Box 13
264

THE MARYSVILLE, MONTANA, GEOTHERMAL PROJECT

**SPECIFICATIONS
FOR
DRILLING THE DEEP GEOTHERMAL RESEARCH WELL**

Prepared by:

ROGERS ENGINEERING CO., INC.

for:

SPONSOR:

**THE NATIONAL SCIENCE FOUNDATION
RESEARCH APPLIED TO THE NATION'S NEEDS (RANN)**

CO-PRINCIPAL INVESTIGATORS:

**BATTELLE PACIFIC NORTHWEST LABORATORIES
SOUTHERN METHODIST UNIVERSITY**

**ENGINEER AND DRILLING PROGRAM MANAGER:
ROGERS ENGINEERING CO., INC.**

April 1, 1974

**Donated By:
Herbert Rogers Jr.
Rogers Engineering Co.**

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**S-73017
April 1, 1974**

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SECTION 1.1

INVITATION TO BIDDERS

- 1.1.1** **RECEIPT OF PROPOSALS:** Sealed Proposals on forms prepared by the Engineer will be received by ROGERS ENGINEERING CO., INC. at 16 Beale Street, San Francisco, California 94105 until 11:00 A. M. (local time) on 29 April 1974 for drilling the deep well for the MARYSVILLE GEOTHERMAL PROJECT for ROGERS ENGINEERING CO., INC., Operator for BATTELLE PACIFIC NORTHWEST LABORATORIES, Principal Investigator and Grantee of THE NATIONAL SCIENCE FOUNDATION at four (4) miles west of Marysville, Montana, in accordance with Drawings, Specifications and other Contract Documents prepared by ROGERS ENGINEERING CO., INC.
- 1.1.2** **PROPOSALS WILL BE PUBLICLY OPENED AND READ** at 11:00 A. M. (local time) on 29 April 1974 at ROGERS ENGINEERING CO., INC., 16 Beale Street, San Francisco, California.
- 1.1.3** **OBTAINING CONTRACT DOCUMENTS:** Drawings, Specifications and other Contract Documents may be obtained upon application at the office of ROGERS ENGINEERING CO., INC. after 10:00 A. M. on 5 April 1974.
- 1.1.4** **PROPOSAL GUARANTY**
- Each Proposal shall be accompanied by an acceptable form of Proposal Guaranty in amount of Five Thousand and No/100 Dollars (\$5,000.00) payable to ROGERS ENGINEERING CO., INC. as a guaranty that if the Proposal is accepted, the Bidder will execute the Contract and file acceptable Performance and Labor and Material Payment Bonds within ten (10) days after the award of the Contract.
- 1.1.5** **OPERATOR'S RIGHTS RESERVED**
- ROGERS ENGINEERING CO., INC., hereinafter called the Operator, reserves the right to reject any or all Proposals and to waive any formality or technicality in any Proposal in the interest of the Operator.

SECTION 1.2

INFORMATION FOR BIDDERS

1.2.1

PROPOSALS are requested for the drilling of the deep well for the MARYSVILLE GEOTHERMAL PROJECT for ROGERS ENGINEERING CO., INC., Operator for BATTELLE PACIFIC NORTHWEST LABORATORIES, Principal Investigator and Grantee of THE NATIONAL SCIENCE FOUNDATION at Marysville, Montana in accordance with Drawings, Specifications and other Contract Documents prepared by ROGERS ENGINEERING CO., INC.

- a. Form: Each Proposal shall be made on a form prepared therefor by the Engineer and included as one of the Contract Documents, and shall be submitted in a sealed envelope marked "BID" and bearing the title of the work and the name of the Bidder.
- b. Discrepancies: In case of a difference between the stipulated amount of the Proposal written in words and the stipulated amount written in figures, the stipulated amount stated in written words shall govern.
- c. Modifications: Proposal shall not contain any recapitulations of the work to be done. Alternate proposals will not be considered unless called for. Oral proposals or modifications will not be considered.
- d. Examination of Contract Documents and Visit to Site: Before submitting a Proposal, Bidders shall carefully examine the Drawings, read the Specifications, and the other Contract Documents, shall visit the site of work, and shall fully inform themselves as to all existing conditions and limitations, and shall include in the Proposal a sum to cover the cost of all items included in the Contract Documents.
- e. Delivery of Proposals: Proposals shall be delivered by the time and to the place stipulated in the Advertisement. It is the sole responsibility of the Bidder to see that his Proposal is received in proper time. Any Proposal received after the scheduled closing time for receipt of Proposals shall be returned to the Bidder unopened.
- f. Withdrawal: Any Bidder may withdraw his Proposal, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of Proposals.
- g. Opening: Proposal will be opened and publicly read aloud at the time and place set forth in the Invitation to Bidders.

h. **Award or Rejection:** The Contract will be awarded to the lowest and/or best qualified responsible Bidder complying with these instructions and with the Invitation to Bidders. The Operator reserves the right to reject any or all Proposals or to waive any formality or technicality in any Proposal in the interest of the Operator. No Bidder may withdraw his Proposal for a period of 30 days after the date of opening thereof.

1.2.2 **INTERPRETATION OF DOCUMENTS:** If any person contemplating submitting a Proposal is in doubt as to the true meaning of any part of the Drawings, Specifications or other Contract Documents, or finds discrepancies in or omissions from the Drawings or Specifications, he may submit to the Engineer a written request for an interpretation or correction thereof providing such request is delivered to the Engineer on or before ten (10) days before the bid opening date. The person submitting the request will be responsible for its prompt delivery. Any interpretation or correction of the documents will be made only by Addendum duly issued and a copy of the Addendum will be mailed or delivered to each person receiving a set of the Contract Documents. Neither the Operator nor the Engineer will be responsible for any other explanations or interpretations of the Contract Documents.

1.2.3 **ADDENDA:** Any addenda issued during the time of bidding, or forming a part of the Contract Documents loaned to the Bidder for the preparation of his Proposal, shall be covered in the Proposal, and shall be made a part of the Contract. Receipt of each Addendum shall be acknowledged in the Proposal.

1.2.4 **BIDDERS INTERESTED IN MORE THAN ONE PROPOSAL:** No person, firm, or Corporation shall be allowed to make, file or to be interested in more than one Proposal for the same work, unless alternate Proposals are called for. A person, firm, or Corporation who has submitted a subproposal to a Bidder, or who has quoted prices on materials to a Bidder, is not hereby disqualified from submitting a subproposal or quoting prices to other Bidders.

1.2.5 **PROPOSAL GUARANTY:** Each Proposal shall be accompanied by a certified check or bid bond acceptable to the Operator, in an amount of Five Thousand and No/100 Dollars (\$5,000.00), payable without condition to the Operator as a guaranty that the Bidder, if awarded the Contract, will promptly execute the Agreement in accordance with the Proposal and the other Contract Documents, and will furnish good and sufficient bond for the faithful performance of the same, and for the payment to all persons supplying labor and material for the work. The Proposal Guaranties of all Bidders, except the three lowest and/or best will be returned promptly after the canvass of Proposals.

1.2.6

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND: The successful Bidder, simultaneously with the execution of the Contract, will be required to furnish a faithful Performance Bond in an amount equal to one hundred percent (100%) of the Contract Amount and a Labor and Material Payment Bond equal to fifty percent (50%) of the Contract Amount; said bonds shall be secured from a surety company satisfactory to the Operator. The forms of the Bonds the successful Bidder will be required to execute are included in the Contract Documents.

1.3 Proposal

1.3.1 The following proposal is hereby made to:

ROGERS ENGINEERING CO., INC., 16 BEALE STREET, SAN FRANCISCO,
CALIFORNIA 94105, ATTENTION: J. T. KUWADA, VICE PRESIDENT.

1.3.2 Stipulated Amount

The Undersigned hereby proposes and agrees to furnish on a Day-work Basis all the necessary labor, materials, equipments, tools and services necessary for the drilling of the Deep Well for the Marysville Geothermal Project for ROGERS ENGINEERING CO., INC. at MARYSVILLE, MONTANA, all in accordance with the Drawings, Specifications and other Contract Documents prepared by ROGERS ENGINEERING CO., INC., according to the following Bidding Schedule:

1.3.3

**BIDDING SCHEDULE for
DRILLING THE DEEP WELL for
THE MARYSVILLE GEOTHERMAL PROJECT**

MARYSVILLE, MONTANA

Bids will be considered on the following schedule of Drill Rig DAYWORK and REIMBURSABLE CONTRACTOR COSTS according to the minimum sizes and amounts as set out in Paragraphs 5.0 through 5.2.28 of the Specifications. Bidding Schedule must show SIZE and/or AMOUNTS to be furnished.

Bids will be considered on equipment larger than the minimums set out if the Contractor chooses to offer such equipment.

BID SCHEDULE

Item No.	Description (Incl. Spec. Paragraph No.)	Equipment Offered on this Bid	Price
1	5.1.1 Complete Drilling Rig	(General Description - Make & Model)	
	Detail of Rig Items Listed by Size:		
	5.1.1.1 Mast or Derrick (min. capacity)	_____	lbs.
	Min. Static Hook Load	_____	lbs.
	Combined Pipe Racking Capacity	_____	ft.
	Min. Height	_____	ft.

BID SCHEDULE (Cont'd)

Item No.	Description (Incl. Spec. Paragraph No.)	Equipment Offered on this Bid	Price
5.1.1.2	Substructure, (min. Capacity _____	lbs.	
	Rotary Beam (min. capacity) _____	lbs.	
	Min. Overall Clear Height Above Cellar _____	ft.	
5.1.1.3	Drawworks min. rated input _____	H.P.	
5.1.1.4	Drawworks min. deliverable to the Drawworks _____	H.P.	
	Type of Power (Diesel, Gas, or Electric): _____		
	Fuel or Power Consumption _____		
5.1.1.5	Rotary Table, dia. _____	ins.	
5.1.1.6	Drill Line _____	ins.	
5.1.1.7	Drill Collars:		
	No. _____ Size _____	ins.	
	No. _____ Size _____	ins.	
	No. _____ Size _____	ins.	
5.1.1.8	Drill Pipe:		
	Size & Weight _____		
	Length of String _____	ft.	
	Inspection Report of condition of pipe to be used on Project: Date of report _____		
	Inspection by: _____		
5.1.1.9	Stand Pipe, type, size _____	ins.	
5.1.1.10	Rotary hose, length, size, working pressure _____		
5.1.1.11	Mud Pumps:		
		<u>Main Pump</u>	<u>Auxiliary Pump</u>
	Type/Make _____	_____	_____
	Capacity, G.P.M. _____	_____	_____
	Driver: Type/H.P. _____	_____	_____
5.1.1.12	Light Plant: Make, Model _____		
	Volts, Phase, Hertz _____		

BID SCHEDULE (Cont'd)

Item No.	Description (Incl. Spec. Paragraph No.)	Equipment Offered on this Bid	Price
-------------	--	-------------------------------	-------

5.1.1.13 Steel Mud Pits

No. _____	Size _____	Bbls. _____
Total Vol. _____		Bbls. _____

5.1.1.14 Shale Shakers - size _____

5.1.1.15 Kelly - Full Description _____

5.1.1.16 Drilling Crew

No. Roughnecks per _____	hour _____	Tour _____
No. Tool Pushers per _____	hour _____	Tour _____

5.1.1.17 Water Storage _____ Bbls.

5.1.1.18 Mud Storage _____ Sacks

5.1.6 Fuel Storage _____ Bbls.

5.1.2 Sand line unit w/prime mover -
Description _____

5.1.2.1 Bloole Line, size, length _____

5.1.2.2 Blowout Preventer, 20-inch, Description _____

5.1.2.3 Blowout Preventer, 13 3/8-inch, Description _____

DAYWORK RATE for Drilling Rig, Associated Equipment,
Materials and Crews (Includes all of above detailed
items, plus all other items included under "DAYWORK",
specifically or by general description in these
specifications)

per hour _____

BID SCHEDULE (Cont'd)

Item No.	Description (Incl. Spec. Paragraph No.)	Equipment Offered on this Bid	Price
REIMBURSABLE CONTRACTOR COSTS:			
2	5.2.6 Water Haulage or Water Lines 2 inch Water line, rental, job, per foot Water Truck, w/spray bar: _____ gallons Rental, fully manned and operated, per hour		_____ _____
3	5.2.9 Fishing Tools and Other Fishing Services not included in DAYRATE. Description:		
		Rate	_____
4	5.2.13 Special Directional Services. Description:		
		Rate	_____
5	5.2.15 Formation testing equipment and services. Description:		
		Rate	_____
6	5.2.20 Trucking service, move in and rig up, tear down and remove Contractor's equipment in connection with drilling, testing, completion of well. (Mobil- ization and Demobilization)		
		Lump Sum	_____
7	5.2.21 Rotating Head	Rental Rate	_____
8	5.2.22 Shock subs	Rental Rate	_____
9	5.2.23 Welding service for Operator directed work	Per Hour	_____
10	5.2.24 Desander: Make and Model _____ Capacity, Efficiency _____ Desilter: Make and Model _____ Capacity, Efficiency _____	Rental Rate	_____ _____ _____ _____
		Rental Rate	_____

BID SCHEDULE (Cont'd)

<u>Item No.</u>	<u>Description (Incl. Spec. Paragraph No.)</u>	<u>Equipment Offered on this Bid</u>	<u>Price</u>
11	5.2.26 Casing Crews (Overtime for holdover crews) No. of personnel, by job: _____ _____ _____		
		Crew, per hour	_____
12	5.2.27 Casing handling tools	Rental Rate	_____
13	5.2.30 Re-Line Drill Pipe - Allowance for high Temperature Damage (if approved by Engineer)	per foot	_____

1.3.4 Knowledge of Local Conditions and Contract Documents

The Undersigned has examined the location of the proposed work, the Drawings, Specifications and other Contract Documents and is familiar with the local conditions at the place where the work is to be performed.

1.3.5 Proposal Guaranty

The Proposal Guaranty attached, without endorsement in the sum of FIVE THOUSAND and NO/100 DOLLARS (\$5,000.00) is furnished to the Operator as a guarantee that the Agreement will be executed and a Performance Bond and a Labor and Material Payment Bond furnished within ten (10) days after award of the Contract to the Undersigned, or that the Undersigned will pay to the Operator the difference between the stipulated amount of this Proposal and such larger amount for which the Operator may in good faith contract with another party to perform the work covered by this Proposal, provided that such payment shall be limited to the amount of the Proposal Guaranty.

1.3.6 Execution of Agreement and Furnishing Bonds

Within ten (10) days after being awarded the Contract, the Undersigned agrees to execute the form of Agreement included as one of the Contract Documents, and to furnish a Performance Bond in an amount equal to 100% of the Contract Amount and a Labor and Material Payment Bond in an amount equal to 50% of the Contract Amount.

1.3.7 Addenda

The Undersigned hereby acknowledges receipt of the following Addenda:

Addendum No.	Dated
_____	_____
_____	_____
_____	_____

1.3.8 Contract Time

If awarded the Contract, the Undersigned agrees to begin moving the Contractor's Rig No. _____ to the Drill Site by _____, 1974 and to spud-in the hole by _____, 1974, and to prosecute the work diligently

as set out in the specifications until notified by the Drilling Engineer that the Contractor's work is completed, as defined in the General Conditions of the Contract.

1.3.9

Operator's Rights Reserved

The Undersigned understands that the Operator reserves the right to reject any or all Proposals or to waive any formality or technicality in any Proposal in the interest of the Operator.

1.3.10

The above Proposal is hereby respectfully submitted by

Contractor

By

Title

Business Address

City

State

Date

1.4

AGREEMENT

1.4.1

THIS AGREEMENT, made as of the _____ day of _____ 19____
by and between ROGERS ENGINEERING CO., INC., hereinafter called
the OPERATOR and _____
hereinafter called the CONTRACTOR.

WITNESSETH, That whereas the OPERATOR intends to drill the DEEP
WELL for the MARYSVILLE GEOTHERMAL PROJECT, hereinafter called the
PROJECT, in accordance with the Drawings, Specifications and other
Contract Documents prepared by ROGERS ENGINEERING CO., INC. NOW,
THEREFORE, The OPERATOR AND CONTRACTOR for the considerations
hereinafter set forth, agree as follows:

1.4.2

THE CONTRACTOR AGREES to furnish all the necessary labor, materials,
equipment, tools and services necessary to perform and complete in
a workmanlike manner all work required for the drilling of the
Project, in strict compliance with the Contract Documents herein
mentioned, which are hereby made a part of the Contract, including
the following Addenda:

Addendum No.

Dated

_____	_____
_____	_____

a. Contract Time

Work under this Agreement shall be commenced upon written notice
to proceed, but no later than 1 June 1974; however, the Opera-
tor recognizes the difficulty for the Contractor to forecast
rig availability exactly, and a nominal adjustment of the
spud-in date either way from the above specified date will be
allowed upon the bonded commitment of the Drilling Rig. The
work shall be completed upon notice by the Drilling Engineer as
defined in the General Conditions of the Contract.

b. Sub-Contractors

The Contractor agrees to bind every sub-contractor by the
terms of the Contract Documents. The Contract Documents shall
not be construed as creating any contractual relation between
any sub-contractor and the Operator.

1.4.3 THE OPERATOR AGREES to pay, and the Contractor agrees to accept, in full payment for the performance of this Contract, payment at the Contract DAYWORK Rate, Rental Rates, and Unit Prices as set out in the Bid Schedule (1.3.3) in accordance with the provisions of the Contract Documents.

1.4.3.1 Federal, State, and Local Taxes

- a. Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State, and local taxes and duties.

1.4.3.2 Progress Payments will be made in accordance with the General Conditions of the Contract.

1.4.4 Contract Documents

The Contract comprises the Contract Documents listed in Paragraph 2.1.1 of the General Conditions of the Contract. In the event that provision of one Contract Document conflicts with the provision of another Contract Document, the provision in that Contract Document first listed below shall govern, except as otherwise specifically stated:

- a. Agreement (This Instrument)
- b. Addenda to Contract Documents
- c. Remaining Legal and Procedural Documents
 - 1. Proposal
 - 2. Information for Bidders
 - 3. Advertisement
- d. Detailed Specification Requirements
- e. Drawings
- f. Modifications of the General Conditions of the Contract (Section 2.8)
- g. General Conditions of the Contract (Section 2.1 through 2.7)
- h. Bonds
 - 1. Performance Bond
 - 2. Labor and Material Payment Bond
 - 3. Proposal Guaranty

1.4.5 Authority and Responsibility of the Engineer

All work shall be done under the general supervision of the Engineer. The Engineer shall decide any and all questions which may

arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of Drawings and Specifications and all questions as to the acceptable fulfillment of the Contract on the part of the Contractor.

1.4.6

Successors and Assigns

This Agreement and all of the covenants hereof shall inure to the benefit of and be binding upon the Operator and the Contractor respectively and his partners, successors, assigns and legal representatives. Neither the Operator nor the Contractor shall have the right to assign, transfer or sublet his interests or obligations hereunder without written consent of the other party.

1.4.7

Special Provisions

The Operator and the Contractor mutually agree that this Agreement shall be subject to the following Special Provisions, which shall supersede other conflicting provisions of this Agreement.

1.4.8

IN WITNESS WHEREOF, the parties have made and executed this Agreement, the day and year first above written.

Operator

Contractor

By

By

Title

Title

Business Address

Business Address

City

State

City

State

1.5

BID BOND

1.5.1

KNOW ALL MEN BY THESE PRESENTS, that we _____, hereinafter called the Principal, as Principal, and the _____, of _____, a corporation duly organized under the laws of the State of _____, hereinafter called the Surety, as Surety, are held and firmly bound unto ROGERS ENGINEERING CO., INC., SAN FRANCISCO, CALIFORNIA hereinafter called the Oblige, in the sum of FIVE THOUSAND and NO/100 DOLLARS (\$5,000), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

1.5.2

WHEREAS, the Principal has submitted a bid for DRILLING THE DEEP WELL for the MARYSVILLE GEOTHERMAL PROJECT.

1.5.3

NOW, THEREFORE, if the Oblige shall accept the bid of the Principal and the Principal shall enter into a Contract with the Oblige in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof or in the event of the failure of the Principal to enter such contract and give such bond or bonds, if the Principal shall pay to the Oblige the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Oblige may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

1.5.4

SIGNED AND SEALED this _____ day of _____ A.D. 19____

In the presence of:

Principal (Seal)

Witness

Title

Surety (Seal)

Witness

Title

1.6

PERFORMANCE BOND

1.6.1

KNOW ALL MEN BY THESE PRESENTS that _____

(Here insert the name and address or legal title of the Contractor)
as Principal, hereinafter called Contractor, and _____

(Here insert the legal title of Surety)

as Surety, hereinafter called Surety, are held and firmly bound unto ROGERS ENGINEERING CO., INC., SAN FRANCISCO, CALIFORNIA as Oblige, hereinafter called Operator, in the amount of ONE HUNDRED FIFTY THOUSAND and No/100 DOLLARS (\$150,000.00), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

1.6.2

WHEREAS, Contractor has by written agreement dated _____, 19____ entered into a Contract with Operator for DRILLING THE DEEP WELL for the MARYSVILLE GEOTHERMAL PROJECT in accordance with drawings and specifications prepared by ROGERS ENGINEERING CO., INC., the ENGINEER, which Contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

1.6.3

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Contractor shall promptly and faithfully perform said Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

- a. The Surety hereby waives notice of any alteration or extension of time made by The Operator.
- b. Whenever Contractor shall be, and declared by Operator to be in default under the Contract, or shall promptly
 1. Complete the Contract in accordance with its terms and conditions, or
 2. Obtain a bid or bids-for submission to Operator for completing the Contract in accordance with its terms and conditions, and upon determination by Operator and Surety of the lowest responsible Bidder, arrange for a contract between such Bidder and Operator, and make available as work progresses (even though there should be a default or succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph

hereof. The term "balance of the Contract price," as used in this paragraph, shall mean the total amount properly paid by Operator to Contractor.

- c. Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.
- d. No right of action shall accrue on this bond to or for the use of any person or corporation other than the Operator names therein or the heirs, executors, administrators or successors of Operator.

1.6.4

SIGNED AND SEALED this _____ day of _____ A.D. 19__

In the presence of:

Principal (Seal)

Witness

Title

Surety (Seal)

Witness

Title

1.7

LABOR AND MATERIAL PAYMENT BOND

1.7.1

KNOW ALL MEN BY THESE PRESENTS that _____

(Here insert the name and address or legal title of the Contractor)

as Principal, hereinafter called Principal, and _____

(Here insert the legal title of Surety)

as Surety, hereinafter called Surety, are held and firmly bound unto ROGERS ENGINEERING CO., INC., SAN FRANCISCO, CALIFORNIA, as Obligee, hereinafter called Operator, for the use and benefit of claimants as hereinbelow defined, in the amount of SEVENTY-FIVE THOUSAND and NO/100 DOLLARS (\$75,000.00), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

1.7.2

WHEREAS, Principal has by written agreement dated _____, 19____ entered into a contract with Operator for DRILLING the DEEP WELL for the MARYSVILLE GEOTHERMAL PROJECT in accordance with drawings and specifications prepared by ROGERS ENGINEERING CO., INC., the ENGINEER, which contract is by reference made apart hereof, and is hereinafter referred to as the Contract.

1.7.3

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

- a. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the Contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.
- b. The above named Principal and Surety hereby jointly and severally agree with the Operator that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, may sue on this bond for the use of such claimant, prosecute the suit to final judgment for such sum or sums as may be

justly due claimant, and have execution thereon. The Operator shall not be liable for the payment of any costs or expenses of any such suit.

c. No suit or action shall be commenced hereunder by any claimant,

1. Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: The Principal, the Operator, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Operator or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need not be made by a public officer.

2. After the expiration of one (1) year following the date on which Principal ceased work on said Contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

3. Other than in a state court of competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated, or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

d. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanics' liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

1.7.4

SIGNED AND SEALED this _____ day of _____ A.D. 19__

In the presence of:

(Seal)

Principal

Witness

Title

(Seal)

Surety

Witness

Title

2. GENERAL CONDITIONS OF THE CONTRACT

2.1 Definitions

2.1.1 Contract Documents: The Contract comprises the following documents, including all additions, deletions and modifications incorporated therein before the execution of the Contract:

a. Legal and Procedural Documents

1. Invitation to Bidders
2. Information for Bidders
3. Proposal
4. Proposal Guaranty
5. Contract
6. Performance Bond

b. General Conditions of the Contract

c. Detailed Specification Requirements

d. Drawings

2.1.2 Engineer is the Engineer duly authorized in writing by the Operator.

2.1.3 Operator is the Operator named in the Contract Documents.

2.1.4 Contractor is the Contractor named in the Contract Documents.

2.1.5 Sub-Contractor is any person, firm or corporation with a direct contract with the Contractor who acts for or in behalf of the Contractor in executing any part of the Contract, but does not include one who merely furnishes material.

2.1.6 Proposal: The offer of a Bidder to perform the work described by the Contract Documents when made out and submitted on the prescribed Proposal Form, properly signed and guaranteed.

2.1.7 Proposal Guaranty: The cashier's check or Bidder's bond accompanying the Proposal submitted by the Bidder, as a guaranty that the Bidder will enter into a Contract with the Operator for the drilling of the well, if the Contract is awarded to him.

2.1.8 Contract is the agreement covering the performance of the work described in the Contract Documents including all supplemental agreements thereto and all general and special provisions pertaining to the work or materials therefore.

- 2.1.9 Performance Bond is the approved form of security furnished by the Contractor and his Surety as a guaranty of good faith on the part of the Contractor to execute the work in accordance with the terms of the Contract.
- 2.1.10 Surety is the person, firm or corporation who executes the Contractor's Performance Bond.
- 2.1.11 Specifications shall mean the Legal and Procedural Documents, General Conditions of the Contract, together with the modifications thereof, and the Detailed Specification Requirements, with all addenda thereto.
- 2.1.12 Drawings are those listed in the Index to Specifications and Drawings with all addenda thereto.
- 2.1.13 Written Notice: Written notice shall be considered as served when delivered in person or sent by registered mail to the individual, firm or corporation or to the last business address of such known to him who serves the notice.
- a. Change of Address: It shall be the duty of each party to advise the other parties to the Contract as to any change in his business address until completion of the Contract.
- 2.1.14 Act of God means an earthquake, flood, cyclone or other cataclysmic phenomenon of nature. Rain, wind, flood or other natural phenomenon of normal intensity for the locality shall not be construed as an Act of God and no reparation shall be made to the Contractor for damages to the work resulting therefrom.
- 2.1.15 The Foundation is the funding sponsor of the project: The National Science Foundation.
- 2.2 Drawings, Specifications and Related Data
- 2.2.1 Intent of Drawings and Specifications: The Intent of the Drawings and Specifications is that the Contractor furnish all labor and materials, equipment and transportation necessary for the proper execution of the work unless specifically noted otherwise. The Contractor shall do all the work shown on the Drawings and described in the Specifications and all incidental work considered necessary to complete the project in a substantial and acceptable manner, and to fully complete the work or improvement, ready for use, occupancy and operation by the Operator.

- 2.2.2 Conflict: If there be conflicting variance between the Drawings and the Specifications, the provisions of the Specifications shall control. In case of conflict between the General Conditions of the Contract or any modifications thereof and the Detailed Specification Requirements, the Detailed Specification Requirements shall control.
- 2.2.3 Discrepancies in Drawings: Any discrepancies found between the Drawings and Specifications and site conditions or any errors or omissions in the Drawings or Specifications shall be immediately reported to the Engineer, who shall promptly correct such error or omission in writing. Any work done by the Contractor after his discovery of such discrepancies, errors or omissions shall be done at the Contractor's risk.
- 2.2.4 Adequacy of Drawings and Specifications: Responsibility for adequacy of the design and for sufficiency of the Drawings and Specifications shall be borne by the Operator. The complete requirements of the work to be performed under the Contract shall be set forth in Drawings and Specifications to be supplied by the Operator through the Engineer. Drawings and Specifications furnished shall be in accordance with the Contract Documents and shall be true and accurate developments thereof.
- 2.2.5 Additional Instructions: Further Instructions may be issued by the Engineer during the progress of the work by means of Drawings or otherwise to make more clear or specific the Drawings and Specifications or as may be necessary to explain or illustrate changes in the work to be done.
- 2.2.6 Copies of Drawings and Specifications Furnished: Except as provided for otherwise, all required copies of Drawings and Specifications necessary for the execution of the work shall be furnished to the Contractor without charge.
- 2.2.7 Drawings and Specifications at Job Site: One complete set of all Drawings and Specifications shall be maintained at the job site and shall be available to the Engineer at all times.
- 2.2.8 Ownership of Drawings and Specifications: All original or duplicated Drawings and Specifications and other data prepared by the Engineer shall remain the property of the Engineer, and they shall not be reused on other work, but shall be returned to him upon completion of the work.
- 2.2.9 Quality of Equipment and Materials: In order to establish standards of quality, the Engineer has, in the detailed Specifications, referred to certain products by name and catalog number. This

procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design.

2.2.9.1 The Contractor shall furnish the complete list of proposed desired substitutions prior to signing of the Contract, together with such engineering and catalog data as the Engineer may require.

2.2.9.2 The Contractor shall abide by the Engineer's judgment when proposed substitute materials or items of equipment are judged to be unacceptable and shall furnish the specified material or item of equipment in such case. All proposals for substitutions shall be submitted in writing by the Contractor. The Engineer will approve or disapprove proposed substitutions in writing within a reasonable time. No substitute materials shall be used unless approved in writing.

2.2.10 Surveys: The Operator shall survey the drill site and shall set a stake for the location of the Deep Well.

2.3 Engineer-Operator-Contractor Relations

2.3.1 Engineer's Responsibility and Authority: All work shall be done under the general supervision of the Engineer. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, rate of progress of work, interpretation of Drawings and Specifications and all questions as to the acceptable fulfillment of the Contract on the part of the Contractor.

2.3.2 Engineer's Decisions: All claims of the Operator or the Contractor shall be presented to the Engineer for decision which shall be made in writing within a reasonable time. All decisions of the Engineer shall be final except in cases where time and/or financial considerations are involved, which shall be subject to arbitration.

2.3.3 Suspension of Work: The Engineer shall have the authority to suspend the work, wholly or in part, for such period or periods, as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for prosecution of the work, or failure on the part of the Contractor to carry out the provisions of the Contract or to supply materials meeting the requirements of the Specifications. The Contractor shall not suspend operation without the Engineer's permission.

2.3.4 Arbitration: Should there be any dispute or any questioned decision of the Engineer which is subject to arbitration, it shall be promptly submitted to arbitration upon demand by either

party to the dispute. The Contractor shall not delay the work because arbitration proceedings are pending unless he shall have written permission from the Engineer so to do and such delay shall not extend beyond the time when the arbitrators shall have opportunity to determine whether the work shall continue or be suspended pending decision by the arbitrators of such a dispute. Any demand for arbitration shall be in writing and shall be delivered to the Engineer and any adverse party either by personal delivery or by registered mail addressed to the last known address of each within ten (10) days of receipt of the Engineer's decision, and in no event after final payment has been made and accepted, subject, however, to any express stipulation to the contrary in the Contract Documents. Should the Engineer fail within a reasonable period to make a decision, a demand for arbitration may then be made as if the Engineer's decision had been rendered against the party demanding arbitration.

- a. No one shall be qualified to act as an arbitrator who has, directly or indirectly, any financial interest in the Contract or who has any business or family relationship with the Operator, Contractor, or the Engineer. Each arbitrator selected shall be qualified by experience and knowledge of the work involved in the matter to be submitted to arbitration.
- b. Arbitration shall be in accordance with the procedures and standards of The American Arbitration Association.

2.3.5

Inspection of Work: All materials and each part or detail of the work shall be subject at all times to inspection by the Engineer, and the Contractor will be held strictly to the true intent of the Specifications in regard to quality of materials, workmanship, and the diligent execution of the Contract. Such inspection may include mill, plant, or shop inspection, and any material furnished under these Specifications is subject to such inspection. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

2.3.6

Contractor's Superintendence: A qualified Superintendent or Tool-Pusher, who is acceptable to the Engineer, shall be maintained on the work and give efficient supervision to the work until its completion. The "Tool-Pusher" shall have full authority to act in behalf of the Contractor, and all directions given to the "Tool-Pusher" shall be considered given to the Contractor. In general, the Engineer's instructions shall be confirmed in writing and always upon written request from the Contractor.

- 2.3.7 Lands by Operator: The Operator shall provide the lands shown on the Drawings upon which the work under the Contract is to be performed and to be used for rights of way for access. Any delay in furnishing these lands by the Operator shall be deemed proper cause for adjustment in the Contract Amount and in the time of completion.
- 2.3.8 Lands by Contractor: Any additional land and access thereto not shown on the Drawings that may be required for temporary construction facilities or for storage of materials shall be provided by the Contractor with no liability to the Operator. The Contractor shall confine his apparatus and storage of materials and operation of his workmen to those areas described in the Drawings and Specifications and such additional areas which he may provide as approved by the Engineer.
- 2.3.9 Private Property: The Contractor shall not enter upon private property without obtaining permission, and he shall be responsible for the preservation of all public property, trees, monuments, etc. along and adjacent to the street and/or right-of-way, and shall use every precaution necessary to prevent damage or injury thereto. He shall use suitable precautions to prevent damage to pipes, conduits, and other underground structures, and shall protect carefully from disturbance or damage all monuments and property until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed.
- 2.3.10 Assignment of Contract: Neither the Contractor nor the Operator shall sublet, sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of his right, title or interest therein, or his obligations thereunder, without written consent of the other party.
- 2.3.11 Removal of Drilling Equipment, Tools and Supplies: At the termination of this Contract, before acceptance of the work by the Engineer, the Contractor shall remove all of his equipment, tools and supplies from the drill site. Should the Contractor fail to remove such equipment, tools, and supplies, the Operator shall have the right to remove them.
- 2.3.12 Suspension of Work by Operator: The work may be suspended at any time by the Operator provided that he gives the Contractor five (5) days' written notice of suspension, which shall set forth the date on which work is to be resumed. The Contractor shall resume the work upon written notice from the Operator and within ten (10) days after the date set forth in the notice of suspension. If the Owner does not give written notice to resume work within ten (10) days of the date fixed in the notice of suspension, the Contractor may abandon the work so suspended and shall be entitled to payment in accordance with Paragraph 2.7.11.

2.3.13

Operator's Right to Correct Deficiencies: Upon failure of the Contractor to perform the work in accordance with the Contract Documents, including any requirements with respect to the Schedule of Completion, and after five (5) days' written notice to the Contractor and receipt of written approval from the Engineer, the Operator may, without prejudice to any other remedy he may have, correct such deficiencies.

2.3.14

Operator's Right to Terminate Contract and Complete the Work: The Operator shall have the right to terminate the employment of the Contractor after giving ten (10) days' written notice of termination to the Contractor in the event of any default by the Contractor and upon receiving written notice from the Engineer certifying cause for such action. In the event of such termination, the Owner may take possession of the work and of all materials, tools and equipment thereon and may finish the work by whatever method and means he may select. It shall be considered a default by the Contractor whenever he shall:

- a. Declare bankruptcy, become insolvent, or assign his assets for the benefit of creditors.
- b. Disregard or violate important provisions of the Contract Documents or Engineer's instructions, or fail to prosecute the work in a diligent manner.
- c. Fail to provide a qualified Tool Pusher, competent workmen or sub-contractors, or proper materials, or fail to make prompt payment therefore.

2.3.15

Contractor's Right to Suspend Work or Terminate Contract: The Contractor may suspend work or terminate Contract upon ten (10) days' written notice to the Operator and the Engineer, for any of the following reasons:

- a. If an order of any court, or other public authority caused the work to be stopped or suspended for a period of ninety (90) days through no act or fault of the Contractor or his employees.
- b. If the Engineer should fail to act upon any Request for Payment within ten (10) days after it is presented in accordance with the General Conditions of the Contract.
- c. If the Operator should fail to act upon any Request for Payment within thirty (30) days after its approval by the Engineer.
- d. If the Operator should fail to pay the Contract or any sum within thirty (30) days after its award by arbitrators.

- 2.3.16 Rights of Various Interests: Wherever work being done by the Operator's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Engineer, to secure the completion of the various portions of the work in general harmony.
- 2.3.17 Separate Contracts: The Operator may let other contracts in connection with the work of the Contractor. The Contractor shall cooperate with other Contractors with regard to storage of materials and execution of their work. It shall be the Contractor's responsibility to inspect all work by other Contractors affecting his work and to report to the Engineer any irregularities which will not permit him to indicate the work of other Contractors has been satisfactorily completed to receive his work. The Contractor shall not be responsible for defects of which he could not have known, which develop in the work of others after the work is completed. It shall be the responsibility of the Contractor to measure the completed work in place and report to the Engineer immediately any difference between completed work by others and the Drawings and Specifications.
- 2.3.18 Sub-Contractors: At the time specified by the Contract Documents or when requested by the Engineer, the Contractor shall submit in writing to the Operator for approval of the Engineer the names of the sub-contractors proposed for the work. Sub-contractors may not be changed except at the request or with the approval of the Engineer. The Contractor is responsible to the Operator for the acts and omissions of his sub-contractors, and of their direct and indirect employees, to the same extent as he is responsible for the acts and omissions of his employees. The Contract Documents shall not be construed as creating any contractual relation between any sub-contractor and the Operator. The Contractor shall bind every sub-contractor by the terms of the Contract Documents.
- 2.3.19 Work During an Emergency: The Contractor shall perform any work and shall furnish and install any materials and equipment necessary during an emergency endangering life or property. In all cases he shall notify the Engineer of the emergency as soon as practicable, but he shall not wait for instructions before proceeding to properly protect both life and property.
- 2.3.20 Oral Agreements: No oral order, objection, claim or notice by any party to the others shall affect or modify any of the terms or obligations contained in any of the Contract Documents, and none of the provisions of the Contract Documents shall be held to be waived or modified by reason of any act whatsoever, other than by a definitely agreed waiver or modification thereof in writing, and no evidence shall be introduced in any proceeding of any other waiver or modification.

2.4 Materials and Workmanship

2.4.1 Materials Furnished by the Contractor: All materials used in the work shall meet the requirements of the respective Specifications, and no material shall be used until it has been approved by the Engineer. All materials not otherwise specifically indicated shall be furnished by the Contractor.

2.4.2 Materials Furnished by the Operator: Materials specifically indicated shall be furnished by the Operator. The fact that the Operator is to furnish material is conclusive evidence of its acceptability for the purpose intended, and the Contractor may continue to use it until otherwise directed. If the Contractor discovers any defect in materials furnished by the Operator, he shall notify the Engineer. Unless otherwise noted or specifically stated, materials furnished by the Operator which are not of local occurrence, are considered to be f.o.b. the nearest railroad station. The Contractor shall be prepared to unload and properly protect all such material from damage or loss. The Contractor shall be responsible for material loss or damage after receipt of material at point of delivery.

2.4.3 Storage of Materials: Materials shall be so stored as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and/or they shall be placed under cover. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without the written permission of the owner or lessee.

2.4.4 Character of Workmen: The Contractor shall at all times be responsible for the conduct and discipline of his employees and/or any sub-contractor or persons employed by sub-contractors. All workmen must have sufficient knowledge, skill and experience to perform properly the work assigned to them. Any foreman or workman employed by the Contractor or sub-contractor who, in the opinion of the Engineer does not perform his work in a skillful manner, or appears to be incompetent or to act in a disorderly or intemperate manner shall, at the written request of the Engineer, be discharged immediately and shall not be employed again in any portion of the work without the approval of the Engineer.

2.4.5 Rejected Work and Materials: All materials which do not conform to the requirements of the Contract Documents, are not equal to samples approved by the Engineer, or are in any way unsatisfactory or unsuited to the purpose for which they are intended, shall be rejected. Any defective work whether the result of poor workmanship, use of defective materials, damage through carelessness or

any other cause shall be removed immediately after notice is given by the Engineer, and the work shall be re-executed by the Contractor. The fact that the Engineer may have previously overlooked such defective work shall not constitute an acceptance of any part of it.

2.4.5.1 Should the Contractor fail to remove rejected work or materials within ten (10) days after written notice to do so, the Operator may remove them and may store or otherwise dispose of the materials.

2.4.6 Manufacturer's Directions: Manufactured articles, material and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the Manufacturer unless herein specified to the contrary.

2.4.7 Guaranty Period: The Contractor shall warrant all equipment furnished and work performed by him for a period of one year from the date of written acceptance of the work.

2.5 Insurance, Legal Responsibility and Public Safety

2.5.1 Insurance: The Contractor shall secure and maintain such Insurance from an Insurance company authorized to write casualty Insurance in the State of Montana where the work is located as will protect himself, his sub-contractors, and the Operator from claims for bodily injury, death or property damage which may arise from operations under this Contract. The Contractor shall not commence work under this Contract until he has obtained all Insurance required under this paragraph and shall file the certificate of Insurance or the certified copy of the Insurance policy with the Operator. Each Insurance policy shall contain a clause providing that it shall not be cancelled by the Insurance company without ten (10) days' written notice to the Operator of intention to cancel. The amounts of such Insurance shall be not less than the following:

- a. Workmen's Compensation and Employer's Liability Insurance shall be secured and maintained as required by the State of Montana where the work is located.
- b. Public Liability, Bodily Injury, Property Damage:
 1. Injury or death of one person.....\$500,000
 2. Injury to more than one person in a single accident...\$1,000,000
 3. Property damage.....\$ 100,000
- c. Automobile and Truck Public Liability, Bodily Injury, and Property Damage:
 1. Injury or death of one person...\$ 500,000
 2. Injury to more than one person in a single accident...\$1,000,000
 3. Property damage.....\$ 100,000

- 2.5.2 Indemnity: The Contractor shall indemnify and save harmless the Landowner and the Operator from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against him by reason of any omission or act of the Contractor or his agents or employees, in the execution of the work or in the guarding of it. The contractor shall obtain in the names of the Landowner and the Operator, and shall maintain and pay the premiums for such insurance in such amount and with such provisions as will and shall protect the Landowner and Operator from contingent liability under this Contract and a copy of such insurance policy or policies shall be delivered to the Landowner and the Operator. Full compliance by the Landowner and the Operator with the terms and provisions of such insurance policy or policies shall be a condition precedent to the Landowner's right and the Operator's right to enforce against the Contractor any provisions of this article.
- 2.5.3 Fire Insurance: In addition to such Fire Insurance as the Contractor elects to carry for his own protection, he shall secure and maintain in the name of the Owner policies upon such structures and material and in such amounts as shall be designated in Section 2.10 - Modifications of the General Conditions. The policies shall be secured from a company which is satisfactory to the Operator and delivered to the Operator.
- 2.5.4 Performance Bond: The Contractor shall, at the time of his execution of the Contract, furnish a corporate surety bond in the sum equal to the Contract Amount. The form of the bond shall be as the Operator may prescribe and with a Surety Company authorized to do business in the State of Montana where the work is located.
- 2.5.5 Patents and Royalties: If any design, device, material or process covered by letters patent or copyright is used by the Contractor, he shall provide for such use by legal agreement with the Owner of the patent or a duly authorized licensee of such Owner, and shall save harmless the Operator from any and all loss or expense on account thereof, including its use by the Operator.
- 2.5.6 Permits: All permits and licenses necessary for the Prosecution of the work shall be secured by the Contractor, except that permits from the United States Bureau of Land Management and the Montana State Land Department shall be secured by the Operator.
- 2.5.7 Laws to be Observed: The Contractor shall give all notices and comply with all Federal, State and local laws, ordinances and regulations in any manner affecting the conduct of the work, and all such orders and decrees as exist, or may be enacted by bodies or tribunals having any jurisdiction or authority over the work,

and shall indemnify and save harmless the Operator against any claim or liability arising from, or based on, the violation of any such law, ordinance, regulation, order or decree, whether by himself or his employees.

2.5.8

Safety of the Public: Roads subject to interference by the work shall be kept open or suitable detours shall be provided and maintained by the Contractor. The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient flasher lights, flagmen, danger signals, and signs, and shall take all necessary precautions for the protection of the work and the safety of the public. Roads closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning and detour signs. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise.

2.5.8.1

The cost of all work required by this paragraph shall be included in the prices bid in the schedule for other items of work.

2.5.9

Sanitary Provisions: The Contractor shall provide and maintain such sanitary accommodations for the use of his employees and those of his sub-contractors as may be necessary to comply with the requirements and regulations of the local and State departments of health and as directed by the Engineer.

2.5.10

Safety and Health

- a. The Contractor shall not require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under construction safety and health standards promulgated by regulations of the Secretary of Labor.
- b. The Contractor shall comply with the Department of Labor Safety and Health Regulations for Construction promulgated under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327, et seq.).
- c. The Contractor shall: (1) Submit a proposed safety program to the Engineer for his approval prior to start of construction operations; (2) Provide for weekly 5-minute "tool-box" safety meetings, conducted by his foremen and attended by all mechanics and laborers at the worksite; (3) Conduct regularly scheduled safety meetings, at least monthly, for all levels of supervision; (4) Provide adequate facilities and trained personnel to insure prompt and efficient first aid and medical care of injured employees; and, (5) Designate a competent supervisory employee to carry out the Contractor's accident prevention program.

- d. The Contractor is responsible for being cognizant of and insuring compliance with the requirements set forth in Safety and Health Regulations for Construction. Such responsibility shall apply to both his operations and those of his sub-contractors. When violations of the safety and health regulations are called to his attention by the Engineer or his authorized representatives, the Contractor shall immediately correct the condition to which attention has been directed. Such notice, either oral or written, when served on the Contractor or his representative(s) shall be deemed sufficient.
- e. In the event the Contractor fails or refuses to promptly comply with the compliance directive issued under Subparagraph d. above, the Engineer or his authorized representative may issue an order to suspend all or any part of the work. When satisfactory corrective action is taken, an order to resume work will be issued. The contractor shall not be entitled to any extension of time, nor to any claim for damage or to excess costs by reason of either the directive or the suspension order. Failure of the Engineer or his representative to order discontinuance of any or all of the contractor's operations shall not relieve the contractor of his responsibility for the safety of personnel and property.
- f. The Contractor shall maintain an accurate record of, and shall report to the Operator in the manner prescribed by the Engineer, all cases of death, occupational diseases, or traumatic injury to employees or the public involved, and property damage by accident in excess of \$100 incident to performance of work under this Contract.
- g. The Contractor shall indemnify and hold the Operator harmless for any and all losses, damages, or liability on account of personal injury, death, or property damage, or claims for personal injury, death, or property damage of any nature whatsoever and by whomsoever made arising out of the activities of the Contractor, his employees, sub-contractors, or agents under the Contract. Such indemnity shall include, but shall not be limited to, the failure of the Contractor, his employees, sub-contractors, or agents to comply with the safety and health provisions contained in these specifications.
- h. The rights and remedies of the Operator provided in this paragraph are in addition to any other rights and remedies provided by law or under this Contract.
- i. In the event there is a conflict between the requirements of this paragraph and any requirement of the United States Department of Labor in its regulations of the Construction Safety Act, the more stringent requirement will prevail.

2.6 Environmental Quality Protection

2.6.1 General Surface Protection Provisions

The Contractor shall: (1) conduct its activities in such a manner as not to interfere with or endanger other land uses; (2) conduct its activities in such a manner as to preserve and protect the environment including land, water, and air, to restore any damages to such environment, and to conserve all other natural resources; (3) to comply with all applicable Federal, State, and local regulations and requirements; and (4) to conduct its activities in accordance with the following terms and conditions:

2.6.2 Stream Protection

All operations shall be conducted in such a manner to avoid (1) blockage of any drainage systems; (2) changing the character, or causing the pollution or siltation of rivers, streams, lakes, ponds, waterholes, seeps, and marshes; and (3) damaging fish and wildlife resources or habitat. Cuts or fills causing any of the above-mentioned problems will be repaired immediately in accordance with specifications of the authorized officer (Bureau of Land Management).

2.6.3 The Contractor shall protect all survey monuments, witness corners, reference monuments, and bearing trees against destruction, obliteration, or damage. He shall, at his expense reestablish damaged, destroyed, or obliterated monuments and corners, using a licensed surveyor, in accordance with Federal survey procedures. A record of the reestablishment shall be submitted to the authorized officer (Bureau of Land Management).

2.6.4 Safety and Health

Contractor shall conduct all operations in connection with this contract in compliance with the applicable provisions of Federal, State, and local safety, health, and sanitation laws, codes, and regulations, and shall make it possible for the authorized officer of each Agency having jurisdiction to inspect such operations.

2.6.5 Landscape Preservation

2.6.5.1 General

The Contractor shall exercise care to preserve the natural landscape and shall conduct his operations so as to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for approved roads and for drilling operations, all

trees, native shrubbery, and vegetation shall be preserved and shall be protected from damage which may be caused by the Contractor's operations and equipment. Movement of crews and equipment within the right-of-way and over routes provided for access to the work shall be performed in a manner to prevent injury or damage to persons, property and the landscape.

2.6.5.2

Drill Site

The Contractor's equipment, shop, office and yard area shall be located and arranged in a manner to preserve the natural terrain conditions to the maximum practicable extent. On the Contractor's abandonment of the drill site, equipment, storage, and buildings, including all of the Contractor's materials and debris, except liquid drilling mud and cuttings shall be removed from the site. The drill site shall be left in a neat condition.

2.6.6

Abatement of Air Pollution

The Contractor shall comply with applicable Federal, State, and local laws and regulations concerning the prevention and control of air pollution.

In conduct of drilling activities and operation of equipment, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize atmospheric emissions or discharges of air contaminants.

Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.

Burning of materials resulting from combustible drilling materials, and rubbish will be permitted only when atmospheric conditions for burning are considered favorable by appropriate State or local air pollution or fire authorities. In lieu of burning, such combustible materials may be removed from the site, chipped or shredded, or buried, as directed by the Engineer.

Burning of cleared timber, brush, and rubbish will not be permitted if in violation of State or local air pollution or fire authorities. Cleared timber and brush shall be removed from the site, chipped or shredded, or buried as directed by the Engineer. Rubbish, trash, and combustible materials shall be buried in a manner and in locations approved by the Engineer or removed from the site and disposed of in an approved manner.

Storage and handling of flammable and combustible materials, provisions for fire prevention, and control of dust resulting from drilling operations shall be in accordance with the applicable provisions of the Department of Labor's "Safety and Health Regulations for Construction", and the Bureau of Land Management Supplement thereto.

The costs of complying with this paragraph shall be included in the prices bid in the schedule for DAYWORK, except that extra pay will be authorized at the hourly rental quoted for water truck if the Engineer orders sprinkling of the roads within the drilling area or access roads when dusty conditions warrant.

2.6.7 Disposal of Waste Materials

2.6.7.1 General

Waste materials including, but not restricted to, refuse, garbage, sanitary wastes, industrial wastes, and oil and other petroleum products, shall be disposed of by the Contractor. Disposal of combustible materials shall be by burying, where burial of such materials is approved by the Engineer; by burning, where burning of such materials is permitted in accordance with State and local laws; or by removal from the drilling area. Disposal of noncombustible materials shall be by burying, where burial of such materials is approved by the Engineer, or by removal from the drilling area. Waste materials removed from the drilling area shall be dumped at an approved dump.

2.6.7.2 Disposal of Material by Burying

Only materials approved by the Engineer may be buried. Burial shall be in pits at locations shown on the drawings or as otherwise approved by the Engineer. The pits shall be covered by at least 2 feet of earth material prior to abandonment.

2.6.7.3 Disposal of Material by Burning

The Contractor shall secure the necessary burning permits from the State and local authorities. All burning shall be in accordance with State and local laws.

All materials to be burned shall be piled in designated burning areas in such a manner as will cause the least fire hazards. Burning shall be thorough and complete and all charred pieces remaining after burning except for scattered small pieces, shall be removed from the drilling area and disposed of as otherwise provided in this paragraph.

The Contractor shall, at all times, take special precautions to prevent fire from spreading beyond the piles being burned and shall be liable for any damage caused by his burning operations. The Contractor shall have available, at all times, suitable equipment and supplies for use in preventing and suppressing fires and shall be subject to all laws and regulations locally applicable for presuppression, suppression, and prevention of fires.

2.6.7.4 Disposal of Material by Removal

Materials disposed of by removal from the drilling area shall be removed from such lands prior to the completion of the work under these specifications.

Materials to be disposed of by dumping shall be hauled to an approved dump. It shall be the responsibility of the Contractor to make any necessary arrangements with private parties and with City or County officials pertinent to locations and regulations of such dumping. Any fees or charges required to be paid for dumping of materials shall be paid by the Contractor.

2.6.7.5 Costs

The costs of complying with this paragraph shall be included in the prices bid in the schedule for Daywork.

2.6.8 Oil Spills

2.6.8.1 The Contractor shall exercise extreme care to prevent spillage of diesel fuel, lubricating oil, and any and all other liquid hydrocarbons or toxic materials used in his operations, from draining or leaching into Empire Creek.

2.6.8.2 The Contractor shall construct a berm surrounding the fuel storage tank. An impervious layer (4 mil polyethylene or equal) shall be used to line the reservoir created by the berm. This impervious layer shall be covered with compacted fine fill material whose volume is at least twice that of the stored fuel. Volume of the reservoir shall be adequate to contain all stored fuel plus an excess capacity to allow for precipitation. The berm shall be higher on the side nearer Empire Creek and lower on the side nearer the mud sump. Work under this paragraph shall be classified as "Reimbursable Costs".

2.6.8.3 The Contractor shall take such action as is necessary to assure that his Supplier of diesel fuel and any bulk oils or oil-based materials is equipped, or makes provisions, to handle the clean-up of any oil-spill that could occur enroute to delivery to the

Contractor at the drill site, to the satisfaction of the authorities having jurisdiction. The Contractor shall furnish to the Engineer satisfactory evidence that such oil spill contingency provisions have been met before taking delivery of such oil materials at the drill site.

2.6.8.4 Any spilled oil or oil-based material shall be disposed of in accordance with Paragraph 2.6.7 (Disposal of Waste Materials).

2.6.8.5 Costs -- The costs of complying with this paragraph shall be included in the price in the schedule for Daywork, except work under sub-paragraph 2.6.8.2 (earthen berm).

2.6.9 Noise Control

2.6.9.1 The Contractor shall maintain the mufflers of all internal combustion engines in good working order to hold the noise level to accepted industry practice in the vicinity of the project.

2.6.9.2 If a piece of the Contractor's equipment has an inadequate or defective muffler, the Engineer shall require that the Contractor repair the defect as soon as practicable in the interest of the Operator.

2.6.10 Fence

2.6.10.1 The Operator shall construct a fence to enclose the Project Area. The Contractor shall limit his operations and the activities of his employees and subcontractors to the fenced project area and access roads thereto, except as may be authorized by the Engineer.

2.7 Fire Protection

2.7.1 The Contractor shall make every reasonable effort to prevent, control, or suppress any fires started by his operations or personnel, and to report, as soon as possible, to the Engineer, location and size of fires, and assistance needed to suppress such fires. The Contractor shall inform the Engineer as soon as possible of all fires, regardless of location, noted, or suppressed by independent action. The Government reserves the right to close any area to operators in periods when fire danger or other dangers to natural resources are severe.

2.7.2 The drill site is situated on Federal land controlled by the Bureau of Land Management, and the two access roads to the site pass through portions of the Helena National Forest nearby. All operations of the Contractor, including travel by Contractor personnel and suppliers to and from the site, shall be carried out in strict observance of Federal Fire Laws (Appendix A), and Montana State Fire Regulations (Appendix B).

- 2.7.3 Prior to move-in on the site the Contractor shall file with the District Ranger, Helena District, a "Region 1 Fire Prevention and Suppression Plan for National Forest Timber Sales" (Appendix C).

2.8 Progress and Completion of Work

2.8.1 Notice to Proceed

Following the execution of the Contract by the Operator, written Notice to Proceed with the work shall be given to the Contractor. The Contractor shall begin and shall prosecute the work regularly and uninterruptedly thereafter (unless otherwise directed in writing by the Operator) with such force as to secure the completion of the work within the shortest practicable time.

2.8.2 Changes in the Work

The Operator may, as the need arises, order changes in the work through additions, deletions or modifications without invalidating the Contract. Compensation and time of completion affected by the change shall be adjusted at the time of ordering such change.

2.8.3 Extra Work

New and unforeseen items of work found to be necessary and which cannot be covered by any item or combination of items for which there is a Contract price shall be classed as Extra Work. The Contractor shall do such Extra Work and furnish such materials as may be required for the proper completion or construction of the whole work contemplated upon written order from the Operator as approved by the Engineer. In the absence of such written order, no claim for Extra Work shall be considered. Extra Work required in an emergency to protect life and property shall be performed by the Contractor as required.

2.9 Measurement and Payment

- 2.9.1 The Contractor shall perform all of the work required by the specifications on Daywork basis. The Contractor shall furnish his fully manned drilling rig, complete with all necessary personnel and laborers, machinery, equipment, materials and supplies as required for proper operation and maintenance of the drilling rig in performance of the work specified herein, and as normally furnished under Daywork rates in the oil and gas drilling industry, whether specifically listed or not, and shall be paid the Daywork rate set out in the Contract for all such work performed. Items specifically included in the Dayworkrate are set out in Paragraph 5.1; items to be furnished by the Contractor for additional pay, or to be furnished by others, are set out in Paragraph 5.2 (Reimbursable Costs).

2.9.2

Requests for Payment

The Contractor may submit periodically but not more than once each month a Request for Payment for work done and materials delivered and stored on the site. Where unit prices are specified the Request for Payment shall be based on the quantities completed, or hours worked.

2.9.3

Engineer's Action on a Request for Payment

Within ten (10) days of submission of any Request for Payment by the Contractor, the Engineer shall:

- a. Approve the Request for Payment as submitted.
- b. Approve such other amount as he shall decide is due the Contractor, informing the Contractor in writing of his reasons for approving the amended amount.
- c. Withhold the Request for Payment, informing the Contractor in writing of his reasons for withholding it.

2.9.4

Operator's Action on an Approved Request for Payment

Within thirty (30) days from the date of approval of a Request for Payment by the Engineer, the Operator shall:

- a. Pay the Request for Payment as approved.
- b. Pay such other amount in accordance with Paragraph 2.9.5 as he shall decide is due the Contractor, informing the Contractor and the Engineer in writing of his reasons for paying the amended amount.
- c. Withhold payment in accordance with Paragraph 2.9.5 informing the Contractor and the Engineer of his reasons for withholding payment.

2.9.5

Operator's Right to Withhold Payment of an Approved Request Pay

The Operator may withhold payment in whole or in part on an approved Request for Payment to the extent necessary to protect himself from loss on account of any of the following causes discovered subsequent to approval of a Request for Payment by the Engineer:

- a. Defective work.
- b. Evidence indicating the probable filing of claims by other parties against the Contractor.

- c. Failure of the Contractor to make payments to sub-contractors, material suppliers or labor.
- d. Damage to another contractor.

2.9.6

Interest on Unpaid Requests for Payment

Should the Operator fail to pay an approved Request for Payment within thirty (30) days from the date of approval by the Engineer, and should he fail to inform the Engineer and the Contractor in writing of his reasons for withholding payment, the Operator shall pay the Contractor Interest on the amount of the Request for Payment at the rate of six percent (6%) per annum until payment is made.

2.9.7

Responsibility of the Contractor

Unless specifically noted otherwise, the Contractor shall furnish all materials and services and perform all the work described by the Contract Documents or shall have all materials and services furnished and all the work performed at his expense. It shall be the Contractor's responsibility to pay for:

- a. Lands by Contractor provided in accordance with Paragraph 2.3.9
- b. Insurance obtained in accordance with Paragraphs 2.5.1 and 2.5.2.
- c. Fire Insurance obtained in accordance with Paragraph 2.5.3.
- d. Performance Bond obtained in accordance with Paragraph 2.5.4.
- e. Royalties required under Paragraph 2.5.5.
- f. Permits and Licenses required of the Contractor and all sub-contractors.

2.9.8

Payments for Extra Work

Written notice of claims for payments for Extra Work shall be given by the Contractor within ten (10) days after receipt of instructions from the Operator as approved by the Engineer to proceed with the Extra Work and also before any work is commenced, except in emergency endangering life or property. No claim shall be valid unless so made. In all cases, the Contractor's itemized estimate sheets showing all labor and material shall be submitted to the Engineer. The Operator's order for Extra Work shall specify any extension of the Contract Time and one of the following methods of payment:

- a. Unit prices or combinations of unit prices which formed the basis of the original Contract.
- b. A lump sum based on the Contractor's estimate, accepted by the Operator, and approved by the Engineer.
- c. Actual cost plus 15% for overhead and profit.

2.9.9 Payment for Work Suspended by the Operator

If the work or any part thereof shall be suspended by the Operator and abandoned by the Contractor as provided in Paragraph 2.3.12, the Contractor will then be entitled to payment for all work done on the portions so abandoned, plus 15% of the value of the abandoned work to compensate for overhead, plant expense, and anticipated profit.

2.9.10 Payment for Work by the Operator

The cost of the work performed by the Operator removing construction equipment, tools and supplies in accordance with Paragraph 2.3.11 and in correcting deficiencies in accordance with Paragraph 2.3.13 shall be paid by the Contractor.

2.9.11 Payment for Work by the Operator Following His Termination of the Contract

Upon termination of the Contract by the Operator in accordance with Paragraph 2.3.14, no further payments shall be due the Contractor until the work is completed.

2.9.12 Payment for Work Terminated by the Contractor

Upon suspension of the work or termination of the Contract by the Contractor in accordance with Paragraph 2.3.15, the Contractor shall recover payment from the Operator for the work performed, plus loss on plant and materials, plus established profit and damages, as approved by the Engineer.

2.9.13 Release of Liens

The Contractor shall deliver to the Operator a complete release of all liens arising out of this Contract before the final Request for Payment is paid. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Operator such amount as the Operator may have been compelled to pay in discharging such liens including all costs and a reasonable attorney's fee.

2.9.14

Acceptance and Final Payment

When the Contractor shall have completed the work in accordance with the terms of the Contract Documents, the Engineer shall certify his acceptance to the Operator and his approval of the Contractor's final Request for Payment, which shall be calculated at the Contract rates plus all approved additions less all approved deductions and less previous payments made. The Contractor shall furnish evidence that he has fully paid all debts for labor, materials, and equipment incurred in connection with the work, following which the Operator shall accept the work and release the Contractor except as to the conditions of the Performance Bond, any legal rights of the Operator, required guarantees, and Correction of Faulty Work after Final Payment, and shall authorize payment of the Contractor's final Request for Payment. The Contractor must allow sufficient time between the time of completion of the work and approval of the final Request for Payment for the Engineer to assemble and check the necessary data.

2.9.15

Termination of Contractor's Responsibility

The Contract will be considered complete when all work has been finished, the final inspection made by the Engineer, and the project accepted in writing by the Operator. The Contractor's responsibility shall then cease, except as set forth in his Performance Bond, as required by the Guaranty Period in accordance with Paragraph 2.4.7 and as provided in Paragraph 2.7.19.

2.9.16

Correction of Faulty Work after Final Payment

The approval of the final Request for Payment by the Engineer and the making of the final payment by the Operator to the Contractor shall not relieve the Contractor of responsibility for faulty materials or workmanship. The Operator shall promptly give notice of faulty materials or workmanship and the Contractor shall promptly replace any such defects discovered within one year from the date of written acceptance of the work. The Engineer shall decide all questions arising under this paragraph, and all such decisions shall be subject to arbitration.

2.10

Modifications of the General Conditions

2.10.1

Equal Opportunity Clause

During the performance of this Contract, the Contractor agrees as follows:

- a. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Engineer setting forth the provisions of this Equal Opportunity clause.
- b. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
- c. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under this Equal Opportunity clause, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- d. The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- e. The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- f. In the event of the Contractor's noncompliance with the Equal Opportunity Clause of this contract or with any of the said

rules, regulations, or orders, this contract may be cancelled, terminated or suspended, in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- g. The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, as amended, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for non-compliance: Provided; however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the Operator to enter into such litigation to protect the interests of the Operator.

2.10.2

Acknowledgement

The Contractor shall give appropriate acknowledgement of National Science Foundation support in connection with publication of any material based on research aided by the Foundation.

2.10.3

Patents and Inventions

Whenever any invention, which is or may be patentable, is conceived or first actually reduced to practice in the course of this Contract, the Contractor shall furnish the Foundation with complete information thereon; and the Foundation shall have the right to determine whether or not and where a patent application shall be filed, and to determine the disposition of the invention and title to and rights under any application or patent that may result. The Foundation, in making such a determination, shall take into account the public interest and the equities of the Contractor. In any case, the Foundation may arrange to have the invention described in a printed publication. The Contractor, for itself and for its employees, agrees that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the determination of the Foundation.

2.10.4

Civil Rights Act of 1964

Title VI of the Civil Rights Act of 1964 provides that: "No person in the United States shall, on the ground of race, color, or

national origin be excluded from participation in, be denied the benefits of, or be subject to discrimination under a program of activity receiving Federal financial assistance." (Section 601). The Contractor hereby affirms that the Assurance of Compliance with the National Science Foundation Regulation under Title VI of the Civil Rights Act of 1964 (P.L. 88-352), previously executed, is fully applicable to this Contract and to any programs assisted thereby.

2.10.5 Cooperative Research Contract

The Contractor agrees to abide by the terms and conditions set forth in the "Cooperative Research Contract" entered into between the United States Department of the Interior's Bureau of Land Management, Battelle-Northwest, Southern Methodist University, and Rogers Engineering Co., Inc., which is incorporated in this Contract by this reference.

2.10.6 Independent Contractor

The Contractor is an independent contractor and not an agent or employee of the Operator in the performance of the work under this Contract.

2.10.7 Covenant Against Contingent Fees

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this Contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty, Battelle-Northwest shall have the right to annul this Contract without liability or in its discretion to deduct from the Contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

2.10.8 Officials not to Benefit

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Contract, or to any benefits that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

2.10.9 Compliance with Laws

In the performance of the work provided by this Contract, the Contractor shall comply with all applicable State, Federal and local laws, rules, and regulations. This Contract shall be construed, interpreted and applied in accordance with the laws of the State of Montana.

2.10.10

Examination of Records

(The following clause is applicable if this contract exceeds \$2,500 and was entered into by means of negotiations, but is not applicable if entered into by means of formal advertising.)

- a. The Contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until expiration of 3 years after final payment under this contract, or of the time periods for the particular records specified in Part 1-20 of the Federal Procurement Regulations (41 CFR Part 1-20), whichever expires earlier, have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to this contract.
- b. The Contractor further agrees to include in all his sub-contracts hereunder a provision to the effect that the sub-contractor agrees that the Comptroller General of the United States or any of his duly authorized representatives shall, until expiration of 3 years after final payment under the sub-contract, or of the time periods for the particular records specified in Part 1-20 of the Federal Procurement Regulations (41 CFR Part 1-20), whichever expires earlier, have access to and the right to examine any directly pertinent books, documents, papers, and records of such sub-contractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes (1) purchase orders not exceeding \$2,500 and (2) subcontracts or purchase orders for public utility services at rates established for uniform applicability to the general public.

2.11

Bidder's Qualifications

All prospective Bidders are hereby notified that, before any bid submitted in response to this invitation is considered for award, the Operator may require the Bidder to submit a statement of facts in detail as to the previous experience of the Contractor in performing similar or comparable work and of the business and technical organization and financial resources and plant of the Bidder available and to be used in performing the contemplated work. The Operator expressly reserves the right to reject any bid on which the facts as to business and technical organization, plant, financial, and other resources, or business experience, compared with the work under this invitation justify such rejection.

In the case of highly specialized or complicated work or equipment where prior satisfactory performance over a period of time under actual operating conditions is essential to establish the

ability of the Contractor to perform the work or reliability of the equipment and where failure to perform or operate properly could result in loss of life or serious property damage, the Engineer may require the Contractor to furnish evidence of satisfactory performance of comparable work or of equipment for over a sufficient period of time to insure the satisfactory performance of the work or the reliability of the equipment being offered. Additional qualifications for Contractor's personnel are set out in Paragraph 4.6.1.

2.12

Cleaning Up

Upon completion of the work, the Contractor shall remove from the vicinity of the work, all equipment, supplies, rubbish, unused materials, and other like material, belonging to him or used under his direction during the Project. In the event of his failure to do so the same may be removed by the Operator at the expense of the Contractor.

3. SPECIAL CONDITIONS

3.1 Description of Project

The Marysville Geothermal Project is a research activity of Research Applied to National Needs (RANN), of the National Science Foundation.

The objective of the Project is the coordinated application of multi-discipline forces and agencies to carry out the Evaluation of a Geothermal Area of Abnormally High Heat Flow at Marysville, Montana, by drilling a deep well into the formation, and to determine how this natural resource might be developed as a source of useful energy for the Nation (See Appendix D).

These specifications shall govern the bidding and selection of the Contractor who will carry out the drilling of the deep well, shall specify the drilling rig requirements, and shall establish the terms and conditions under which the drilling operation will be performed.

3.1.2 Location

The deep well will be located in the southwest quarter of the northeast quarter of Section 32, Township 12 North, Range 6 West, Lewis and Clark County, Montana. This location is in Empire Gulch (see Drawing No. E-04-1001).

3.1.3 Name of Well

Marysville Geothermal No. 1.

3.1.4 Co-Principal Investigators

3.1.4.1 Battelle Pacific Northwest Laboratories

3.1.4.2 Southern Methodist University

3.1.5 Consultants

Systems, Science and Software

3.1.6 Operator and Engineer

Rogers Engineering Co., Inc.

3.1.7 Land Owner

Surface - U. S. Government, Bureau of Land Management
Oil and Minerals - May be held by others.
Geothermal - U. S. Government

3.1.8

Terrain

The drill site is on the floor of a mountain valley, at approximately elevation 5,350 feet.

3.1.9

Access to Drill Site

There is good valley level access from Helena through Canyon Creek (a gas station and store): 23 miles of good hard surface road to Canyon Creek, then 12 miles of well graded gravel road to the drill site, maintained by the County. Bridges are adequate.

3.2

WELL DESCRIPTION

3.2.1

Depth of Well

See Drawing No. E-04-1009. The objective of the Project is to drill to approximately 6,000 foot depth, or until the current high temperature limit of drilling industry capability is reached (750°F to 800°F), if that is reached sooner.

3.2.2

Expected Temperature Gradient

Heat flow measurements at the site indicate a geothermal gradient of 13.2°F per 100 feet (240°C per Km). If the formations are essentially dry, as expected, this gradient should hold to the bottom, yielding a bottom hole temperature of 750°F to 800°F at 6,000 feet. If the lower formations reveal an aqueous reservoir, the gradient could stabilize at a maximum temperature of about 400 - 450°F, resulting in wet or dry steam production. See Drawing No. E-04-1010.

3.2.3

Casing Program

The planned casing program is shown in profile in Drawing No. E-04-1009. Cementing procedures, whether in one stage, or whether to cement bottom end and then pretension casing before cementing to surface is subject to later determination.

3.2.3.1

Casing couplings. Casing couplings shall be removed, inspected, cleaned and treated with an ample quantity of high-temperature thread compound as approved by the Engineer.

3.2.3.2

Inspection and cleaning of casing - Prior to running, all casing shall be inspected for defects with Tuboscope, or equal, new casing shall be inspected by the following methods consisting of combination mechanical-optical and magnetic particle inspection for the full length and API drift for the full length and shall be accepted by the Engineer prior to installation. The exterior of all blank casing requiring cementing shall be cleaned thoroughly to remove all scale, dirt, loose rust, and coatings.

Extreme care shall be taken to keep threads and thread compound free of sand. Copies of inspection reports shall be furnished to the Engineer. Cost of casing inspection will be borne by the Operator.

- 3.2.3.3 Installation - The casing shall be reciprocated during the entire cementing operation, (except the second stage if pretensioning is used).

3.3 Materials to be Furnished by the Contractor

- 3.3.1 General - The Contractor shall furnish all materials required for completion of the work except the materials listed in Paragraph 3.4 (Special Equipment Furnished by the Operator), and Paragraph 5.2 (Equipment, Materials, and Services to be furnished by Operator, or as Separate Bid Items).

When a separate item, which includes the furnishing of any material, is provided in the schedule, the cost of furnishing, hauling, storing, and handling shall be included in the price bid for that item. When a separate item is not provided in the schedule for furnishing any material required to be furnished by the Contractor, the cost of furnishing, hauling, storing, and handling shall be included in the price bid for the work for which the material is required.

Materials furnished by the Contractor shall be of the type and quality described in these specifications. The Contractor shall make diligent effort to procure the specified materials from any and all sources, but where because of Government priorities or other causes, materials required by the specifications become unavailable, substitute materials may be used: Provided, that no substitute materials shall be used without prior written approval of the Engineer. The determination as to whether substitution shall be permitted and as to what substitute materials may be used shall be final and conclusive. If the substitute materials approved are of less value to the Operator or involve less cost to the Contractor than the materials specified, an adjustment shall be made in favor of the Operator, and where the amount involved or the importance of the substitution warrants, an order for changes will be issued, otherwise the adjustment will be handled by deduction from payments to the Contractor on the basis of prices stated in the written approval. No payments in excess of prices bid in the schedule will be made because of substitution of one material for another or because of the use of one alternate material in place of another.

3.4 Special Equipment Furnished by the Operator

The Operator will furnish the following Special equipment:

3.4.1

A mud cooling tower with blower. The Operator will deliver the tower to the Contractor at the drill site. The Contractor shall accept the tower and shall erect, make all connections, and perform all maintenance required to operate the cooling tower. Upon completion of the work, the Contractor shall clean and dismantle the tower and deliver it to the Operator at the site of the work in as good condition as received, usual wear excepted.

3.5

Mobilization and Demobilization

Mobilization and demobilization for drilling shall include moving onto the site, assembling into working condition, disassembling, and removing from the site all machinery and equipment and supplies necessary to perform the required drilling operations. Payment for assembling all drilling machinery and equipment and rigging up at the site preparatory to initiating the drilling described in these specifications and for disassembling and removing them from the site when the drilling program has been completed will be made at the lump sum price bid in the schedule for mobilization and demobilization.

The lump sum price bid in the schedule will be paid only once regardless of the number of times the equipment is moved and assembled or reassembled during the work, and shall consist of complete mobilization and demobilization, including the cost of moving onto the site during the progress of the work any additional equipment that may be required to perform the drilling operations. Seventy-five percent of the lump sum price bid in the schedule will be included in the estimate for progress payment for the month during which the mobilization and assembly is essentially complete and drilling the rathole and mousehole has commenced. The remaining twenty-five percent will be included in the estimate for progress payment for the month during which machinery and equipment are demobilized and removed from the site after completion of all drilling operations.

3.6

Drilling Methods and Practices

The Contractor shall drill a minimum of 26-inch-diameter hole for the 20-inch conductor casing, a 17 1/2-inch-diameter hole for the 13 3/8-inch surface casing, a 12 1/4-inch-diameter hole for 9 5/8-inch production casing, and a 7 7/8-inch-diameter hole for the Barefoot Section, in accordance with these specifications, with due diligence and care, in a good workmanlike manner, and in accordance with good drilling practices.

The Contractor shall maintain well control equipment in good operating condition at all times and shall use all reasonable means to prevent fires and blowouts and to protect the hole. Blowout prevention equipment shall be installed and tested in accordance with good oil field practices and with reference to the pressures being encountered.

The Contractor shall keep and furnish to the Engineer daily an accurate record of the work performed on an AAODC-API Daily Drilling Report Form or a form acceptable to the Engineer. A legible copy of said form signed by the Contractor's representative shall be furnished by the Contractor to the Engineer.

The Contractor shall exercise due diligence and care to maintain a straight hole in accordance with these specifications, and all risk and expense of maintaining or restoring the hole to such specifications shall be borne by the Contractor. The contractor shall make hole deviation surveys at intervals of not more than 300 feet between 0- and 1,000-foot depth and of not more than 500 feet between 1,000-foot depth and total depth. From 0- to 1,000-foot depth the maximum deviation gradient between surveys shall be one-half ($1/2$) degree per 100 feet with a maximum deviation from the vertical of three (3) degrees. From 1,000-foot depth to total depth the maximum deviation gradient between surveys shall be two (2) degrees per 500 feet with a maximum deviation from the vertical of six (6) degrees.

3.7 Responsibility for Loss of or Damage to the Equipment or the Hole

3.7.1 Contractor's surface equipment - Contractor shall be liable at all times for damage to or destruction or loss of Contractor's surface equipment including all drilling tools, machinery, and appliances for use above the surface, and for any other type of equipment, including in-hole equipment when such in-hole equipment is above the ground surface regardless of when or how such damage or destruction occurs. The Operator shall be under no liability to reimburse the Contractor for any such loss except loss or damage thereto caused by the negligent acts or omissions of the Operator or its agents, representatives, or employees.

3.7.2 The Operator will reimburse the Contractor for his tools and equipment lost in the hole while the Contractor is on Daywork unless such loss is caused by the Contractor's negligence. The basis of reimbursement shall be as follows:

1. Current stock-item costs for lost tools and equipment to be replaced by the Operator, or
2. Replacement in kind by the Operator for lost tools and equipment.

Reimbursement shall be subject to the written approval of the Engineer.

3.7.3

Operator's equipment - All machinery, tools, materials, and equipment furnished by the Operator shall, at the completion or abandonment of the well, be returned to the Operator in as good condition as when received by the Contractor, ordinary wear and tear excepted. The Contractor shall be liable for any loss or damage to such equipment except that due to negligence of the Operator, its agents, representatives, or employees.

3.7.4

The hole - Should the hole for any cause attributable to the Contractor's negligence be lost or damaged while the Contractor is engaged in the performance of work on a Daywork basis, all such loss or damage to the hole shall be borne by the Contractor. If the hole should be lost and is not in condition to be carried to the contract depth or completed in accordance with these specifications due to the Contractor's negligence, the Contractor shall properly plug and abandon the hole in accordance with Paragraphs 2.2.19 (Plugging and Abandonment) and 2.2.18 (Cleanup), and shall remove and dispose of the cellar, dispose of all drilling mud and cuttings, and backfill all disposal pits, and if requested by the Operator shall move to a new well site without delay, at the Contractor's expense. Provided, that the Contractor may remove and reuse the cellar or any casing that can be pulled without damage and is approved for reuse by the Engineer. Any casing that is pulled for reuse shall be inspected in accordance with standard casing inspection methods as may be required by the Engineer and such inspection shall be at the expense of the Contractor. The drilling of the new hole shall be conducted under the terms and conditions of the specifications in the same manner as though it were the hole that had been lost or damaged. In such case, the Contractor shall not be entitled to any payment or compensation for expenditures made or incurred by the Contractor in connection with the abandoned hole.

3.8

Access to the Drill Site Location and Haul Routes

Rights-of-way for access to the work at the drill site location from existing roads will be provided by the Operator in accordance with Dwg. No. E-04-1004.

The hauling of drilling equipment and materials, or other intrajob hauling, over public highways, roads, or bridges shall be in compliance with the applicable local regulations and shall be such as to minimize interference with or congestion of local traffic. Where haul routes cross public highways or roads the Contractor shall provide barricades, flagmen, and other necessary precautions for safety of the public as provided in Paragraph 2.5.8 (Safety of the Public).

The maintenance of the access roads by the Operator will provide for the prevention of dust nuisance from these sources.

3.9 Water for Drilling Operations

The Operator shall furnish untreated water for the Contractor's operations from a site well or wells, or from wells and surface water by an impoundment of a portion of the flow of Empire Creek.

3.9.1 The Operator shall furnish the water at a valve or valves on the northeast line and/or the southwest line of the drill site. The Contractor is responsible for piping the water within the Drill Site, and the cost shall be included in the Daywork rate.

3.10 Reimbursable Contractor Costs

The Contractor will be reimbursed by the Operator for the costs of all materials, services, and articles required in connection with Daywork under the supervision of the Engineer, except those items of work or materials for which payment is specifically provided in the schedule on a unit or lump sum price basis.

The major materials, services, and articles covered by this paragraph are as follows:

1. Drill-stem formation testing, if any.
2. Fishing tools and other fishing services not included in Daywork rate, if any.
3. Special directional services, if any.

The Operator payment to the Contractor will be for the actual cost of such materials, services, and articles, and shall be less cash discounts thereon to which the Contractor may be entitled. The Contractor shall furnish the Operator copies of supplier's, vendor's, or third party invoices and their current posted price schedule covering such materials, services, and articles.

Materials and services furnished under this paragraph shall be subject to the written approval of the Engineer.

The cost for billing of the Operator for reimbursable Contractor costs and related overhead shall be included in the prices bid in the schedule for other items of work.

3.11 Maintenance of Drilling Rig

In the event it is necessary to shut down the Contractor's drilling rig for repairs or maintenance while the Contractor is performing

work on a Daywork basis, the Contractor will be allowed compensation at Daywork rate as follows:

The number of hours for which the Contractor is to be compensated under this provision shall be limited to (1) 4 hours for any one repair job and (2) 12 hours in the aggregate for the well.

3.12

Supervision of Work by the Engineer

The Engineer shall have the right, as required, to direct and supervise all of the work at the Well Site being performed on a Daywork basis, including the manner and mode in which the work is done. The actual performance of the Contractor's employees and superintendence of drilling or other well work operations under Daywork shall be by the Contractor.

3.13

Work Stoppage

The Operator shall have the right to direct the stoppage of work at any time prior to reaching the contract depth specified. The Operator shall have the further right to require the well to be completed in accordance with these specifications or abandoned at any depth as set forth in Paragraph 3.15 (Plugging and Abandonment). Immediately upon receipt of instructions from the Engineer, the Contractor shall discontinue the drilling of the well and, plug and abandon or complete the well, as the Engineer may direct. The Contractor will be paid for the actual work completed at the respective prices bid therefor in the Bidding Schedule.

In case of work stoppage, the Contractor will be reimbursed for costs incurred, in accordance with Paragraph 2.9 of these specifications.

In the event of unreasonably slow progress, carelessness, inattention, or incompetency on the part of the Contractor in the performance of the work under Daywork, the Engineer shall notify the Contractor of the dissatisfaction and the provisions of Paragraph 2.3.14 of the specifications shall apply.

3.14

Cleanup

After the Operator has accepted the work, the Contractor shall clean up the well site in accordance with Paragraph 2.12 (Cleaning Up). The Contractor will not be required to dispose of the drilling mud and cuttings nor to backfill the disposal pits. The Contractor shall leave the cellar in place at the well head. The cost of cleanup shall be included in the prices bid in the schedule for the other items of work.

3.15

Plugging and Abandonment

In the event the Engineer orders the hole to be plugged and abandoned, the Contractor shall plug and abandon the hole in a manner and method prescribed by the Engineer and shall clean up the drill site location as set forth in Paragraph 3.14 (Cleanup).

If the Contractor voluntarily stops work before the well is completed to a depth of 6,000 feet or less as ordered by the Engineer or it does not satisfy alignment requirements as set forth in Paragraph 3.6 (Drilling Methods and Practices) or the hole is lost or damaged due to the Contractor's negligence as set forth in Paragraph 3.7 (Responsibility for Loss of or Damage to the Equipment or Hole), the well will be rejected by the Engineer and abandoned. No payment will be made by the Operator for abandonment due to the fault or negligence of the Contractor.

Payment for plugging and abandonment of the well due to the operations or responsibility of the Operator will be made in accordance with Paragraph 2.9.11 of the "General Provisions."

3.16

Effect of Hole Conditions on Drill String

3.16.1

Drilling Environment - The high bottom-hole temperatures which are expected may have some degree of adverse effect on plastic drill pipe lining. In addition, if geothermal steam under considerable formation pressure is encountered (not considered likely) and air drilling is utilized in such conditions, some erosion of tool joints could occur.

3.16.2

Inspection - In order to establish the amount of any damage to the Contractor's drill string resulting from such possible operating environment on this project, inspections shall be made before and after drilling operations by an independent testing organization, such as Sonoscope or equal, according to API and IADC standards, of all drill pipe, drill collars, and subs used by the Contractor on the Project. Both before-drilling and after-drilling inspections shall be made at the Drill Site of this Project, and payment shall be made therefor by the Operator, after the inspections are approved by the Engineer.

3.16.3

Payment for damage to drill string components - The Contractor shall be reimbursed by the Operator for any diminished increment of fair value of the drill string, revealed by the before and after operations inspections required above (3.16.2), that will have been caused, in the opinion of the Engineer, by use on this Project, normal wear and tear excepted.

4.

DRILLING PROCEDURE

4.1

Conductor Casing

4.1.1

The Contractor shall precede the 26-inch hole for the conductor casing by drilling a 7-7/8 inch pilot hole ahead to insure that the conductor casing reaches bedrock. The hole shall then be opened to 26 inches to a depth of 250 feet, after which the 20-inch conductor casing shall be set and cemented to the surface. Cementing shall be in accordance with the requirements set forth in Paragraph 4.5.2.3 (Cementing Operations).

4.1.2

After cementing is completed the Contractor shall allow a waiting period of 12 hours for the cement to set before drilling out from under the 20-inch conductor casing.

4.1.3

Contractor shall weld 20-inch 3,000 psi series casing head on top of 20-inch casing.

4.1.4

Install 20-inch 2,000 psi series blowout preventer equipment.

4.1.5

Pressure test 20-inch casing with water for 30 minutes to 1,200 psi. If the pressure declines more than 5 percent in 15 minutes or if there is any other indication of leakage, corrective measures shall be taken until a satisfactory test is obtained.

4.1.6

Pressure test BOP to 2,000 psi with water for 30 minutes after installing test plug. If the pressure declines more than 5 percent in 15 minutes or if there is any other indication of leakage, corrective measures shall be taken until a satisfactory test is obtained.

4.1.7

Drill out cement baffle and shoe.

4.1.8

Mud logging trailer (furnished by others) will be moved in at this time. Mud logging program is subject to later determination, but will include at least the following:

lithology, drilling time, bit penetration,
mud properties, mud temperature in and out,
mud resistivity, mud pit level, plus H₂S,
CO₂, and hydrocarbon chromatograph.

4.2

SURFACE CASING SECTION

4.2.1

The Contractor shall drill a pilot hole at 7-7/8 inches to 2,500 foot depth.

4.2.2

Cores shall be taken with 6-1/4 inch head as directed. It is estimated that 10 foot long cores will be taken frequently to accommodate the needs of the Research Scientists of the Project.

- 4.2.3 Mud cooling tower shall be connected when flow line temperature exceeds 140°F.
- 4.2.4 Pilot hole shall be opened to 17-1/2 inches to 2,500 foot depth.
- 4.2.5 Logs shall be run by others as directed.
- 4.2.6 Contractor shall run 13-3/8 inch casing to 2,500 feet and cement to the surface. (See Paragraph 4.5.2.3) (Cementing Operations)
- 4.2.7 Installation of the landing flange for hanging the 9-5/8 inch production casing is subject to later determination.
- 4.2.8 Cementing procedure, whether in one stage, or whether to cement bottom end and then pretension casing before cementing to surface is subject to later determination.
- 4.2.9 Contractor shall wait 24 hours, during which time temperature survey will be run every 6 hours.
- 4.2.10 Install 12 inch, 3,000 psi series, blowout preventer equipment.
- 4.2.11 Pressure test 13-3/8 inch casing and valves to 2,500 psi with water for 30 minutes. Use same test criteria and corrective procedures as in Paragraph 4.1.5.
- 4.2.12 Pressure test BOP to 3,000 psi with water for 30 minutes after installing test plug. Use same test criteria and corrective procedures as in Paragraph 4.1.6.
- 4.2.13 Wait for temperature surveys as directed.
- 4.2.14 Drill out cement collar and shoe, breaking circulation every 500 feet as hole is re-entered, or as directed by the Engineer.

4.3 PRODUCTION CASING SECTION

- 4.3.1 The Contractor shall drill a 12-1/4 inch hole below 2,500 feet to 4,000 foot depth.
- 4.3.2 Cores shall be taken as directed with 6-1/4 inch head. It is estimated that frequent coring will be done, as in above section.
- 4.3.3 Logs shall be run by others as directed.
- 4.3.4 Contractor shall run 9-5/8 inch casing to 4,000 feet and cement as directed. Decision whether to hang 9-5/8 inch casing at 2,500 feet or to run 9-5/8 inch to surface is subject to later determination. Pretensioning is also subject to later determination.

4.3.5 Installation, cleaning, and inspection procedures of 9-5/8 inch casing and couplings shall be the same as in Paragraphs 3.2.3.1, 3.2.3.2 and 3.2.3.3.

4.3.6 Contractor shall wait 24 hours, during which time temperature survey will be run every 6 hours.

A cement-bond log will be run by others to verify the integrity of the cement job.

4.3.7 Install 12 inch, 3,000 psi series, double date and bag. Pressure test 9-5/8 inch casing, valves, and BOP to 3,000 psi with water for 30 minutes.

4.3.8 Wait for temperature surveys as directed.

4.3.9 Drill out cement collar and shoe, breaking circulation every 500 feet as hole is re-entered. (Toward bottom, Engineer may require Contractor to break circulation more often).

4.4 BAREFOOT SECTION TO TD

4.4.1 The Contractor shall drill a 7-7/8 inch hole below 4,000 feet as directed by the Engineer. If the drilling reveals a fluid geothermal system trapped under a dense impervious cap (considered unlikely), a drill stem test shall be conducted as directed by the Engineer.

4.4.2 It is considered more likely that the lower formations will be relatively dry, with the geothermal gradient of 13.2°F. per 100 feet holding as drilling proceeds. Under such conditions the Contractor shall drill ahead until, in the opinion of the Engineer, the upper temperature limit of drilling fluids (whether mud, aerated mud, air, air-mist, or aerated foam) currently available in the drilling industry has been reached, or to TD 6,000 feet if that depth is reached sooner. A decision on drilling below 6,000 feet, if the upper temperature limit described above has not yet been reached at that depth, is subject to later determination.

4.4.3 It is estimated that extensive coring will be done as in the hole sections above.

4.4.4 Logging and temperature surveys shall be carried out by others.

4.4.5 The Contractor shall clean out the well and complete it by such means as directed by the Engineer.

4.5 Cementing Program

4.5.1 General

After the Contractor has drilled to casing depth, the hole shall be thoroughly circulated to condition it for running and landing the casing. The casing shall be cemented as required in Paragraph 4.0 (Drilling Sequence).

4.5.2 Cementing Service Company

4.5.2.1 The Operator shall employ a well Cementing Service Company of wide experience on high temperature well cementing projects to furnish the cementing materials, casing equipment, and complete cementing service for cementing the casing strings as directed by the Engineer.

4.5.2.2 The Cementing Service Company shall be employed by separate contract; however, these specifications are made a part of the Cementing Service Company contract by reference.

4.5.2.3 Cementing Operations

Cementing shall be in accordance with good oil well cementing practice and shall be by the displacement method from the bottom. The casing shall be cemented by stages if required. Mixing equipment and pumps shall be of adequate size to provide good circulation of the cement around the casing and to complete the cementing operation in the relatively high temperatures encountered without detrimental effects due to premature hydration of the cement.

The Cementing Service Company shall have on hand at the beginning of cementing operations, cement and other materials in an amount of not less than 150 percent (150%) of that theoretically required for cementing of the annulus around the casing.

All cement and additives shall be in accordance with API Standards 10A "0.1 - Well Cements and Cement Additives". The following information shall be plainly marked on each bag of cement and on each shipping invoice covering a shipment of bulk cement:

- (a) Manufacturer's name.
- (b) API monogram.
- (c) Class of cement.
- (d) The word "RETARDED" if the cement contains a retarder other than or in addition to calcium sulfate.

(e) The words "MODERATE SULFATE RESISTANCE (MSR)" or "HIGH SULFATE RESISTANCE (HSR)" if the cement complies with the respective requirements for sulfate resistance.

(f) The cement slurry for all systems shall contain a minimum ratio of silica flour to cement of 1:3, by weight.

4.5.2.4

CEMENT PROPOSALS

Sealed proposals for furnishing the Cementing Service in accordance with these Specifications will be received at the time and place and in the manner set out in Paragraphs 1.1.1 and 1.1.2, according to the following schedule:

I. Conductor Casing - 250' of 20" casing in

26" hole:

A. Filler System:

(1) Description: (Ingredients and Procedure)

(2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment costs per 12 hour increment)

B. Tail-End System:

(1) Description: (Ingredients and Procedure)

(2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment costs per 12 hour increment)

C. Casing Equipment:

(1) Description

(2) Cost: (Unit Prices)

II. Surface Casing - 2500' of 13-3/8" casing in 17-1/2" hole:

A. Filler System:

(1) Description: (Ingredients and Procedure)

- (2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment costs per 12 hour increment)

B. Tail-End System:

- (1) Description: (Ingredients and Procedure)
- (2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment costs per 12 hour increment)

C. Casing Equipment:

- (1) Description:
- (2) Cost: (Unit Prices)

III. Production Casing - 4000' of 9-5/8" casing in 12-1/4" hole:

A. Filler System:

- (1) Description: (Ingredients and Procedure)
- (2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment costs per 12 hour increment)

B. Tail-End System:

- (1) Description: (Ingredients and Procedure)
- (2) Cost: (Unit prices of ingredients and cost per cu. ft. of slurry; plus equipment cost per 12 hour increment)

C. Casing Equipment:

- (1) Description:
- (2) Cost: (Unit Prices)

IV. A statement of Cementing Service Company's experience in well cementing at high temperatures supported by test data showing strength retrogression under appropriate range of high temperature conditions of cement mix proposed.

4.6

Mud/Air Program

4.6.1

General

The upper formations to be encountered are expected to be hard shale, metamorphosed slate, and possible quartzite, and the lower portion is expected to be hot, dry granite. The principal drilling problems expected then are lost circulation due to unknown extent of fracturing, hole deviation, and slow penetration. In addition, there is little or no empirical knowledge available in the industry of the behavior of drilling fluids in the anticipated environment above 700°F, little formation pressure, and relatively shallow depth.

It is intended, therefore, that the Engineer shall have the options available of drilling with a mud system, or with air, or a combination of the two including aerated mud, air-mist, or foam. To this end it is required that the Contractor shall be experienced and competent in such multi-phase drilling and his crews furnished on this project shall have had such experience.

4.6.2

Mud Service Company

4.6.2.1

The Operator shall employ a Mud Service Company of wide experience on high temperature well drilling projects to furnish the drilling mud materials, lost circulation materials and mud engineering service normally supplied by such mud service companies in the oil and gas well drilling industry.

4.6.2.2

The Mud Service Company shall be employed by the Operator under a separate contract; however, these specifications are made a part of the Mud Service Company contract by reference.

4.6.2.3

Mud System

Drilling mud used in drilling the hole to total depth shall be of suitable quality to remove drill cuttings and to maintain the well bore in a high temperature environment. Temperatures of rock that may be penetrated cannot be predicted precisely; however, the Contractor should anticipate rock temperatures in excess of 700°F.

Proposals will be received for a water-based bentonite system, with appropriate surfactants, flocculating agents, lost circulation materials, and other mud chemicals as deemed necessary by the Mud Service Company making the proposal according to the schedule in Section 4.6.2.5 below.

4.6.2.4

The Mud Service Company shall work in close cooperation with the Contractor and the Air Service Company in the event the Engineer orders a change from one drilling medium to the other, or a combination of available drilling media.

4.6.2.5

Mud System Proposal

Sealed proposals for furnishing the drilling fluid (mud) service in accordance with these specifications will be received at the time and place and in the manner set out in Paragraphs 1.1.1 and 1.1.2, according to the following schedule:

- I. For drilling the 26" hole for conductor casing:

<u>List of Ingredients*</u>	<u>Amt./Bbl.</u>	<u>Unit Cost</u>
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Cost per barrel of mud system: _____

- II. For drilling the 17-1/2" hole to 2,500 ft. for surface casing:

<u>List of Ingredients*</u>	<u>Amt./Bbl.</u>	<u>Unit Cost</u>
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Cost per barrel of mud system: _____

- III. For drilling the 12-1/4" hole to 4,000 ft. for production casing and the 7-7/8" hole to total depth:

<u>List of Ingredients*</u>	<u>Amt./Bbl.</u>	<u>Unit Cost</u>
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Cost per barrel of mud system: _____

*Trade names acceptable if trade secrets are involved, however, a statement whether temperature degradable in project's expected environment must be furnished.

- IV. A statement of the Mud Service Company's experience in furnishing drilling fluids in actual high temperature well-bore drilling conditions, and/or laboratory test data on simulated high temperature well-bore conditions. Statement should include maximum temperature at which pumpable mud has been maintained, how temperature was determined, and an estimate of maximum trip time the proposed mud system will remain pumpable under maximum project conditions.

This information may be included by reference if already submitted to the Engineer.

4.6.2.6

MEASUREMENT FOR PAYMENT

Payment to the Mud Service Company shall be based on the quantity of mud ingredients used and according to the unit prices quoted in the proposal (not per barrel of drilling fluid).

The cost of furnishing the normal mud engineering and consulting services shall be included in the unit price of mud materials quoted. The proposal should describe the scope of such services.

4.6.2.7

Additional equipment and services.

The Mud Service Company may quote on furnishing solids control equipment, corrosion control systems, mud logging, and/or other auxiliary services, however, the quotations for such equipment and services shall be made as separate proposals, by posted rental rates and service rates.

4.6.3

Air Service Company

4.6.3.1 The Operator shall employ an air service company of wide experience on hard rock air drilling projects if, in the opinion of the Engineer, the presence of air drilling equipment on an operating or standby basis is in the best interest of the most practical, economical, and expeditious operation of the Deep Well drilling program.

4.6.3.2 The Air Service Company shall be employed by the Operator under a separate contract; however, these specifications are made a part of the Air Service Company contract by reference.

4.6.3.3 The Air Service Company shall be capable of furnishing in first class operating condition sufficient compressors, booster, after-cooler, injector pump, associated piping, fittings, air lines, and qualified air drilling operating personnel, to adequately furnish the drilling air if needed for straight air drilling, air-mist, aerated mud, or foam drilling.

4.6.3.4 The Air Service Company shall work in close cooperation with the Contractor and the Mud Service Company in the event the Engineer orders a change from one drilling medium to the other, or a combination of available drilling media.

4.7

Changes In Drilling Program

The drilling sequence, casing program, mud and/or air program, cementing program, and drilling depth as set out in preceding sections are tentative, and changes could occur depending on subsurface geological conditions encountered and the degree of geothermal activity.

5. DRILLING RIG AND EQUIPMENT SPECIFICATIONS

5.1 Equipment Specifically Included in Base Daywork Rate:

5.1.1 Complete drilling rig with major items as listed. Other equipment, services and items normally furnished by the Contractor under the Daywork rate, whether listed or not, shall be compatible with the maximum capacity of the rig. (See Drawing E-04-1004 for Schematic Layout).

5.1.1.1 Mast or derrick minimum of 550,000 pounds gross nominal capacity and minimum static hook load of 380,000 pounds with ten lines. Combined racking capacity for 10,000 feet of 4-1/2 inch drill pipe, related drill collars. Minimum height of 130 feet.

5.1.1.2 Substructure must handle all equipment listed in the derrick specifications and have a minimum capacity of 380,000 pounds and rotary beam capacity of 400,000 pounds. It must accommodate the BOP equipment. The substructure, with a minimum overall clear height of 14 feet, is required to accommodate the BOP stack and production valves with a Braden head located in the cellar.

5.1.1.3 Drawworks minimum of 600 horsepower rated input equipped with an auxiliary brake - 36-inch hydramatic or equivalent.

5.1.1.4 Drawworks power minimum of 600 horsepower deliverable to the drawworks.

NOTE:

Source of Power -- Montana Power Company is able to furnish A. C. electric power to the drill site for the primary drilling rig power source. If the Contractor intends to use an electric powered rig he must so state in the Bid Schedule.

5.1.1.5 Rotary table 27-1/2 inches.

5.1.1.6 Drill line 1-1/8 inch O. D. steel line.

5.1.1.7 Drill collars to include 8-inch O. D., 7-inch O. D. and 7-3/4 inch O. D. with an I. D. of 2-3/4 inch minimum or 3-1/2 inch maximum; total weight of 8-inch, 7-inch and/or 7-3/4 inch collars to be at least 50,000 pounds in air. A magnetic particle inspection must be made on boxes and pins immediately before drilling begins and a copy of the inspection report is to be delivered to the Engineer before drilling operations begin.

5.1.1.8 Drill pipe minimum of 8,000 feet, 4-1/2 inch O. D., 16.6 pounds per foot, Grade E. Tuboscope No. 2 or equal with internal plastic coating and flash-weld tool joints.

- 5.1.1.9 Stand pipe 4-inch I. D. single.
- 5.1.1.10 Rotary hose 55-foot by 3-inch I. D., 5,000 psi working pressure.
- 5.1.1.11 Mud pumps and power: Two pumps required, main pump 750 horsepower minimum, auxiliary pump 500 horsepower minimum.
- 5.1.1.12 Light plants adequate for rig and associated equipment. The Contractor shall have the option to furnish all electric power required for use in his operations, or to purchase electric power from Montana Power Co. Intention to use Montana Power Co. service must be stated in the Proposal.
- 5.1.1.13 On-floor driller's office and separate trailer house for tool pusher.
- 5.1.1.14 Catwalk and ramp.
- 5.1.1.15 Pipe racks capable of holding all of Contractor's tubular goods, plus Operator's casing.
- 5.1.1.16 Subs for all drill pipe and drill collars.
- 5.1.1.17 Steel mud pits minimum of four steel tanks with an overall minimum capacity of 1,000 barrels.
- 5.1.1.18 Double shale shakers (Screen size 4 by 5)
- 5.1.1.19 Kelly one 5-1/4 inch hexagon by 40 feet with bushings for 27-1/2 inch table, and all crossover subs with Kelly cock with minimum I. D. of 3-1/2 inches.
- 5.1.1.20 Drilling crew three 5-man crews 8 hour tour and two tool pushers 12 hour tour.
- 5.1.1.21 Weight indicator Martin Decker Type E or D or equal.
- 5.1.1.22 Water storage 1,000 barrel capacity.
- 5.1.1.23 Mud storage dock for 500 sacks of bentonite and chemicals.
- 5.1.1.24 Mouse hole and rat hole liners.
- 5.1.2 Sand line unit with prime mover, or double drum drawworks equipped with 10,000 feet of 9/16 inch line.
- 5.1.3 Drilling recorder six-pen.
- 5.1.4 Non-directional survey instrument Totco or equal.

- 5.1.5 Handling tools for Contractor's drill collars, drill pipe, and other equipment, including tongs, safety clamps, spiders, slips, bails, elevators, wipers, bit breaker plates, etc.
- 5.1.6 Fuel and lubricants for Contractor's equipment.
- NOTE: Contractor must provide a plastic lined earth berm around fuel storage adequate to contain storage volume in case of accidental spill; however, the Operator shall reimburse the Contractor for the cost of the berm as "Reimbursable Costs".
- 5.1.7 Hole covers.
- 5.1.8 Welding services required for repair and/or maintenance of Contractor's equipment.
- 5.1.9 Auxilliary mud-mixing centrifugal pumps.
- 5.1.10 Tool joint lubricant (high temperature).
- 5.1.11 Chemical toilet facilities
- 5.1.12 A minimum 6-5/8 inch O. D. "Bloole" line 150 feet.
- 5.1.13 Pipe and fittings for all mud and water lines within 100 feet of hole.
- 5.1.14 Crown-o-matic block protector.
- 5.1.15 Rotary jars and overshots for complete drilling string.
- 5.1.16 Drill pipe casing protectors.
- 5.1.17 Timber mats
- 5.1.18 Adding machine
- 5.1.19 Tongs with make-up torque gauge for drill collars and tool joints.
- 5.1.20 Blow-out preventor stack: See Drawing No. E-04-1006.
- 5.1.21 For 20 inch casing.
- 5.1.21.1 Hydril type "GK", 20-inch, series 600 (2,000 psi working pressure), bolted flange type body or equal.
- 5.1.21.2 Hydraulically operated 20-inch, series 600 (2,000 psi working pressure), double gate, with blind and pipe rams.

- 5.1.21.3 Flange spool, 20-inch, series 600 (2,000 psi working pressure) with two 3-inch flanged side outlets.
- 5.1.21.4 Closing unit, Hydril, Koomey, Payne, or equal, with remote controls located on the floor and at the accumulator. Hydraulic fluid.
- 5.1.21.5 Choke manifold (See Drawing No. E-04-1007)
- 5.1.21.6 Pit volume indicator.
- 5.1.21.7 Upper and lower Kelly cock.
- 5.1.21.8 Inside drill pipe blowout equipment.
- 5.1.21.9 Floor safety valve.
- 5.1.22 For 13-3/8 inch casing as above except:
 - 5.1.22.1 Hydril type "GK", 12-inch, series 900 (3,000 psi working pressure), bolted flange type body or equal.
 - 5.1.22.2 Hydraulically operated 12-inch, series 900 (3,000 psi working pressure), double gate, with blind and pipe rams.
 - 5.1.22.3 Flange spool, 12-inch by 12-inch, series 900 (3,000 psi working pressure), with two 3-inch flanged side outlets.
- 5.1.23 Mobilization and Demobilization

Trucking service, move in and rig up, teardown and remove Contractor's equipment in connection with drilling, testing, completion and operation of well.
- 5.2 Equipment, Materials and Services to be Furnished By Operator or as Separate Bid Items (Reimbursable Costs):

*Indicates separate bid item (lump sum or unit price) optionally furnished by Contractor.

 - 5.2.1 Furnish and maintain roadway.
 - 5.2.2 Stake location, clear and grade location, provide turnaround.
 - 5.2.3 Cellar - size 8' x 8' x 6'.
 - 5.2.4 Reserve pit (plastic or Bentonite lined).
 - 5.2.5 Water (from creek or Site well).

- 5.2.6 Water haulage or water lines*.
- 5.2.7 Drilling mud, chemicals, lost circulation materials and other additives.
- 5.2.8 Drilling bits, reamers, reamer cutters and stabilizers.
- 5.2.9 Fishing tools and other fishing services not included in Day-rate*.
- 5.2.10 Core barrel 50 feet with conventional tungsten carbide 6 1/4" x 4"; 7-7/8 inch core head. Change will be made to diamond head if formation hardness requires it.
- 5.2.11 Cement and cementing services.
- 5.2.12 Electrical logging program dual induction-laterolog log, Gamma ray-compensated formation density log, compensated neutron porosity log, borehole compensated sonic log and caliper log evaluation by synergetic log system (Subject to change).
- 5.2.13 Special directional services*.
- 5.2.14 Formation testing equipment and services. (All packer rubbers will be 90-durometer)*
- 5.2.15 Mud logging services.
- 5.2.16 Casing, liners, hangers, float collars, guide shoes and associated equipment.
- 5.2.17 Casing head equipment. (See Drawing No. E-04-1006.)
- 5.2.18 Christmas tree (See Drawing No. E-04-1008.)
- 5.2.19 Shock subs*.
- 5.2.20 Welding service for Operator directed work*.
- 5.2.21 Desanders and desilters*.
- 5.2.22 Circulation pits for mud cooling system, including cooling tower if required.
- 5.2.23 Casing crews. (Overtime for holdover crews*)
- 5.2.24 Casing handling tools*.
- 5.2.25 Temperature logging.
- 5.2.26 Fence around drill site area.

5.2.27 Re-line Drill Pipe after high temperature exposure, if needed, in the opinion of the Engineer.

6. DRAWINGS

6.1 Drawings, General

Schematic drawings of the well section and casing head are furnished for the Contractor's general information. Final dimensions determined, depending upon field conditions and equipment as supplied, will be furnished by the Engineer. The Contractor shall check all drawings carefully and shall advise the Engineer of any errors.

The Contractor will be furnished such additional copies of the specifications and drawings as may be required for carrying out the work. Full-size contact prints of the original drawings from which the attached reproductions were made will be furnished to the Contractor, upon request.

6.2 List of drawings

The following drawings are made a part of these specifications:

1. E-04-1001 - Location Map
2. E-04-1004 - Drill Site - Plan
3. E-04-1005 - Reinforced Concrete Cellar - Plan, Sections and Details
4. E-04-1006 - Casing Head Equipment
5. E-04-1007 - Choke Assembly
6. E-04-1008 - Christmas Tree
7. E-04-1009 - Schematic Well Section
8. E-04-1010 - Blackwell Geothermal Gradient

ROGERS ENGINEERING CO., INC. ENGINEERS & ARCHITECTS 10 DEALE STREET, SAN FRANCISCO, CALIF. 9410					BATTELLE PACIFIC NORTHWEST LABORATORIES RICHLAND WASHINGTON		MARYSVILLE GEOTHERMAL PROJECT EMPIRE CREEK AREA MAP AND DRILLSITE LOCATION		
SCALE AS SHOWN DATE					APPROVALS		DATE 2-28-74		
DR. H. H. CH. A. A. J. ENG. WFB. APPROVED					DATE		JOB NO. S-73077 E-04-1001 0		
REFERENCED DRAWINGS					REV. DATE		REVISION

BATTELLE PACIFIC NORTHWEST
LABORATORIES-RICHLAND WASH.

MARYSVILLE GEOTHERMAL
PROJECT

CASING HEAD EQUIPMENT

◇			
◇	ISSUED FOR PURCHASE	1/29/71	
REVISION	REVISION	DATE	

ROGERS ENGINEERING CO. INC.
ENGINEERS - ARCHITECTS
16 DEALE ST. SAN FRANCISCO, CALIF. 94105
J.B.H S-73016 E-04-1006 0

- 13-SETS OF 3" 900 FLANGE BOLTS & NUTS.
- 2-SETS OF 2" 1500 FLANGE BOLTS & NUTS
- 4-R-57 RING GASKETS
- 13-R-31 RING GASKETS
- 2-R-24 RING GASKETS
- 3-3" 3000 x 3" THREADED FLANGES
- 1-3" HI-PRESSURE BULL PLUG W/1/8" SIDE OPENING
- 1-5000 # GAUGE
- 1-3" 3000 # BALL CHOKE
- 1-1/2" NEEDLE VALVE

BATTELLE PACIFIC NORTHWEST
LABORATORIES-RICHLAND WASH.
MARYSVILLE GEOTHERMAL
PROJECT
CHOKE ASSEMBLY

◇					
⑥	✓	ISSUED FOR PURCHASE	6/20/78	ROGERS ENGINEERING CO. INC. ENGINEERS - ARCHITECTS 16 DEALE ST. SAN FRANCISCO, CALIF. 94105	
REV.	WTR	REVISION	DATE	J.B-M S-73016 E-04-1007	0

Christmas Tree
Casing Head

LIST OF PARTS

PART NO.	DESCRIPTION	NO. REQ'D
1	10"- 00# Valves	3
2	10"x10"x10"x10" Cross	1
3	10" Welding Neck Flange	2
4	23" O.D. Companion Flange	1
5	2" Bull Plug	1
6	Steel Ring Baskets	8
7	Stud Bolts with Nuts	48
8	Stud Bolts with Nuts	48

NOTES

The cross shall have full bore dimensions of 10 inches.

The welding neck flange shall be bored to 9.75 inches.

BATTELLE PACIFIC NORTHWEST
LABORATORIES-RICHLAND WASH.

MARYSVILLE GEOTHERMAL
PROJECT

CHRISTMAS TREE

ISSUED FOR	8/10/71
FILECHASE	
REVISION	DATE

ROGERS ENGINEERING CO. INC.
ENGINEERS - ARCHITECTS
16 DEALE ST. SAN FRANCISCO, CALIF. 94105

J.B-M 5-73016 E-04-1008 0

=====

WELL CASING PROFILE

SURFACE

DEPTH IN 100 FEET

10
20
30
40
50
60
70
80

13.2° F BLACKWELL MEASUREMENT
100 FT EXTRAPOLATED ASSUM.
(240°C/KM) CONDUCTIVE HEAT
FLOW.

POSSIBLE GRADIENT
IF A THERMAL CONVECTIVE
SYSTEM IS PRESENT

0 200 400 600 800 1000 1200

TEMPERATURE IN °F

BATTELLE PACIFIC NORTHWEST
LABORATORIES-RICHLAND WASH.

MARYSVILLE GEOTHERMAL
PROJECT

BLACKWELL GEOTHERMAL GRADIENT

◇			
◇	ISSUED WITH BID SPECIFICATIONS	8/24/74	
REVISION	REVISION	DATE

ROGERS ENGINEERING CO. INC.
ENGINEERS - ARCHITECTS
16 DEALE ST. SAN FRANCISCO CALIF 94105
JLB-M 9-73016 E-04-1010 0

7

APPENDIX A

5331 - FIRE TRESPASS

5331.01a - Federal Fire Laws

The Act of June 25, 1948, provides that:

Whoever, willfully and without authority, sets on fire any timber, underbrush, or grass or other inflammable material upon the public domain or upon any lands owned or leased by or under the partial, concurrent, or exclusive jurisdiction of the United States, or under contract for purchase or for the acquisition of which condemnation proceedings have been instituted, or upon any Indian reservation or lands belonging to or occupied by any tribe or group of Indians under authority of the United States, or upon any Indian allotment while the title to the same shall be held in trust by the Government, or while the same shall remain inalienable by the allottee without the consent of the United States, shall be fined not more than \$5,000 or imprisoned not more than five years, or both.

This section shall not apply in the case of fire set by an allottee in the reasonable exercise of his proprietary rights in the allotment. (18 U.S.C. 1855; based on Sec. 52, of the Criminal Code, March 4, 1909)

Fires Left Unattended

The Act of June 25, 1948, provides also that:

Whoever, having kindled or caused to be kindled, a fire in or near any forest, timber, or other inflammable material upon any lands owned, controlled, or leased by, or under the partial, concurrent, or exclusive jurisdiction of the United States, including lands under contract for purchase or for the acquisition of which condemnation proceedings have been instituted, and including any Indian reservation or lands belonging to or occupied by any tribe or group of Indians under the authority of the United States, or any Indian allotment while the title to the same is held in trust by the United States, or while the same shall remain inalienable by the allottee without the consent of the United States, leaves said fire without totally extinguishing the same, or permits or suffers said fire to burn unattended, shall be fined not more than \$500 or imprisoned not more than six months, or both. (18 U.S.C. 1856; based on Sec. 53 of the Criminal Code, March 4, 1909)

Trespass on National Forest Lands

The Act of May 24, 1949, provides that:

Whoever, without lawful authority or permission, goes upon any national forest land while it is closed to the public pursuant to lawful regulation of the Secretary of Agriculture, shall be fined not more than \$500, or imprisoned not more than six months, or both. (62 Stat. 19; 18 U.S.C. 1863)

5331.01e - Fire Trespass (36 CFR 261.2)

The following acts are prohibited on lands of the United States within national forests:

- (a) Setting on fire or causing to be set on fire any timber, brush, or grass, except as authorized by a Forest officer.
- (b) Building a campfire in leaves, rotten wood, or other places where it is likely to spread, or against large or hollow logs or stumps, where it is difficult to extinguish it completely.
- (c) Building a campfire in a dangerous place, or during windy weather, without confining it to holes or cleared spaces from which all vegetable matter has been removed.
- (d) Leaving a campfire without completely extinguishing it.
- (e) Building a campfire on those portions of any national forest which have, with the approval of the Regional Forester, been designated by the respective supervisors thereof without first obtaining a permit from a Forest officer.
- (f) Using steam engines, steam locomotives or internal combustion engines or motors in operations on national forest lands under any timber-sale contract or under any permit, unless they are equipped with such spark arresters as shall be approved by the Forest Supervisor.
- (g) [Reserved]
- (h) Smoking during periods of fire danger publicly announced by the Regional Forester upon such areas as may be designated by him, which may include roads and trails and improved camping grounds but shall not include improved places of habitation.
- (i) Going or being upon those portions of the national forest which may be designated by the Regional Forester as areas of fire hazard, except with permit issued by the local Forest officer, but no permit shall be required or any actual settler going to or from his home.
- (j) Using an automobile, truck, tractor, or other machine powered by an internal combustion engine not provided with exhaust and muffler equipment in efficient condition, on any lands of the United States or on any road over lands of the United States within national forests, or on any road acquired or maintained by the Secretary of Agriculture for the protection and administration of the national forests which shall have been posted by the Secretary of Agriculture as closed to such vehicles.
- (k) Carrying a firearm, except by authorized Federal or State officers, upon any portion of any national forest designated by the Regional Forester in time of fire or other public emergency.

(l) The throwing or placing of a burning cigarette, match, pipe heel, firecracker, or any ignited substance in any place where it may start a fire; and the discharge of any kind of fireworks on any portion of a national forest closed by order of the Regional Forester to the discharging of fireworks.

(m) Going or being upon those portions of the national forest which may be designated by the Regional Forester as areas of fire hazard, unless registered previously to entering upon such areas, at points designated by the local Forest officer, but such registration shall not be required of any actual settler going to or from his home.

(n) Going or being upon any portion of a national forest designated by the Regional Forester as an area of fire hazard without being equipped with firefighting tools, such as axes, shovels, and similar implements of the kind and number prescribed by the Regional Forester, when means of conveyance, such as an automobile or pack outfit are available for carrying such tools. In the case of a camping party the person in charge will be held responsible for any violation hereof.

(o) Having in possession, or firing or causing to be fired any tracer bullet or tracer charge onto or across such lands. (36 CFR 261.2)

NOTE: The application of item (o) above to all Armed Forces' maneuvers is specifically waived by the Secretary.

5331.01f - Rewards in Connection with Fire Prosecutions (36 CFR 261.3)

(a) Hereafter, provided Congress shall make the necessary appropriation or authorize the payment thereof, the Department of Agriculture will pay the following rewards:

(1) Not exceeding \$500 and not less than \$100 for information leading to the arrest and conviction of any person on the charge of willfully and maliciously setting on fire, or causing to be set on fire, any timber, underbrush, or grass upon the lands of the United States within or near a national forest.

(2) Not exceeding \$300 and not less than \$25 for information leading to the arrest and conviction of any person on the charge of building a fire on lands of the United States within or near a national forest, in or near any forest timber or other inflammable material, and leaving said fire before the same has been totally extinguished.

(3) All officers and employees of the Department of Agriculture are barred from receiving reward for information leading to the arrest and conviction of any person or persons committing either of the above offenses.

(4) The Department of Agriculture reserves the right to refuse payment of any claim for reward when, in its opinion, there has

been collusion or improper methods have been used to secure the arrest and conviction thereunder, and to allow only one reward where several persons have been convicted of the same offense or where one person has been convicted of several offenses, unless the circumstances entitle the claimant to a reward on each such conviction.

(b) These rewards will be paid to the person or persons giving the information leading to such arrests and convictions upon presentation to the Department of Agriculture of satisfactory documentary evidence thereof, subject to the necessary appropriation, as aforesaid, or otherwise, as may be provided for by law.

(c) Applications for reward, made in pursuance of this notice, should be forwarded to the Chief of the Forest Service, Washington, D.C.; but a claim will not be entertained unless presented within 3 months from the date of conviction of an offender.

(d) In order that all claimants for reward may have an opportunity to present their claims within the prescribed limit, the Department will not take action for 3 months from date of conviction of an offender. (36 CFR 261.3)

Smokey Bear Act (36 CFR 271.5)

The manufacture, importation, reproduction or use of "Smokey Bear," except as provided under 36 CFR 271.2, 271.3, or 271.4 is unauthorized. (36 CFR 271.5)

FOREST FIRE REGULATIONS

Applicable To All Operations, Including Camping, On Forested Lands Within Montana

Violation of any of Montana's forestry laws or of any regulations promulgated by the Montana State Board of Forestry under authority of Title 28, Chapter 1, Revised Codes of Montana 1947, as amended, is an offense punishable by fine or imprisonment, or both.

Fire Regulation—No. 1: During periods of dangerous fire weather, no person shall enter or be upon those forest lands designated by public proclamation of the State Forester, under the authority of the State Board of Forestry, as areas of extreme forest fire hazard, except under a written permit issued by a State Firewarden. Permits to enter upon such areas during critical periods will not be issued by the State Firewarden except upon a showing of real need by the applicant. Permits may be issued to those persons having actual residence, as a permanent or principal place of abode, or persons engaged in non-fire hazardous employment on an area of extreme hazard.

Fire Regulation—No. 2: In areas designated by public proclamation as areas of extreme forest fire hazard, the State Forester, under the authority of the State Board of Forestry, may request all persons, firms or corporations present or engaged in any activity in the hazardous areas, to voluntarily cease operations or to adjust working hours to less critical periods of the day. In the event such a request is refused, the State Forester, with the consent of the State Board of Forestry will issue a written order directing compliance.

Fire Regulation—No. 3: During the forest fire season, May 1 to September 30 or any legal extension thereof, all persons, firms, or corporations engaged in any activities in forest areas shall have available for firefighting purposes one basic fire cache per each 10 men so employed. A basic fire cache shall consist of 1 axe, 5 shovels, 5 pulaski tools, all in good condition and located at a point immediately accessible for firefighting purposes. The fire cache tools shall be contained in a closed box marked specifically, "FOR FIRE USE ONLY." Where less than 10 men are so employed, the shovel, axe and bucket regulation shall apply.

Fire Regulation—No. 4: During the forest fire season, the State Firewarden responsible for fire protection within the area, will give proper notice and publicity regarding these fire regulations to all persons, firms or corporations engaged in activities within said forest area. Whenever, in the judgment of the State Firewarden an extreme fire hazard exists, he may require that any industrial operation, any burning, outdoor welding, blasting or any other activity known to cause fires, be halted until such hazard is removed, abated or corrected. The State Firewarden during periods of high fire hazard may require of the party or parties engaged in activities within the forest area that an able individual in their employ be designated as a patrolman, whose duties shall be to patrol the operation as specified by the State Firewarden, enforce the fire laws, rules and regulations, extinguish small fires and immediately report all fires to the Firewarden.

Fire Regulation—No. 5: On all crew operations of 20 or more men on forest lands, all persons, firms or corporations, responsible for said operations shall designate a fire crew, and fire foreman with powers to act for his employer, to take immediate initial action to suppress any fire starting on the operation area and to immediately report all fires to the Firewarden.

Fire Regulation—No. 6: During the forest fire season, smoking is prohibited on all operations on forest lands except at safe places designated and properly posted. Lunch and warming fires shall be limited to cleared and bare areas and such fires will not be left unattended until completely extinguished. Smoking while walking, riding horses, motorcycles, bicycles or other unenclosed equipment and conveyances is prohibited.

Fire Regulation—No. 7: Prior to the forest fire season and as directed by the State Firewarden, the operator, owner or resident of any camp, establishment or resident located upon or within the forest area, shall dispose of accumulations of slash or other inflammable debris upon the property of such owner or operator. During the fire season, inflammable material, slash or other inflammable debris will not be burned excepting under a written fire permit issued by the State Firewarden.

Fire Regulation—No. 8: Prior to the forest fire season, every operator of a sawmill or other woodworking plant, located upon or immediately adjacent to forest lands shall dispose of all slash, brush, snags and other natural debris within such distance from such sawmill settings, camps or other buildings as may be designated by the State Firewarden. Operators of sawmills or other woodworking plants erected during the fire season on or immediately adjacent to forest lands will not begin sawing or other utilization operations until the State Firewarden is satisfied that conditions surrounding the mill or land are such, or have been made such, that sparks from the operation will not set fires in the adjacent areas.

WARNING

These regulations have been established by the State Board of Forestry for your own protection and your benefit.

Carelessness or negligence may also make you liable in damages to the owners of land and timber damaged or destroyed.

Protect your forests — protect your pocketbook — be cautious! Prevent Fire!

Fire Regulation—No. 9: During the forest fire season each unit of mobile or stationary power equipment, including trucks operating on forest lands, shall be equipped with at least one 2½-lb. dry chemical fire extinguisher, at least one serviceable shovel and enough other serviceable firefighting tools to equip, for firefighting purposes, the number of men that ordinarily work with such equipment.

Power saw operators shall have serviceable firefighting equipment including one shovel and one fire extinguisher of at least 8 ounces liquid or 1-pound dry chemical capacity available at the place of refueling.

Fire Regulation—No. 10: During the fire season all internal combustion engines excluding automobiles, trucks with less than 2½ ton capacity, and power saws, operating on forest lands, shall be equipped with spark arrestors adequate to meet standards set forth in the Spark Arrestor Guide published by the San Dimas Equipment Development Center, or shall be equipped with a tailpipe and effective muffler combination which points upward. Each spark arrestor must have the manufacturer's name and model plainly stamped upon it. All automobiles, trucks with less than 2½ ton capacity, and power saws, must have an effective muffler and exhaust system in good condition. Provided, however, this requirement shall not apply to those automotive or internal combustion engines traveling upon numbered State, Federal or County highways within forest areas, on designated forest campgrounds, and places of permanently improved habitat.

Further provided that turbochargers qualify as efficient spark arrestors when all gases pass through the turbine wheel. The turbine wheel must be turning at all times and there must be no exhaust bypass.

Fire Regulation—No. 11: Should any operator believe that in his case, any requirement of the State Firewarden is excessive, the operator may request the State Forester, acting for and in behalf of the State Board of Forestry, to review said requirement; and if in the opinion of the State Forester any or all are not necessary in the interest of public safety, he may make such changes as he deems advisable.

Fire Regulation—No. 12: Prior to each fire season, all persons, firms or corporations creating or responsible for mill waste within the forest areas will treat, dispose of, remove, or reduce the hazard created until the State Firewarden is satisfied that such accumulation of sawmilling waste does not constitute a fire hazard.

In the event that burning is the disposal method elected, the piles shall be prepared for burning by cribbing the base with slabs. The State Firewarden is authorized to determine when and how the piles will be burned.

Fire Regulation—No. 13: Shovel, bucket and axe provision—During the forest fire season, May 1 to September 30, or any legal extension thereof, all persons going into forest lands with automobiles, other vehicles, or pack animals, shall have each such vehicle or pack train equipped with a serviceable shovel, axe and bucket. Recommended standards are as follows:

- 1 axe 26" in length over-all, weight 2 lb. or over.
- 1 shovel 30" in length over-all, with 6" wide blade.
- One water container, capacity 1 gallon or more.

Provided, however, that this tool requirement shall not apply to designated forest camps and places of permanently improved habitation and while traveling on numbered state or federal highways.

PERSONS DESIGNATED AS STATE FIREWARDENS UNDER THE LAWS OF MONTANA

Ex-Officio Firewardens, serving for purpose of enforcing penal provisions of forestry laws and rules: Members of State Board of Forestry; State Forester and all regular employees of his office; officers of organized forest protection districts; members of the Montana Highway Patrol; all field officers in the U.S. Forest Service; game and deputy game wardens; officers of National Park Service and Indian Service in Montana.

Also the State Forester may appoint public-spirited citizens to act as volunteer firewardens with same power as ex-officio firewardens designated above.

AS REVISED AUGUST, 1948

MONTANA STATE BOARD OF FORESTRY

APPENDIX C

R1-5110-14

REGION 1 FIRE PREVENTION AND
SUPPRESSION PLAN FOR NATIONAL FOREST TIMBER SALES

(Reference FSM 5113.32a)

(Applicable for use with either 2400-2 or 2400-5 sales)

SALE DESIGNATION:	
Purchaser	Date plan prepared
Name of sale	Date revised
Date of sale	Date revised
Plan prepared by (list those participating)	
.....	
.....	
.....	
.....	
.....	
.....	

DATES OF FIELD INSPECTIONS:		
<u>Date</u>	<u>Unsatisfactory or satisfactory</u>	<u>Initials</u>
.....		
.....		
.....		
.....		
.....		
.....		
.....		
.....		
.....		
.....		

REVIEWED AND AGREED TO BY:	
Purchaser	Date
District Ranger	Date

APPENDIX C

National Forest Fire Prevention and Suppression Plan

During the closed fire season, all operators engaged in the production and manufacture of forest products from National Forest lands are required to comply with the Federal rules and regulations regarding the prevention and suppression of forest fires.

In accordance with this plan, jointly prepared by the Forest Service and the purchaser, all personnel and equipment referred to in the plan shall be available for fire as specified under the terms of the Timber Sale Contract.

The operator, or his designated representative, shall insure that all personnel working under the terms of this contract are familiar with the fire prevention plan, and applicable fire rules and regulations.

During periods of extreme fire danger, as determined by the Forest Service, conditions may necessitate adjustments in working hours, need for patrolman, or suspension of operations.

Before each closed fire season or prior to commencing operations during the closed fire season, the Forest Service representative and the purchaser or his representative, should reach agreement on the fire prevention plan for the timber sale area. Federal rules and regulations and contractual fire prevention and suppression clauses shall be reviewed, and the operation brought to satisfactory standards by a mutually established date.

This plan shall also be reviewed by the Forest Service representative and the purchaser's representative at the time fire inspections are made. The Forest Service representative will update the plan by making necessary penciled additions or deletions of men and equipment available for fire at the time of each inspection.

Copies of this plan shall be furnished the purchaser.

Men authorized to represent the purchaser on the sale area:

<u>Name</u>	<u>Telephone and Address</u>
1.	
2.	
3.	
4.	

The District Ranger's representative authorized to conduct fire prevention inspections on the sale area is:

APPENDIX C

Following is a list of actionable points and materials to be attached to and made a part of this plan:

1. Documentation of pertinent discussions or agreements that are not otherwise covered in this plan. Include approximate date of first inspection and any waiver or deviation in fire clause requirements.
2. Listing of special hazards and requirements that may be applicable to the sale area, or this season's operations; i.e., camps, berry pickers, flashy fuels, dumps, sawmills, new types of equipment, use of welders, and location of tail blocks when using haul back cables.
3. Copy of Timber Sale Contract fire clauses and applicable State requirements or regulations.
4. Documentation of agreements of action to be taken during periods of critical fire-weather conditions, such as:
 - a. Adjustments of daily working hours of the operation, or hazardous parts of the operation to periods of high relative humidity.
 - b. Provisions for fire patrolman with needed fire tools. Patrolman's duties to include: Patrolling the operations area, checking compliance with required fire precautions, extinguishing small fires, and reporting immediately all fires beyond his control.
 - c. Keeping selected sale area roads open for emergency fire traffic.
 - d. Restricting welding and blasting operations, and providing for other special precautions, as prescribed by the Forest Service.
 - e. Closing down high risk portions of the operation.
 - f. Specification of appropriate buildup index classes applying to the various emergency measures planned.
5. Copy of current firefighting wage rates.
6. Copy of each fire prevention inspection report (form RI-5110-2).
7. Inventory of personnel and equipment available for fire.
8. Fire tool requirements.

Equipment Available for Fire

-5-

APPENDIX C

Firefighting Wage Rates
(Reference FSH 5132.51, 401.36)

Date

The following hourly wage rates are applicable to contractor's employees hired for fire emergency:

Firefighter	
Squad boss	
Faller-bucker	
Bulldozer operator	
Pump operator	
Power-saw operator	
Crew boss	
.....	
.....	
.....	

Board may be furnished, free of charge, in addition to the above rates. No increase in pay rate is allowed for overtime. All men taken from the purchaser's operations will be paid in accordance with the rates listed above, regardless of the type of work they may have been doing.

All men will be payrolled and paid by the USDA, Forest Service when working on a Forest Service fire.

APPENDIX C

Fire Tool Requirements for National Forest Timber Sales

The following measures represent a standardized interpretation of fire tool needs necessary under timber sale contractual requirements. These fire tool measures are applicable to both 2400-2 and 2400-5 contracts.

1. Fire Extinguishers and Tools on Mobile or Stationary Equipment. Each unit of powered mobile equipment, including trucks, used in connection with this sale, shall be equipped with serviceable tools and fire extinguishers acceptable to the Forest Service, as follows:

a. Jammer, Skidder, or Loader

1 - fire extinguisher, either liquid chemical of not less than 1-quart capacity or dry chemical type of not less than 2-1/2-pound capacity. (Dry chemical type recommended.)

1 - weather-proofed tool box marked "Fire Only," equipped with a hasp, and containing:

- 1 - ax, double bit 3-1/2-pound
- 2 - shovels (round point No. 0 Lady or equal)
- 2 - pulaskis
- 1 - 5-gallon standard galvanized metal or fiberglass backpack water container, with handpump attached, to be filled at all times.

The tool box is to be mounted on the equipment if possible; otherwise, it must be within 100 feet of the machine at all times when in operation.

b. Power Tractors (used for road construction or skidding)

1 - fire extinguisher, either liquid chemical of not less than 1-quart capacity or dry-chemical type of not less than 2-1/2-pound capacity. (Dry chemical type recommended.)

1 - shovel (round point No. 0 Lady or equal)

1 - ax, double bit 3-1/2-pound or 1 pulaski

c. Trucks, Busses, Pickups, Panels, Service Trucks, or Similar Equipment Used in Transporting Logs, Men, Equipment, and/or Materials:

1 - fire extinguisher, either liquid chemical of not less than 1-quart capacity, or dry chemical-type of not less than 2-1/2-pound capacity. (Dry chemical-type recommended.)

1 - shovel (round point No. 0 Lady or equal)

1 - ax (2-pound or over, 26-inch minimum length) or 1 pulaski

1 - bucket (at least 1-gallon capacity)

APPENDIX C

d. Power Saws

- 1 - shovel (round point No. 0 Lady or equal). Shovel can be no more distant than the length of the tree on which the sawyer is working.
- 1 - fire extinguisher, containing not less than 8 ounces of extinguisher fluid or a dry chemical powder type of not less than 1-pound capacity. The extinguisher must be carried by the operator or attached to the saw to be immediately available at all times.

Any fueling or refueling of a power saw shall be done in an area which has first been cleared of all material capable of carrying fire; such power saw shall be moved at least 10 feet from place of fueling before starting.

2. Fire Tools on Sale Area. Purchaser shall furnish and maintain in serviceable condition, in quantities and at locations to be designated by Forest Service, tool boxes, fire tools and other fire equipment to be used only for suppressing forest fires. Each tool box shall be weather proofed, marked "Tools for Fire Only," and kept sealed..

a. Special tool caches will not be required when less than 20 men are employed on the sale area, excluding logging truck drivers.

b. Operations employing 20-30 men on the timber sale area shall furnish a tool cache, in addition to the fire tools required on mobile and/or stationary equipment, as follows:

- 1 - ax, double bit 3-1/2-pound
- 5 - shovels (round point No. 0 Lady or equal)
- 5 - pulaskis

For each multiple of 10 men over 30, the above tool cache requirements will be doubled.

APPENDIX C

R1-C7.2
4/72

C7.2 - Normal Precautions. (4/72) Specific fire precautionary measures are set forth below. Upon request of Forest Service, Purchaser shall permit and assist in periodic testing and inspection of required fire equipment. Purchaser shall promptly remedy deficiencies found through such inspecting and testing.

The following requirements shall apply during the period stated in A16, and during other such periods as specified by Forest Service.

A. Fire Extinguishers and Tools Required with Mobile or Stationary Equipment. Each unit of powered equipment, used in connection with this sale, shall be equipped with serviceable tools and fire extinguishers acceptable to Forest Service as follows:

(1) Jammers, Loaders, and Long-Line Skidders.

One fire extinguisher, dry chemical type of not less than 2-1/2-pound capacity.

Weatherproofed tool box marked "FIRE ONLY", equipped with a hasp, and containing:

One - Axe, double bit 3-1/2#.

Two - Shovels (round point #0 lady or equal).

Two - Pulaskis.

One - 5-gallon standard galvanized metal or fiber glass backpack water container, with handpump attached, to be filled at all times.

The tool box shall be mounted on the equipment if possible, otherwise, it shall be within 100 feet of the machine at all times when in operation.

(2) Dozers, Tractors and Rubber-Tired Skidders.

One - Fire extinguisher, dry chemical type of not less than 2-1/2-Pound capacity.

One - Shovel (round point #0 lady or equal).

One - Axe, double bit 3-1/2#, or one pulaski.

(3) Trucks, Busses, Pickups, Panels, Automobiles, Service Trucks, or Similar Equipment Used In Transporting Logs, Men, Equipment, and/or Materials.

One - Fire extinguisher, dry chemical type of not less than 2-1/2-pound capacity.

One - Shovel (round point #0 lady or equal).

One - Axe (2# or over, 26-inch minimum length, or one pulaski).

One - Bucket (at least 1-gallon capacity).

APPENDIX C

R1-C7.2 (Cont'd)
4/72

(4) Power Saws.

One - Shovel (round point #0 lady or equal). Shovel shall be no more distant than the length of the tree on which the sawyer is working.

One - Fire extinguisher, containing not less than 8-ounces of extinguisher fluid or a dry chemical powder type of not less than one-pound capacity. The extinguisher shall be carried by the operator or attached to the saw so as to be immediately available at all times.

Any fueling or refueling of a power saw shall be done in an area which has first been cleared of all material capable of carrying fire; such power saw shall be moved at least 10 feet from place of fueling before starting.

B. Fire Tools on Sale Area. Purchaser shall furnish and maintain in serviceable condition, in quantities and at locations to be designated by Forest Service, tool boxes, fire tools and other fire equipment to be used only for suppressing forest fires. Each tool box shall be weatherproofed and marked "TOOLS FOR FIRE ONLY" and kept sealed. These requirements are in addition to fire tool requirements in mobile and/or stationary equipment.

(1) Special tool caches shall not be required when less than 20 men are employed on Sale Area, excluding logging truck drivers.

(2) Operations employing 20-30 men on Sale Area, excluding truck drivers, shall furnish a tool cache as follows:

One - Axe, double bit 3-1/2#.
Five - Shovels (round point #0 lady or equal).
Five - Pulaskis

For each multiple of 10 men over 30, the above tool cache requirement shall be doubled.

C. Spark Arresters. Each internal combustion engine shall be provided with a spark arrester or spark arresting device approved by Forest Service. Exceptions where Forest Service may approve mufflers or other equipment in lieu of spark arresters qualified and rated under Forest Service standard 5100-1a are: (1) small multiposition engines, such as chain saws, may have mufflers equipped with approved screens; (2) passenger-carrying vehicles and light trucks may have baffle-type muffler with tail pipe; (3) heavy-duty trucks may have a vertical stack exhaust system, provided the exhaust stack extends above the cab of the vehicle; (4) an exhaust driven turbocharger is considered to be a satisfactory spark arrester. Internal combustion engine exhaust systems, arresters and other devices shall be properly installed and maintained.

APPENDIX C

R1-C7.2 (Cont'd)

D. Blasting. Fuse or prima cord shall not be used unless authorized in writing by Forest Service, with special precautions stated.

E. Smoking. Smoking shall not be permitted within logging operations except on graded or dirt roads, at landings, in camps or at other posted places.

Smoking shall not be permitted while working or traveling on foot, within or through Sale Area.

F. Precautions for Stoves. Stovepipes on all temporary buildings, trailers and tents using wood-burning stoves, shall be equipped with roof jacks and serviceable spark arresters of mesh with openings no larger than 5/8 inches. All stovepipes, inside and out, shall not be closer than 2 feet from any wood or other flammable material or 1 foot if the combustible material is protected by a metal or asbestos shield.

G. Debris Around Buildings. The grounds around buildings, tents, and other structures shall be kept free of flammable material for a distance of at least 15 feet from the wall of such structures.

H. Storage of Petroleum and Other Highly Inflammable Products. Gasoline, oil, grease, or other highly flammable material shall be stored either in a separate building, or at a site where all debris is cleared away within a radius of 25 feet. Fire extinguishers and/or sand barrels may be required at such locations specified by Forest Service, when unusually hazardous conditions exist.

I. Debris Burning and Warming Fires. Burning permits shall be required for all debris burning fires.

Lunch and warming fires may be allowed in fireproofed areas during periods of low fire danger as specified in the fire plan. Such fires shall not be left unattended.

J. Cable Logging. Tail blocks and corner blocks shall be located to prevent cables from rubbing against trees, snags or down logs when operating.

Areas adjacent to blocks shall be cleared of flammable material within a 5-foot radius. One 5-gallon standard backpack water container (filled at all times and with handpump attached), one shovel and one pulaski shall be maintained within 10 feet of each block.

K. Emergency Measures. Additional measures and/or other special requirements necessary during periods of critical fire-weather conditions, shall be included in the fire prevention and suppression plan.

L. State Fire Laws. These requirements and precautions may be deemed satisfactory unless higher standards are required under State law.

INSTRUCTIONS: To be used in all contracts.

APPENDIX C

W0-C7.4
6/72

C7.4 - Negligence in Prevention or Suppression. (6/72) Notwithstanding Purchaser's obligations stated in B7.4, if Purchaser's failure to comply with the requirements of B7.2 and B7.3, results in a fire starting or permits a fire to spread, damages and the cost of suppressing such fires shall be borne by Purchaser.

Instructions: Required in all contracts.

APPENDIX C

RI-C7.21
7/71

C7.21 - Pump and Trailer. (7/71) Purchaser shall provide at a location satisfactory to Forest Service, a serviceable truck or trailer, equipped with a firefighting tanker unit to be kept ready for instant use for suppressing forest fires. The unit shall consist of a tank of not less than 100-gallon capacity upon which shall be mounted a live hose reel or live hose basket with 250 feet of at least 3/4-inch I.D. heavy-duty rubber hose; a portable or power takeoff pump with discharge capacity of at least 10 gallons per minute at 150 P.S.I. pressure. Gear type pumps shall be provided with a bypass or pressure relief valve so the hose nozzle may be shut while the pump is operating. Each tanker unit shall have a hose nozzle of the shut-off type, adjustable for straight stream, spray or fog, at least 12 feet of 1-inch suction hose with an intake screen, an additional 250 feet of 3/4-inch heavy-duty rubber hose or 1-inch cotton jacket rubber-lined or linen hose to be carried on the unit for use as needed. Tools, adapters, accessories and fuel necessary to operate the pump and truck or trailer shall be provided. If a trailer is used, a serviceable vehicle with the proper trailer tow hitch shall be located at a point satisfactory to Forest Service. Where water is available, a supply sufficient for rapidly filling the water tank shall be provided at one or more accessible points along or adjacent to the main truck roads.

Instructions: Use in contracts when an adequate water supply is readily available on the sale area and a mobile tanker unit will be needed as an initial attack tool in areas containing hazardous material.

HEAT FLOW IN A "BLIND" GEOTHERMAL AREA NEAR MARYSVILLE, MONTANA†

DAVID D. BLACKWELL* AND CZANG-GO BAAG‡

A unique geothermal area has been discovered during the course of a regional heat-flow study using holes drilled for mineral exploration. There are no surface manifestations of abnormal subsurface temperature in spite of the fact that at one locality a temperature of 58°C was measured at a depth of only 220 m. The area of anomalous heat flow straddles the Continental Divide near the old gold mining camp of Marysville, Mont. about 30 km northwest of Helena. Measured values of conducted heat flow range from 3.2 to 19.5 $\mu\text{cal}/\text{cm}^2 \text{ sec}$. The immediate source of the high heat flow is either an unexposed reservoir of thermal fluids or a very shallow still-cooling

magma chamber. At the present time the magma chamber model is preferred. The presence of additional similar areas in the western U. S. is suggested by the data from regional heat-flow studies. However, in most of the other areas only single anomalous heat-flow value is available, whereas at Marysville a region of several tens of km^2 is known to have abnormal heat-flow values. It is suggested that temperature measurements should be made in available drill holes deeper than 30 m in the high heat-flow regions of the western U. S. as an inexpensive way to explore for other "blind" geothermal reservoirs.

INTRODUCTION

During the course of an investigation of the regional heat-flow distribution in the northwestern U. S., Blackwell (1969) found unusually high values of conducted heat flow (averaging 6.5 $\mu\text{cal}/\text{cm}^2 \text{ sec}$) at a locality about 30 km northwest of Helena, Mont., and 4.5 km west of the old gold mining camp of Marysville. Since that work, data have been obtained for an additional eleven holes in four other areas as much as 4 km from the original locality. In all the drill holes a conducted heat flow well in excess of the regional background is indicated. The highest value is 19.5 $\mu\text{cal}/\text{cm}^2 \text{ sec}$ and is the highest reported continental value of conducted heat flow measured outside a known geothermal area. The average gradient at that locality is 240°C/km in rock with a thermal conductivity of about 8 $\text{mcal}/^\circ\text{C sec cm}$. In spite of extremely high gradients and resulting high temperatures at

shallow depths, there are no surface manifestations of anomalous subsurface temperatures. The area appears to be unique in this respect and the object of this paper is to present the data and suggest some possible explanations for the high heat flow. The data have been mentioned briefly before (Blackwell, 1970), and the results reported here are preliminary in that additional work is in progress in the area. A gravity survey has been carried out, data are being reduced, and shallow drilling (<150 m) is in progress. However, the presently available data are believed to be of sufficient interest to justify publication at this time.

GEOLOGY

The geology of the Marysville stock, which outcrops over an area of about 5 km^2 around the town of Marysville, was the subject of a classic paper by Barrell (1907). From mine workings he

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APPENDIX D

Blackwell and Baag

FIG. 1. Location map and generalized geologic map of the Marysville area (after Barrell, 1907; Ratcliffe, personal comm.). The heavy lines are the trace of faults. The symbols Kgr, Peb, and Tv stand for Cretaceous granodiorite (Marysville stock), Precambrian Belt Series, and Tertiary volcanics, respectively. Dikes and sills and a few small outcrops of Tv are not shown. Also not shown are Paleozoic sedimentary rocks lying unconformably above the Belt Series in the southwest corner of the map, and Quaternary alluvium in Little Prickly Pear Creek at the northwest edge of the map. The light line outside the Kgr indicates the limit of contact metamorphosed Belt rock surrounding the Marysville stock (Barrell, 1907). Locations of the drill holes are shown as solid dots. The location of the centers of spherical magma chambers are shown as circled numbers. The numbers correspond to the models shown in Figure 10.

developed detailed evidence supporting the stoping theory of magma emplacement. One of his figures is included in a widely used textbook on structural geology (Billings, 1954). More recently, aspects of the geology have been discussed by Knopf (1950), Mantei and Brownlow (1967), and Rostad (1969). M. Ratcliffe (personal communication, 1971) has mapped parts of the Ellison 15 minutes, Canyon 7½ minutes and Granite Butte 7½ minutes quadrangles, including part of the area mapped by Barrell (1907). The mapping of Ratcliffe covers the area of anomalous heat flow values discussed here.

The area location, generalized geologic information, and heat flow values are shown in Figure 1. Locations of the drill sites are shown on a generalized topographic map of the area in Figure 2. The bedrock in the area consists of Precambrian sedimentary rocks of the Belt Series (see Ross, 1963). The two formations outcropping most extensively in the area are Empire Shale and Helena Limestone. The shale is in most places a dense, blocky fracturing argillite. The limestone is actually a

very impure limestone or dolomite with a silica content of about 33 percent (Knopf, 1950, p. 837). In much of the area the limestone has been transformed into a dense low porosity calc-silicate hornfels. To the southwest Paleozoic and Mesozoic sedimentary rocks onlap the Belt rocks.

The sedimentary rocks are cut by several ages of intrusive rocks, but the only exposed body of any size is the Marysville stock which, because of its proximity and similarity in composition to rocks of the Boulder batholith, was presumed to be of late Cretaceous age (Barrell, 1907; Knopf, 1950). According to a potassium-argon determination the age is 79 my (Baadsgaard et al, 1961) or about the age of older phases of the Boulder batholith and of the Elkhorn Mountains volcanics (Tilling et al, 1968). There are several suites of dikes and sills both pre- and post-emplacement of the Marysville stock. Several small outcrops of rhyolitic and dacitic volcanics occur in the area and more extensive outcrops occur to the north and south. These rocks may be correlatives of the Lowland Creek volcanics of

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FIG. 2. Generalized topographic map of the Marysville area. The contour interval is 500 ft (152 m). Locations of measured drill holes are shown as solid dots. Heat flow value for each locality is also shown. Units of heat flow are $\mu\text{cal}/\text{cm}^2 \text{ sec}$.

the Boulder batholith region which are Eocene (49 my) in age (Smedes and Thomas, 1965). However, Melson (1971) reported collection of a flora of probable Oligocene age from silt-stone beds in lavas near Little Prickly Pear Creek, just north of the Marysville district. In addition, drill holes at Empire Creek and Bald Butte cut small quartz porphyry stocks which have, respectively, little or no surface expression. The age of these intrusive rocks is Tertiary. The Bald Butte intrusive has been dated by potassium-argon techniques at 48 my (Rostad, 1969, and personal communication).

The Marysville stock is surrounded by a broad belt of contact metamorphosed sedimentary rocks (see Figure 1), and thus the stock may have a much greater subsurface extent than its present exposure would indicate, particularly to the west where the contact belt is 2 km or more wide, and where dikes and sills are most abundant in the Belt rocks. The stock occupies the center of a structural and topographic high perhaps caused by doming associated with emplacement of the stock. Most faults in the area are high angle faults, and some can be traced for several kilometers. Maximum displacements appear to be on the order of a few hundred feet.