UNIVERSITY OF UTAH
RESEARCH INSTITUTE

UURI

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February 14, 1979

MEMORANDUM

TO: State Coupled Core Group

FROM: Duncan Foley & Debra Struhsacker

SUBJECT: Trip Report - Nevada Bureau of Mines and Geology

Date of Trip: January 31, 1979

Place: NBM&G offices, Reno, Nevada

Purpose: Discussion of State Coupled project and map production

Attendees: Dennis Trexler, Brian Koenig, Tom Flynn; NBM&G
Duncan Foley, Debra Struhsacker; ESL/UURI

General and Business

1. NBM&G Bulletin 91, "Inventory of thermal waters of Nevada", should be published in 4 to 5 months.

2. The 20° to 35°C Nevada entries to GEOTHERM have been coded, and will be submitted to the USGS in a few weeks.

3. Several potential users of geothermal energy for direct use applications have contacted the NBM&G. Two projects currently being studied include heating the fire station in Gabbs, Nevada and growing prawns at Wabuska Hot Springs. Tom Flynn and Kelly Jackson (O.R.) may give an interview explaining geothermal energy, which will be broadcast by a local television station.

Technical

1. ESL/UUGG technical support services to the State Coupled program, including fission track dating, stable isotope analysis, K-Ar dating and geophysical interpretive studies were outlined.

2. Tom Flynn has proposed to study thermophyllic algae in the Gerlach area. This study will be documented by low-altitude photography and will hopefully identify such photography as an inexpensive reconnaissance

exploration tool with applications in remote areas that have poor access.

3. Brian Koenig has devised a probability function for determining the potential for direct application of geothermal resources. Key parameters (water quality, temperature, distance to user, etc.) are selected, given a weighting factor, and numerically represented for direct heat or industrial process applications. The numbers are based solely on existing data; no resource base extrapolations or scenarios are involved. Results from this study will be incorporated into Nevada's preliminary geothermal map.

4. The Nevada team has streamlined GEOTHERM forms to facilitate key punching by adding additional codes for reference number, contributors, county, etc. They also expanded the "other information" section.

5. A preliminary geothermal energy map of Nevada will be published in about (6) months. The map will be primarily aimed towards the public. Technical data from other publications will be cross referenced on the map, making it useful to the scientific community as well. The following specific map data sets were discussed:

-The point data set will include temperature, total dissolved solids, pH and dominant anion-cation chemistry. These data will be represented using symbols similar to those used on weather maps.

-Flow rate may not be significant and won't be shown.

-Depth of wells is taken into account by Koenig's probability function, and won't be shown as a separate data set.

-Thermal gradient data may not be reliable since most values have not been obtained from holes drilled specifically for heat flow tests; these will be examined prior to depiction on the map.

-NBMG feels that geothermometers are inappropriate on the preliminary map, and should be reserved for site specific Phase II studies. Except for the thoroughly studied KGRA's, the dependability of most geothermometry data is questionable, since local hydrology has not been considered.

-Water toxicity is a parameter built into Koenig's probability function and won't be shown as a separate data set.

-Young faults will be shown.

-Major lineaments may best be used as an overlay on the scientific map. Problems inherent in defining and recognizing lineaments may produce a biased data set with questionable applicability to geothermal investigations.

-Areas of present use will be shown. Different symbols may be used to distinguish between industrial processing and space heating applications.

-Petroleum Information data probably will not be shown due to its irregular distribution. The State Engineer's office keeps a record of most well data, including temperature. Unfortunately there are no reporting requirements for geothermal wells.

-The only heat flow data for the state is NOAA's data set. This may or may not be shown.

-"State-line faults" probably do not pose any problem with the possible exception of data in the Alvord-Baltazor areas.

-Areas of low probability, as determined by Koenig's probability function, will not be illustrated as such. Other point data for these areas will be shown, however.

-The resource numbering system for the geothermal map (and GEOTHERM) is based on latitude and longitude. This system will be cross referenced with Garside and Schilling's (Bulletin 91) county-by-county numbering scheme.

6. Dennis Trexler commented that there is little awareness on either the technical or public level of GEOTHERM's existence. This is due in part to lack of communication and publicity as well as the expense involved in duplicating the GEOTHERM files. He suggested that these files be reduced onto standard 8 1/2 X 11 sheets that could be xeroxed by conventional means.

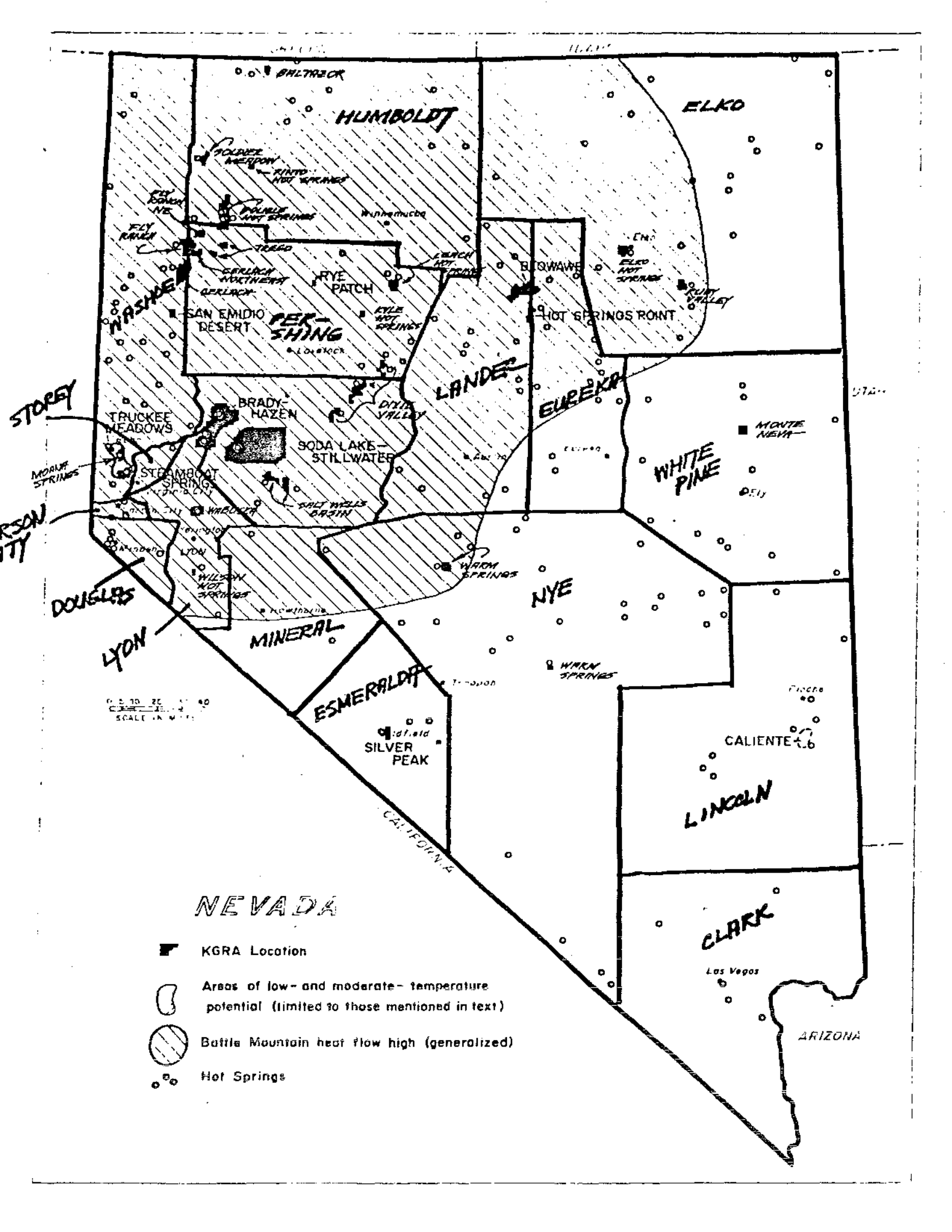
Action Item

1. ESL will investigate the fault map of Utah plotted on a shaded relief base by Darryl Miller of Fugro Inc., Long Beach, CA, to see if other such maps have been prepared and to examine in detail the base.

Duncan Foley
Associate Geologist

Debra Struhsacker
Associate Geologist

DF/DS:kg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LYON
DOUGLAS
CALIENTE
SILVER PEAK
Las Vegas
ARIZONA
CALIFORNIA
BRADY-HAZEN
SODA LAKE-STILLWATER
TRUCKEE MEADOWS
STEAMBOAT SPRINGS
WILSON HOT SPRINGS
WARM SPRINGS
HOT SPRINGS POINT
NEVADA
KGRA Location
Areas of low- and moderate- temperature potential (limited to those mentioned in text)
Battle Mountain heat flow high (generalized)
Hot Springs

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Geothermal explorers probe Carson Valley

By ROBERTA McCONNELL
Special to the Journal

MINDEN — For the first time in more than 15 years, Carson Valley is to be explored this summer for possible geothermal energy sources.

Long touted for its hot springs, previously thought-of only in connection with spas, the valley is to be probed in four separate areas including the historic Wally's Hot Springs resort area two miles south of Genoa, the Hobo Hot Springs area north of Genoa, the Saratoga Springs area in the Johnson Lane residential vicinity north of Minden, and another goethermal area farther east in the Pine Nut Mountains.

According to Dennis Trexler of the Nevada Bureau of Mines and Geology, three people from the bureau will spend the summer finding out how much energy can be produced and how the energy can be used.

Trexler said geothermal energy from Steamboat Hot Springs south of Reno already is heating some Reno homes and that the same potential may be available for Carson Valley homes.

One such heating system already is in use at Hot Springs Mountain where Saratoga Hot Springs are located. It was devised and installed by Robinson Plumbing Contractors in a home built by the owner.

The proposal to explore Carson Valley geothermal sources, Trexler said, already has been approved by the technical staff of the U.S. Department of Energy. He said he expects a contract for the work to be signed soon.

It was in 1962 that the last extensive exploratory geothermal work was done in the valley when U.S. Steel Corp. drilled 20 wells at Wally's to depths ranging from 100 feet to more than 1,000 feet. Maximum water temperature was measured at 181 degrees, Trexler said, and the well produced water of high enough quality to be potable.

Water quality is of major importance to geothermal explorers because too great a mineral content causes erosion and fouling of pipes in home heating systems.

At Hobo Hot Springs, formerly a favorite local "swimming hole" managed by the U.S. Bureau of Indian Affairs, water temperature has been measured at 114 degrees and it has been analyzed as containing approximately the same amount of sediment as is apt to be found in drinking water.

Water from Saratoga Springs, which are privately-owned, as are Wally's Hot Springs, showed a temperature of 122 degrees and only slightly more sediment than exists in water from Hobo Springs and less sediment than is found in water from Wally's.

Hobo Hot Springs got its name following the depression years when hobos, the "knights of the road," passed the word among their comrades that it was a fine place to take a bath without charge, and in steaming-hot, continually-flowing water.

Later problems with "hippie" use, all-night parties and skinny-dipping requiring regular police patrol brought an end to Hobo as a swimming hole some eight years ago, when it was graded over and covered to preclude the undesirable use.

The water instead flows downhill to two large settling ponds where it cools and is used for irrigation of Indian lands.

Trexler said he expects water temperatures to be considerably higher underground than where it surfaces, and wells are to be drilled drectly into the sources for temperature checks.

Whether other potential uses of the hot springs would curtail future use of the springs as spas is a question that has not been answered.

Wally's Springs have been slated for development as a combined spa and tennis resort, but work on improvements has been at a standstill for nearly a year.

Trexler said he feels that insufficient emphasis is being placed on the geothermal energy potential but that the summer exploration is expected to produce some definite answers as to how much is available and to what uses it might be put to lighten the burden on existing energy sources in the Carson Valley area.

Jet's weight hurts surface

Special to the Journal

ELKO — Two 12-feet-

Hospital ups fees, but still offers bargain

By DICK SNYDER
Special to the Journal

ELKO — A 3.26 percent aggregate increase in room rates was approved by Elko

maternity lodging from $100 to $105 (five percent).

Welch said there will be no increase in charges for use of the nursery, labor room,

He said the nationally-recommended ra
increase is a maximum of 9.7 percent, a
that those suggested by the state's and Pr
ident Carter's voluntary guidelines are

MEMORANDUM

2/2/79

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General and Business

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2. The 20° to 35° C Nevada entries to GEOTHERM have been coded, and will be submitted to the USGS in a few weeks

3. Several potential users of geothermal energy for direct-use applications have contacted the NBM+G. Two projects currently being studied include heating the fire station in Gabbs, Nevada, and growing prawns in Wabuska, Nevada. Tom Flynn may give an interview explaining geothermal energy, to be broadcast by a local television network.

Technical

1. ESL/DGG technical support services to the State Coupled program including fission track dating, stable isotope analyses, K-Ar dating and geophysical interpretive studies were discussed.

2. Tom Flynn's proposed thermophylic algae study is currently out for bid. This study of (algae name) in the Berlack area will be documented by airborne, low-altitude photography and will hopefully outline an inexpensive reconnaissance exploration tool useful in remote areas with poor access.

3. Brian Koenig has devised a probability function for determining the potential of direct applications geothermal resources. This scheme considers a variety of parameters which may influence the potential of a given resource, and is based solely on existing data. Results from this study will be incorporated into Nevada's Preliminary geothermal map.

4. To facilitate keypunching, the Nevada group streamlined the GEOTHERM forms by adding additional codes for reference number, contributors, county etc. They also upgraded the "other exploration" section.

5. A preliminary geothermal energy map of Nevada will be published in about (6) months. The purpose of this map is to interest potential users of geothermal energy. As such, this map is primarily aimed towards the public. Technical data from other publications will be cross referenced on the map, making it useful to the scientific community as well. Specific map data sets discussed included:

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should elaborate? →

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Action Items

ESL tufa mounds

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3. ESL will determine what type of heating system is being used by the International Center, West of the SL Airport.

POE comm
tufa mounds

NV. BMG 1/31/79

w/ B. Koenig
T. Flynn
D. Treyler
D. Foley

G+B Bulletin 91
Goes to painter in 3 wks
4 mos. minimum before published

Foley's Fission Farm!

T Discussion of ESL/DGG support
Fission track
Stable isotope C-O-H
K-Ar
Geophysical interpretation

G+B
3 contacted ~~for RR~~ no RR
→ A.I.

Meeting Agenda
Where's DOE going
what is Phase II
who to contact
what does DOE want done. } B.K.
Communication problems

G+B Geotherm
Finishing coding forms
Streamlined forms

G+B Additional coding to cut keypunch time:
- Reference#
- Contributors
- County
- etc.

Expanded "other info" section

G+B User contacts:
- GABS - firehouse heat w/ geothermal?
- Report power WABUSHKA
  - w/ Engan from G+B
- Television Spot

T.F. ALGAE
- T Contract out for bid since >$2,500
- Black Rock Desert beach area
  - Thermophyllic algae
  - purpose: quick+ dirty exploration tool
    - airborne (low-altitude) photographic survey
- Trapping of calcareous material in algaal mat ⇒ tufa mounds??
- A.J. Radio Carbon Dates to determine longevity?? (of tufa mounds)
  - but getting constant influx of CO_2
  - problem in dating tufa mounds
- Finding critters in tufa mounds
  - possible biochronology

T Brine's #s
- Potential on 1:500,000 map for direct applications
- Parameters affecting potential

T

NOT A SCENARIO!

devised a "Probability Function"

probability of potential

based on existing data

considered only

1) space heating

2) industrial processing

no agriculture / aquaculture — question of economics - not energy intensive

Ranking of parameters for #1 + #2

Industrial process heat:

	RANK
T°	$(3)^4$
H_2O chem.	$(3)^3$
Accessibility	$(3)^2$
Population Centers	$(3)^1$
Depth to Resource	$(3)^0$

Space Heating Parameters:

Population centers	3^4
Depth to resource	3^3
T°	3^2
WATER chemistry	3^1
Areal Extent	3^0

Probability Function Ranking

High, moderate, low + adjectives (+, I, -)

T DATA Representation:

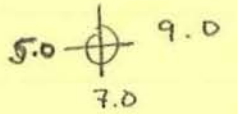
Spring or well ⊕: TDS:

fill in 1/4s then place dots around when filled

dots + 1/4 s = 500

T° 150° (surface) or well

pH - clock work (5 - 9'0 clock)



Dominant anion-cation systems

color coded

Probability Study

Shown as shaded regions

T Other data:

Flow rate - may not be significant

Depth - should be brought out by probability shades

Gradient - question of depth dependency since not specifically host flow holes

Geothermometers - should be used in site specific "Phase II" type of studies

Questionable reliability of data ~~see~~ except in KGRAs - well studied

Map should represent 1st cut type of data

To wisest users

further studies should then determine flow, discharge geochemical T° etc.

MERDE
T
↓

Site specific geothermometry
Need to know local hydrology, geology etc.
not valid for 1st cut
Contamination from airborne playa material

Toxicity
Built into probability study
Chemistry studies vary from site to site w/ types of analyses

Different numbering systems for resources
GEOTHERM

Subsurface Heat Investigative Team
cross reference { by state system - by county
Geothermal map - lat + long

A.I. Traeger suggests reducing GEOTHERM to 8½ x 11 sheets
cheaper / easier to Xerox etc.
problem w/ public access to GEOTHERM
than state or USGS ??
than state more convenient
USGS not public service oriented

Young Faults
Major Lineaments
question of meaning + problems in recognition
biased data set
perhaps better for up-dated map
used as overlay??

DARRYL MAUER
Fugro Inc.
Long Beach, Ca.
A.I.

Shaded relief map of UTAH w/ faults
G.O. "Preliminary" map
skewed towards public use
cross referenced w/ more technical data

(213)

T KGRAs

peripheral areas

direct applications on margins etc.

T Areas of present use - representation

House symbol - for space heating

Plant symbol - for industrial use

T PI data

too concentrated areally

probably won't use

most wells in State Eng. office

report depth, sometimes T°

A.I.? no reporting requirements for geothermal wells

Heat Flow

only have NOAA data

T State Line Faults - only need to worry about OR?

T Exclusion of "low probability" areas

will still include point data

Prelim. Trip Report

G & B

Bull-91 schedule

GEOTHERM progress & Modifications

User Contacts

Technical

- GEOTHERM Modifications
- Algae Survey

- Probability Survey (as applied to maps)

- NEVADA MAP
  - Scope & Purpose of Preliminary Map
  - Data Representation
  - Types of data
    - flow rate
    - well depth
    - gradient
    - geothermometry
    - toxicity
    - young faults
    - major lineaments
    - KGRAs & permitting for direct use
    - Areas of present use & representation of [illegible]
    - P.I. type data
      - [illegible]
    - heat flow

Stable/live faults

~~Agenda Items~~

~~Scope + purpose of "Preliminary Map"~~

Request for DOE/DGE to clarify goals + management people during Feb. meeting

Suggestion to reduce GEOTHERM sheets to 8½ x 11 format so can reproduce

inaccessibility of GEOTHERM

Utah Shaded Relief map w/ fault data

Tufa mounds

International Center

30 Jan 79

AI's 31 Jan 79 NBMG

f & DS

Pub office - new pub list
ESL theses order
Bull 91 status

Feb mtg details /RR trip

Rare II

Geotherm

User contacts /activity
(give ind. coup. sheet)

DT- mapping in Beowawe
Tusc.

Trenching

Tom Flynn

Algae

Koenig

Brians #s

Map- data sets
depiction
modif sam-fo circs
finalize criteria
denote potential areas

Dixie Valley