCOUNTING AND APPROPRIATIONS DATA				15. EMPLOYER I.D. NUMBER/SSN
a. Appropriation Symbol	b. B & R Number	c. FT/AFP/OC	d. CFA Number	
89X0224.91	AM 1510000	YA 410		

16. BUDGET AND FUNDING INFORMATION	
a. CURRENT BUDGET PERIOD INFORMATION	b. CUMULATIVE DOE OBLIGATIONS
(1) DOE Funds Obligated This Action \$ 87,173	(1) This Budget Period \$ 87,173 [Total of lines a.(1) and a.(3)]
(2) DOE Funds Authorized for Carry Over \$ -0-	(2) Prior Budget Periods \$ -0-
(3) DOE Funds Previously Obligated in this Budget Period \$ -0-	(3) Project Period to Date \$ 87,173 [Total of lines b. (1) and b. (2)]
(4) DOE Share of Total Approved Budget \$ 87,173	
(5) Recipient Share of Total Approved Budget \$ 68,242	
(6) Total Approved Budget \$ 155,415	

17. TOTAL ESTIMATED COST OF PROJECT \$ 155,415
(This is the current estimated cost of the project. It is not a promise to award nor an authorization to expend funds in this amount.)

18. AWARD/AGREEMENT TERMS AND CONDITIONS

This award/agreement consists of this form plus the following:

a. Special terms and conditions (if grant) or schedule, general provisions, special provisions (if cooperative agreement)

b. Applicable program regulations (specify) _____ (Date) _____

c. DOE Assistance Regulations, 10 CFR Part-600, as amended, Subparts A and B (Grants) or C (Cooperative Agreements).

d. Application/proposal dated June 19, 1987 as submitted with changes as negotiated

19. REMARKS This Grant consists of this NFAA (DOE F 4600.1), Part I - Budget Plan, Part II - Special Conditions, Part III - General Conditions, Part IV - Statement of Work, and Part V - Reporting Requirements. DOE Financial Assistance Rules (10 CFR Part 600), OMB Circular A-102, OMB Circular A-87, and OMB Circular A-128 "Audits of State and Local Governments" are hereby incorporated by reference.

20. EVIDENCE OF RECIPIENT ACCEPTANCE <i>[Signature]</i> _____ (Signature of Authorized Recipient Official) (Date) Mr. Roger A. Ulveling _____ (Name) Director, Department of Business & Economic Development _____ (Title)	21. AWARDED BY <i>[Signature]</i> _____ (Signature) (Date) J. P. Anderson _____ (Name) Contracting Officer _____ (Title)
--	---

FEDERAL ASSISTANCE BUDGET INFORMATION FORM

FORM EIA-459C
(10 80)

FORM APPROVED
OMB No. 1900-0127

1. Program/Project Identification No. DE-FG07-88ID12741		2. Program/Project Title Silica Control and Recovery in HI Geothermal Fluids	
3. Name and Address State of Hawaii, Department of Business and Economic Development, P. O. Box 2359, Honolulu, HI 96804			4. Program/Project Start Date June 20, 1988
			5. Completion Date June 20, 1990

SECTION A - BUDGET SUMMARY						
Grant Program, Function or Activity (a)	Federal Catalog No. (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. 12693	81.087	\$	\$	\$	\$	\$
2. First Year				52,555.	63,433	115,988
3. Second Year				34,618	4,809	39,427
4.						
5. TOTALS		\$	\$	\$	\$	\$

SECTION B - BUDGET CATEGORIES					
6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	1st Year		2nd Year		
	(1) DOE	(2) Hawaii	(3) DOE	(4) Hawaii	
a. Personnel	\$29,070	\$ 4,000	\$19,366	\$ 2,681	\$55,117
b. Fringe Benefits Fed. 30% Non-Fed. 42.07%	8,721	1,683	5,810	1,128	17,342
c. Travel	3,592	750	2,300	600	7,242
d. Equipment		45,000			45,000
e. Supplies		12,000		400	12,400
f. Contractual					
g. Construction					
h. Other	1,000		442		1,442
i. Total Direct Charges	42,383	63,433	27,918	4,809	138,543
j. Indirect Charges Fed. 24% Non-Fed. 0	10,172	-0-	6,700	-0-	16,872
k. TOTALS	\$52,555	\$ 63,433	\$34,618	\$ 4,809	\$155,415
7. Program Income	\$	\$	\$	\$	\$

Note: This Grant is for a twenty four month period at a total estimated DOE cost of \$87,173 and total estimated Grantee cost of \$68,242 for a total of \$155,415.

This will be funded as follows:

First Year: DOE	-	\$52,555	Grantee	-	\$63,433
Second Year: DOE	-	34,618	Grantee	-	4,809
		<u>\$87,173</u>			<u>\$68,242</u>

Special Terms and Conditions for Research Grants

The requirements of this attachment take precedence over all other requirements of this grant found in regulations, the general terms and conditions, DOE orders, etc. except requirements of statutory law. Any apparent contradiction of statutory law stated herein should be presumed to be in error until the Grantee has sought and received clarification from the Contracting Officer, whose signature appears on the face page of this award.

1. Payments and Cost-Share

- a. The Grantee may request advance payment of cost to be incurred. Such requests should not exceed the expected outlays by the Grantee in the succeeding 30-day period.
- b. Cost-Share Arrangement - The cost-share will be in accordance with Part I - Budget Plan. Invoices must include in-kind contributions and DOE's reimbursed costs. To be an invoiced cost, a cash or in-kind contribution must be allowable under the terms and conditions of the award and meet the applicable cost principle tests of allowability in 10 CFR 600.103.

The Department of Energy will pay the salaries, fringe benefits, and travel for Dr. Donald Thomas, Principal Investigator and a University of Hawaii technician. All other salaries, fringe benefits, and travel will be paid by the state of Hawaii. All equipment costs and supplies will be paid by the state of Hawaii, and other costs will be paid by the Department of Energy. Indirect costs will be applied to the Department of energy's cost-share. Indirect costs associated with the state of Hawaii's cost-share will not be billed to DOE nor be considered an allowable cost for this grant.

- c. Payments to the Grantee shall equal the Federal share of actual allowable costs of performance of this grant, provided however, and notwithstanding any other provision of this grant, that the Government's monetary liability under this grant shall not exceed the Government share of the total approved budget or an amount equal to the Federal share of actual allowable costs, whichever is less. The Grantee shall be obligated to perform under this grant throughout the agreed-upon period of performance, and to bear all costs which DOE has not agreed to pay. However, the Grantee shall have the right to cease to perform when or after the Federal share of actual allowable costs equals or exceeds the Government share of the total approved budget and if prior written notice to that effect has been provided to DOE.
- d. The Government obligations may be increased unilaterally by DOE by written notice to the Grantee and may be increased or decreased by written agreement of the parties.

- e. Upon termination or expiration of the total period of performance, the Grantee shall promptly refund to DOE (or make such disposition as DOE may in writing direct) any sums paid by DOE to the Grantee under this grant in excess of the cumulative Government allowable cost incurred in performance under the grant.
- f. Applicable Credits - The Grantee agrees that any refunds, rebates, credits, or other amounts (including any interest thereon) accruing to or received by the Grantee or any assignee under this grant shall be paid by the Grantee to the Government, to the extent that they are properly allocable to costs for which the Grantee has been reimbursed by the Government under this grant. Reasonable expenses incurred by the Grantee for the purpose of securing such refund, rebates, credits, or other amounts shall be allowable costs hereunder when approved by the Contracting Officer.
- g. Audit Adjustments - The Contracting Officer may have invoices or vouchers and statements of cost submitted under this grant audited at any time prior to the end of the required retention period for the grant records. Each payment made shall be subject to reduction for amounts included in the related invoice or voucher which are found by the Contracting Officer, on the basis of audit, not to constitute allowable cost. If a final audit of costs has not been performed prior to closeout of the grant, DOE or its successor agency, shall have the right to recover an appropriate amount after fully considering the recommendations on disallowed costs resulting from the final audit when conducted.
- h. Cognizant Office - Invoices should be sent to the individual designated in Block 12. of the Notice of Financial Assistance Award Form (NFAA). In addition to the initial supply of forms made available with this award, appropriate payment forms and instructions will be provided by this office upon request.

2. Budget Flexibility and Limitation of DOE Liability

- a. Under the terms of this award, grantee may obligate up to 110% of the amount awarded by DOE for a budget period, during that period, without prior authorization by DOE. Obligations in excess of 110% of the amount awarded by DOE require prior DOE authorization. (A prior approval made in accordance with the provisions of paragraph b. of this clause would constitute such prior approval.) Such authorized grantee obligations in excess of the amount awarded by DOE for a budget period shall be funded from unobligated funds remaining from the prior budget period to the extent they are available; or such obligations may be incurred at grantee's own risk, subject to the following conditions:
 - (1) If grantee receives a continuation or renewal award, the amount obligated in excess of 100% may be charged against the subsequent continuation or renewal award to the extent not funded from any unobligated balance from an earlier budget period.

- (2) Even if prior authorization required by this paragraph has been obtained, grantee shall not be entitled to reimbursement, or have any claim against DOE, for any amount obligated by grantee in excess of the total funds obligated by DOE, if a continuation or renewal award is not made.
- b. When the funds remaining unobligated by the grantee in any given budget period are 10% or less of the amount awarded by DOE for the subsequent budget period, grantee may use the unobligated funds during the subsequent budget period to pay for costs (1) budgeted for in either budget period and (2) subject to any applicable prior approval requirements. If funds remaining unobligated by the grantee at the end of a budget period exceed 10% of the amount awarded for the subsequent budget period, use of the amount in excess of 10% must receive the prior approval of the Contracting Office.
- c. Nothing in paragraphs a. or b. of this article shall in any way require DOE to increase the total obligated for the project period or to make any additional supplemental, continuation, renewal, or other award for the same or any other purpose.

3. Reporting Program Technical Performance

- a. Copies. Copies of reports and all other related data and information generated under this grant shall be submitted in accordance with the attached Federal Assistance Reporting Checklist (DOE Form EIA-459A).
- b. Publication of Results. The Grantee may publish the results of its work. However, publications and reports prepared under this grant shall contain the following acknowledgment statement, "This (material) was prepared with the support of the U.S. Department of Energy (DOE) Grant No. DE-FG07-88ID12741. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of DOE."
- c. Reporting Requirements. The Federal assistance recipient shall prepare and submit (postage prepaid) the plans and reports indicated on the Federal Assistance Reporting Distribution List. Preparation of the specified plans and reports shall be in accordance with DOE Order 1332.2. The level of detail the recipient provides in the plans and reports shall be commensurate with the scope and complexity of the task and shall be as delineated in Block 4 - Reporting Requirements and Block 5 - Special Instructions.

All reports delivered to DOE shall be the sole property of DOE. The Grantee shall not claim that any report contains any trade secrets or commercial or financial information deemed by the Grantee to be privileged or confidential, or that the Grantee has any proprietary interest in any report.

4. Designated Key Personnel

The following individual is designated key personnel in accordance with General Condition No. 14:

Dr. Donald Thomas

5. Project Completion Date

The project completion date identified in Block 7. of the Notice of Financial Assistance Award includes an additional 90 days for completion of the final report. All R&D effort must be completed 90 days prior to the project completion date. Only costs associated with preparation of the final report will be allowed during the 90 days prior to the project completion date.

6. Technical Data

Except for technical data contained in pages N/A of the recipient's application, dated N/A, which are asserted by the Grantee as being proprietary data, it is agreed that as a condition of this award, and notwithstanding the provisions of any notice appearing on the application, the Government shall have the right to use, duplicate, disclose and have others do so for any purpose whatsoever the technical data not identified in the above blanks contained in the application upon which this award is based.

7. Prior Approval

The following actions or costs specified in the application require prior approval of DOE and are specifically disapproved in accordance with General Condition No. 3:

None

8. General Procurement Prior Approval

Article 17 of the General Terms and Conditions for Research Grants is hereby revoked. Grantee must receive prior approval from DOE before entering into any sole source contract or a contract where only one bid or proposal is received, when the value of the contract in the aggregate is expected to exceed \$25,000.

9. Patent Clauses

The following patent clauses and technical data requirements are applicable to this grant award:

600.118(b)(2) "Patent Rights (Short Form)"

600.118(b)(3) "Rights in Technical Data (Short Form)"

600.118(b)(5) "Authorization and Consent"

600.118(b)(6) "Notice and Assistance"

600.118(c) "Reporting of Royalties"

10. Title to Equipment

- a. Title to the following items of equipment shall vest with the Grantee upon completion of this grant:

Custom built heat exchanger

- b. Title to the following items of equipment shall vest with the Government at the end of the grant project period:

None

11. Annual Budget Review

The Budget Plan included in this grant is subject to annual review by DOE. The Grantee shall submit to the DOE Contracting Officer: 1) the status of progress on the research effort; 2) the actual costs to date; 3) the estimated cost to complete the research effort being supported; and 4) any proposed charges to the current budget plan. This information shall be submitted annually in the same level of detail as the original proposal. The annual submission date shall be within 15 days of the day identified as the start date of the budget period in Block 6. of the Notice of Financial Assistance Award. Items 1) and 2) above may be provided as part of the Financial Assistance Management Summary Report (FAMSR) if the annual submission date and the normal FAMSR due date coincide.

12. Audit Requirements

In addition to the terms and conditions identified in blocks 18.b. and 18.c. of the Notice of Financial Assistance Award and those attached to this award, if any, the recipient shall comply with the audit requirements contained in the DOE Financial Assistance rules, 10 CFR 600, Subpart D, Audits of State and Local Governments.

General Terms and Conditions for Research Grants

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General Terms and Conditions for Research Grants

1. Explanation

These general terms and conditions do not restate all the provisions of applicable statutes and regulations nor do they represent an exhaustive listing of all requirements applicable to this grant. Rather they highlight and are consistent with those requirements which are especially pertinent to research grants in general. They are being emphasized by inclusion here either because they are invoked with high frequency, their violation is a matter of especially serious concern (e.g., use of human subjects), and/or they have been restated in the research context to be more easily understood by the research community.

In addition to these general terms and conditions, the grantee must comply with all governing requirements, including those identified in Block 18 of the Notice of Financial Assistance Award and those included in the Special Terms and Conditions attached to this grant award.

2. Grantee Adherence to Grant Terms and Conditions

The grantee's signature on the application and on the Notice of Financial Assistance Award signifies the grantee's agreement to the terms and conditions of award. Should the grantee believe modification of any of the terms and conditions of this award is necessary, an authorized official of the grantee organization or, in the case of an individual, the grantee, must submit a written request on its own behalf or on behalf of any subgrant recipient or applicant to the Contracting Officer named on the face page of this award.

Following this procedure is very important because many of the terms and conditions of this grant are required by statute and must be enforced by the Department of Energy.

3. Definitions

Principal Investigator

As used herein, the scientist or other programmatic expert named in Block 8 of the Notice of Financial Assistance Award designated by the grantee organization to direct the scientific/technical efforts being supported (also called program director or project director/leader).

Prior Approval

A statement in writing, signed by the DOE Contracting Officer, that a cost may be incurred or an action may be taken. The approval may take the form of a letter or of a revision to the grant. If actions or costs requiring prior approval are specified in the application and are not expressly disapproved by DOE in the attached Special Terms and Conditions, the award of the grant constitutes such prior approval.

4. Authorized Grantee Signatures for Prior Approval Requests

All requests for prior approval must be signed by an individual who is authorized to act for the grantee organization. The signature of the Principal Investigator (unless also a corporate officer or otherwise authorized) is insufficient to obtain action on a prior approval request, although countersignature by the Principal Investigator is not discouraged. Requests for budget revisions shall be made on the same budget format as used in applying for this grant and must be supported by a narrative justification. Other prior approval requests may be made by letter. Prior approval requests should be addressed to the Contracting Officer named on the face page of this award.

5. Allowable Costs/Applicable Cost Principles

In accordance with the applicable cost principles cited below and up to the amount shown on the face page of this award for the total approved budget for the current budget period (line 16.a.(6)), the allowable costs of this grant shall consist of the actual allowable direct costs incident to performance of this project plus the allocable portion of the allowable indirect costs, if any, of the organization less applicable credits.

The allowability of costs for work performed under this grant and any subsequent subaward will be determined in accordance with the Federal cost principles applicable to the grantee or subrecipient in effect on the date of award or, for any subaward, in effect as of the date of that subaward, except as modified by other provisions of this grant or the subaward.

The Federal cost principles applicable to specific types of grantees and subrecipients are:

1. Institutions of Higher Education. OMB Circular A-21, Cost Principles Applicable to Grants, Contracts and Other Agreements with Institutions of Higher Education, is applicable to both public and private colleges and universities.
2. State and local governments and Indian tribal governments. OMB Circular A-87, Cost Principles Applicable to Grants, Contracts and other Agreements With State and Local Governments, is applicable to state, local, and Indian tribal governments (and shall also be used to the extent appropriate for foreign governments).
3. Hospitals. 45 CFR Part 74, Appendix E, Principles for Determining Costs Applicable to Research and Development under Grants and Contracts with Hospitals, applies to nonprofit and for-profit hospitals.

4. Other nonprofit organizations and individuals. OMB Circular A-122, Cost Principles Applicable to Grants, Contracts, and other Agreements with Nonprofit Organizations, applies to nonprofit organizations and individuals except for nonprofits specifically exempted by the terms of the circular or those nonprofits covered by the cost principles cited in items 1.- 3. above.
5. Commercial firms and certain nonprofit organizations. 48 CFR Subpart 31.2, Contracts with Commercial Organizations, as supplemented by 48 CFR Subpart 931.2, applies to those nonprofit organizations not covered by OMB Circular A-122, as specified by the terms of that circular, and to all commercial organizations other than those covered by the cost principles in item 3. above.

6. Payment

Payments under this award will be made by an advance payment method unless DOE determines that the grantee's financial management system does not meet the requirements of 10 CFR 600.109 or the grantee has not maintained, or demonstrated the willingness and ability to maintain, procedures that will minimize the time elapsing between transfer of funds from the U.S. Treasury and their disbursement for grant-related purposes.

The appropriate advance payment method or the reimbursement method and the cognizant finance office are specified in the attached Special Terms and Conditions.

Advances by the grantee to subgrantee and contractor organizations must conform substantially to the same standards of timing and amount that govern advances made by the Federal Government to the grantee. Excess cash advances erroneously withdrawn from the U.S. Treasury shall be promptly refunded to DOE unless the funds will be disbursed within seven calendar days or the amount is less than \$10,000 and will be disbursed within 30 calendar days.

Interest earned on advance payments to other than state governments or their subgrantees shall be reported on the Report of Federal Cash Transactions (SF-272) and promptly remitted to the cognizant finance office (unless otherwise specified in the attached Special Terms and Conditions) by check payable to the Department of Energy.

7. Preaward Costs

Costs incurred prior to the beginning date of a new or renewal award are allowable only if they were approved in writing, prior to incurrence, by a DOE Contracting Officer. (Note - this provision does not apply to such bid and proposal costs as may be recovered through an indirect cost rate negotiated in accordance with the applicable Federal cost principles.)

8. Reporting Requirements

Attached to this grant award is EIA 459A, a checklist of the reports required under this grant.

The grantee shall submit a technical progress report (also called a performance report) as part of any application for continuation or renewal of DOE grant support. This report shall be in lieu of a separate annual performance report. Upon completion or termination of the project, the final technical report shall be prepared in accordance with the applicable program rule cited on the face page of this award or, in the absence of such program rule coverage, with the technical reporting format specified in the Uniform Reporting System for Federal Assistance (Grants and Cooperative Agreements) (DOE/MA-001).

The grantee shall submit an annual Financial Status Report (SF-269) within 90 days after the close of the budget period shown on the face page of this award. The grantee shall submit a final Financial Status Report within 90 days after the completion or termination of the project period shown on the face page of this award unless the project period is extended. In the latter case, the report for the last budget period of the existing project period shall be considered an annual report.

Instructions concerning reports to be submitted in conjunction with payment under this award are specified in the attached Special Terms and Conditions.

9. Cost-Sharing

Any cost-sharing as shown on the face page of this award shall defray allowable costs of the project only. Allowability of such costs shall be determined in accordance with the statutes, regulations, applicable cost principles, and other terms and conditions governing this award.

Cost-sharing contributions may be in the form of direct or indirect costs, including cash or in-kind contributions, incurred by the grantee, its subgrantees, or contractors. The cost sharing may be in any allowable budget category or combination of categories. When a direct cost item represents some or all of the non-Federal contribution, any associated indirect costs may not be charged to Federal funds but may be counted as part of the cost-sharing. The treatment of a contributed cost as direct or indirect must be consistent with the classification of similar items charged to DOE funds.

Valuation of in-kind contributions and documentation of cost-sharing shall be in accordance with 10 CFR 600.107.

10. Continuations, Renewals, and Extensions

Grantees are responsible for assuring that properly completed applications for continuation awards are received no later than 4 months prior to the expiration date of the current budget period shown on the Notice of Financial Assistance Award.

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Valuation of in-kind contributions and documentation of cost-sharing shall be in accordance with 10 CFR 600.107.

10. Continuations, Renewals, and Extensions

Grantees are responsible for assuring that properly completed applications for continuation awards are received no later than 4 months prior to the expiration date of the current budget period shown on the Notice of Financial Assistance Award.

If a grantee wishes to apply for a renewal award in order to receive funding beyond the scheduled expiration of the existing project period, a properly completed application must be submitted to DOE no later than four months prior to the scheduled expiration date of the project period as shown on the Notice of Financial Assistance Award.

Grantee requests for extensions (modifications extending an existing project period by 18 months or less in order to complete a project) must be submitted prior to the expiration date of the project period as shown on the face page of this award, and must include a budget for the use of any remaining funds or any additional funds requested. Any request for an extension, which includes a request for additional funds and any request for an extension of more than 90 days, should be submitted to DOE no later than four months prior to the scheduled expiration date of the project period.

11. Maximum DOE Obligation

This grant is subject to the requirement that the maximum DOE obligation to the recipient is the amount shown on the Notice of Financial Assistance Award as the amount of DOE funds obligated. DOE shall not be obligated to make any additional, supplemental, continuation, renewal or other award for the same or any other purpose.

12. Transfers of Funds Between Grants

Transfers of funds between DOE grants, and transfers of funds from a DOE grant to a project (or portion of a project) not supported by that grant require the prior approval of DOE. Transfer of funds into a DOE grant-supported project from a grant awarded by another Federal agency does not require DOE prior approval but may, of course, require the approval of the other Federal agency. Funds so transferred from the grant of another Federal agency may not be used to satisfy any cost-sharing requirement on a DOE grant.

13. Property

Real and Tangible Personal Property

No real property may be acquired under this award.

Title to any equipment (an article of tangible personal property that has a useful life of more than 2 years and an acquisition cost of \$500 or more) or supplies acquired by a nonprofit institution of higher education or a nonprofit organization whose primary purpose is the conduct of scientific research shall vest in the grantee and such equipment shall be exempt from accountability except that DOE has the right to transfer ownership of any item of equipment having a unit acquisition cost of \$1,000 or more under the conditions specified in 10 CFR 600.117(d)(2). This exemption is derived from Public Law 95-224. The Federal Grant and Cooperative Agreement Act of 1977, as amended.

Title to equipment and supplies acquired by all other grantees shall vest in the grantee. However, such grantees shall be accountable for equipment with a unit acquisition cost of \$1,000 or more acquired under this grant as specified in 10 CFR 600.117(d)(2), (3) and (4). For such grantees, supplies need only be accounted for at closeout and then only if they are unused and exceed \$1,000 in total aggregate current fair market value. In this case accountability requires that DOE be compensated in an amount computed in accordance with Section 600.117(e) if the supplies are retained for use on non-Federal activities.

All grantees shall follow property management policies and procedures which provide for adequate control of the acquisition and use of assets acquired under the grant.

Intangible Property

Treatment, including reporting, of patent and data rights and copyrights shall be as specified in the Special Terms and Conditions of this grant.

14. Change or Absence of the Principal Investigator or Designated Key Personnel

Since the DOE decision to fund a project is based, to a significant extent, on the qualifications and level of participation of the Principal Investigator, a change of Principal Investigator or of the level of effort of the Principal Investigator is considered a change in the approved project. The approval of DOE must be obtained prior to any change of the Principal Investigator or, in certain cases, other key personnel who have been identified as key personnel in the Special Terms and Conditions of this grant. In addition, any continuous absence of the Principal Investigator in excess of three months or plans for the Principal Investigator to become substantially less involved in the project than was indicated in the approved grant application requires DOE prior approval. Grantee is encouraged to contact DOE immediately upon becoming aware that any of these changes are likely to be proposed, but in any event must do so and receive DOE prior approval before effecting any such change.

15. Changes in Objectives or Scope

Any change in the objectives or scope of a grant-supported project requires the prior approval of DOE. Such changes include changes in the phenomenon or phenomena under study and in the methodology or experiment if they are a specific objective of the research work as stated in the application approved by DOE.

16. Transfer of Substantive Programmatic Effort

None of the substantive effort of this project may be transferred by contract or subgrant to another organization or person without the prior approval of DOE. This provision does not apply to the procurement of

equipment, supplies, materials, or general support services which may, however, be subject to other prior approval requirements as found, for example, in the applicable cost principles or procurement standards.

17. General Procurement Prior Approval Requirements

A grantee must receive prior approval from DOE before entering into any sole source contract or a contract where only one bid or proposal is received when the value of the contract in the aggregate is expected to exceed 1) \$10,000 and the grantee is a state, local, or Indian tribal government or 2) \$5,000 for all other grantees.

18. Equipment and Other Capital Expenditures

Expenditures for equipment and other capital assets having a unit acquisition cost of \$500 or more require the prior approval of DOE with one exception. For special purpose equipment, prior approval is required only when the unit acquisition cost is \$1,000 or more. (Special purpose equipment means equipment which is used only for research, medical, scientific, or other technical activities.)

19. Travel

Foreign Travel - DOE prior approval is required for each separate foreign trip. Foreign travel must be directly related to the project objectives. Foreign travel is any travel outside Canada and the United States and its territories and possessions or, for grantees located in another country, travel outside that country.

Domestic Travel - Such costs are allowable to the extent provided in the approved budget. In addition, grantees may exceed the approved budget amount for domestic travel by up to 25% or \$500 whichever is greater, without DOE prior approval. All other expenditures for domestic travel beyond these limits require prior approval.

20. Consultant Services

Costs of consultant services are allowable subject to satisfaction of the requirements of the applicable cost principles, including the requirement that the consultant not be an employee of the grantee organization. There is one exception to the requirement that the consultant not be an employee of the grantee organization which applies to colleges and universities only. For colleges and universities, in unusual cases, and only with the prior approval of DOE, intra-organizational consultation may be permitted where consultation is across departmental lines or involves a separate or remote operation.

21. Paperwork Reduction

This award is subject to the requirements of the Paperwork Reduction Act of 1980 as implemented by the Office of Management and Budget rules,

"Controlling Paperwork Burdens on the Public," published at 5 CFR 1320 (48 FR 13666, 3/31/83) if the grantee will collect information from ten or more respondents either:

- A. At the specific request of DOE, or
- B. If the award requires specific DOE approval of the information collection or the collection procedures.

Any proposed sponsored information collection under item 21 B. above shall be submitted by the grantee to the Contracting Officer named on the face page of this award at least 90 days prior to the intended date of information collection. DOE will seek the requisite approval from the Office of Management and Budget and will promptly notify the grantee of the disposition of the request.

22. Generally Applicable Requirements

In accordance with 10 CFR 600.12, this grant is subject to a number of statutory and other generally applicable requirements. Those requirements most pertinent to research projects are highlighted below:

Animal Welfare

Any grantee performing research on warm-blooded animals shall comply with the Laboratory Animal Welfare Act of 1966 (Public Law 89-544, as amended) and the regulations promulgated thereunder by the Secretary of Agriculture at 9 CFR Chapter 1, Subchapter A, pertaining to the care, handling, and treatment of warm-blooded animals held or used for research, teaching, or other activities supported by Federal awards. The grantee is expected to ensure that the guidelines described in Department of Health and Human Services (DHHS) Publication No. [NIH] 78-23, "Guide for the Care and Use of Laboratory Animals," are followed (Copies are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20024, Stock No. 017-040-00427-3).

Research Involving Recombinant DNA Molecules

Any grantee performing research involving recombinant DNA molecules and/or organisms and viruses containing recombinant DNA molecules agrees by acceptance of this grant to comply with the National Institutes of Health "Guidelines for Research Involving Recombinant DNA Molecules," June 1983 (48 FR 24556) or such later revision of those guidelines as may be published in the Federal Register.

Use of Human Subjects in Research, Development, and Related Activities

Any DOE grantee performing research, development, or related activities involving any use of human subjects must comply with DOE regulations

found at 10 CFR Part 74S "Protection of Human Subjects" and any additional Provisions which may be included in the Special Terms and Conditions of this grant. Such provisions are intended to safeguard the rights and welfare of human subjects at risk of possible physical, psychological, or social injury as a consequence of their participation.

23. Nondiscrimination

This grant is subject to the provisions of 10 CFR Part 1040 "Nondiscrimination in Federally Assisted Programs."

24. Public Access to Information

The Freedom of Information Act, as amended, and the DOE implementing regulations (10 CFR Part 1004) require the release by DOE of certain documents and records regarding grants upon written request by any member of the public. The intended use of the information will not be a criterion for release. These requirements apply to information held by DOE, and do not require grantees, their subgrantees, or their contractors to permit public access to their records.

Records maintained by DOE with respect to grants are subject to the provisions of the Privacy Act and the DOE implementing regulations (10 CFR Part 1008) if those records constitute a "system of records" as defined in the Act and the regulations. Generally, records maintained by grantees, their subgrantees, or their contractors are not subject to these requirements.

25. Acknowledgement of Support

Publication of the results of this grant, subject to any applicable restrictions in 10 CFR 600.118 ("Patents, data, and copyrights"), is encouraged. Any article which is published shall include an acknowledgement that the research was supported, in whole or in part, by a DOE grant (including the grant number), but that such support does not constitute an endorsement by DOE of the views expressed in the article.

26. National Security

It is not expected that activities under this grant will generate or otherwise involve classified information (i.e., Restricted Data, Formerly Restricted Data, National Security Information).

However, if in the opinion of the grantee or DOE such involvement becomes expected prior to the closeout of the grant, the grantee or DOE shall notify the other in writing immediately. If the grantee believes any information developed or acquired may be classifiable, the grantee shall not provide the potentially classifiable information to anyone, including the DOE officials with whom the grantee normally communicates, except the Director of Classification, and shall protect such information

as if it were classified until notified by DOE that a determination has been made that it does not require such handling. Correspondence which includes the specific information in question shall be sent by registered mail to U.S. Department of Energy, Attn: Director of Classification, DP-32, Washington, DC 20545. If the information is determined to be classified the grantee may wish to discontinue the project, in which case the grantee and DOE shall terminate the grant by mutual agreement. If the grant is to be terminated, all material deemed by DOE to be classified shall be forwarded to DOE, in a manner specified by DOE, for proper disposition. If the grantee and DOE wish to continue the grant, even though classified information is involved, the grantee shall be required to obtain both personnel and facility security clearances through the Office of Safeguards and Security. Costs associated with handling and protecting any such classified information shall be negotiated at the time the determination to proceed is made.

27. Liabilities and Losses

DOE assumes no liability with respect to any damages or loss arising out of any activities undertaken with the financial support of this grant.

28. Contracting Officer's Technical Representative (COTR)

The individual identified in Block 11. of the Notice of Financial Assistance Award as the DOE Project Officer is the Contracting Officer's Technical Representative (COTR). The COTR is responsible for 1) monitoring the research efforts being conducted by the Grantee under the scope of this award; 2) advising the Contracting Officer on technical matters related to administration of the grant, including progress and status of the Grantee's research; and 3) providing technical advice and guidance to the Grantee in order to assist both the research efforts of the Grantee and the Grantee's adherence to the grant terms and conditions.

The COTR does not have the authority to:

Cause an increase or decrease in the total estimated cost of, or the time required for, the research effort being supported;

Cause any change in the express terms and conditions of the grant;

Cause any change in the objectives or scope of the effort being supported;

Act in the capacity of the Contracting Officer by issuing any approval or disapproval required by the terms and conditions of the grant;

Interfere with the Grantee's right to perform under the terms and conditions of the grant.

29. Interest

(a) Notwithstanding any other term or conditions of this grant, all amounts that become payable by the recipient to the Government under this grant shall bear simple interest from the date due until paid unless paid within 30 days of becoming due. The interest rate shall be the interest rate established by the Secretary of Treasury (Secretary) as provided in Section 11 of the Debt Collection Act of 1982 (31 U.S.C. 3717), which is applicable to the period in which the amount becomes due, as provided in paragraph (b) of this provision, and then at the rate applicable for each three-month period as fixed by the Secretary until the amount is paid.

(b) Amounts shall be due at the earliest of the following dates:

- (1) The date fixed under this grant.
- (2) The date of the first written demand for payment consistent with this grant, including any demand resulting from a termination.
- (3) The date the Government transmits to the recipient a proposed agreement to confirm completed negotiations establishing the amount of debt.

(c) The interest charge made under this provision may be reduced in accordance with the procedures prescribed in 4 CFR 102.13 or in accordance with agency regulations in effect on the date of original award of this grant.

STATEMENT OF WORK

1.0 INTRODUCTION

The goal of this grant is to support cost-shared research on geothermal resource development in the state of Hawaii. Several productive, high temperature geothermal wells have been drilled in the Kilauea East Rift Zone and a major geothermal resource is known to be present. The geothermal brines have a high silica content and brine disposal could have negative environmental impacts or inordinately expensive waste management for commercial scale power production. This research project will examine concepts for reducing the operating cost and potential environmental problems associated with the disposal of silica-laden geothermal brines.

2.0 SCOPE

The technical objective of this grant is to accomplish the initial phase of demonstrating that the large volume, high silica geothermal brines associated with the hydrothermal resource in the Kapoho Reservoir of the Kilauea East Rift Zone can be disposed of on a commercial scale, in an economical and environmentally acceptable manner. The rate of silica polymerization in the geothermal brines will be determined under both natural conditions and with the addition of known amounts of transition metal salts. A custom-made brine treatment system will be constructed into a side stream of brine at the state-owned Puna Research Center for brine treatment tests. Chemical reaction rates, recovery and precipitation data will be obtained and the characteristics of the residual fluid will be determined. The recovered silica will be studied for chemical and physical characteristics and potential by-product recovery value. Preliminary design for a larger scale system will be developed, and options for silica removal evaluated. All tasks including reporting will be completed in a 24-month period.

3.0 APPLICABLE DOCUMENTS

The research described herein is abstracted from a proposal titled "Hawaii Geothermal Research and Development Project," dated June 17, 1987, and submitted by the Department of Planning and Economic Development, state of Hawaii. This proposal was modified in a letter to DOE-ID dated October 28, 1987. The proposal was submitted in response to DOE-ID Program Research and Development Announcement (PRDA) for State Geothermal Research and Development - PRDA No. DE-PRO7-87ID12662.

4.0 TECHNICAL TASKS

The following tasks will be accomplished under this grant.

- 4.1 Polymerization Studies. Complete an analysis of the rate of polymerization of the dissolved silica from the geothermal brine at temperatures ranging from 100 degrees C down to 30 degrees C, and after the addition of the following reagents: acid and caustic; iron sulfate; and potassium aluminum sulfate. Investigate other commercially available reagents for scale/polymerization control to determine whether it will be possible to either better accelerate or to retard the rate of silica polymerization.

- 4.2 Low-temperature Brine Treatment. Conduct an experiment to treat a continuous side stream of brine (cooled to temperatures of less than 100 degrees C) with pH control and metal ion reagents at the optimum levels determined in the polymerization studies. Analyze the depositional characteristics of the brine for settling efficiency, recovery rates, and fouling temperatures of less than 100 degrees C. Analyze the effect of reagent addition and retention times on the rate of silica deposition inside the treatment system, in the heat exchanger, and in a retention volume at the outlet of the treatment system. Test the efficiency of removal of the silica from the low temperature fluids. Design a high-temperature pressurized treatment system.
- 4.3 Fabricate a pilot scale treatment system based on the results of subtask 4.2. Conduct tests with pH control and reagent addition to determine the effects of the brine treatment on the deposition rate of silica in the piping system and in the heat exchanger.
- 4.4 Fluid Characterization. Analyze the discharge fluids from subtask 4.3 for solids settling rates and residual silica concentrations. Conduct a particle size/fouling experiment to determine fouling rates of filters having varying pore sizes.
- 4.5 Preliminary Design of Pilot Scale System. Prepare a preliminary design for a larger scale silica treatment system capable of handling the full brine load from the HGP-A geothermal generator.
- 4.6 By-product Characterizations. Retain the precipitated silica recovered from the long-term operation of the small scale treatment system and analyze this silica for its physical and chemical characteristics that are relevant to possible commercial use. Analyze for particle sizes, specific surface areas, overall purity, and concentrations of key coloration elements such as iron, zinc, and manganese. Investigate potential uses for the silica and determine the silica removal and treatment conditions that will optimize the most valuable characteristics of the recovered by-product.

5.0 REPORTS, DATA, AND OTHER DELIVERABLES

5.1 Management Records

Reports will be due as indicated on the Federal Assistance Reporting Checklist and the Report Distribution List.

5.2 Final Report

A final technical report will be submitted which will describe all experiments and experimental apparatus in detail. Chemical analyses and physical property determinations will be tabulated in an appropriate form and included in this report. Interpretations and conclusions will also be presented. A draft of the final technical

report will be submitted no later than 60 days after completion of all subtasks, and not less than 45 days prior to the scheduled delivery of the final report.

6.0 SPECIAL CONSIDERATIONS

The state of Hawaii will provide \$45,000 to construct and install a reagent mixing system, and the state and private sector will provide \$12,000 in supplies and expendable equipment.

REPORT DISTRIBUTION LIST

Grant No. DE-FG07-88ID12741

Report/Plan	Form No.	Frequency	No. of Copies	Address
Federal Assistance Management Summary Report	EIA-459E	Q	1,1,1,1,1	a,b,c,d,e
Notice of Energy RD&D	DOE 538	O	1,1	a,f
Technical Progress Report	N/A	Q	1,1,1,1	a,b,d,e
Topical Report	N/A	A	1,4,1,1	a,b,d,e
Final Technical Report	N/A	F	1,4,1,1	a,b,d,e
Financial Status Report	SF 269	F	1,1,1	a,b,c

LIST OF ADDRESSEES

a. U.S. Department of Energy 785 DOE Place Idaho Falls, ID 83402 Attn: Trudy A. Thorne	f. U.S. Department of Energy Technical Information Center P.O. Box 62 Oak Ridge, TN 37830
b. Same as above Attn: Kenneth J. Taylor	
c. Same as above. Attn: Earl Jones	
d. U.S. Department of Energy Forrestal Bldg., CE-342 1000 Independence Ave, SW Washington, DC 20585 Attn: Marshall Reed	
e. University of Utah Research Institute Earth Science Laboratory 391 Chipeta Way, Suite C Salt Lake City, UT 84108-1295 Attn: Howard Ross	

U.S. DEPARTMENT OF ENERGY Grant No. DE-FG07-88ID 12741
FEDERAL ASSISTANCE REPORTING CHECKLIST

FORM EIA 459A
 (10-80)

FORM APPROVED
 OMB NO 1900 0127

1. Identification Number: DE-FG07-88ID 12741	2. Program/Project Title: Geothermal Research & Development Asst.		
3. Recipient: State of Hawaii, Business and Economic Development			
4. Reporting Requirements: PROGRAM/PROJECT MANAGEMENT REPORTING <input type="checkbox"/> Federal Assistance Milestone Plan <input type="checkbox"/> Federal Assistance Budget Information Form <input checked="" type="checkbox"/> Federal Assistance Management Summary Report <input type="checkbox"/> Federal Assistance Program/Project Status Report <input checked="" type="checkbox"/> Financial Status Report, OMB Form 269 TECHNICAL INFORMATION REPORTING <input checked="" type="checkbox"/> Notice of Energy RD&D <input checked="" type="checkbox"/> Technical Progress Report <input checked="" type="checkbox"/> Topical Report <input checked="" type="checkbox"/> Final Technical Report	Frequency	No. of Copies	Addressees
	Q	1,1,1,1,1	a,b,c,d,e
	F	1,1,1	a,b,c
	O	1,1	a,f
	Q	1,1,1,1	a,b,d,e
	A	1,4*,1,1	a,b*,d,e
	F	1,4*,1,1	a,b*,d,e
FREQUENCY CODES AND DUE DATES: A - As Necessary; within 5 calendar days after events. F - Final; 90 calendar days after the performance of the effort ends. O - Quarterly; within 30 days after end of calendar quarter or portion thereof. Q - One time after project starts; within 30 days after award X - Required with proposals or with the application or with significant planning changes. Y - Yearly; 30 days after the end of program year (Financial Status Reports 90 days). S - Semiannually; within 30 days after end of program fiscal half year.			
5. Special Instructions: *3 copies plus a camera-ready copy			
6. Prepared by: (Signature and Date) <i>Ken Jay'a 1-27-88</i>	7. Reviewed by: (Signature and Date) <i>Stacy Brown 2/2/88</i>		

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
391 CHIPETA WAY, SUITE C
SALT LAKE CITY, UTAH 84108-1295
TELEPHONE 801-524-3422

M E M O R A N D U M

TO: Kenneth Taylor, DOE/ID

Date: March 30, 1989

FROM: Howard Ross

Subject: Annual Budget Review, Grant No. DE-FG07-88ID12741
State of Hawaii, Dept. of Business and Economic Development

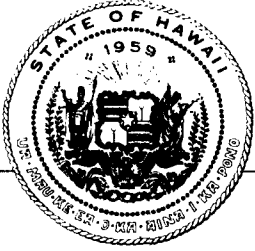
The State of Hawaii, Department of Business and Economic Development (HI-DBED) grant is substantially behind schedule due to a prolonged delay in executing subcontracts with the University of Hawaii. Since December 1988, considerable progress has been made on the start up for Task 4.1, Silica Polymerization Studies; Task 4.2, Low-temperature Brine Treatment; Task 4.5, Preliminary Design of Pilot Scale System, and Task 4.6, By-product characterizations. A laboratory chemical technician who will work on these tasks, has been hired; a literature search and back-ground studies are underway; and a facilities use agreement was negotiated with the Natural Energy Lab of Hawaii. A preliminary design of the pilot brine treatment system is nearing completion and the silica polymerization rate experiment will begin next quarter.

The expenditure of funds is behind schedule, comparable to the delay in starting project work, but expenditures will reach planned levels in the next quarter. I anticipate the need for a three- to six-month no cost time extension before this grant will be completed.



Howard Ross
Project Manager

HPR:kr



DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

ENERGY DIVISION, 335 MERCHANT ST., RM. 110, HONOLULU, HAWAII 96813 FAX: (808) 531-5243

JOHN WAIHEE
GOVERNOR

ROGER A. ULVELING
DIRECTOR

BARBARA KIM STANTON
DEPUTY DIRECTOR

LESLIE S. MATSUBARA
DEPUTY DIRECTOR

89:1064B-203

Rec 3/27/89
HPR

March 21, 1989

Ms. Trudy Thorne
U.S. Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

Dear Ms. Thorne:

The purpose of this letter is to request a modification to our DOE grant (No. DE-FG07-88ID12741) in order to continue the contract term for the second budget period from June 20, 1989 through June 20, 1990.

We would like to request that the contract be modified to allow us to carry the unexpended balance of funds from the current budget period (June 20, 1988 through June 20, 1989) over to our second year of investigations. This action is necessary because of delays encountered in executing the necessary contracts between the Department of Business and Economic Development (DBED) and the University of Hawaii. As a result, initiation of the research program by Dr. Donald Thomas at the University was delayed until December 27, 1988, the date of contract execution between DBED and the University. The schedule of expenditure of the funds has been delayed several months which will result in a substantial unexpended balance in the contract at the end of the budget period. Although the schedule of the research program as proposed will have to be modified somewhat, carryover of the unexpended balance will enable us to complete all the tasks as described in the statement of work. The proposed schedule of expenditures is attached.

The progress that has been accomplished on the research program since the initiation of work is described in the attached report. Should you have any questions on the work or on the contract continuation, please contact me at your convenience.

Sincerely,

MAURICE H. KAYA
Energy Program Administrator

MHK/GOL:wn

Attachments

✓ cc: Mr. Howard Ross (w/attachments)

REVISED PLANNED EXPENDITURE OF USDOE FUNDS
GROUP NO. DE-FG-07-88ID12741

FY 1989

1st quarter	\$ 3,000
2nd quarter	\$ 6,000
3rd quarter	\$17,000
4th quarter	\$17,000
	<u>\$43,000</u>

End of 1st Year Project

1st quarter	\$17,000
2nd quarter	\$17,000
3rd quarter	\$10,173
	<u>\$44,173</u>

End of 2nd Year Project

\$87,173

REVISED PLANNED EXPENDITURE OF USDOE FUNDS
GROUP NO. DE-FG-07-88IDT2741

FY 1989

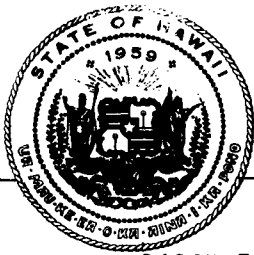
1st quarter	\$ 3,000
2nd quarter	\$ 6,000
3rd quarter	\$17,000
4th quarter	\$17,000
	<u>\$43,000</u>

End of 1st Year Project

1st quarter	\$17,000
2nd quarter	\$17,000
3rd quarter	\$10,173
	<u>\$44,173</u>

End of 2nd Year Project

\$87,173



DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

ENERGY DIVISION, 335 MERCHANT ST., RM. 410, HONOLULU, HAWAII 96813

1034B:508

November 10, 1988

GOVERNOR

ROGER A. ULVELING
DIRECTOR

BARBARA KIM STANTON
DEPUTY DIRECTOR

LESLIE S. MATSUBARA
DEPUTY DIRECTOR

*Rec
11/14/88
HPR*

Ms. Trudy Thorne
U.S. Department of Energy
785 Doe Place
Idaho Falls, Idaho 83402

Dear Ms. Thorne:

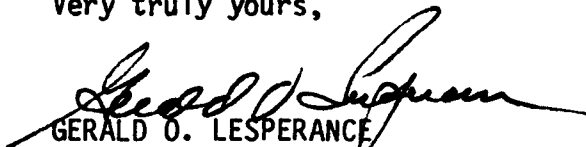
RE: DE-FG-07-88ID12741, "Silica Control and Recovery in Hawaiian Geothermal Fluids"

This letter is to advise you that no quarterly reports will be submitted for the quarter ending September 30, 1988, for the reasons indicated below.

Due to longer than anticipated delays in obtaining internal approvals including authorization from the Governor of Hawaii, our notice to proceed to our subcontractor, the University of Hawaii at Manoa, was not issued until September 29, 1988. No expenses were incurred involving Federal funds during the quarter ending September 30, 1988.

The Principal Investigator, Dr. Donald S. Thomas, was a co-organizer of the International Workshop, "Deposition of Solids in Geothermal Systems" in Iceland, August 16-19, 1988. Our Department funded this travel. We will incorporate the technical and State fiscal aspects of this workshop in the report for the quarter ending December 31, 1988.

Very truly yours,


GERALD O. LESPERANCE
Alternate Energy Specialist

GOL:geo

cc: Mr. Earl Jones
Mr. Marshall Reed
Mr. Howard Ross ✓
Mr. Kenneth J. Taylor