

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

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

GL00885

December 30, 1983

ARCO Exploration Co.
Exploration Operations - Western U.S.
707 17th Street
P.O. Box 5540
Denver, CO 80217

Attn: R. G. Ouellette, Director, Geophysical Services

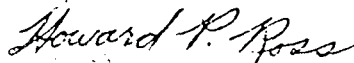
Dear Mr. Ouellette:

Transmitted under separate cover are correlated seismic data tapes for the Grass Valley area, Nevada (shot for SUNOCO) and field data tapes for Dixie Valley, Nevada, as requested by Mr. Dean Fitzgerald, American Geophysical Corporation. An inventory of the data tapes is attached. These seismic data tapes are to be returned to the Earth Science Laboratory/UURI upon completion of copying, and not later than February 1, 1984.

The Earth Science Laboratory/UURI is no longer supported by the Department of Energy or any other agency to provide data distribution services for retrieval, handling and shipping of the data being transmitted. Thus we are invoicing ARCO Exploration Co. for our costs in providing this service, as approved in our earlier discussions with Mr. Dean Fitzgerald. Our invoice is attached.

I regret the delay in responding to this data request and hope that you find the data useful. The data are being shipped via United Parcel Service in four boxes totaling approximately 130 pounds.

Sincerely,



Howard P. Ross
Section Head, Geophysics

HPR/jp

encl.

cc: Mr. D. Fitzgerald
Mr. W. Forsberg

TRANSMITTAL OF SEISMIC DATA TAPES

Box 1 Dixie Valley, Nevada Line 1 - North Field Data Tapes
 Line 2

Box 2 Dixie Valley, Nevada Line 1 - North Field Data Tapes
 Line 3

Box 4 Dixie Valley, Nevada Line 1 - North Field Data Tapes
 Line 1 - South

Box 3 Dixie Valley, Nevada Line 1 - South Field Data Tapes

Box 3 Grass Valley, Nevada Correlated Data Tapes

<u>Reel No.</u>	<u>Line</u>	<u>S.P.'s</u>	<u>Rec. No.</u>
J7905793	1	101-439	5001-5170
J7905796	2	101-299	5001-5098
J7905799	3	101-283	5001-5092
J7905803	4	101-255	5001-5072
J7905774	1,2,3,4		

NOTE: All Dixie Valley tapes are itemized on attached sheets.

**WESTERN
GEOPHYSICAL**

[Handwritten signature]

WESTERN GEOPHYSICAL COMPANY OF AMERICA, BLDG. 29, DENVER TECH. CENTER, 8455 E. PRENTICE, ENGLEWOOD, CO 80111
PHONE (303) 770-8660

Ship originals To:

UNIVERSITY of Utah
Research Institute
% Dr. Dennis Nielson
Earth Science Lab
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108
TO Mr. Fiore

Date 10-13-81

DS-1676

35 2400 Reels for
Bit Copy

Dept. of Energy
Nevada Operations Office
2753 S. Highland
Las Vegas, Nev. 89109

Bill: SUNEDCO

% Mr. Allen Ramo

Send Tape Copies To Data Storage

Dear Sir: Irving, Texas

In accordance with instructions received, we are shipping you this date via
Burlington Northern on Waybill # 119191310 the digital
reels for SCR containing data for Dixie Valley Nev.

The supporting data concerning these reels consist of No Support

(JOB # 710) (Spencer = 35 Field tape Copies)

The shipment contains a total of 4 boxes with data sheets in box 4

Please check this shipment for accuracy and acknowledge receipt of same by
signing a copy of this transmittal and returning it to sender.

Very truly yours,

Jeff Beringer

R. J. H.

Tape Library
Denver Digital Center

Received by Joseph A. Fiore
Date 10/14/81

DIXIE VALLEY TAPES

Box 1

Reel No.	Line No.	Shot Points	Process
/ SRC-N01A	1-NORTH	102-140	Field tape
/ SRC-N01B		102-140	Copy
/ SRC-N02A		142-190	
/ SRC-N02B		142-180	
/ SRC-N03		182-220	
/ SRC-N04		222-260	
/ SRC-N05		262-300	
/ SRC-N06A		302-332	
/ SRC-N06B		302-332	
/ SRC-N07	↓	334-362	↓

Box 2

Reel No.	Line No.	Shot Points	Process
/ SRC-N08	1-NORTH	364-376	Field tape
/ SRC-501A	1-SOUTH	102-138	Copy
/ SRC-501C		102-138	
/ SRC-502A		140-176	
/ SRC-502B		140-176	
/ SRC-503A		178-214	
/ SRC-503B		178-214	
/ SRC-504A		216-254	
/ SRC-504B		216-254	
/ SRC-505	↓	182-298	↓

Box 3

Reel No.	Line No.	Shot Points	Process
/ SRC-506	1-SOUTH	298-336	Field tape
/ SRC-507	↓	223-244	Copy
/ SRC-508	↓	382-404	
/ HPF-001A	2	102-140	
/ HPF-001B	↓	102-140	
/ HPF-002	↓	142-176	
/ HPF-003	↓	178-200	
/ HPF-001A	3	101-140	
/ HPF-001B	↓	101-140	
/ HPF-001C	↓	101-140	↓

FOR: DEAN FITZGERALD
 for A.G.C.
 ARCO

12-29-83
 H.P. Ross

9 track
 1600 BPL

GRASS VALLEY - SUNOZO

	<u>Tape Reel No</u>	<u>Line</u>	<u>SP's</u>	<u>Reel No</u>	<u>FORMAT</u>
1	J7905793	1	101-439	5001-5170	SEGB
2	J7905796	2	101-299	5001-5098	"
3	J7905799	3	101-283	5001-5092	"
4	J7905803	4	101-255	5001-5072	"
5	J7905774	1, 2, 3, 4	_____	_____	SEGY

Date Transmitted today:

Dean Fitzgerald
 ARCO EXPL. CO.
 EXPLORATION OPER. - Western U.S.
 707 17th Street
 P.O. Box 5540
 Denver, CO 80217

Attn: R.G. Ouellette
 Robert G.
 Director Geophys. Services

Dixie Valley

Box 1 of 4 Field Data Tapes, Lines 1 & 2
 Box 2 of 4 " " " Lines 1N & 3
 Box 3 of 4 " " " Line 1S & empty
 Box 4 of 4 " " " Line 1-N, 1-S (9), 1-S (1) Need
 (2 Packing Slip, box 4)

Field tapes SEG B-6

15-102-13E

364-376
 334-362
 302-332
 262-300
 222-260

Western Geophysical Co of America
 Denver Digital Data Center

FDT IN - 102-140 Dupl?

Client Southland Reel No SRC-No. 2

Area Dixie Valley, N.V.

Line	SP to SP	File to File
1-North		

Date: 10-7-81

Type of Data Field

Format SEG B-6

Density 1600 BPI



Western Geophysical Co of America
Denver Digital Center (303) 707-8660

Dean Fitzgerald - American Geophysical ^{Corp.} of Denver → date broker
→ client already purchased ^{sections} wants copies of tapes
Dixie Valley, NV, data purchased
recorded by Western for Southland Royalty Co.
partially funded by DOE?
four lines 1-S, 1-N, 2, 3
1978 recording, Vibroseis
Arco wants tapes → copies of correlated tapes, not
new field tapes (~200!!)

303-773-3073
6472 S. Quebec St.
Englewood, CO.
80111

from Phil Wannamaker

SUNMARK EXPLORATION COMPANY

TRANSFER OF CONFIDENTIAL MATERIALS

UNIVERSITY OF UTAH RESEARCH INSTITUTE

TO ATTN DENNIS NIELSON DATE 11-23-81

EARTH SCIENCE LAB BY R. C. Brandhorst

420 CHIPETA WAY Suite 120 THE MATERIAL LISTED BELOW IS

SALT LAKE CITY UTAH 84108

Table with 7 columns: PROSPECT NUMBER, AREA, LINE NUMBER, HOW MANY, TYPE OF SECTION, SHOTPOINTS, COMMENTS. Includes entry for Dixie Valley and a note: As per attached transmittal from Western Geophysical

OTHER -envelopes(s) with support data-

PLEASE ACKNOWLEDGE RECEIPT OF THIS MATERIAL BY SIGNING THE ATTACHED COPY OF THIS LETTER AND RETURNING IT TO:

RECEIVED BY - COMPANY

SUN EXPLORATION COMPANY

P.O. BOX 936, ATTN: CHARLOTTE WILSON

DATE

RICHARDSON, TEXAS 75080



Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114

JUN 02 1981

Mr. Richard L. Jodry
Southland Royalty Company
1000 Fort Worth Club Tower
Fort Worth, TX 76102

Dear Mr. Jodry:

DIXIE VALLEY SEISMIC DATA ACQUIRED UNDER CONTRACT NO. DE-AC08-79ET27006

According to our recent telephone discussions, it is my understanding that the subject seismic data is recorded on 10 original magnetic tapes, and copies of these tapes could be provided to the Government at a price equal to the duplication cost of \$100.00 per tape. Since the subject contract is no longer in effect, the Government would be unable to readily reimburse Southland for tape duplication costs. An alternative approach which we would like to pursue is to make the original tapes available to our technical support contractor, the University of Utah Research Institute (UURI), which would provide for tape duplicating services under its existing Government contract for support to the Department of Energy's Geothermal Reservoir Assessment Program.

If such an arrangement is agreeable to you, please transmit the tapes to:

Mr. Dennis Nielson
UURI/ESL
420 Chipeta Way, Suite 120
Salt Lake City, UT 84108

UURI will duplicate the tapes and return them to Southland in a timely manner.

If you choose not to incur the mailing costs for transmitting the tapes to UURI, a COD mailing will be acceptable.

Mr. Richard L. Jodry

2


Your cooperation in this matter will be greatly appreciated. Should you wish to discuss the matter further, please contact me at (702) 734-3424.

Sincerely,

Original Signed by
J. N. FIORE

J. N. Fiore
Project Engineer
Geothermal Branch
Energy Applications Division

EAD:JNF-1267

cc: Dennis Nielson, UURI 
Leland (Roy) Mink, DOE/ID
Robert Gray, DGE/HQ (CE) FED

MEMO ROUTE SLIP

Form ERDA-93 (1-75) ERDAM 0240

See me about this.

Note and return.

For concurrence.

For signature.

For action.

For information.

TO (Name and unit)

DENNIS NIELSON
LIRI/ESL
SLC/LIT

INITIALS

DATE

REMARKS

TO (Name and unit)

INITIALS

DATE

REMARKS

DIXIE VALLEY SEISMIC

TO (Name and unit)

INITIALS

DATE

REMARKS

Dennis,

FROM (Name and unit)

JOE FIORE
DOE/NV

REMARKS

Attached letter for your info. re:
our acquisition of subject "field data"
(mag. tapes).

PHONE NO.

FTS 598-3424

DATE

10/13/81

Joe

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1975 O-577-369

Southland Royalty Company

RANDOLPH P. MUNDT
Associate Corporate Counsel

October 5, 1981

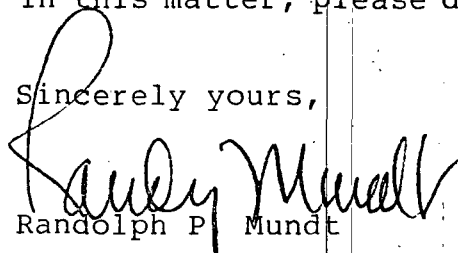
Mr. Buford Allen
Department of Energy
P. O. Box 14100
Las Vegas, Nevada 89144

Dear Mr. Allen:

Pursuant to our recent telephone conversation, please find the enclosed letter from Southland Royalty Company transmitting the geophysical tapes to Western Geophysical Company for duplication.

If you have any questions in this matter, please do not hesitate to contact me.

Sincerely yours,


Randolph P. Mundt

RPM:gp

Enclosure

OCC



Southland Royalty Company

October 2, 1981

RECEIVED

OCT 1981

LEGAL DEPT.

Mr. Bill Brown
Western Geophysical Co.
Box 3118
Denver (Englewood), Colorado 80155

Dear Mr. Brown:

I have forwarded to you, under separate cover, 24 reels of magnetic data tape to be duplicated, as we discussed in our phone conversation a few weeks ago. These tapes are the field data derived from our progress shot in Dixie Valley, Nevada. You previously, June 1980, reprocessed this data for us providing us with migrated data.

Upon duplication of this data, would you forward the duplicated tapes to the

Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89144
Attention: Mr. Fiore

James E. Coffey

Please return the original tapes and all invoices to me at this office.

Please call me if the duplication and returning of the tapes will extend beyond October 20.

Thank you for your consideration.

Very truly yours,

SOUTHLAND ROYALTY COMPANY

R. A. Grinstead

R. A. Grinstead
Vice President
Geology and Geophysics

RAG:ns

cc: R. P. Mundt
C. R. Huskey



Southland Royalty Company

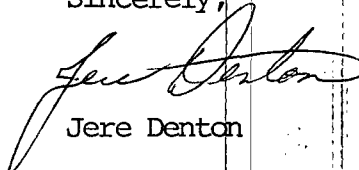
February 13, 1981

Mr. Howard P. Ross
University of Utah Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Howard:

I have recently sent the final report on our Dixie Valley project to Joe Fiore. In that report the availability of previous work from UURI is indicated. For purposes of referencing reports I used the numbers you provided in your September 26 memo to me. Elaine Bell has recently indicated that she has information indicating that the reports have actually received different number designations. I would appreciate it if you could contact Joe Fiore directly so that these report designations can be corrected while he has the final report copies in his possession. Otherwise, I suspect a fair amount of confusion may result when people attempt to order reports from you based on the designations used in the final report to DOE.

Sincerely,



Jere Denton

JD/dcs

Enclosure

cc: Joe Fiore

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

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

RECEIVED
SEP 28 1980
GEOTHERMAL

September 26, 1980

Mr. Jere Denton
District Manager,
Natural Resources
Southland Royalty Co.
1000 Fort Worth Club Tower
Fort Worth, Texas 76102

Dear Jere:

Enclosed is a list of all the Dixie Valley data we have announced and released. Some items are yet to be received and announced. I expect these will include the following, plus your final report and any work by Mackay Minerals Research Institute which has not been delivered.

- NV/DV/SR-14 - Mackay Minerals Research Inst. Report, Geothermal Reservoir Assessment Case Study, V. III - Geochemistry and Petrochemistry.
- NV/DV/SR-15 - Reflection seismic survey; approximately 15 line miles of 2400% Vibroseis data, with F-D migration, by Western Geophysical Co., August, 1980.

I am also enclosing for your information a complete list of all data items released under the Industry Coupled Program.

Sincerely,

Howard

Howard P. Ross
Project Manager

HPR:ls

Enclosure

DIXIE VALLEY, CHURCHILL CO., NEVADA

NV/DV/SR-1	Southland Royalty Co, Dixie Valley, Nevada; 6 shallow temperature gradient holes (td=500-1500'); lithology data only	3.25
NV/DV/SR-2	Geothermex report "Geothermal Potential of the Quest Leasehold Dixie Valley, Nev", 1976	11.00
NV/DV/SR-3	Keplinger & Assoc report "Preliminary Evaluation of Dixie Valley Geothermal Potential & Associated Economics", 1977	4.25
NV/DV/SR-4	EDCON report "Gravity and Magnetic Survey over the Humboldt Salt Marsh, Dixie Valley Nevada", 1976	1.00
NV/DV/SR-5	Microgeophysics report "Seismicity Report on the Dixie Valley Prospect", 200 sq km; 1976	3.00
NV/DV/SR-6	Senturion Science Inc report "High Precision Multilevel Aeromagnetic Survey Over Dixie Valley Part I" Oct 1977, 100 sq mi; 5 multilevel profiles	7.50
NV/DV/SR-7	Senturion Sciences Inc report "High-Precision Multilevel Aeromag Survey Part II", 1978; 50 sq mi; 7 multilevel profiles	3.75
NV/DV/SR-8	Senturion Sciences Inc report "South Dixie Valley, Nevada Scalar Magnetotelluric Survey", 1978, 20 sq mi, 27 scalar stations	5.75
NV/DV/SR-9	Keplinger & Assoc report "Interim Evaluation of Exploration & Development Status, Geothermal Potential and Associated Economics of Dixie Valley, Nevada"	6.00
NV/DV/SR-10	Temperature Survey data, 6 shallow thermal gradient holes (td=500-1500')	1.40
NV/DV/SR-11	Southland Royalty Co well Dixie Federal #45-14 (td=9022'); well history, daily drilling report, temp-press surveys, directional surveys, chem analysis of fluid, well summary	3.10
NV/DV/SR-12	Southland Royalty Co. well Dixie Valley 66-21 (td= 9780 ft). Well history, daily drilling report, bit record, subsurface directional survey, static temperature and pressure survey, 24-hour flow test, circulation & caustic wash record, rig test record. Well is sec 21, T24N, R36E.	2.10
NV/DV/SR-13	"Geothermal Reservoir Assessment case study, northern Basin and Range Province, northern Dixie Valley Nevada-Final Report," by Mackay Minerals Research Institute; Vol. I 248 p., Vol. II 8 plates	18.60

NV/DV/SR-17 DRI
 Environmental Isotope Hydrology
 26 p. 1 plate

DIXIE VALLEY, CHURCHILL CO., NEVADA

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MACKAY SCHOOL OF MINES

"A School of Mineral Resources"

UNIVERSITY OF NEVADA, RENO

RENO, NEVADA 89557

Department of Geological Sciences

December 9, 1980

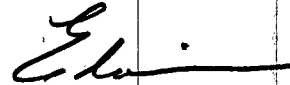
Mr. Howard Ross
University of Utah Research Institute
Earth Science Laboratory
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Howard:

Enclosed please find a set of duplicate mylars for Plates I through IX to accompany the volume 3, Soil Geochemistry and Petrochemistry, of the Geothermal Reservoir Assessment Case Study of Dixie Valley.

I have already received a number of inquiries on the availability of this report, so I'm certain the response will be comparable to that for the first phase of the study.

Best regards.



Elaine J. Bell
Geologist/Research Assoc.

enc.

MACKAY SCHOOL OF MINES

"A School of Mineral Resources"

UNIVERSITY OF NEVADA, RENO

RENO, NEVADA 89557

Department of Geological Sciences

December 9, 1980

Mr. Howard Ross
University Utah Research Institute
Earth Science Laboratory
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

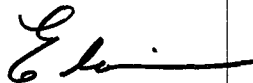
Dear Howard:

Enclosed please find copies of seven pages of the volume 3, Soil Geochemistry and Petrochemistry report of the Dixie Valley Geothermal Case Study. These pages should be substituted for the appropriate pages in the copy you have prior to reproducing the report for public release.

The mylars for the plates of the report are being sent under separate cover by UPS and should arrive shortly. I hope that no delay occurs during shipping to alter the public release date for this report.

If I can be of any further assistance, please do not hesitate to contact me.

Best regards,



Elaine J. Bell
Geologist/Research Associate

enc.



Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, NV 89114

OCT 24 1980

Mr. Jere Denton, District Manager
Natural Resources District
Southland Royalty Company
1000 Fort Worth Club Tower
Fort Worth, TX 76102

Dear Mr. Denton:

DELIVERABLES FOR TWO 1500-FOOT TEMPERATURE GRADIENT HOLES DRILLED UNDER
CONTRACT NO. DE-AC08-79ET27006

- References:
1. Letter, Denton to Fiore, dated 9/25/80, subject as above
 2. Letter, Denton to Cotter, dated 10/20/80, subject as above

We have reviewed the information transmitted through the referenced letters and concur with your opinion that the analyses of cuttings samples and descriptions of thin sections for the two subject holes are exceptionally complete, thereby precluding the necessity to reproduce slides of the thin sections.


The signed enclosed deliverables list constitutes our acknowledgement and acceptance of the listed deliverables. Upon receipt of the drill cuttings samples by the University of Utah Research Institute and your transmittal of the appropriate invoices for the two holes, reimbursement will be made in accordance with the contract provisions.

Sincerely,

J. B. Cotter, Director
Energy Applications Division

EAD:JNF-897

Enclosure:
As stated

cc w/o encl:
Dr. H. P. Ross, UURI/ESL, 
Salt Lake City, UT

NOV 20 1980



Southland Royalty Company

November 21, 1980

Geothermal Branch	Action	Info
STARKS		
CLARK		
FIORE	✓	
...		
...		

Mr. Joe Fiore
 Department of Energy
 Nevada Operations Office
 P.O. Box 14100
 Las Vegas, Nevada 89114

Dear Joe:

Enclosed you will find one copy of each of the following.

1. Line 1-North; Final Stack
2. Line 1-North; F.D. Migration
3. Line 1-South; Final Stack
4. Line 1-South; F.D. Migration
5. Line 2; Final Stack
6. Line 2; F.D. Migration
7. Line 3; Final Stack
8. Line 3; F.D. Migration
9. Seismic Location Map

This is the data upon which the interpretation by Bill Haskins was based. Please acknowledge receipt of this information below and return a copy of this letter to me.

Sincerely,

Jere Denton
 Jere Denton
 District Manager
 Natural Resources District

JD/dcs

Received and accepted this 20th day
 of November, 1980.

By:

Joseph N. Fiore

ACTION END



Southland Royalty Company

November 21, 1980

Mr. Howard P. Ross
University of Utah Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Howard:

Enclosed you will find three copies and a mylar film of each of the following.

- ✓ 1. Line 1-North; Final Stack
- ✓ 2. Line 1-North; F.D. Migration
- ✓ 3. Line 1-South; Final Stack
- ✓ 4. Line 1-South; F.D. Migration
- ✓ 5. Line 2; Final Stack
- ✓ 6. Line 2; F.D. Migration
- ✓ 7. Line 3; Final Stack
- ✓ 8. Line 3; F.D. Migration
- ✓ 9. Seismic Location Map (Three copies only)

This is the data upon which the interpretation by Bill Haskins was based. Please acknowledge receipt of this information below and return a copy of this letter to me.

Sincerely,

Jere Denton
District Manager
Natural Resources District

JD/dcs

Received and accepted this 3rd day
of December, 1980.

By: Howard P. Ross



Southland Royalty Company

January 8, 1980

Howard P. Ross
University of Utah
Research Institute
420 Chipetah Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed you will find three copies of the Bit Record for Dixie Federal 66-21 which was omitted from the drilling history for that well sent to you late in December. This should complete the well history.

If you have any questions concerning any of the material, please do hesitate to contact me.

Sincerely yours,

Dennis S. McMurdie
Geothermal Geologist

SOUTHLAND ROYALTY COMPANY

DSM/rr
enc.



Southland Royalty Company

January 3, 1980

Howard P. Ross
University of Utah
Research Institute
420 Chipetah Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed please find three copies of the Daily Drilling History for Dixie Federal 66-21 in Dixie Valley, Churchill County, Nevada.

Included with this report is a well data sheet, and the 17th, September, 1979, report of subsurface directional survey by Eastman-Whipstock.

Water samples from Dixie Federal 45-14 and Dixie Federal 66-21 will be forwarded this week to the University of Utah, Research Institute from the Desert Research Institute from Dr. Michael Campana's office.

If you have any questions concerning these items, please feel free to contact me.

Sincerely yours,

Dennis S. McMurdie
Geothermal Geologist

SOUTHLAND ROYALTY COMPANY

DSM/rr
enc.

Received this 10th day of January, 1980.

Received by Howard P. Ross

(Return the original to this office).

LINER SET FOR PRODUCTION TESTS AT DEEP NEVADA GEOTHERMAL WILDCAT

Sunoco Energy Development has set seven-inch liner and is preparing to run production tests at Nevada's deepest geothermal well in the north end of the Dixie Valley. Sunedco set pipe from 7165 to 9730 ft and will test an open hole interval between 9730 and 12,500 ft, total depth, at 62-21 Federal, se nw ne 21-24n-37e, a wildcat in northern Nevada's Churchill County. The well was tested earlier in open hole between 7418 and 10,783 ft but no details were released (NGS 9-19-80). The company then obtained approval from the U. S. Geological Survey to drill to 12,500 ft.

If flow tests of the deep 2770-ft zone are considered satisfactory, the well would be the state's deepest producing geothermal well. The drillsite is approximately 20 miles northeast of the town of Dixie Valley and a little more than two miles southeast of a cluster of four geothermal wells drilled by Sunedco during the last two years in 18-24n-37e, Churchill County, some of which are capable of production (NGS 5-9-80). The wildcat is about four miles south-southeast of the Senator Fumaroles.

Little technical information is available on the Dixie Valley reservoir characteristics. The Known Geothermal Resource Area contains nearly 39,000 acres. The wells are drilled into Jurassic metasedimentary rocks overlain by Tertiary sediments, which in turn, are overlain by volcanic deposits including basalt and andesitic rocks, rhyolitic flows and ash deposits and younger alluvial fans. Complex folding and thrust faulting is present, and active structure consists of normal faults bounding a north-northeast trending graben with horst blocks. Numerous hot springs are present at surface.

Upon completion of the deep well, Sunedco will move the Montgomery Drilling rig two and a half miles to the northwest, and within a mile north of the previously drilled wells, where a pad has been built for 84-7 Federal, se se ne 7-24n-37e, Churchill County. Projected depth is 10,000 ft.

*Dennis
Howard*



Southland Royalty Company

October 20, 1980

Mr. Jim B. Cotter
Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89114

RE: Contract #DE-AC08-79ET27006

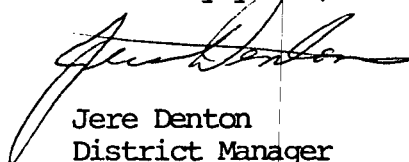
Dear Mr. Cotter:

The attached information constitutes delivery of items listed under D.2.a. for work performed on C.1. of our contract.

Preparations are being made for shipment of cuttings from these two temperature gradient holes to Mr. M. Bullett at the Geothermal Sample Library at the University of Utah Research Institute.

If these deliverables are acceptable, would you please sign and return the enclosed list to acknowledge receipt.

Sincerely yours,



Jere Denton
District Manager
Natural Resources District

JD/dcs

Attachments

✓ cc: Howard P. Ross

DOCUMENTS TRANSMITTED

A. Hole SR-4

- ✓ 1. Temperature log and list of temperatures at 10' intervals--08/07/80.
- ✓ 2. Well driller's report to State.
- ✓ 3. Location map.
- ✓ 4. "Summary of Lithologies and Alteration in SR-4" by M. J. Sweeney.
- ✓ 5. Thin section descriptions by M. J. Sweeney.
- ✓ 6. Well cuttings and sample descriptions at 10' intervals by M. J. Sweeney.

B. Hole SR-3

- ✓ 1. Temperature log and list of temperatures at 10' intervals--03/05/80.
- ✓ 2. Temperature log and list of temperatures at 10' intervals--05/29/80.
- ✓ 3. Well driller's report to State.
- ✓ 4. Location map.
- ✓ 5. "Summary of Lithology and Alteration in SR-3" by M. J. Sweeney.
- ✓ 6. Description of thin sections by M. J. Sweeney.
- ✓ 7. Well cuttings and sample descriptions at 10' intervals by M. J. Sweeney.

Subject: Dixie Valley Deliverables

*From: Southland Royalty Co.
Lere Denton, District Manager*

Received October 22, 1980.

By Howard P. Ross.



Southland Royalty Company

August 13, 1980

Mr. Howard Ross
University of Utah Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed please find three (3) copies of the University of Nevada, Reno, Mackay School of Mines Final Technical Report on the Soil Geochemistry and Petrochemistry, Geothermal Reservoir Assessment Case Study of Dixie Valley, Nevada. This report is being sent to you in two (2) separate containers. The large graphic plates will be sent "one extra copy" in a mailing tube.

The University of Nevada spent a great deal of time preparing this report. I feel that you will find their efforts, thus far, have been successful and they have greatly enhanced our understanding of the geothermal system in Dixie Valley.

If I can be of any further assistance or answer any questions regarding the report or any phase of the work completed, please feel free to contact me.

Sincerely yours,

Dennis S. McMurdie
Geothermal Geologist
Natural Resources District

DSM/dcs

Enclosure

MACKAY SCHOOL OF MINES

"A School of Mineral Resources"

UNIVERSITY OF NEVADA, RENO

RENO, NEVADA 89557

(702) 784-6166

Department of Geological Sciences

July 23, 1980

Mr. Howard Ross
University of Utah Research Institute
Earth Science Laboratory
420 Chipeta Way, Suite 100
Salt Lake City, Utah 84108

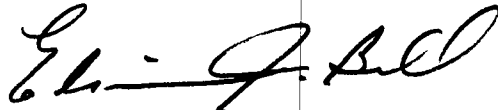
Dear Howard:

Enclosed please find the copy of our Case Study report on Dixie Valley. I regret the delay in transmitting this report to you, however, it is not always easy to overcome equipment and people breakdowns.

The photographs in chapter 4 are screened half-tones of the color photos. The quality is much better than I had expected, so well worth the wait.

If you have any questions, please do not hesitate to contact me. I'll be looking forward to seeing the report in print, and would appreciate your placing my name on the distribution list.

Sincerely,



Elaine J. Bell
Geologist/Research Associate

enc.



Southland Royalty Company

June 2, 1980

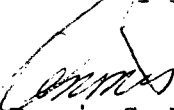
Mr. Howard Ross
University of Utah Research Institute
420 Chipetah Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Please find enclosed one mylar copy of plates 1 thru 7 for the University of Nevada Mackay School of Mines, DOE Study conducted by Southland Royalty Company in Dixie Valley, Churchill County, Nevada.

I have been requested to send these mylars to you in preparation for the distribution of our report. If you have any questions concerning the enclosed material, please feel free to contact me.

Sincerely yours,

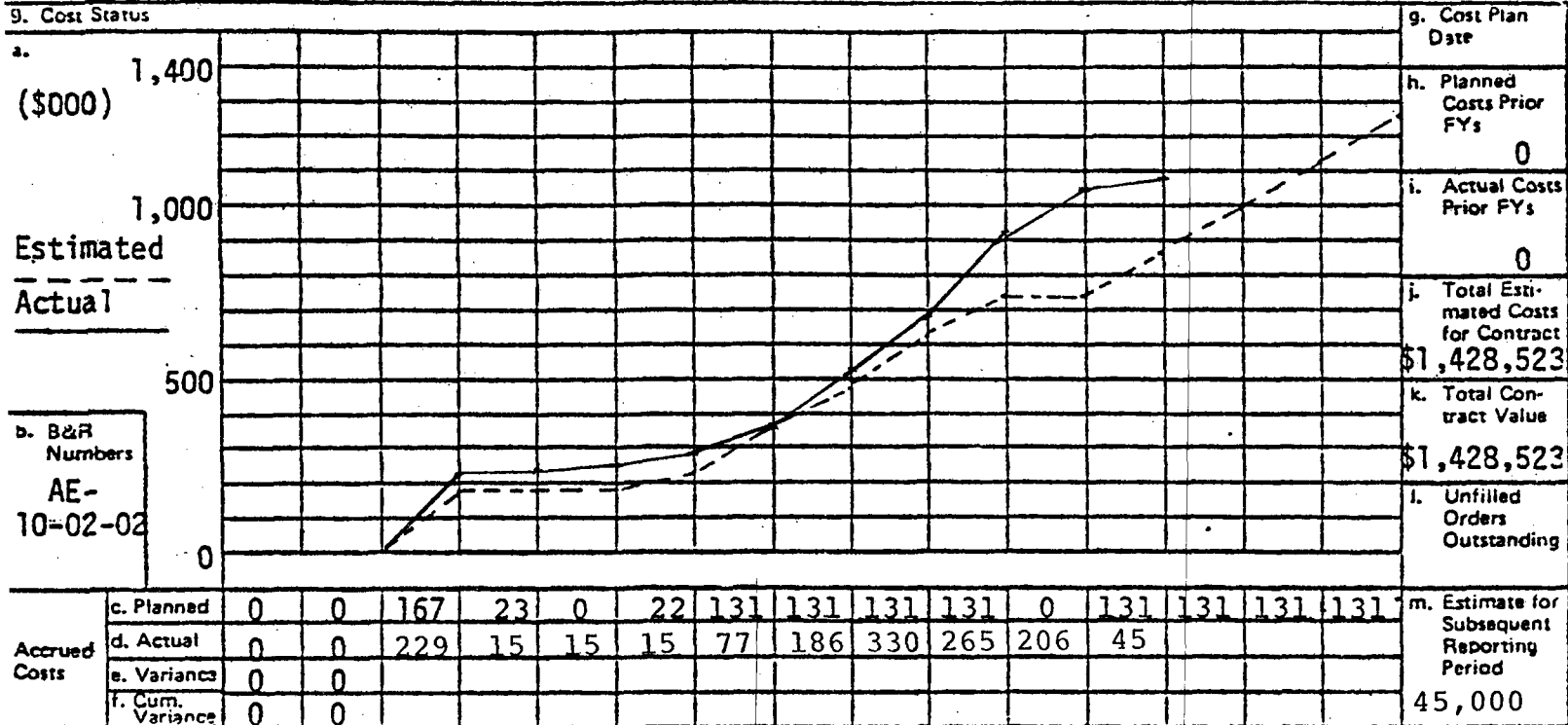

Dennis S. McMurdie
Geothermal Geologist
Natural Resources Department

SOUTHLAND ROYALTY COMPANY

DSM/rr
Enc.

1. Contract Identification Geothermal Reservoir Assessment Northern Basin & Range	2. Reporting Period _____ through _____	3. Contract Number DE-AC08-79ET-27006
4. Contractor (Name and Address) Southland Royalty Co. 1000 Fort Worth Club Tower Fort Worth, TX 76102		5. Contract Start Date 10/1/78
		6. Contract Completion Date 9/30/80

7. Months	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	8. FY 1979
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11. Major Milestone Status	
a. Deliver Exist. Data	▲
b. Drill Two 1,500' Holes	▬
c. Drill One 8,500' Hole	▬
d. Test	▬
e. Drill One 8,500' Hole	▬
f. Test	▬
g. U of N Studies	▬
h. Final Report	Jan 1980
i.	Apr-July 1980

12. Remarks

13. Signature of Contractor's Project Manager and Date 10/4/79	14. Signature of Government Technical Representative and Date
--	--



Southland Royalty Company

March 28, 1980

Mr. Howard Ross
University of Utah
Research Institute
Earth Science Laboratory
420 Chipetah Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed please find three copies of the report by the Mackay Minerals Research Institute entitled, Geothermal Reservoir Case Study, Northern Basin and Range Providence, Northern Dixie Valley, Nevada. You will find volumes one and two to complete this report.

Please sign and date the appropriate lines below acknowledging receipt of the materials enclosed. Send the original copy back to Southland Royalty Company.

If you have any questions regarding the final copy of this report, please feel free to contact me.

Sincerely yours,

Dennis S. McMurdie
Geothermal Geologist

SOUTHLAND ROYALTY COMPANY

DSM/rr
Enc.

Received this FIRST day of APRIL, 1980.

Received by Howard P. Ross

January 28, 1980

MEMORANDUM

TO: H. Ross and J. Moore
FROM: B. Sibbett
SUBJECT: Summary of Dixie Valley Data File.

Dixie Valley is a complex graben with several step faults on the east side and two normal faults on the west side. The graben is asymmetric with the deepest block toward the west side of the valley. The Stillwater Range front fault and the Marsh fault, a mile or two east and parallel to the range front, are the most active and have greater vertical offset than the faults on the east side of the valley. Ground breakage has occurred on both sides of the valley during historic quakes however (1903, 1915, and 1954). A major structure, the Benice Creek Fault trends SE across the valley from the Dixie site, a mile north of D.F. 45-14. Alluvial fill in the deep part of the graben may be 10,000 feet. This figure probably includes some Tertiary volcanic rocks, however. Estimates of dip on the range front faults are 40 to 80°.

The expected stratigraphy in the valley from the surface down is: alluvium (1,000-10,000'), Tertiary volcanics (1,000-2,000), Jurassic gabbro (1,000' plus), Jurassic to Triassic meta-argillites and siltstone (several 1,000'). Dixie Federal 45-14, drilled about 2,000' east of the Stillwater

Range front fault, encountered 1,100 feet of alluvium, 1,425 feet of volcanics, then went into metasediments (siltstone and argillite) down to T.D. at 9,022 feet. At first glance it is surprising the gabbro was not encountered because gabbro is the major rock type in the Stillwater Range east of the hole, and this Jurassic lopolith is also exposed on the east side of the valley in the Clan Alpine Mountains. My conclusion is the gabbro has been faulted out. Dixie Federal 45-14 probably penetrated the range front fault at 2,525 feet, the base of the volcanic rocks, and went into the Stillwater Range horst below the Jurassic gabbro. Gabbro may, therefore, be present to the east in the graben block. A silica sealed fault zone was reported at 3,800-3,900'.

The bottom hole temperature was 385°F at 9,000'. The bottom 500 feet are nearly isothermal with a temperature of 382°F (210°C) at 8,500'. Water entries occur at 5,820 to 5,870' and possibly at 6,208'. Flow rates appear to be low however.

The GeothermEx report (Koenig, et al., 1976) shows thermal gradients as high as 308°C/km in sec. 14, T23N, R35E, (same section as DF 45-14). Three miles south and two miles north along the range front the gradient is 50°C/km. The report concludes that there could be a geothermal reservoir with temperatures of $\geq 200^{\circ}\text{C}$ at 6,600' (2 km) depth. They suggest that a fracture reservoir may be in the gabbro with the Tertiary volcanic rocks forming a cap.

The Mackay Minerals Resource Inst. stated in their July to Sept., 1979 Quarterly Report, that the metasediments cannot function effectively as a thermal reservoir due to lack of an overlying cap rock and the metasediments

have a low permeability. This conclusion was based on water chemistry studies and flow test of DF 45-14. Water samples from DF 45-14 suggest a more acid (< pH5) water is coming from 'depth' and mixing with the higher pH cool surface water. This is based in part on clay mineralogy in fracture zones.

The Mackay Minerals Research Institute's Analysis of Shallow Gradient Holes, Nov. 1, 1979, is generally well done and detailed. The alteration effects including clay mineralogy have been carefully studied. Briefly, the conclusion is made that much of the alteration in the alluvium predates deposition and was produced by earlier hydrothermal alteration in the source area, the Stillwater Range. Under present conditions montmorillonite-type clays are forming. The kaolinite represents a relict phase of an earlier, more acidic period of alteration.

Four of the six holes are 1,400 to 1,500 feet deep and the other two are 500 feet deep. The holes are all located close to the Stillwater Range front, from a mile south of the Dixie site to seven miles northeast. Four of the holes penetrate only alluvium and the report states that none of the holes encountered bedrock. Based on the lithology logs, I have to question this conclusion however.

Hole S-8, NW 1/4 NW 1/4 sec. 2, at the mouth of White Rock Canyon penetrated 100 feet of alluvium and below encountered andesite and tuff to the bottom of the hole at 500 feet. There is no mention of rounded grains or degree of cementing in the lower part of the hole. The location of the hole was mapped as Tertiary volcanic rocks by Page (1965) and is west of the range front fault. Also the alteration shown in Figure 7 of the Mackay Minerals

Research Institute report is different from the alteration found in the alluvial holes and montmorillonite is not shown as present. All of these facts indicate the hole was drilled in Tertiary bedrock.

Hole SR2A, drilled in the NW 1/4 of sec. 14, just west of DF 45-14, penetrated diorite/gabbro from 700 feet to TD at 1425. There was a lost circulation zone at the top of the diorite and the report states that this is probably the range front fault. A minor amount of alluvial is present in the cuttings to the bottom of the hole, but their own log (Figure 3) suggest the alluvium is contamination. Montmorillonite content drops off considerably below 800 feet. The diorite/gabbro must be the Jurassic lopolith bedrock.

CONCLUSIONS

The Tertiary volcanic rocks may not be providing the reservoir cap as Koenig et al. (1976) suggested. Altered Jurassic basalt flows or an altered upper contact could form a cap over a fracture reservoir in the gabbro lopolith within the valley east of DF 45-14. Lithology and hydrology data from the Sunco 9,126' hole will be interesting if the hole is far enough east of the range front. We do not have this data at this time.

REFERENCES CITED

- Koenig, J. B., Greensfelder, R. W., and Klein, C. W., 1976, Geothermal potential of the Quest Leasehold, Dixie Valley, Nevada: Earth Science Laboratory open-file report March 22-23, 1979, Salt Lake City.
- Page, B. M., 1965, Preliminary geologic map of a part of the Stillwater Range Churchill County, Nev: Nev. Bur. Mines Map 23.
- Southland Royalty, 1979, Mackay Minerals Research Institute, Analysis of shallow gradient holes.

Dixie Valley Data Package

1. Mackay Minerals Research Inst., Quarterly Report for July 1 - Sept. 30, 1979. (2 copies)
contains:
 1. Structural - Tectonic Analysis
 2. Hydrology & Hydrogeochem. (chem. & isotope)
 3. Shallow Hole Temp. Survey (1 mi.)
 4. Petrologic Alteration Studies of (DF45-14 Cuttings, 100' Composites)

Plate ST-1:

Structural - Tectonic Features in N. Dixie V.
(4 copies, 1 finish c., 3 prel.? copies)

2. Dixie Federal 45-14, Thermal Power Co.
Well History - (includes: temp. survey, flow test, drift survey
chemical analysis of water)
Mud Log 120'-4618' (1 copy)
3600'-9022' (3 copies)
Dual Induction - SFL with linear corr. log - on 5/1/79
Dual Induction - SFL 1"/500' on 5/1/79
Dual Induction - SFL on 6/9/79
Dual Induction - SFL on 6/9/79 different amplitude scale
Induction - Electrical log on 7/3/79
Induction - Electrical log on 7/3/79 diff. vert. scale
2 Compensated Neutron-Fm Density 6/9/79 (diff. scales)
Temperature log 6/9/79
Temperature log 6/9/79
Compensated Neutron log 7/3/79 SS-OH matrix
Compensated Neutron log 7/3/79 OH-SS matrix
 3. Shallow Temperature Survey (F⁰ at 1M) Maps
Southland Royalty Company
On: Sept. 15-16, 1979 (3 copies)
August 1979 (3 copies)
July 9-11, 1979 (3 copies)
 4. Analysis of shallow gradient holes, Nov. 79, (6-500'-1500')
Mackay Minerals Research Inst.-for-Southland Royalty.
 5. Mackay Minerals Research Inst., Quarterly Report for Apr. 1 - June 30, 1979
contains:
 1. Regional setting
 2. Shallow Hole Temp. Survey (1 m)
 3. Water chemistry from springs, and wells
 4. Preliminary petrologic alteration studies.
 6. Mackay Minerals Research Inst., Quarterly Report for Dec. 1, 1978 - March 31, 1979
- Dixie Federal 66-21 - Thermal Power/Southland Royalty Company
Daily Drilling History (3 copies)
Sub-surface Directional Survey (3 copies)
Bit Record (3 copies)

Southland Royalty - Dixie Valley Drill Cuttings

Oct. 15. SR send data pkg for 45-14

.. 17 - rec. above by HPR. noted that no cuttings yet received for 1500' thermal grad hole, as for DF 45-14.

Nov. 12 - SR sent 3 copies of info to complete Mackay Sch. Mines analysis of shallow Grad. Holes.

Nov. 13 - rec. above.

Nov. 29 - SR sent 3 copies of Plate SE-1 - 3rd qtr report

Dec. 7. - Rec. above.

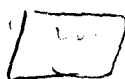
Jan., 16, 30



27 boxes



1-3 garbage bags/box



Poly plastic bag 5-50/garbage bag.
w. mark.

all red markings washed off
most black in

No sequence of packing in garbage bags.

→ 12 from Mackay Sch Mines
Rec Jan 10, 1980
labelled with black ink.

→ Price batch

JAN 14 1980

Mr. Jere Denton
Southland Royalty Company
1000 Ft. Worth Club Tower
Ft. Worth, Texas 76102

Dear Mr. Denton:

CONTRACT NO. DE-AC08-79ET27006, ACCEPTANCE OF DELIVERABLES, DIXIE
FEDERAL WELL NO. 66-21

Our records indicate that all required deliverables associated with the drilling phase of the subject well have been received by the Department of Energy, and such deliverables are hereby determined to be complete and acceptable. In accordance with the contract payment provisions, Southland shall be reimbursed at the rate of \$62.50 per foot of drilled depth as measured vertically from the surface but not to exceed a maximum of \$1,062,500.00 for two wells.

Such reimbursement shall be authorized by this office upon receipt of Southland's invoice by the undersigned. The invoice should include a reference to the Eastman Whipstock directional survey, dated September 17, 1979, which verifies the true vertical depth of Dixie Federal No. 66-21 as being 9664.56 feet.

Sincerely,

Original Signed by
JAMES B. COTTER

J. B. Cotter, Director
Energy Applications Division

EAD:JNF-201

cc: D. K. Parker, FIN
N. P. Ross, Univ. of Utah
Research Park, Salt Lake City, UT



MEMO ROUTE SLIP Form ERDA-93 (1-75) ERDAM 0240		<input type="checkbox"/> See me about this. <input type="checkbox"/> Note and return.	<input type="checkbox"/> For concurrence. <input type="checkbox"/> For signature.	<input type="checkbox"/> For action. <input type="checkbox"/> For information.
TO (Name and unit) Dr. H. P. Ross LURI / ESL SLC UTAH	INITIALS	REMARKS "DIXIE VALLEY DATA"		
	DATE			
TO (Name and unit)	INITIALS	REMARKS		
	DATE			
TO (Name and unit)	INITIALS	REMARKS Howard, We received 3 copies of each of the attached maps.		
	DATE			
FROM (Name and unit) Joe Fiore DOE / NV	REMARKS One copy is sufficient for our purposes. The additional copies are transmitted here for your use.			
	Joe			
	PHONE NO. 702 734-3424	DATE 10/18/79		

shallow (1m) F₀ Survey - Southland Royalty



Southland Royalty Company

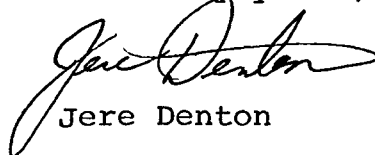
October 10, 1979

Mr. Jim Cotter
Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89114

Dear Mr. Cotter:

Enclosed you will find copies of photographs which were only zeroes in the quarterly report on the Dixie Valley work we are performing under contract to you. In addition, we have made reproducible copies of the one-meter hole temperature maps for July, August, and September as these were not available at the time the narrative was forwarded to you. I am enclosing, as well, the composite structural map which goes with the quarterly report narrative. This map is as it was received from the University of Nevada. We have spent time trying to figure out how we could improve the quality and reproduce it for you. At this point, it appears that we will have to obtain the original plates from the university and change the size of the lettering on those plates before reducing them and preparing a new composite map. As this process will undoubtedly take some time, I am forwarding these copies to you for whatever benefit you may derive from them. I hope the delay in delivering these attachments and components of the quarterly report has not been a serious problem for you.

Sincerely yours,



Jere Denton

District Manager,
Natural Resources
SOUTHLAND ROYALTY COMPANY

JD/ji
enc.

cc Howard P. Ross, ✓
University of Utah Research Institute

JAN 4 1980

Mr. Jere Denton
Southland Royalty Company
1000 Ft. Worth Club Tower
Ft. Worth, TX 76102

Dear Mr. Denton:

CONTRACT NO. DE-AC08-79ET27006, ACCEPTANCE OF DELIVERABLES, DIXIE
FEDERAL WELL NO. 45-14

With our recent receipt of drill cuttings samples from the subject well, all required deliverables associated with that well are hereby determined to be complete and acceptable under the terms of the subject contract. In accordance with the contract payment provisions, Southland is entitled to reimbursement at the rate of \$62.50 per foot of drilled depth as measured vertically from the surface but not to exceed a maximum of \$1,062,500.00 for two wells. Such reimbursement, pertaining to the subject well, shall be authorized by this office upon receipt of Southland's invoice by the undersigned.

As you know, a formal contract modification to include specifying certain public data release dates shall be processed as soon as the parameters for the scheduled seismic work to be performed under the contract are finalized.

The cooperation demonstrated by Southland in providing data from each of two wells beyond the maximum depths to which the government cost sharing applied is greatly appreciated and is considered highly responsive to the intent of the Department of Energy's Geothermal Reservoir Assessment Case Study Program.

Sincerely,

Original Signed by
JAMES B. COTTER

J. B. Cotter, Director
Energy Applications Division

EAD:JMF-186

cc: R. A. Gray, DGE, HQ
RA-233, N/S 3344

H. P. Ross, Univ. of Utah
Research Inst., Salt Lake City, UT





Southland Royalty Company

November 29, 1979

Howard P. Ross
University of Utah
Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed please find three copies of Plate St-1, The structural Tectonic features in northern Dixie Valley, Nevada, by Bob Whitney of the University of Nevada of Reno.

This is the map which was to accompany the University of Nevada-Reno's third quarterly report. It has been redrafted and reduced by the Southland Royalty Company drafting department.

A revision of this map is taking place at the present time in preparation for the annual report by the University of Nevada.

If you have any questions concerning the map, please feel free to contact me.

Sincerely yours,

Dennis S. McMurdie
Geothermal Geologist
Natural Resources Department

SOUTHLAND ROYALTY COMPANY

DSM/rr
enc.

Received by Howard P. Ross this 7th day of November 1979.

Return the original.



Southland Royalty Company

November 12, 1979

Mr. Howard P. Ross
University of Utah Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed you will find three copies of the information needed to complete the Mackay School of Mines analysis of the shallow gradient holes for the petrographic studies. These items were promised to you earlier. If you have any questions concerning this material, please feel free to contact me.

Sincerely yours,

Dennis S. McMurdie
Dennis S. McMurdie

Geothermal Geologist
Natural Resources
SOUTHLAND ROYALTY COMPANY

DSM/ji
enc.

RECEIVED BY HOWARD P. ROSS ON THIS 13 th DAY OF
November, 1979.

Howard P. Ross
(Please return signed original upon receipt)



Southland Royalty Company

October 4, 1979

Mr. J. B. Cotter
Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89114

Dear Mr. Cotter:

Enclosed you will find the University of Nevada at Reno 3rd Quarter Report on their efforts under our sub-contract in Dixie Valley. Copies of photos included in the petrologic alteration section of the report will be forwarded in the near future.

You should also be advised that during the month of September, drilling was completed on Dixie Federal 66-21 to a depth of 9,780'. Logs were run and a fracture zone appears to exist at 9,200'. This zone had been drilled with a 10.3 pound mud in order to hold back substantial water flow from a 4,600' zone. During the month, the 4,600' zone was cased off and a sodium hydroxide solution was placed in the fracture interval at 9,200'. Currently, the well is shut-in waiting for the caustic to work and for the temperature to reach equilibrium in the well bore. Our current expectation is that another temperature survey will be taken in approximately ten days to two weeks and at that time, a nitrogen lift will be attempted. A well history report and copies of logs are in preparation and should be forwarded in the near future.

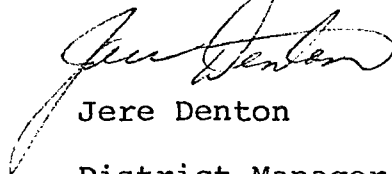
Another temperature survey was taken on Dixie Federal 45-14 which indicated bottom hole temperature has remained constant as this reading was 382°F. This compares with earlier readings in the 380°F-382°F range. The well continued to flow 10 to 12 gallons of water a minute at a temperature which finally reached 206°F. The well has currently been shut-in pending further evaluation which may follow the seismic program which is expected to commence this month in Dixie Valley.

Page Two
Continued
October 4, 1979

Deliverables under our contract with respect to Dixie Federal 45-14 are enclosed with an inventory list which I would like you to sign and return. Samples have previously been delivered to UURI.

The annual progress report is going to be delayed slightly as the completion of drilling on Dixie Federal 66-21 came so near the end of the contract year. I expect a draft will be delivered to you within two weeks.

Sincerely yours,



Jere Denton

District Manager,
Natural Resources
SOUTHLAND ROYALTY COMPANY

JD/ji
enc.



Southland Royalty Company

October 15, 1979

Mr. Howard Ross
University of Utah
Research Institute
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Ross:

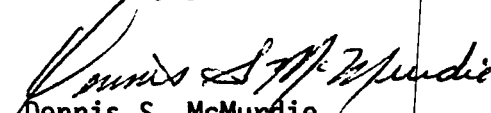
Enclosed you will find three (3) copies of the information needed to complete page 3A-4A, Sections B and C of DOE Contract No. DE/Ac08/ET27006.

The following data inventory is for Dixie Federal 45-14, drilled in Sec 14, T 23 N - R 35 E, of Churchill County, Nevada.

- ✓Item #1: Dual Induction - SFL Log - 2" & 5", Schlumberger Survey, May 1, 1979. 3 copies each
- ✓Item #2: ^{1" = 2000'} ~~2" and 5"~~ Agnew and Sweet ^{Static} Temperature ^{Gradient} Survey dated: September 27, 1979.
- ✓Item #3: Pressure Survey dated: September 27, 1979 of Agnew and Sweet
- ✓Item #4: Detailed daily drilling history for the Dixie Federal 45-14 Well, Dixie Valley, Nevada

These are the items which were mentioned in the October 4, 1979 letter to you that would be forwarded at a later date. If you have any questions concerning this material, please feel free to contact me.

Sincerely yours,


Dennis S. McMurdie
Geothermal Geologist
Natural Resources Department

SOUTHLAND ROYALTY COMPANY

DSM/rb
enc.

Page Two
Continued
October 15, 1979

Received by Howard P. Ross

This 17th day of October, 1979.

(Please return original upon receipt).

Items #1, 2, 3, 4 have been received as indicated. Drill cuttings have not yet been received for two new 1500 foot thermal gradient holes or for exploration well Dipic Federal # 45-14.

Howard P. Ross



Southland Royalty Company

March 8, 1979

Mr. James B. Cotter
Director
Engineering & Energy Applications Div.
U. S. Department of Energy
P.O. Box 14100
Las Vegas, Nevada 89114

Dear Mr. Cotter:

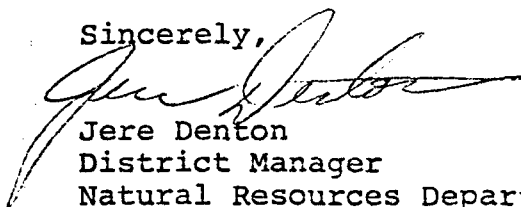
Attached is a copy of the monthly report from the University of Nevada regarding work under the subcontract.

In addition, I would like to report that Southland Royalty Company is very near to signing an Operating Agreement with Thermal Power Company in which Thermal Power Company will obtain a 50% interest in our lands in Dixie Valley, and will, during the duration of the drilling of the two deep tests under the DOE Contract, be acting as field operator. Southland Royalty Company will continue as project operator. I have, in the course of the past month, checked this out with Joe Fiore and he in turn has checked it with Brad Bourn who finds that there is no problem in this procedure as far as the DOE is concerned.

In addition, I can report that work is well under way towards obtaining a drill rig for the two Dixie Valley wells. It is currently contemplated that drilling will begin on or about May 1, 1979. Water permits have been received for the water well necessary for making mud and also for the diversion of of waters from a geothermal well that will be located in Township ship 23 North, 35 East, Section 14.

I can also report that a drill rig is currently in Dixie Valley and it is contemplated that drilling of the first 1500' gradient hole under the DOE Contract will commence in approximately one week. The drilling firm is Exploration Engineering out of Santa Rosa, California.

Sincerely,



Jere Denton
District Manager
Natural Resources Department

JD/kp
Enclosure

cc: Dr. Howard P. Ross ✓
University of Utah Research Institute

SOUTHLAND ROYALTY COMPANY - MACKAY MINERALS RESEARCH INSTITUTE

Geothermal Reservoir Assessment Case Study - Dixie Valley
Northern Basin and Range Province

Contract # DE-AC08-79ET27006

Monthly Progress Report: February 1-28, 1979

The Mackay Minerals Research Institute (MMRI) aspect of this contract is continuing field work for the shallow temperature survey and for planning the second stage of the structural and tectonic analysis. Petrologic analysis of available samples is continuing and is being integrated with all other available data.

Results to date are as follows for the main phases of work.

Petrographic Alteration Studies

All samples from the thermal gradient test wells have been examined with a binocular microscope and lithologic logs were completed. Copies of these logs were distributed to the various appropriate agencies, and confirmation of the receipt of the "detailed" lithologic logs has been received from Howard Ross (Utah repository). More detailed petrographic and mineralogic analyses of selected samples utilizing binocular microscope, x-ray diffraction and grain mounts are continuing.

A computerized program for mineral identification based on analysis of x-ray diffraction patterns has been entered into the UNR computer banks. Operational analysis of the program has been initiated.

The search for literature related to hydrothermal alteration is ongoing.

Structural and Tectonic Analysis

The EROS computer listing of available Landsat and NASA imagery has been received. These data are being compiled on regional maps in order to evaluate the coverage and to identify specific imagery scenes for future analysis.

Two aerial reconnaissance flights of the study area have been conducted following snowfall in Dixie Valley. However, in both instances the snow cover was inadequate in distribution to accurately reflect the sub-surface heat flow effects. Snow-lapse photography is still pending.

U.S.G.S. 7 1/2-minute topographic maps have been obtained for the entire study area. These are the working base for compiling all existing photography and photographic analyses, as well as for planning the low-sun-angle photographic missions. Final planning and operational flights for low-sun-angle photography are scheduled for March.

Shallow Temperature Survey

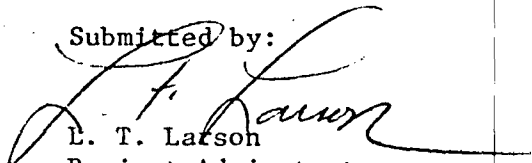
A detailed net of approximately 160 holes has been planned, with approximately one-fourth of these having been emplaced to date. The net is scheduled to be operational by March 15. A reserve of approximately 80 holes will be added to the net based upon evaluation of data obtained from the initial temperature probe readings. It is projected that these holes will be added to the net during March and April.

Hydrology and Hydrogeochemistry

Most of the work during February consisted of the analysis and interpretation of previously-collected spring and well-water samples, although the examination of existing well logs was started. This latter work effort was aimed at obtaining a rough estimate of the hydrologic properties of the valley fill as well as locating additional sampling points.

The water samples were chemically analyzed and the data further analyzed using the WATEQF computer program, various plots and trilinear diagrams and chemical geothermometers (both Na-K-Ca and Silica). Three classes of water (based on water chemistry) have been distinguished. Calculated temperatures ranged as high as 132°C with the Na-K-Ca method and as high as 225°C with the silica-mixing geothermometer. With regard to the latter technique, it remains to be seen whether the appropriate silica level has been applied for the cold-water fraction. Results of these analyses will be extremely useful in planning the remainder of the sampling program.

Submitted by:


L. T. Larson
Project Administrator



Southland Royalty Company

January 23, 1979

Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, Nevada 89114

Attention: Mr. J. B. Cotter, Director
Engineering and Energy Applications
Division

Dear Mr. Cotter:

I am enclosing the remaining information which is due under the existind data part of our contract. You should find enclosed:

- ✓(1) A map that goes with the Microgeophysics Report
- (2) Plate I-II, which goes with the Keplinger Report
- ✓(3) The temperature gradies for four deep holes and two shallow holes and a copy of Plate 13 of the GeothermEx Report, which includes the gradient holes which were drilled by Southland Royalty and shows them in relation to the gradient holes which were drilled by GeothermEx for Dow Chemical.

In addition, I am having mylars prepared for reproduction purposes to be sent to Howard P. Ross at the University of Utah Research Institute. I expect these will be available within the next few days.

If there are any questions or any problems with this data, please give me a call.

Sincerely yours,

SOUTHLAND ROYALTY COMPANY

Jere Denton
District Manager
Natural Resources

cc: Dr. H. P. Ross
University of Utah
Research Institute
Salt Lake City, Utah

MACKAY SCHOOL OF MINES

"A School of Mineral Resources"

UNIVERSITY OF NEVADA

RENO, NEVADA 89557

Geology-Geography Department

February 6, 1979

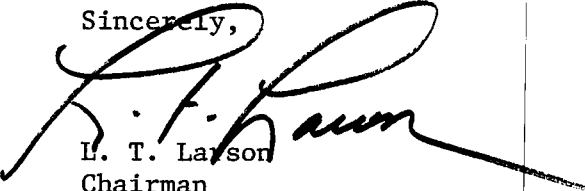
Mr. Howard Ross
Geothermal Sample Library
Research Park
391 Chipeta Way
University of Utah
Salt Lake City, Utah 84108

Dr. Mr. Ross:

This letter is notification that I am having shipped to the above address via Garrett Freightlines six (6) boxes containing drill cuttings from thermal gradient holes Nos. H-1, H-2, DD-9, CORRAL, SR-2, SR-2A (Note: samples for hole SR-2A are marked SRL-A) drilled by Southland Royalty Company in Dixie Valley, Nevada. Research and exploration in Dixie Valley is being pursued under Federal Contract #DE-AC08-79ET27006 by Southland Royalty and their subcontractor the University of Nevada.

Garrett is scheduled to pick up the boxes of cuttings on Feb. 7, 1979.

Sincerely,



L. T. Larson
Chairman

LTL:jb

cc: Jere Denton

MACKAY SCHOOL OF MINES

NEVADA BUREAU OF MINES • NEVADA MINING ANALYTICAL LABORATORY

CHEMICAL AND METALLURGICAL ENGINEERING DEPARTMENT • GEOLOGY-GEOGRAPHY DEPARTMENT • MINING ENGINEERING DEPARTMENT

NEVADA BUREAU OF MINES AND GEOLOGY

MACKAY SCHOOL OF MINES
UNIVERSITY OF NEVADA • RENO
RENO, NEVADA 89557

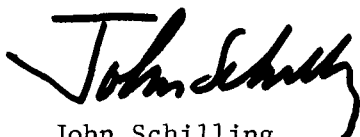
(702) 784-6691

2 February 1979

Howard P. Ross
University of Utah Research Institute
Earth Science Laboratory
Research Park
391 Chipeta Way
Salt Lake City, UT 84108

Dennis Trexler mentioned that your organization will be a depository for DOE cuttings, core, and logs, and that it may be possible to get a split of the cuttings and copies of the logs for our Geology Sample Library.

We are very much interested in getting everything we can for our Sample Library, and would like to make some sort of arrangement with your Lab (or DOE) to receive material from Nevada. The many individuals using our informational services want a "one-stop shopping center" rather than having to "shop" several different places. Having the material in Reno as well as Salt Lake City would be very useful --- I hope that we can work out something.



John Schilling
Director

JS:hm

*Next time you're in Reno
hope you'll stop by*

MACKAY SCHOOL OF MINES
"A School of Mineral Resources"
UNIVERSITY OF NEVADA, RENO
RENO, NEVADA 89557

Department of Geological Sciences

February 14, 1979

Howard Ross
Geothermal Sample Library
Research Park
391 Chipeta Way
University of Utah
Salt Lake City, Utah 84108

Dear Mr. Ross:

Enclosed herewith are three copies of the lithologic logs of the six low temperature thermal gradient holes drilled by Southland Royalty Company in Dixie Valley as per your request. I hope that you find them to be satisfactory.

As time did not permit a very detailed examination of every sample interval, these logs provide only a rough first interpretation of the material through which these holes were drilled. With regard to the columns labeled 'grain mount' and 'x-ray', any marks signify work that is to be done in the near future. All examination of the samples was made with a binocular microscope.

If you have any questions or problems regarding these lithologic logs, please don't hesitate to contact me.

Sincerely yours,

Thomas R. Bard

TB: tb

Enclosure



Southland Royalty Company

January 16, 1979

Dr. H. P. Ross
Earth Science Laboratory
University of Utah Research Institute
391 Chipeta Way
Salt Lake City, Utah 84108

Dear Dr. Ross:

Enclosed for your records and information, please find three (3) copies of the Plate III, entitled "Structural Interpretation of Dixie Valley & Environs, Churchill County, Nevada", which accompanies the Keplinger and Associates report, previously forwarded to you.

Should you have any questions concerning this data, please do not hesitate to contact Mr. Jere Denton at (817) 390-9200.

Sincerely,

SOUTHALND ROYALTY COMPANY

Susan E. Duden
Susan E. Duden
Natural Resources Dept.

sd

Enclosures (3)



Southland Royalty Company

February 5, 1979

Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, Nevada 89114

Attention: Mr. J. B. Cotter, Director
Engineering & Energy Applications

Dear Mr. Cotter:

Enclosed is the Monthly Progress Report from the University of Nevada MacKay School of Mines, with respect to their sub-contract for research in Dixie Valley. The only thing I can add is that the water permits have made it through the review procedure with the state of Nevada without any protest being filed, and are currently being processed before issuance by the State Water Board. Search has commenced for a deep rig so drilling of two deep wells can begin.

With respect to the two additional gradient holes to be drilled in Dixie Valley, the bid letters went out on February 2, Permit Applications were delivered to the BLM that day, and a field trip had been planned to review site locations. The trip had to be cancelled due to a severe snow storm. It will be rescheduled sometime in the month of February.

A single level aeromagnetic survey over the majority of Dixie Valley, from south of Dixie Hot Springs to north of Sou Hot Springs, has been completed. Although this information is not available under the Department of Energy Contract, it has been useful in helping to interpret the multi-level data which had previously been available. This data will be incorporated in other phases of the work insofar as it may help direct studies to be conducted by the University of Nevada.

Southland has traded gradient hole information to Phillips Petroleum Company and purchased information from Republic Geothermal gradient holes in Dixie Valley. This information also will be used in trying to better understand the model of the valley and will be incorporated, where possible, in the work

Mr. J. B. Cotter

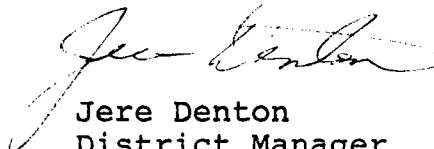
-2-

February 5, 1979

being performed by the University of Nevada. Under the terms of the trade and purchase agreements, the data cannot be published and, therefore, cannot be released to the University of Nevada.

Sincerely yours,

SOUTHLAND ROYALTY COMPANY



Jere Denton
District Manager
Natural Resources

JD/msa
Enclosure

cc: Dr. Howard P. Ross ✓
University of Utah
Research Institute
391 Chipeta Way
Salt Lake City, Utah

SOUTHLAND ROYALTY COMPANY - MACKAY MINERALS RESEARCH INSTITUTE

Geothermal Reservoir Assessment Case Study - Dixie Valley,
Northern Basin and Range Province

Contract # DE-AC08-79ET27006

Monthly Progress Report: January 1-31, 1979

The Mackay Minerals Research Institute (MMRI) aspect of this contract is now fully staffed and Mr. Richard Juncal has been added as a research assistant. Planning for field work has continued and the petrographic work is soundly initiated.

Results to date are as follows for the main phases of work.

Petrographic alteration studies:

All samples from the five thermal gradient test wells have been split, packaged and labeled. Remaining bulk of samples ready for shipment to Utah depository. Major effort is now on developing a gross lithologic log for each of the holes which will be based on binocular microscope examination of washed cuttings. More detailed petrographic and mineralogic analysis of selected samples by use of binocular microscope, X-ray diffraction and by petrographic microscope examination of grain mounts has been initiated.

Samples have been chosen for petrographic analysis on the basis of grain size and color variations as well as distinct lithologic changes. Observations are recorded on a work sheet and consist of major rock types present, color, identification of secondary minerals. To date the petrographic examination has not noted any distinct or obvious signs of hydrothermal alteration although pyrite, secondary quartz, epidote and calcite (iceland spar) have been seen in minor amounts.

Research of literature related to hydrothermal alteration is continuing.

Hydrology and Hydrogeochemistry

The following were accomplished during January:

1. Continuation of hydrologic data search
2. Continuation of existing data assessment
3. Continuation of chemical and computer analyses of water samples collected in December, 1978.
4. A two day field trip to Dixie Valley for the purpose of site familiarization and determination of additional sample site locations was made.

Structure and Tectonics:

This aspect of our study is in the literature search and planning stage for future field work. The search of the most cost effective method of conducting the aerial photography is near completion and discussions are being held with the State of Nevada Highway Department. Other options to be investigated include competitive bidding of aerial photographers in Los Angeles, Sacramento, Salt Lake City and Los Angeles areas, or by our in-house group with camera and light plane rental.

The 7-1/2° U.S.G.S. topographic map sheets for the entire project area have been ordered from Menlo Park. Upon receipt existing low sun angle and AMS photography will be transferred.

Aerial reconnaissance of the area is planned for the very near future. The initial flight will check snow melt patterns and preliminary reconnaissance for the new low sun angle photography flights to be scheduled.

Shallow Temperature Survey

Plans have been completed (subject to Southland approval) for the placement of the one meter temperature gradient holes. Net should be in operation before end of February, 1979.

Submitted by:


L. T. Larson
Project Administrator



Southland Royalty Company

January 2, 1979

Department of Energy
Nevada Operations Office
P. O. Box 14100
Las Vegas, Nevada 89114

Attention: Mr. J. B. Cotter, Director
Engineering and Energy
Applications Division

Dear Mr. Cotter:

Enclosed is the monthly progress report for December. I have nothing to add, except that I will advise the University of Nevada at Reno to send the portion of the physical samples from the gradient holes which they do not need to the Geothermal Sample Library at the University of Utah Research Institute.

Sincerely yours,

SOUTHLAND ROYALTY COMPANY

Jere Denton
District Manager-
Natural Resources

JD:ss
Enclosure

cc: Dr. H. P. Ross
Earth Science Laboratory
University of Utah Research Institute
Salt Lake City, Utah

SOUTHLAND ROYALTY COMPANY - MACKAY MINERALS RESEARCH INSTITUTE

Geothermal Reservoir Assessment Case Study -
Dixie Valley, Northern Basin and Range Province

Contract # DE-AC08-79ET27006

Monthly Progress Report: December 1-31, 1978

The progress to date has been primarily focused on selecting project personnel and establishing laboratory analysis methods. The two research assistants that have been selected include Mr. Bob Whitney for the structural studies, and Mr. Tom Bard for the mineralogical and petrographic studies. They have undertaken a preliminary review of the literature and have assembled basic publications relating to the geology of the site area.

The results to date are as follows for the main phases of work.

Sample Descriptions and Analyses:

The main thrust of the work to date includes the splitting and cleaning of samples for mineralogic and petrographic analysis. Samples from five wells have been received and about 90 percent have been split. One-fourth of each sample is to be retained by the UNR project for study and analysis and three-fourths is to be returned to Southland Oil Company. Selected samples are being cleaned for binocular study; samples from two wells are completed. The cleaning has been for removal of drilling mud, organic debris and has included dilute HCl treatment of some samples to promote disaggregation of the samples for study.

The procedure for study includes rapid binocular examination of samples from approximately every 50 feet, at locations above and beneath each change in lithology. The samples will be evaluated for alteration and petrographic change. Grain mounts will be prepared for all of these samples for detailed mineralogical study and some samples will be analysed by X-ray diffraction.

Structural Studies:

The structural studies will be initiated on January 1, 1979, as the base maps have just been received. The first week of January will include an aerial reconnaissance of the area and examination of the snow melt pattern from the previous snow.

The aerial camera is being serviced and assembled for the low-sun angle aerial photography study.

Ground Temperature Studies:

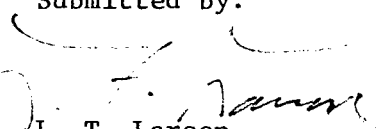
The temperature measuring equipment has just been received and the location map of the shallow temperature holes is expected to arrive soon. The implementation of the thermal logging of shallow holes will be started as soon as both equipment and location maps are available.

Hydrology and hydrogeochemistry studies:

The following were accomplished during December, 1978:

1. Compilation of existing hydrogeochemical data.
2. Initiation of hydrologic data search.
3. Initiation of existing data assessment.
4. Collection of approximately 20 to 30 water samples. These samples are currently undergoing chemical analyses and computer analysis (chemical equilibrium calculations).
5. Familiarization of graduate assistants with project goals and study area.

Submitted by:


L. T. Larson
Project Administrator

SOUTHLAND ROYALTY COMPANY - MACKAY MINERALS RESEARCH INSTITUTE

Geothermal Reservoir Assessment Case Study -
Dixie Valley, Northern Basin and Range Province

Contract # DE-AC08-79ET27006

Monthly Progress Report: December 1-31, 1978

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1. Compilation of existing hydrogeochemical data.
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4. Collection of approximately 20 to 30 water samples. These samples are currently undergoing chemical analyses and computer analysis (chemical equilibrium calculations).
5. Familiarization of graduate assistants with project goals and study area.

Submitted by:


L. T. Larson
Project Administrator

SOUTHLAND ROYALTY COMPANY - MACKAY MINERALS RESEARCH INSTITUTE

Geothermal Reservoir Assessment Case Study -
Dixie Valley, Northern Basin and Range Province

Contract # DE-AC08-79ET27006

Monthly Progress Report: December 1-31, 1978

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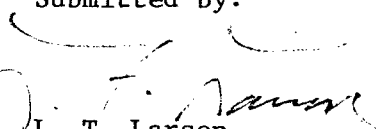
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4. Collection of approximately 20 to 30 water samples. These samples are currently undergoing chemical analyses and computer analysis (chemical equilibrium calculations).
5. Familiarization of graduate assistants with project goals and study area.

Submitted by:


L. T. Larson
Project Administrator



Southland Royalty Company

October 4, 1979

Mr. J. B. Cotter
Department of Energy
Nevada Operations Office
P.O. Box 14100
Las Vegas, Nevada 89114

Dear Mr. Cotter:

Enclosed you will find the University of Nevada at Reno 3rd Quarter Report on their efforts under our sub-contract in Dixie Valley. Copies of photos included in the petrologic alteration section of the report will be forwarded in the near future.

You should also be advised that during the month of September, drilling was completed on Dixie Federal 66-21 to a depth of 9,780'. Logs were run and a fracture zone appears to exist at 9,200'. This zone had been drilled with a 10.3 pound mud in order to hold back substantial water flow from a 4,600' zone. During the month, the 4,600' zone was cased off and a sodium hydroxide solution was placed in the fracture interval at 9,200'. Currently, the well is shut-in waiting for the caustic to work and for the temperature to reach equilibrium in the well bore. Our current expectation is that another temperature survey will be taken in approximately ten days to two weeks and at that time, a nitrogen lift will be attempted. A well history report and copies of logs are in preparation and should be forwarded in the near future.

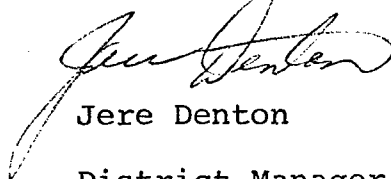
Another temperature survey was taken on Dixie Federal 45-14 which indicated bottom hole temperature has remained constant as this reading was 382° F. This compares with earlier readings in the 380° F-382° F range. The well continued to flow 10 to 12 gallons of water a minute at a temperature which finally reached 206° F. The well has currently been shut-in pending further evaluation which may follow the seismic program which is expected to commence this month in Dixie Valley.

Page Two
Continued
October 4, 1979

Deliverables under our contract with respect to Dixie Federal 45-14 are enclosed with an inventory list which I would like you to sign and return. Samples have previously been delivered to UURI.

The annual progress report is going to be delayed slightly as the completion of drilling on Dixie Federal 66-21 came so near the end of the contract year. I expect a draft will be delivered to you within two weeks.

Sincerely yours,



Jere Denton

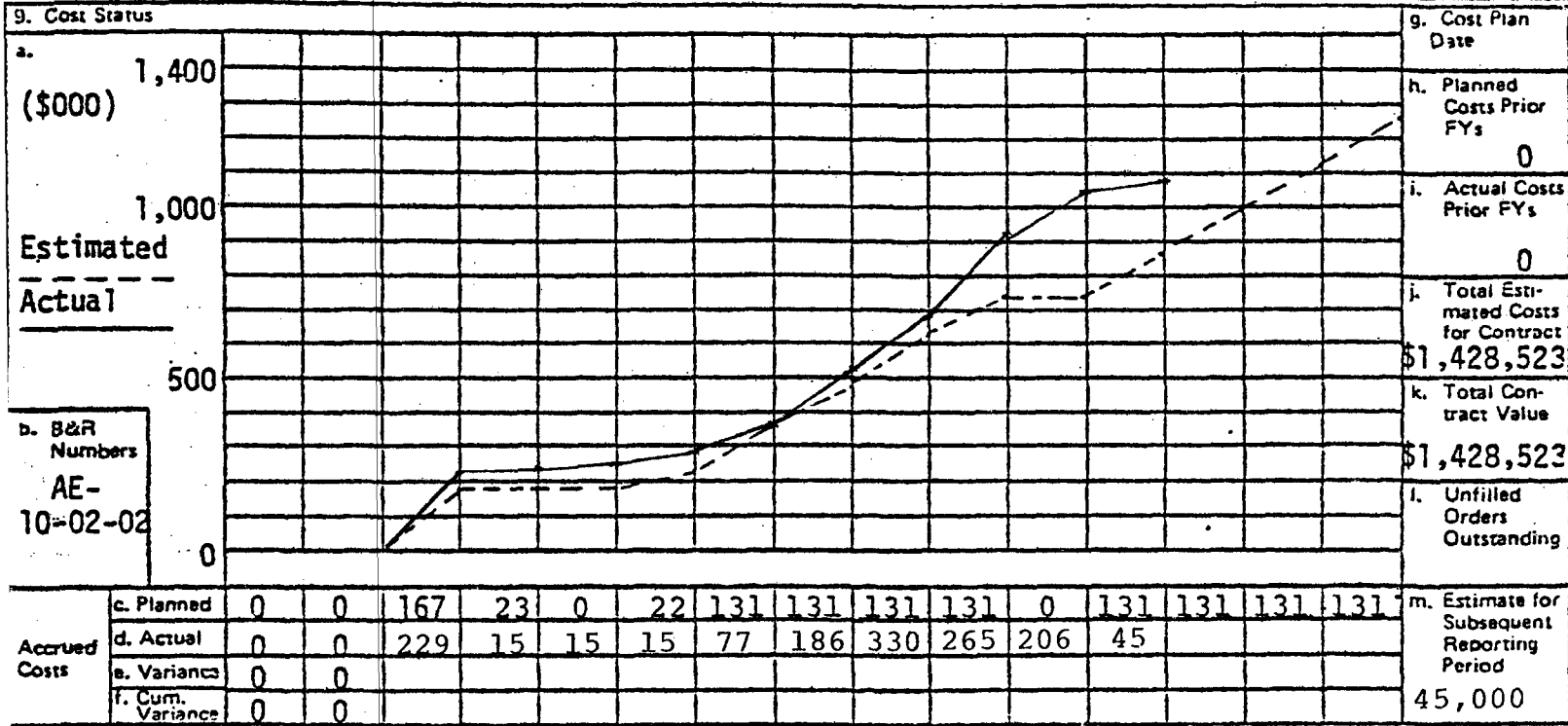
District Manager,
Natural Resources
SOUTHLAND ROYALTY COMPANY

JD/ji
enc.

CONTRACT MANAGEMENT SUMMARY REPORT

1. Contract Identification Geothermal Reservoir Assessment Northern Basin & Range	2. Reporting Period _____ through _____	3. Contract Number DE-AC08-79ET-27006
4. Contractor (Name and Address) Southland Royalty Co. 1000 Fort Worth Club Tower Fort Worth, TX 76102		5. Contract Start Date 10/1/78
		6. Contract Completion Date 9/30/80

7. Months	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	8. FY 1979
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11. Major Milestone Status	
a. Deliver Exist. Data	▲
b. Drill Two 1,500' Holes	▬
c. Drill One 8,500' Hole	▬
d. Test	▬
e. Drill One 8,500' Hole	▬
f. Test	▬
g. U of N Studies	▬
h. Final Report	Jan 1980
i.	Apr-July 1980

12. Remarks

13. Signature of Contractor's Project Manager and Date 10/4/79	14. Signature of Government Technical Representative and Date
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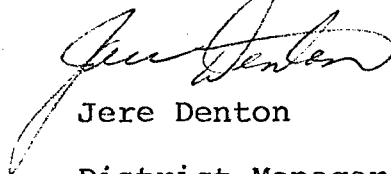
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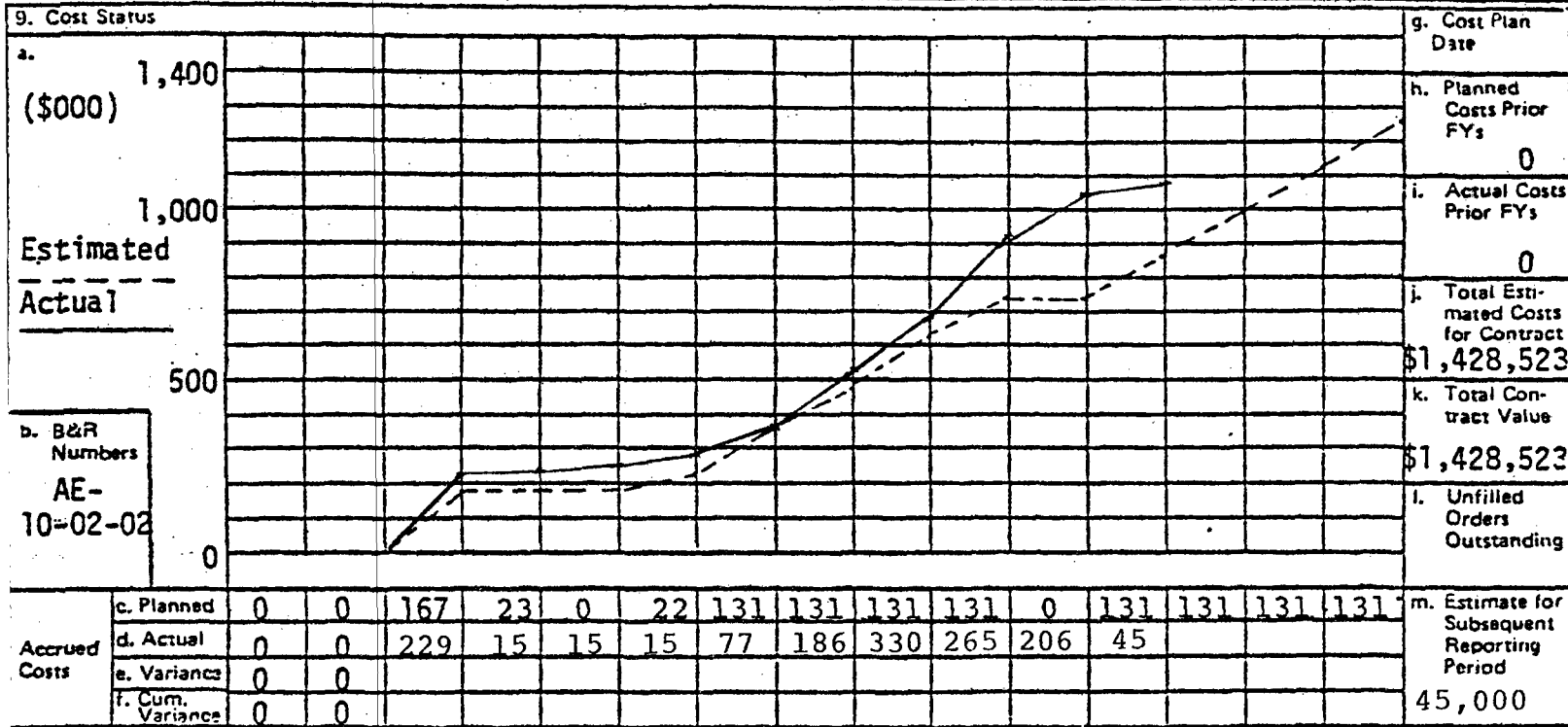
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7. Months	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	8. FY 1979
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