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## NEVADA BUREAU OF MINES AND GEOLOGY

MEMORANDUM

DATE: April 7, 1994

FROM: Larry Garside

TO: Paul Lineau Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601

#### SUBJECT: Quarterly Progress Report, Nevada Low-Temperature Geothermal Resources

Progress for the preceding quarter is summarized below; if you have further questions, please contact me.

The selection of records for the spreadsheet for the final report continues. So far, I have marked records for final selection in the northern half of the state. This constitutes about 250 records for over 200 "sites". Most of these records are from GEOTHERM or WATSTORE, but I have had to enter a few from other sources when those sources have the best or only data. I am selecting the sites by comparing 1:1,000,000-scale plots of GEOTHERM, WATSTORE, and the digitized 7.5-minute topographic map data. These were plotted by our GIS lab from the digital longitude and latitude files. The selected records have the best chemical data or best represent the range of chemical data available.

Checking each one of the potential thermal spring and well points has been an eye-opening experience so far. There are numerous errors in the longitude-latitude data, requiring that many erroneous points be checked out (a time-consuming, but necessary, process). Errors occur in both GEOTHERM and WATSTORE with about equal frequency.

I am finding that GEOTHERM has more useable data than WATSTORE; many of Nevada's thermal springs and wells are not represented in WATSTORE. And, if they are, it is not unusual to find that the data is repeated in GEOTHERM (especially for pre-1970's analyses).

I am also finding that quite a number of thermal springs and wells do not have adequate (or even any) analyses. Some of the older analyses do seem quite good, however (based on the ion balance). In some less-populated areas of the state, it appears that there have been no new water chemistry data collected since the late 1970's (when I searched the literature for the data that was published as NBMG Bulletin 91 and eventually entered in GEOTHERM).

Also, there are quite a number of areas where work on the ground needs to be done to figure out just which springs and wells are warm, and which published analyses refer to which localities. I made a brief visit to the Smoke Creek Desert between Reno and Gerlach because of problems with some old location data from Waring (1965). The complete coverage of Nevada with modern 7.5minute topographic maps has certainly increased our ability to find potential thermal springs and wells. To have a really firstclass database of geothermal information, a considerable amount of field work should be done (not just sampling, but surveys of areas known or suspected to have undescribed or poorly known thermal springs and wells). A number of previously unknown geothermal sites have been found during drilling of mineral exploration holes. This source of information, along with the thermal-gradient wells drilled by the geothermal industry in the 60's and 70's, is not readily available and has hardly been researched at all.

The data in WATSTORE has posed some problems that are not completely resolved yet. The bicarbonate and carbonate analyses are represented by several different parameters in the database, requiring quite a bit of extra manipulation. Also, it appears that although boron and iron results are supposed to be reported in ppb, some are in ppm. Hopefully, for those analyses used in the final database, I will resolve these problems.

Over the next 3 months, I plan to complete the selection of records for the final database. These will then be moved from their respective spreadsheets to a final one. The 1:1,000,000scale map will be easily plotted in the GIS lab from these data.

We continue to add new references to the bibliography from the published, unpublished, and gray literature available in our geothermal files in the NBMG public information office and from my own library. As I mentioned last quarter, the final bibliography will include articles in the GRC Bulletin, the Geo-Heat Center Quarterly Bulletin, and the GRC Transactions.

The article on Nevada geothermal use came out in the last GRC Bulletin. I will be adding a comment in the database on use to those thermal areas mentioned in the article.

Although I am beginning to note quite a number thermal springs and wells that should be sampled to improve the database, I think it is unlikely that I will be able to collect samples from very many of these before July 1. Hopefully, if I am able to collect some of these at a later date, I will be able to apply them to my 10 "free" analyses from UURI. I am hopeful that there will be a continuing DOE low- to moderate temperature geothermal program of data collection and database refinement.

Cc: Howard Ross, UURI



Per 1115

#### NEVADA BUREAU OF MINES AND GEOLOGY

November 16, 1992

Howard P. Ross Project Manager University of Utah Research Institute 391 Chipeta Way, Suite C Salt Lake City, UT 84108-1295

#### Dear Howard:

Please find enclosed the Nevada data for Table 1. There are a lot of caveats for these data. The total database entries are just that, duplicates and all. The YPGA number is GEOTHERM; the 1993 is totals for the three sources I am presently working with. The number of moderate-temperature wells is really a guess, and depends on how you count unutilized exploratory holes. High-Priority resource areas aren't really identified yet, so this too is a guess.

I am enclosing a copy of a letter to Paul concerning an extension of the contract. Also, you might find the Lobster articles from the Reno paper interesting. Please call me if you need anything further.

Sincerely yours,

Larry Garside Research Geologist

encl.

Table 1. GEOTHERMA	AL DATABAS	e summ	ARY				12	3993 800 111	sta.		
Database Result	State YPGA	AZ 82	CA 80	CO 80	ID 80	MT 81	NV 83	NM 80	OR - 82	UT 80	WA 81 <sup>°</sup>
Total Database Entries (thermal wells, springs)	1993 YPGA						<u>3300</u> 3* 1 <u>376</u>				
Moderate Temp. Wells (100°C <t< 150°c)<="" td=""><td>1993 YPGA</td><td> </td><td></td><td></td><td></td><td></td><td><u>50</u> 35</td><td> ·</td><td></td><td><u> </u></td><td>·</td></t<>	1993 YPGA	 					<u>50</u> 35	·		<u> </u>	·
Low Temp. Wells/Springs (20°C <t<100°c)< td=""><td>1993 YPGA</td><td></td><td></td><td> </td><td></td><td></td><td><u>/000,</u> .700.</td><td></td><td></td><td></td><td></td></t<100°c)<>	1993 YPGA			 			<u>/000,</u> .700.				
Low Temp. Resource Areas (20°C <tres.<150°c)< td=""><td>1993 YPGA</td><td><u> </u></td><td></td><td></td><td></td><td></td><td>400 0K</td><td><u></u></td><td></td><td></td><td></td></tres.<150°c)<>	1993 YPGA	<u> </u>					400 0K	<u></u>			
Direct Heat Utilization (Commercial or district)	1993 YPGA		·				20	<u>.</u>			
Greenhouses, Aquaculture, Industrial Processes (Number separate businesses	1993 YPGA s)						53	<u> </u>			
Areas, Multiple Residence Heating (not a district)	1993						-2-				
Areas, Potential Near-Term Direct Heat Utilization (Commercial Buildings)	1993			<u> </u>	<u> </u>		2		<del>.</del>	<u> </u>	
Areas, Possible New Binary Power Development (110°C <tres<150°c)< td=""><td>1993</td><td></td><td></td><td></td><td></td><td></td><td>Z_</td><td></td><td></td><td><u> </u></td><td></td></tres<150°c)<>	1993						Z_			<u> </u>	
Areas, High Priority Resource Study	1993	. <u></u>		————————			4			<u></u>	

Areas, Multiple Residence Heating: 1 or more residences Tres = Estimated reservoir temperature



## NEVADA BUREAU OF MINES AND GEOLOGY

June 20, 1994

Howard P. Ross Project Manager University of Utah Research Institute 391 Chipeta Way, Suite C Salt Lake City, UT 84108-1295

Dear Howard:

I am sending you, under separate cover, a copy of the final report for the Nevada low-temperature project. The enclosed letter and the original report were sent to Paul Lineau at the same time. I did submit a very short paper for the GRC meeting this fall, and I hope to talk a little bit more then about the areal distribution of major and trace elements in Nevada thermal fluids.

Sincerely yours,

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Larry Garside Research Geologist

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#### NEVADA BUREAU OF MINES AND GEOLOGY

MEMORANDUM

DATE: June 20, 1994

FROM: Larry Garside Kan

TO: Paul Lineau Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601

SUBJECT: Final Report, Nevada Low-Temperature Geothermal Resources

I am sending you under separate cover the final report and 1:1,000,000-scale map showing the geothermal occurrences listed in Appendices 1 and 2. The diskette has the spreadsheet, in Quattro Pro, that produced the two Appendices. The Appendices were just printed from the same spreadsheet by hiding columns not needed for a particular Appendix. The map was produced in ArcInfo here at NBMG, and so it can be modified with relative ease if there are any problems noted. I showed certain geothermal areas with shading surrounded by a line; in these areas, the spring/well locations do not adequately represent, at the map scale, the known area of thermal groundwater (based on all the data examined).

The bibliography is also available as digital data (WordPerfect, ascii, etc.) if you like.

I will be in the field much of the summer, but messages will reach me if they are left at the above telephone/FAX numbers. Please contact me if there are questions or problems with the report, map, and spreadsheet.

Cc: Howard Ross



#### NEVADA BUREAU OF MINES AND GEOLOGY

November 9, 1993

Paul Lienau Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601

#### Dear Paul:

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. . . .

I received the memo today from you and Howard describing several items concerning the Low-Temperature program. As I have mentioned before, I will need an extension to allow completion of the project tasks; I certainly underestimated the amount of data that is available for Nevada. At present, I am working with about four groups of geothermal analytical+location data (mostly in spreadsheet format). One has over 1,700 records, another (GEOTHERM) over 1,200, and a third has about 350 records. There are a lot of duplicates and incomplete analyses in these sets, although I don't know how many yet. Additionally, our GIS lab has digitized over 2,000 thermal spring/well locations from 7.5minute topographic maps (combined with GEOTHERM data). I am still trying to get all this data into the same format so that I can select the best records from it. Based on the individual geothermal sites or areas we know of in Nevada, it is certain that there are over 400 locations. There are, for example, 800 locations on the NOAA geothermal map for Nevada. I have included copies of a couple of pages of the spreadsheet data to give you an idea of what it looks like. Also enclosed are copies of some clippings of interest from the Reno Gazette Journal.

I will send a copy of this letter to Howard along with my entries in the Database Summary Table. I believe it would be most efficient for the continuation of the contract here if a no-cost extension was given until June 30, 1994. I expect to deliver most of the data before that date, but extension to that date would allow me to continue to pay for associated expenses as long as possible (for example sample collection and plotting by the GIS lab). If you agree to this extension date, please send me a letter that I can provide to our Grants and Contracts Office. Thanks for your assistance. Please contact me if I can provide any more information.

Sincerely yours,

an

Larry Garside Research Geologist

cc: Howard Ross

encl.



# AGRICULTURE

# Oh, give me a home where 64,000 lobsters roam

## Hot springs: Douglas County farmers seek permission to cultivate crustaceans.

MINDEN — Cows, alfalfa and sheep production may be on the decline in Douglas County but the number of lobsters on the range could reach 64,000 in the next ster's West of Bay Point, is proposcouple of years.

• A California company wants to öpen an experimental lobster farm

on four acres in the Johnson Lane area, making use of natural, geothermal hot springs.

Richard Leudemann, with Lobing to raise about 64,000 lobsters a year in a metal building equipped with two tanks filled with 17.2 million gallons of water.

The lobsters would be hatched using about 100 female lobsters and would grow to size in larger tanks. The grow-out tanks would be heated by geothermal water that would be injected back into the aquifer.

The experiment would last four years and would employ about three people. Live lobsters would be shipped twice a month to local markets.

The advantages to using geothermal water for the operation,

Leudemann wrote in his application, include developing a new use for the resource, promoting aquaculture technology and bringing in economic benefit to the area.

Leudemann and his contractor. Scott Construction Co., will ask the County Commission today for a special use permit to run the lobster farm on the agricultural propertv.

While other kinds of farming are allowed uses in agriculture zones, aquaculture or lobster farming is not listed.

County planner Paul Patterson also says Leudemann has been having trouble acquiring the appropriate lease from the property owner, the Bureau of Land Management.

In an Oct. 1 letter from BLM, the agency said Leudemann has appealed a notice of lease cancellation. which was based on the fact that he didn't meet regulatory requirements for geothermal development.

Leudemann has appealed the decision. It will take several more

months for the process to be completed, state BLM chief Billy Templeton said.

Patterson is recommending approval if Leudemann gets the lease resolved with BLM, gets all permits for raising lobsters for human consumption and makes substantial progress on the project.

He is also asking that Leudemann put in landscaping to screen the farm from an adjacent house and make some road improvements. Associated Press



**JICOL** 

NITU

A daily look at people and events making news in Nevada.

METRO

# Trooper says seatbelt might have saved Fernley High pupil

A Fernley High School student killed Thursday in a traffic accident near Fernley might have survived if she had worn a seat belt, an investigator said.

At about 7:10 a.m., Danielle Beaulac, 17, was thrown from her overturning pickup truck on Interstate 80, three miles east of town.

"If people would just wear their seat belts," Nevada Highway Patrol Trooper Dan Bauer said at the scene. "She would have lived."

She was alone driving west in the small truck. On a curve to the left, the truck went straight and off the highway to the right. It went 114 feet into sagebrush, overturning and hurling Beaulac out. There were no witnesses.

A passing doctor and three nurses stopped to try to save her, but couldn't, Bauer said. "She died while I was there."

## Wildlife concert tonight

There will be a benefit concert today for Animal Ark, a non-profit nature center and wildlife sanctuary, from 7 to 9 p.m. at Truckee Meadows Community College Auditorium.

The concert will feature the Jan Short Trio, a well-known California group that performed at the Nevada State Fair this year playing all types of music including some jazz and county.

Animal Ark cares for wildlife that can't be released in to the wild, including a black bear, falcons, bobcats and wolves. The animals have been injured or orphaned.

Concert tickets are \$5, and are available at the door. Details: The Ark, 969-3111.

## **Craft fair scheduled for today**

The Fourth Annual O'Brien Middle School Holiday Craft Faire has been scheduled from 10 a.m. to 4 p.m. today at 10500 Stead Blvd.

More than 100 crafters invite you to come see their wares. Proceeds from this yearly event support activities like, the RIF program (three free paperbacks for each student), NOVA pharmacy fund, the principal's emergencey fund and a Washoe County dance for disabled adults. Admission-is \$1, for which you will-receive threeraffle tickets. Drawings will be held all day, giving away prizes that include: pizzas, subs, lunches, dinners, hair care, auto care and items donated by the crafters.

Grand prize is a trip for two to Disneyland Knotts Berry Farm, courtesy of Anaheim Holiday Inn and Reno Air.

## **Potluck marks Community Day**

Church Women United of Washoe County will celebrate World Community Day with a potluck lunch today at the Salvation Army, 1925 Sutro St.

All area women are invited to come and bring their favorite dish.

The free event is scheduled to begin at noon and run until about 2 p.m.

### **Adult hike slated Sunday**

For the Love of Hikin' and Bikin' will conduct a hike Sunday along Hunter Creek for adults who enjoy leisurely hiking.

Bring a lunch and water and meet the group at 10 a.m. behind the First Interstate Bank in the

Keystone Square Shopping Center.

For more information call 826-5136.

#### **Donate old winter coats**

Donate your old winter coats through Nov. 14 at Applegate Video, 520 E. Prater Way.

The first 150 contributors will receive one free video rental for each coat or jacket donated.

All of the winter wraps donated will be given to local needy children and adults by the Salvation Army. Details: **688-4550**.

# STATE

#### Lobster farm project hits snag

MINDEN — Don't tie up those bibs or melt the butter just yet — a proposed lobster farm is on hold because the developer failed to follow the county's noticing requirements.

Richard Leudemann of Bay Point, Calif., sent notices of Thursday's public hearing to only three property owners. Planning staffers said 25 property owners are within 1,350 feet of the 280-acre lobster farm-site and all-must be notified. -------

And Chief Deputy District Attorney Robert Storey told county commissioners Leudemann doesn't have a valid lease for the Bureau of Land Management land or a hot springs that would be used to warm lobster-growing ponds.

Without a lease or a letter of intent from the BLM, Storey said the county can't issue a permit. Storey agreed to talk with BLM and, once the noticing requirement is met, reschedule a public hearing on the project.

Leudemann got approval for the lobster farm in 1988 but the permit expired, and now he is seeking a new approval to grow 64,000 three-quarterpound lobsters a year on the experimental site.

#### **POLICE BLOTTER**

# **SPARKS**

Nov. 4

ADA BRIFFI

Glendale Avenue, 700 block, Wednesday to Thursday — commercial burglary. Glendale Avenue, 600 block, Wednesday to Thursday — commercial burglary. O'Callaghan Drive, 1100 block, 9 a.m. to 3 p.m. bicycle theft.

# RENO

Nov. 5

Idlewild Drive, 2800 block, Monday to Thursday — hospital burglary. Rainna Court, 1:50 a.m. — burglary and gross lewdness.

#### Nov. 4

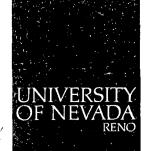
East Second Street, 10 block, 5:02 p.m. — larceny not amounting to robbery.

North Arlington Avenue, 200 block — burglary. South Virginia Street, 1900 block, 10:30 a.m. grand larceny.

West Taylor Street, 100 block, Wednesday to Thursday — residential burglary.

#### WASHOE COUNTY JAIL

- Inmate population Friday morning: 742
- Capacity: 559
- Bookings previous 24 hours: 58



### NÉVADA BUREAU OF MINES AND GEOLOGY

#### MEMORANDUM

DATE: September 3, 1993

FROM: Larry Garside Xany

TO: Paul Lineau Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601

SUBJECT: Quarterly Progress Report, Nevada Low-Temperature Geothermal Resources

The contract between OIT and the University of Nevada was signed on March 23, 1993, and a quarterly letter report was provided on June 11, 1993. I have briefly summarized the progress to date below. Please contact me if you have further questions. The meeting in July in Salt Lake City was very useful to me, and I now have a much better idea of what is planned for the program, what is expected of the State Teams, and what other State Teams are doing.

- GEOTHERM As I reported in June, we have been able to 1. extract the Nevada data and convert it to a format that we can use in dBASE and similar database management systems (PC-FILE). I still have the original tape that UURI supplied, which serves as a backup. I can supply the tape to other State Teams if they need it. I have put the data from GEOTHERM that we all decided was necessary to the program (essentially the columns in Bob Blackett's tables) into Quattro Pro spreadsheets (sample pages enclosed). This data consists of 1368 records for Nevada. Many of these are duplicates, have only temperature data, or have incomplete or otherwise bad analytical data. I have started to filter these out using various methods, including an ion balance calculation, a TDS calculation, and a comparison of Na vs. K and Ca vs. Mg values.
- 2. WATSTORE A preliminary search of this database indicates that there are over 900 records for Nevada springs or wells having temperatures greater than 10 °C above mean annual air temperature. We have obtained a CD-ROM from Earthinfo Inc. of the WATSTORE database, and can thus search it as much as necessary "until we get it right". We are in the process of preparing an output file of the pertinent parameters for these 900 or so records in a suitable database/spreadsheet format.

- 3. USGS Circular 892 data I received Marshal Reed's letter and diskette with the data from the tables in his report. I have converted it to a spreadsheet to match the anticipated final ones for the project. I still need to compare the records from this with the original GEOTHERM data they were taken from.
- 4. Other new geothermal data I have added data to the final spreadsheet format from several new reference sources, including a study of the Moana area (Jacobson and Johnson) and the Great Basin geothermal fluid genesis study by Flynn and Buchanan.
- 5. Bibliography The status of the bibliography is about the same as last quarter. It is in digital format (WordPerfect) that includes all references used in NBMG Bulletin 91 plus those additional references in GEOTHERM (listed in the USGS Open-File Report 83-433A), as well as references cited in recent publications on Moana, Beowawe, and the The search for other new references is continuing.
- 6. Geothermal location data The program to identify and digitize every Nevada thermal spring shown on the 1:24,000scale topographic maps is about 80% complete. It appears that this topographic map search has identified at least some thermal springs that are not in the available databases or are incorrectly located. Additionally, we will be able to provide good locations instead of the imprecise ones in GEOTHERM.

7. Timeframe - It seems likely that I will need an extension on the contract to complete all of the tasks. I plan to sample springs in the late fall, but first I need a better idea of what ones are lacking analyses. I should have a better idea of how much more time will be required in a couple of months. Please contact me if you see a problem with this.

P.S. For your information, I have enclosed a copy of a newspaper clipping about the new geothermal vegetable-drying plant under construction in the San Emidio Desert area southwest of Gerlach.

cc: Howard Ross, UURI

C: \ QPRO \ QDATA \ NOHOUSES, WQI

GRECO TDSc TDSm рH Na Κ Ca Mg Fe SiO2 Cl В F HCO3 CO3 SO4 delD delO1 cation/anion Test GRECO TDSc TDSm pН Na K Ca Mg Fe SiO2 Cl В F HCO3 CO3 SO4 delD delO1 cation/anion Test 4402 293 7.56 1450 120 110 6.5 < 0.02 85 2400 8.7 197 120 -125.5 -14.01 0.98 OK 4.6 <1 295 3001 7.30 1350 100 < 0.02 110 7 72 1150 8.4 4.6 213 <1 94 1.76 OK 577 707 8.00 180 8.7 8.4 < 0.1 < 0.02 0.97 OK 160 48 2.9 7.1 143 2 220 -125.3 -15.26 579 1063 7.10 330 23 14 0.4 0.08 150 7.5 12 497 120 -129.2 -14.48 0.99 OK 160 1 585 1173 7.30 300 31 75 37 105 27 7.2 1135 32 1.01 OK 587 561 8.50 135 < 0.02 8.9 1 0.03 210 23 224 -130.1 -16.09 0.93 OK 0.2 17.7 15 40 589 1254 250 9.40 38 1.3 0.2 < 0.02 500 70 2.5 < 0.05 667 -113.6 -11.07 0.84 OK 64 1990 6,50 591 540 80 95 0.2 26 150 770 3.8 5.7 545 51 -130 -15.5 1.01 OK 593 589 7.40 160 13 8.8 < 0.02 0.5 135 29 1.2 7.8 368 53 -128.6 -15.7 0.93 OK 595 733 8.40 200 18 16 0.9 0.18 125 41 2.6 385 -15.74 0.97 OK 140 -131.4 735 597 7.10 180 20 36 4.4 0.08 110 40 1.9 7.8 375 150 -129.5 -15.58 0.97 OK 599 4256 42 108 7.57 1480 1.7 1.05 OK 170 2200 15 5 90 <1 190 -110.2 -12.36 242 603 9.00 242 ERR NO 1738 605 7.90 653 71 865 49 100 1.14 NO 607 1106 8.50 277 15 38 0.2 115 46 580 -131.5 -16.01 0.99 OK 70 1617 609 7.40 450 26 44 0.6 < 0.02 180 380 2.4 7.9 114 <1 470 -125.8 -13.21 0.99 OK 558 611 7.70 170 8.4 0.06 < 0.02 4.8 110 22 0.66 8.9 256 5 102 -130.4 -16.68 1.04 OK 270 613 9.10 81 1 0.2 < 0.1 0.03 57 15 0.91 0.96 OK 1.7 116 11 45 -124.3 -15.3 312 615 9.20 88 1.7 < 0.1 3 85 10 127 62 -127.1 -16.17 1.10 OK 617 506 8.90 150 4.3 1.8 <0.1 <0.02 85 8 277 -128 -16.29 0.86 OK 21 1 17 82 261 619 8.60 74 1.1 3.1 < 0.1 < 0.02 63 18 0.64 12 92 3 41 -129.9 -16.56 0.94 OK 621 616 7.90 180 4.5 4.8 0.1 < 0.02 105 59 10 261 2 -128.8 -15.93 0.91 OK 1.8 120 3215 623 8.10 1500 20 35 4 120 787 932 -122.2 -13.02 1.56 OK 290 625 997 7.90 340 17 31 4.2 0.13 82 240 7 1.9 464 45 -120.7 -14.72 1.09 OK 627 1264 8,40 463 9.3 25 0.2 85 520 -124.5 -14.4 154 86 1.14 OK 284 629 9.10 75 2.2 1.6 < 0.01 83 15 0.47 8.9 108 45 -139 -17.61 0.94 OK 631 631 7.20 120 39 60 15.5 <0.02 65 16 0.7 488 72 -144.7 -15.31 1.9 1 1.04 OK 435 633 7.60 45 60 15 70 16 12 335 52 -132.7 -16.64 0.95 OK 635 1224 7.00 390 41 49 13 84 40 0.77 18 -134.9 -16.78 1.01 OK 7.2 1180 637 910 6.60 230 58 53 35 < 0.02 67 1 2.1 7 -136.1 -15.97 915 1.10 NO 6.6 <1 639 403 6.50 44 14 56 12 < 0.02 68 12 0.12 2.5 264 <1 64 -129.8 -16.87 0.99 OK 777 641 6.50 200 36 43 0.06 77 2.6 9.4 22 4.7 673 51 -135.8 -16.01 0.97 OK 643 -928 -8:00 -288-33 -29 -5 -80 28 823 60 0.98 OK 645 961 4.9 6.50 250 34 45 0.05 80 29 2.3 4.8 814 110 -131.6 -15.85 0.86 OK 647 900 8.00 296 36 10 8 -134.6 -16.44 55 26 881 36 0.94 OK 649 547 6.50 130 22 33 6.8 0.22 18 66 1.1 1.8 429 1 56 -125.5 -15.65 0.95 OK 987 22 651 8.10 165 26 110 65 75 312 370 -130 -16.24 1.01 OK 635 -653 8.60 0.02 < 0.02 190 6.5 -3.6 115 126 0.89 16 111 111 -126.1 -15.89 11 0.97 OK 655 3892 8.40 1100 160 260 0.1 < 0.02 110 1900 -6.33 6.1 3 26 340 -106.5 1.06 OK 657 535 8.70 145 10 0.01 < 0.02 3.6 58 44 1.2 4.9 50 9 235 -119.5 -15.55 0.92 OK 384 659 8.70 102 2.5 4.5 0.01 0.06 52 17 0.19 3.1 54 7 169 -123.2 -16.01 0.90 OK

35,93

GRECORD	NAME	COUNT	Т		SEC	QSECTIONS		LONGITUDE	TYPE	TEMP	FLOW DEP	TH H2S	REFERENCE
GRECORD	NAME	COUNT	т	R	SEC	OSECTIONS	LATITUDE	LONGITUDE	TYPE	TEMP	FLOW DEP	TH H2S	REFERENCE
293	COLADO WELL NO. 1	PE	28N	32E	33	SE	40-14.7 N	119-23.1 W	w	60	•	1.	*MARINER, R., USGS, MENLO PARK
295	COLADO WELL NO. 2	PE	28N	32E	33	NW SE	40-14.7 N	119-23.1 W	w	61		1.	*MARINER, R., USGS, MENLO PARK
577	BALTAZAR HOT SPRINGS	HU	46N	28E	13	NE SE NW	41-55.21 N	118-42.52 W	S	80	100		MARINER AND OTHERS, 1974B, 1975
. 579	EAST PINTO HOT SPRING	HU	40N	28E	17	NE SE SE	41-21. N	118-47. W	S	93	500		MARINER AND OTHERS, 19748, 1975
585	UNNAMED HOT SPRING NEAR WELLS	EL	38N	62E	17	SE NW NE		114-59.37 W	, s	61			MARINER AND OTHERS, 1974B
587	SULPHUR HOT SPRINGS (HOT SULPHUR SPRINGS)	EL	31N	59E		NE NW		115-17.08 W	S	93	75		MARINER AND OTHERS, 1974B, 1975
589	BEOWAWE STEAM WELL	EU	31N	48E		NW		116-35.00 W	Ŵ				MARINER AND OTHERS, 1974B, 1975
591	KYLE HOT SPRINGS	PE	29N	36E		SW		117-52.87 W	S	77 ·	20		MARINER AND OTHERS, 1974B, 1975
593	LEACH HOT SPRINGS	PE	32N			SE		117-38.74 W	s	92	200		MARINER AND OTHERS, 1974B, 1975
595	UNNAMED HOT SPRING	нU	33N			SE		117-29.53 W	s	85	100		MARINER AND OTHERS, 1974B, 1975
597	JERSEY VALLEY AREA - UNNAMED HOT SPRING	PE		40E		SW		117-29.40 W	S	29	20		MARINER AND OTHERS, 1974B, 1975
599	FLOWING WELL IN STILLWATER	CH	19N			sw		118-33,13 W	w	96	20		MARINER AND OTHERS, 1974B, 1975
603	BRADY HOT SPRINGS	CH		26E		NE NE SW			S				OLMSTEAD AND OTHERS, 1975
605	STEAMBOAT SPRINGS - SPRING 8	WA	22N	205	12	NE NE SW		119-01.01 W		98			•
								119-45.00 W	s	89.2			*WHITE, D., USGS, MENLO PARK
607	WABUSKA HOT SPRINGS	LY		25E		SE		119-10.96 W	S	97	400		MARINER AND OTHERS, 1974B, 1975
609	LEE HOT SPRINGS	СН	16N			SWNW		118-43.39 W	S	88	128		MARINER AND OTHERS, 1974B, 1975
611	UNNAMED HOT SPRING	LA	17N					117-33.5 W	S	86	75		MARINER AND OTHERS, 1974B, 1975
613	BOG HOT SPRINGS	HU	46N			SW NE NW		118-48.30 W	. w	54	4000		MARINER AND OTHERS, 1974B, 1975
615	HOWARD HOT SPRINGS	HU		31E		SE NE NE		118-30.20 W	S	56			MARINER AND OTHERS, 1974B, 1975
617	DYKE HOT SPRINGS	HU	43N			SE SE		118-33.95 W	S	66	, 100		MARINER AND OTHERS, 1974B, 1975
619	SOLDIERS MEADOW AREA - UNNAMED HOT SPRING	HU	40N					119-13.08 W	S	54	50		MARINER AND OTHERS, 1974B, 1975
621	DOUBLE HOT SPRING	HU	36N	26E	04	NW SE NW		119-01.55 W	S	80	175		MARINER AND OTHERS, 1974B, 1975
623	BLACK ROCK POINT AREA - UNNAMED HOT SPRING	PE					40-57. N	118-58. W	S	90			MARINER AND OTHERS, 1974B, 1975
625	FLY RANCH (WARDS HOT SPRING) - WELL	WA	34N	23E	02		40·51.8 N	119-20.5 W	w	80	500		MARINER AND OTHERS, 1974B, 1975
627	BUTTE SPRINGS (TREGO)	PE					40-46. N	119-07. W	S	86			MARINER AND OTHERS, 19748, 1975
629	MINERAL HOT SPRINGS	EL		64E				114-43.76 W	S	60			MARINER AND OTHERS, 1974B, 1975
631	HOT HOLE (ELKO HOT SPRINGS)	EL		55E	-	NE		115-46.53 W	S	56	.75		MARINER AND OTHERS, 1974B, 1975
633	UNNAMED SPRINGS NEAR CARLIN	EL		52E		SE SW		116-08, W	S	79			MARINER AND OTHERS, 19748, 1975
635	HOT SULPHUR SPRINGS	EL		52E		NE		116-08.88 W	S	90			MARINER AND OTHERS, 1974B, 1975
637	HOT SPRINGS POINT	EU		48E		NE NE		116-31.00 W	S	54	125		MARINER AND OTHERS, 1974B, 1975
639	WALTI HOT SPRINGS	EU		48E		SW		116-35.22 W	S	72	300		MARINER AND OTHERS, 1974B, 1975
641	SPENCER HOT SPRINGS	LA		45E		NE NE		116-51.4 W	S	72	50		MARINER AND OTHERS, 19748, 1975
643	HOT POT SPRING	HU	35N		10	NE NE SE		117-06.60 W	S	58			MARINER AND OTHERS, 19748, 1975
645	BUFFALO VALLEY HOT SPRINGS	LA	29N			SE		117-19.53 W	S	49	10		MARINER AND OTHERS, 1974B, 1975
647	THE HOT SPRING	HU	41N			NE NE		117-23.2 W	S	58			MARINER AND OTHERS, 1974B, 1975
649	UNNAMED HOT SPRING NEAR GOLCONDA	HU	36N			SW SW SE		117-29.63 W	S	74	750		MARINER AND OTHERS, 1974B, 1975
651	SOU HOT SPRINGS (GILBERTS HOT SPRINGS)	PE	26N	38E		SE		117-43.48 W	S	73			MARINER AND OTHERS, 1974B, 1975
653	DIXIE HOT SPRINGS	СН	22N	35E	05	SE		118-04.04 W	S	72	200		MARINER AND OTHERS, 1974B, 1975
655	PYRAMID LAKE (THE NEEDLES)	WA						119-40.49 W	S	56			MARINER AND OTHERS, 1974B, 1975
657	WALLEYS HOT SPRINGS (GENOA HOT SPRINGS)	DG		19E		SW NW NE		119-49.95 W	· S	61	75		MARINER AND OTHERS, 1974B, 1975
659	NEVADA HOT SPRINGS	LY	12N		16	SE	38-53.97 N	119-24.70 W	S	61	200		MARINER AND OTHERS, 1974B, 1975
663	WARM SPRINGS AREA - UNNAMED WARM SPRING	NY	04N	50E		SW		116-22.48 W	S	61			MARINER AND OTHERS, 1974B, 1975
665	BARTHOLOMAE HOT SPRINGS	EU	18N	50E	28	SE	39-24.32 N	116-20.78 W	S	54			MARINER AND OTHERS, 1974B, 1975
788	BEOWAWE - MAIN GEYSER	EU	31N	48E	17	N 1/2	40-33.5 N	116-35. W	S				*OESTERLING, W.A., 1959
789	DIANA'S PUNCH BOWL	NY	14N	47E	22	SE	39-01.7 N	116-40.0 W	<u>S</u>	59			MARINER AND OTHERS, 1974B, 1975-
790-	-BEOWAWE HOT SPRING	EU	31N	48E	08	SE	40-34. N	116-34. W	S	98	100		MARINER AND OTHERS, 1974B, 1975
791	WABUSKA HOT SPRINGS	LY	15N	25E	16	SE	39-09.6 N	119-11.0 W	S	97			MARINER AND OTHERS, 1974B, 1975
792	UNNAMED HOT SPRING NEAR FERNLEY	LY		26E		SW	39-36.0 N		S	86			MARINER AND OTHERS, 1975
793	SODAVILLE SPRINGS, SODA SPRINGS	MN	06N	35E	29	SE	38-20,5 N	118-06.1 W	S	35	100		MARINER AND OTHERS, 1974B, 1975
794	POTT'S RANCH HOT SPRING	NY		47E		NE	39-04.7 N	116-38.4 W	S	45	125		MARINER AND OTHERS, 1974B, 1975
795	HOT SPRING NEAR DIANA'S PUNCH BOWL	NY	14N	47E	22	SE		116-40.0 W	S	51	200		MARINER AND OTHERS, 1974B, 1975
796	UNNAMED HOT SPRING NEAR TREGO	PE						-=119-07 <del>:</del> =W	S	84:5	150	1.0	MARINER AND OTHERS, 1976A
797	UNNAMED HOT SPRING (VALLEY OF THE MOON)	LA		43E		NE		117-06.05 W	S	53			MARINER AND OTHERS, 19748, 1975
798	UNNAMED HOT SPRING NEAR GREAT BOILING SPRING	WA	32N			SW NW		11 <del>9</del> -22. W	S	89.5	100	0.5	MARINER AND OTHERS, 1976A
799	SAN EMIDIO SPRING	WA	28N	23E	31	NE	40-15.4 N	119-26.1 W	S	15			MARINER AND OTHERS, 1976A

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# Empire getting a dehydration plant

Integrated Ingredients, part of international food manufacturer Burns Philp, is building an onion and garlic dehydration plant in Empire, to be completed by November.

The facility will open with about 25 jobs, possibly growing to about 65 jobs after 18 months, said Robert Shriver of the Economic Development Authority of Western Nevada.

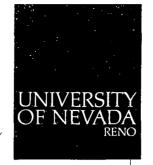
Empire is located about three miles south of Gerlach on state

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highway 447 in Washoe County. The state-of-the-art plant will feature processing and year-round storage of dehydrated onion and carlic products.

Burns Philp is known in the food industry under Integrated Ingredients' brands such as Spice Islands, Durkee-French, Fleischmann's, Dromedary and Blue Ribbon Spice.

Spice Islands operates an herb and spice plant in Sparks on Purina Way.



6/16/93

A1-10-

#### NEVADA BUREAU OF MINES AND GEOLOGY

#### MEMORANDUM

DATE: June 11, 1993

فليعط سيبهم

FROM: Larry Garside

TO: Paul Lineau Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601

SUBJECT: Quarterly Progress Report, Nevada Low-Temperature Geothermal Resources

The contract between OIT and the University of Nevada was signed on March 23, 1993. I have summarized the progress to date below. Please contact me if you have further questions. I anticipate that all the State Teams will have a better understanding of the anticipated final products for the project after our proposed meeting in July in Salt Lake City.

- 1. GEOTHERM We have been able to extract the Nevada data and convert it to a format that we can use in dBASE and similar database management systems. I still have the original tape that UURI supplied, which serves as a sort of backup. I can supply the tape to other State Teams if they need it. I have given Les Youngs (California Division of Mines and Geology) a dBASE-format file for California as well. Most of the GEOTHERM records were entered from data-entry forms that I filled out in the late 1970's, and which was eventually published in the table of Nevada Bureau of Mines and Geology Bulletin 91, "Thermal Waters of Nevada". I have already observed that duplicate or near duplicate records are a problem, as are very old analyses. The coordinate location data (longitudelatitude) are also usually not very accurate (but see discission below on geothermal location data). I know some obvious errors in early versions of GEOTHERM were noted and corrected, but I am sure there are many more. However, errors can and will occur whenever data is entered.
- 2. WATSTORE/NAWDEX This database has a lot of water quality information in it, and I believe a number of State Teams are using it as a first or second source of data. NAWDEX (National Water Data Exchange) has data from agencies other than the U.S. Geological Survey (which has the WATSTORE database). We have received digital data and a paper copy of a preliminary search of NAWDEX, and I can search it with a word processor

for names, Township and Range numbers, etc. I have a program and other information from Bob Blackett (Utah) concerning the conversion of this data to a dBASE format, but haven't proceeded further as yet. I will need to communicate further with Bob, and I hope to have some discussion with other State Teams about conversion methods and final database/spreadsheet output.

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- 3. Database At present GEOTHERM is in a rather archaic database management system called INFO (part of the ARCINFO GIS package), but we have put the Nevada portion out to PC File, which is a shareware product of ButtonWare. PC File produces a .dbf file compatible with dBASE and other database programs. I use Quattro Pro to a limited extent, but haven't yet tried to get any of the geochemical data into it. Our plan at present is to produce the final databases and spreadsheet from several digital sources which we are presently collecting data in. I expect that our final product for the contract will only have the best record or few best records for each geothermal site. The location information and some other data on geothermal sites (GEOTHERM record number, for example) will ARCINFO, because we are digitizing spring locations from 1:24,000-scale topographic maps into ARCINFO.
- 4. Chemistry Spreadsheet The water quality data for this product will come from a variety of sources, including pre-existing databases. I anticipate that the final product will have only the "best" and(or) most complete one or two analyses for each geothermal area. All other incomplete or incorrect analyses will remain in the original source databases at NBMG. I have a copy of Bob Blackett's Pascal program for checking the ion balance, but we haven't tried to apply it to any of our data yet. Other than ion balance, I would like to hear how other State Teams are selecting "best" analyses. Perhaps we can also agree on what elements/ions we want in the final spreadsheet. If someone has written Lotus/Quattro Pro formulas for the geothermometer calculations, I would like these as well. I hope that we can have some discussion on the application of these geothermometers at out July meeting.
- 5. Bibliography I have a bibliography in digital format (WordPerfect) that includes all references used in NBMG Bulletin 91 plus those additional references in GEOTHERM (listed in the USGS Open-File Report 83-433A. A search of GEOREF has produced quite a number more, but these haven't been checked or integrated into the overall list as yet. I intend to put together a complete bibliography of Nevada geothermal references, which can then be used, if necessary, to make a list of references for a abbreviated citation list by promising resource areas. The complete bibliography could eventually be an open-file report here at NBMG.
- 4. Collocation In early April, I provided Howard Ross with a preliminary list of "population centers" that are collocated

with geothermal resources. I made this list from existing data and personal and local knowledge. It includes some really small towns, but I didn't consider things like mines or other manufacturing sites which might have a use for low-temperature geothermal fluids. Our GIS lab will have to compare the U.S. Census TIGER files of the 1990 census with digital location data on hot springs and wells before we have a good handle on collocation. We have tried this on a preliminary data set for Clark County.

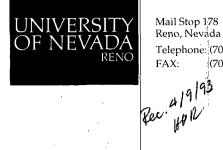
5. Geothermal location data - We have in progress a program to identify and digitize every Nevada thermal spring shown on the 1:24, 000-scale topographic maps. As part of this, we will digitize individual spring locations as well as a central generalized point. I hope this topographic map search will identify thermal springs that are not in the available databases. Additionally, we will be able to provide good locations instead of the imprecise ones in GEOTHERM. When possible, we identify the digitized spring site with the GEOTHERM ID number. We have examined about 45% of the 1:24,000-scale maps to date. Another source of location data is the well files of the Nevada State Engineer's Office. We have a print-out of geothermal wells from them, but the list is apparently mostly high-temperature Industrial and Commercial- Class wells. Computerization of their files is apparently underway, and they may be available for a selective search.

Sincerely yours,

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Larry Garside Research Geologist

cc: Howard Ross, UURI



why had my list

#### NEVADA BUREAU OF MINES AND GEOLOGY

April 7, 1993

Howard P. Ross Project Manager University of Utah Research Institute 391 Chipeta Way, Suite C Salt Lake City, UT 84108-1295

Dear Howard:

I will try to respond to your questions and comments in your recent letter. Please note that the mail address label that you used is incorrect; I suspect that it was only delivered to me because of the zip code.

The contract between UNR and OIT was signed some time in March, and our Grants and Contracts Office set up the account on March 21, 1993. We have made a fair amount of progress on some fronts in the last month or two. Thanks for the suggestions on the database recommendations. I have a sample of Bob Blackett's Lotus file for Utah, and we plan to produce something similar. We will create a more complex database or series of databases for our own use and then will extract the simplified database for OIT and UURI. Please keep me informed of any changes in requirements for fields in the database, as it is much better to set up all needed fields at the start.

Thanks for sending the GEOTHERM tape to us. We have been able to extract the Nevada data and convert it to a format that we can use in dBASE and similar database management systems. Please inform me if you need the tape back. I am pretty familiar with this data, because it was entered in GEOTHERM mainly from the table in my Nevada Bureau of Mines and Geology Bulletin on "Thermal Waters of Nevada" (Bulletin 91). We have not checked much of this data yet for accuracy. I also have requested a preliminary search of the USGS WATSTORE database (via NAWDEX), and this should provide up-to-date spring and well data as well as checks on the GEOTHERM data.

I have a bibliography in digital format (WordPerfect) that includes all references used in NBMG Bulletin 91 plus those additional references in GEOTHERM (listed in the USGS Open-File Report 83-433A. A search of GEOREF has produced quite a number more, but these haven't been checked or integrated into the overall list as yet. I intend to put together a complete bibliography of Nevada geothermal references, which can then be used, if necessary, to make a list of references for a abbreviated citation list by promising resource areas. I assume that the collocation study will be a major factor in the identification and prioritization of promising resource areas.

At the present stage of the Nevada study, I think the only new or significant information developed would be the enclosed preliminary list I have made of "population centers" that are collocated with geothermal resources. I made this list from existing data and personal and local knowledge. Our GIS lab will have to compare the TIGER files of the 1990 census with digital location data on hot springs and wells before we have a good handle on collocation. At present, digital location data for geothermal resources in Nevada consists of the GEOTHERM locations, and a separate digital file of the geothermal resources map. We have just begun to digitize all warm springs and wells shown on the 1:24,000-scale topographic maps for Nevada (this scale of mapping is complete for the state).

The only other item of interest I have is that a mining company has recently encountered very hot ground water at shallow depth in a valley in Nevada. I do not have the location of this discovery yet, but I am told that there are no nearby warm springs known. If this discovery is confirmed, it indicates that there is a high potential for the discovery of more Nevada geothermal resources which have no known surface manifestation.

Sincerely yours,

Larry Garside Research Geologist

LJG/hs

#### Nevada Geothermal Collocation - Preliminary List

#### Larry J. Garside - March 1993

The towns, cities, urbanized areas, and other population centers listed below as being collocated with geothermal waters were compiled by use of NBMG Bulletin 91, the NOAA 1:500,000 geothermal map of Nevada, the most recent Nevada State Highway map, and a variety of unpublished data and local knowledge. The localities are only in a very general north-to south order. The list is not complete, and is certain to have errors.

1. Gerlach

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- 2. Denio/Denio Junction Continental Hot Springs; possibly 6 mi from Denio proper.
- 3. Pyramid 5 mi. to the Needles; Pyramid Lake Indian Reservation.
- 4. Warm Springs Valley, northwest of Reno.\*
- 5. Verdi < 5 mi. to Lawton's Hot Springs; also Mogul and west Reno urbanized area.
- 6. Flanigan (west Honey Lake Valley) Fish Spring is 73°F; low population density.\*
- 7. Sutcliff 5 mi from Anaho Island spring (wildlife reserve) across Pyramid Lake.
- 8. Reno\Moana arèa
- 9. Steamboat, NV urbanized area nearby including Pleasant Valley, Mount Rose Highway, etc.
- 10. Washoe City equidistant from Steamboat Springs and Bowers Mansion Spring (state park).
- 11. New Washoe City east of Washoe Lake; Bowers Mansion Spring and warm well (CWRR data).
- 12. Virginia City hot water at depth in old mine workings; 5 mi to warm wells in Carson Plains to east near Dayton.
- 13. Dayton/Stagecoach warm wells located between these two areas.
- 14. Silver Springs 27°C spring nearby.
- 15. Carson City Carson Hot Springs
- 16. New Empire, etc. east of Carson; Pinyon Hills area.
- 17. Jacks Valley/north Carson Valley/Johnson Lane Saratoga and Hobo Hot Springs.\*
- 18. Crystal Bay Brockway Hot Springs, CA.
- 19 Minden/Gardnerville/Genoa Walleys Hot Springs
- 20. Wellington warm wells
- 21. Wabuska Wabuska Hot Springs; sparsely populated area in north Mason Valley, but Yerington is ~12 mi away.\*
- 22. Hawthorne
- 23. Hazen
- 24. Fallon Soda Lake and Naval Air Station thermal areas.
- 25. Stillwater
- 26. Lovelock/Colado
- 27. McDermitt thermal wells; Indian Reservation.
- 28. Winnemucca 93°F spring, 73°F wells.

29. West Winnemucca - spring at northwest end of East Range, new State prison, potato growing/storage. 30. Paradise Valley - about 10 mi to 135 °F spring. 31. Golconda 32. Battle Mountain - 75 °F spring < 5 mi. Wildhorse - hot spring; only a few homes; cold winters. 34. Mountain City - "warm" spring 35. Crescent Valley - nearby Hot Point Spring. 36. Hadley - < 5 mi from Darroughs Hot Springs; nearby Round Mountain Mine uses geothermal. 37. Contact 38. Wells 39. Warm Springs "siding" north of Ely - is this the second OIT listing? Probably very low population. 40. Sunnyside - any population? 41. Preston/Lund - 70-72 °F. 42. Ely - Lacawana Hot Springs. 43. Warm Springs, Nye County - zero population. 44. Gabbs 45. Duckwater - Indian Reservation; catfish raising. 46. Basalt (Montgomery Pass) - 113 °F well (CWRR data). 47. Mina - < 5 mi from Sodaville. 48. Silver Peak 49. Scotties Junction - few houses? Warm well (72 °F). 50. Tonopah -deep mine workings have lots of hot water. 51. Pahrump - mid- 70's °F water. 52. Beatty 53. Mercury - 84 °F wells at junction with highway; Nevada Test Site Facility. 54. Indian Springs - 79 °F spring; USAF facility; nearby? State prison. 55. Las Vegas - shallow wells have > 75 °F water; resulting from subsurface discharge of 137 °F + water from carbonate aquifer at 5,000 ft. depth. 56. Henderson - adjacent to Las Vegas area wells. 57. Boulder City - Black Canyon Hot Springs (Lake Mead National Recreation Area). 58. Nelson - 81 °F well (CWRR data). 59. Cal Nev Ari - 87 °F well. 60. Laughlin - 81 °F well (CWRR data). 61. Moapa - Springs; Indian Reservation. 62. Logandale/Overton - 70 °F spring, 75 °F well. 63. Mesquite - 70-73 °F wells. 64. Hiko/Ash Springs/Alamo - warm springs and wells. 65. Caliente 66. Panaca

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November 23, 1992

Mr. Paul J. Lienau Geo-Heat Center Oregon Institute of Technology 3201 Campus Drive Klamath Falls, OR 97601

Dear Paul:

Enclosed please find a letter from Larry Garside, Research Geologist, Nevada Bureau of Mines and Geology, with supporting budget, audit, and resume information for the Nevada Low Temperature subcontract. Larry will be the Principal Investigator for this subcontract. This completes our state teams for the Phase I of this DOE program.

If you have any questions regarding this subcontract please feel free to contact Larry Garside directly, or call me if I can help.

Sincerely,

Howard P. Ross Project Manager

HR/mt Enclosures



October 21, 1992

Dr. Larry J. Garisde University of Nevada Nevada Bureau of Mines & Geology Reno, NV 89557-0088

Dear Larry:

A proposed Statement of Work for participation by your organization in the Department of Energy-Geothermal Division's Low Temperature Geothermal Resources and Technology Transfer Program, was mailed to you on September 28. The funding amount which has been designated for your organization is \$55,000 as indicated in Section 6.0 FUNDING.

The proposed Statement of Work is written as an addendum to the OIT Standard Contract Agreement. Upon reaching agreement with the proposed SOW, I will submit the SOW, with any acceptable revisions, to OIT who will initiate the funding process. We have tried to keep the work tasks and deliverable requirements relatively simple, to give the State Teams flexibility in meeting deliverables within the funding available. DOE hopes that additional funding may be available to your effort as a State or Organization cost share, in cost or in kind. The cost share does not have to be specified in your budget.

To expedite the funding process, please prepare a budget and submit it to me for review and forwarding to OIT. The budget should address the available funding amount, and include a detailed breakdown of costs, including salaries and wages by categories, indirect and G & A rates, travel (including estimated mileage, per diem, lodging and conference costs, and probable destinations), supplies, computer costs, reporting, and other costs. Brief resumes (degrees, years of experience, etc) will be required to support the salary schedule, and a reference to indicate organization overhead rates. Budget information will be reviewed by Bob Crowton, EG&G, Idaho, who is the Subcontract Administrator for the OIT-GHC contract. Bob will be glad to respond to questions regarding budget details - his telephone number is (208)-526-7746. Enclosed is a copy of a FAX sent to me by Bob Crowton which indicates the level of detail required for subcontract budgets.

Please call me at (801)-524-3444 with any questions you may have regarding this letter or the enclosures. I look forward to your participation in this DOE-GD program.

Sincerely,

Howard Ross

Howard P. Ross Project Manager

encl.

P.1/2

EG&G Idaho, Inc.		FTS	CONNÈRCIAL
1955 Fremont Avenue			
P. 0. Box 1625	Ricoh 1000L		208-526-7743
Idaho Falls, ID 83415-2082	Ricoh 4000L	583-7744	208-526-7744
Procurement	Confirm	583-7746	208-526-7746
North Holmes Complex 3			•

# TELECOPIER TRANSMITTAL REQUEST

Apr	i1	28,	1992
		Date	3

<u>Dr. Howard Ross</u> To	University of Utah - UURI Organization/Location FAX No. (801) 524-3453	
Bob Crowton From	EG&G Idaho Subcontracts Organization/Location	
Total Pages Excluding Cover Page <u>Each</u>		; ; ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

Dr. Ross,

Attached is a copy of the level of detail EG&G Idaho requires in our solicitations. As we discussed, we would also like to see:

- A current copy of the agencies negotiation agreement that addresses indirect rates.
- \* A copy of the agencies official (typed and formal) travel policy (We would also need to see a very detailed estimate of the point of departure and destination, number of travellers, number of days duration, etc.)

 Resumes of the proposed performers to address education and experience

If you have any questions or concerns (or if there are any questions from your prospective offerers) please call me on (208) 526-7746.

THE PROCUREMENT GROUP OF EG&G IDAHO, INC. HAS UNATTENDED FACSIMILE SERVICE. <u>PLEASE CALL ADDRESSEE</u> WHEN YOU ARE SENDING A MESSAGE, AND FOR CONFIRMATION OF RECEIPT OF FACSIMILE MESSAGES. 2.

EG&G Idaho, is a wholly-owned subsidiary of EG&G, Inc., but was organized for the sole purpose of functioning as a Management and Operating (M&O) contractor for the Department of Energy Field Office, Idaho (DOE-ID). EG&G Idaho is not allowed to submit bids in response to non-DOE-ID requests for competitive proposals/bids or quotes. EG&G Idaho is not permitted to divulge to other EG&G affiliates proprietary information received from those submitting proposals in response to EG&G Idaho's request for proposals/bids or quotes.

Those proposers who are unwilling or fail to provide detailed pricing data to EG&G Idaho for negotiation purposes and determining cost or price reasonableness (see FAR 15.804) or who restrict access to audit information needed by EG&G Idaho for review, evaluation, and negotiation may have their proposals/bids or quotations deemed to be nonresponsive.

3. <u>COST PROPOSALS</u> must include the following information:

- a. The hourly direct labor rate and proposed hours for each person or labor category that will be performing work under the subcontract.
- b. Total proposed direct labor cost.
- c. Fringe benefit rate.
- d. Overhead rate
- e. G&A rate.
- f. Travel costs (reimbursable in accordance with FAR 31.205-46 and the GSA Federal Travel Register or official agency travel policy).
- g. Material and any other miscellaneous costs (itemize).
- h. Total estimated cost.
- i. Please also include the following information with your cost proposal:
  - 1) State whether your company has been audited by the Defense Contract Audit Agency or by another U. S. Government audit agency.
  - 2) The name and address of the agency which performed the audit and approved your accounting system.
  - 3) The name and telephone number of the auditor who performed the audit.

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#### EXAMPLE BUDGET FORMAT

#### LOW TEMPERATURE PROGRAM

Budget:	•		•		
Salaries:					•
Professiona.	L	\$ ххххх			
Support Sta		\$ ХХХХХ			
Research As:	sistants	\$ XXXXX			
Other Personnel B Benefits (Pu			V.V. V*/	\$_XXXXX	,
Benefits (Re		• •		\$ XXXXX	
Deneiros (ite	esearch	H330.7 G	~~* ~/*	+ A0000	
Direct Costs:		-			
Subcontracts	s - (typ	e)		<b>\$</b> xxxxx	· ·
Travel - (se	ee detai	1)		\$ XXXXX	
Conferences					t
Supplies - 1		ry		\$ xx xx x	(
Supplies -				\$ xx x x x	(
Supplies - (	•				
Reproduction	15			∉ xxxxx	<
Indirect Costs @	~~*		•	\$ XXXXX	
G & A Costs @ xx			•	\$ XXXXX	
		х.		· .	•
Fixed Fee @ xx%	(if appl	icable)		<b>\$</b> xxxxx	:
		Total		\$ XXXX	 {
Distribution by Tasks				-	•
		Hours	Salary	Travel	Total
Task 1 Resource Inv Task 2 Fluid Geoche			*****	XXXXXX	XXXXX
Task 3 Database Lis	-		******	******	*****
Task 4 Review Coll(			******	******	××××× ×××××
Task 5 Prioritize f			******	******	*****
	, wa arter iili k <u>a</u> ka	- ~~~~	ANNANA		ANAAA
Froposed Manpower					· · ·
	Mont	hs (hours	)		
******	XXX	• •	÷		
******	XXX				

			APPE	NDIX-1-			
# NAME	CO T R SC	QSEC NLAT		T TEMP		DEPTH CDATE	REFERENCE USE
1 TWIN SPRING, VYA SPRING	W 42N 19E 04	NW 41.5933	119.8650	S 22	715	1952/05/15	WARING, 1965
2 HILL'S WARM SPRING	W 44N 20E 18	NE SE SW 41.7300	119.7867	S 28		1961/08/08	TREXLER AND OTHERS, 1979
3-UNNAMED-SPRING					19		SINCLAIR, 19835
4 VIRGIN VALLEY RANCH 10 5 VIRGIN V CAMP GROUND 1	HU HU 45N 26E 02	<u>41.7906</u> 41.8533	119.1075	W 21 W 32		1975/08/05	WATSTORE
6 ROADSIDE REST AREA 3	HU 46N 26E 31	C 41.8753		W 18		1975/08/05	WATSTORE
7 Surprise Valley Hot Spring	WA	41.166	119.978	S 47		1989/	Flynn and Buchanan, 1990
8 WARM SPRING	W 39N 19E 33	41.2160	119.8627	S warm			WALL CANYON RESERVOR 7.5' QUAD
9 WARM SPRINGS	HU 44N 27E 12	NE SW SW 41.7503	118.8367	S 40		1954/07/27	TREXLER AND OTHERS, 1979
10 McGEE MOUNTAIN	HU 45N 27E	41,8163		S 42.2		61	WENDELL, 1970
11 BOG HOT WELL	HU 46N 28E 31	41.8783		W hot			BOG HOT SPRINGS 7.5' QUAD
12 BOG HOT SPRINGS 13 BALTAZOR HOT SPRING 9	HU 46N 28E 18	SW NE NW 41.9228		S 55.6	3785	1970/09/01	SINCLAIR, 1963B
14 SOLDIER MEADOWS AREA HOT SPRING	HU 46N 28E 18 HU 40N 24E 23	B 41.9217 41.3597	118.7092 119.2180	<u>\$ 83</u> S 54	- 68	1975/08/05	GROSE AND KELLER, 1975B
15 SOLDIERS MEADOW AREA - UNNAMED HOT SPRING	HU 40N 24E 23	41.3597	119.2180	<u> </u>	50	1974/02/20	MARINER AND OTHERS, 1975
16 SOLDIER MEADOW AREA HOT SPRING	HU 40N 24E 23	41.3597	119.2180	S 48		1330/00/13	GROSE AND KELLER, 1975B
17 SOLDIER MEADOW 1	HU 40N 24E 23	41,3581	119.2178	S 54		1975/01/01	WATSTORE
18 CANE SPRING	HU 39N 27E 30	NE 41.2580	118.9362	S 23.3	19		SINCLAIR, 1963A
19 WEST PINTO HOT SPRING	HU	41.3592	118.8136	S 92		1974/01/01	WATSTORE
20 EAST PINTO HOT SPRING	HU 40N 28E 17	NE SE SE 41.3625	118.7880	S 94			GROSE AND KELLER, 1975B
21 WARM SPRING	W 37N 22E 35	41.0397	119.4688	S warm			LEADVILLE 7.5' QUAD
22 LEADVILLE SPRINGS	W 37N 23E	41.0827	119.3871	S warm			SMITH, 1956
23 CANE SPRINGS 24 WHEELER RANCH WELL	HU 36N 24E 16 HU 37N 25E 10	A 41,0133 SE 41,1150		<u>S 21</u>		1961/12/12	
25 DOUBLE HOT SPRING 2	HU 37N 25E 10 HU 36N 26E 04	SE 41.1150 41.0492		W 36.1 S 68.5		1965/09/21	SINCLAIR, 1963A
26 UNNAMED SPRING (D.H2)	HU 36N 26E 16	SE NE 41.0150	the state of the second se	S 68.5		1938/08/24	GROSE AND KELLER, 1975B
27 WW3922T1	HU 37N 24E	41.0733		W 24.2	815.0	1979/12/13	WATSTORE
28 TH SP HARDIN CITY SE QD	HU 37N 26E 10	DCA 41,1156	119.0008	S 50.8	101.9	1980/07/09	WATSTORE
29 MACFARLANE'S BATH HOUSE SPRING	HU 37N 29E 31	41.0507	118.7188	S 76.5	18.9		SINCLAIR, 1963A
32 SPRING	HU 42N 30E 12	A 41,5294	118.5686	S 40		1960/10/08	WATSTORE
33 SPRING	HU 43N 30E 25	D 41.5675		S 70		1960/10/08	WATSTORE
34 UNNAMED SPRING	HU 42N 33E 19	SW SE 41.4922		<u>S 21.1</u>	19	1957/05/18	SINCLAIR, 1962C
35 U.S.G.S. TEST WELL NO. 21 36 WELL	HU 42N 33E 32 HU 42N 31E 11	SE NE 41.4717 B 41.5286		W 24.4		27 1972/00/00	MALMBERG AND WORTS, 1966
37 HOWARD HOT SPRING	HU 42N 31E 11 HU 44N 31E 04	B 41.5286 SE NE NE 41.7200	118.4769	W 24 S 57.8	189	107.3 1960/10/08 1970/05/05	WATSTORE
38 FIVE MILE SPRING	HU 45N 33E 21	SE NE SW 41.7625		\$ <u>57.8</u> \$ 27	109	1975/08/21	TREXLER AND OTHERS, 1979
39 SPRING	HU 44N 33E 10	BB 41.7053		S 26		1959/06/22	WATSTORE
40 JACKSON WELL	HU 39N 35E 07	DCDA 41.2614		W 19.5		1961/02/26	WATSTORE
41 SOD HOUSE RANCH WELL	HU 41N 35E 20	NE 41.4200	118.0633	W 27		34 1975/08/20	SINCLAIR, 1962A
42 CORDERO MERCURY MINE, NORTH LOWER WELL	HU 47N 37E	41.9167		W 53		1967/11/11	*WHITE, D., USGS, MENLO PARK
43 MENTABERRYS WELL 1	HU 47N 37E 24	BAB 41.9478		W 26.5		61.0 1976/04/23	WATSTORE
44 NOQUE'S NEVADA WELL	HU 47N 38E 17	NE NE SE 41.9555	the second s	W 33.3		214 1972/00/00	GARSIDE AND SCHILLING, 1979
45 THE HOT SPRINGS 46 THE HOT SPRING	HU 41N 41E 19 HU 41N 41E 19	NE NE 41.4208 NE NE 41.4208	117.3867 117.3867	S 57.2 S 58	227		LOELTZ AND OTHERS, 1949
40 THE HOT SPRING	HU 41N 41E 19 HU 41N 43E	41.4208 41.4364	117.1436	S 58 S hot			WARING, 1965
48 WELL	HU 37N 39E 03	DC 41.1047		W 69		18.6 1962/04/28	WATSTORE
49 SPRINGS	HU 45N 41E	41.7737	117.3452	S hot			WARING, 1965
50 UNNAMED SPRING	HU 36N 41E 02	SW NE NE 41.0300	117.3215	S 21.1	95	1950/00/00	COHEN, 1962
51 SPRINGS	HU 37N 43E 24	41.0654	117.0762	S warm	>757		ANCTIL, 1960
52 WARM SPRING NEAR DEEP CREEK RESERVOR	EL 43N 55E 19	41,6153	116.2979	S warm			CORNACOPIA RIDGE 7.5' QUAD
53 HOT LAKE	EL 38N 46E 25	41.1480		S hot			SQUAW VALLEY RANCH 7.5' QUAD
54 SPRING	EL 39N 45E 36	41.2137	the second s	S hot			WARING, 1965
55 SPRING, HEAD OF HOT CREEK 56 UNNAMED HOT SPRING	EL 38N 48E 11	41.1832		<u>S 7</u>		1070/00/20	WILLOW CREEK RESERVOIR 7.5' QUAD
57 PETAINI (NIAGARA?) SPRINGS	EL 39N 50E 18 EL 40N 53E 06	41.2571 41.3837		S 47.2 S warm	5960	1972/00/00	HOSE AND TAYLOR, 1974
58 ELLISON RANCH SPRING	EL 41N 52E 08	NE 41.4667	the second s	S 93	3.8	1971/12/30	*WHITE, D., USGS, MENLO PARK, CA
59 HOT SULPHUR SPRINGS	EL 41N 52E 08	NE 41.4677		S 90	0.0	1950/05/24	MARINER AND OTHERS, 1974, 1975
60 UNNAMED HOT SPRING (SSE PATSVILLE)	EL 45N 54E 20	41.7758		S41			MARINER AND OTHERS, 1974, 1975
61 WILD HORSE HOT SPRING	EL 43N 55E 04	SE SE 41.6472		S 54			MARINER AND OTHERS, 1974, 1975
62 ROWLAND HOT SPRINGS	EL 46N 56E 14	NW SW N 41.8767	115.6260	S 77	114	1957/05/17	*WHITE, D., USGS, MENLO PARK
63 SPRING	EL 39N 53E 03	41.2980	the second s	S warm			MAHALA CREEK WEST 7.5' QUAD
64 WARM SPRINGS	EL 37N 58E 28	41.0613		S werm			MORGAN HILL 7.5' QUAD
65 UNNAMED SPRING	EL 38N 59E 14	SE SW SE 41.1800		<u>\$ 36</u>		1962/06/26	TREXLER AND OTHERS, 1979
66 UNNAMED WELL 67 DEVIL'S PUNCH BOWL	EL 38N 59E 11	SW NE SW 41.1950 SE SW 41.2650		W 30		1947/05/18	TREXLER AND OTHERS, 1979 TREXLER AND OTHERS, 1979
68 H.D. RANCH SPRING, HOT CREEK SPRINGS	EL 39N 59E 15 EL 43N 60E 34	SE SW NW 41.5762		<u>\$ 52</u> \$ 64,4	2271	1972/12/13 1946/04/09	
69 RAILROAD SPRING	EL 37N 62 29	41.0661	114.9904	S warm		10-0104/08	OESTERLING, 1960
70 UNNAMED HOT SPRING NEAR WELLS	EL 38N 62E 17	SE NW NE 41.1818		S 61	······································		MARINER AND OTHERS, 1974B HEAT PUMP
71 UNNAMED HOT SP NEAR WELLS	EL 38N 62E 17	A 41.1819	114.9894	S 55		1974/01/01	WATSTORE

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# NAME 72 METROPOLIS (TWELVEMILE SPRINGS)	COT EL 39N		1 SC 27	OSEC NE NE	NLAT 41.2450		T TEMP S 38.9	FLOW		REFERENCE WARING, 1965	USE
73 WINE CUP RANCH WELL	EL 41N		25	NW SE	41.4092		W 58.9	3036	20.7 1946/03/25	RUSH, 1968A	
74 PAN AMERICAN PETROLEUM-COBRE MINERALS WELL	EL 37N	67E	- 03		41,1135		W * * 76.7*		1403	*NEVADA BUREAU OF MINES AND GEOLOGY	
75 GAMBLE RANCH WELL NO. 4	EL 40N	_	16	SW	41.3433		W 20		64	RUSH, 1968	
76 THOUSAND SPRINGS (GAMBLE RANCH SPRING) 77 HOT SPRING	EL 40N		08	SE NW NW		the second s	S 20.6	5110		MIFFLIN, 1968	
78 WELL	EL 40N EL 45N	_	20	ACB	41.3862		S hot W 54		1979/04/26	TWELVEMILE RANCH 7.5' QUAD	
79 MINERAL HOT SPRINGS	EL 45N	_	16		41.7882		S 60		1966/10/13	MARINER AND OTHERS, 1974, 1975	······································
BO SAN JACINTO RANCH SPRING	EL 46N	64E	23	NWNW	41.8683		S 28		1962/07/26	MOORE AND EAKIN, 1968	
81 MINERAL HOT SPRING	EL 45N	_	08	BBA	41.7956		S 60		1974/01/01	WATSTORE	· ··
82 W.D. RANCHING CO. FLOWING WELL	EL 47N		18	NW SW	41.9653	114.6418	W 37.8		188.4 1979/12/15	MOORE AND EAKIN, 1968	
83 WHEELER (Y3) RANCH WELL	EL 47N		17	CBC	41.9586		W36		382.5 1977/12/07	WATSTORE	
84 WHEELER (Y3) RANCH WELL	EL 47N		15	DCCD	41.9547		W 43.5		1981/04/23	WATSTORE	(AQUACULTURE)
85 SHOSHONE WARM SPRINGS 86 UNNAMED HOT SPRING	EL 47N EL 47N		11 09	NE SW SW SE NW	41.9717 41.9800		\$ 35 \$ 30		1962/06/25 1960/10/07	TREXLER AND OTHERS, 1979 HOSE AND TAYLOR, 1974	
87 TROUT CREEK RANCH WELL, GOOSE CREEK AREA	EL 46N	_	15	NW NE	41.8823		W 43.3		75 1912/09/23	MOORE AND EAKIN, 1968	· · · · · · · · · · · · · · · · · · ·
88 GOOSE CREEK AREA SPRING	EL 46N	69E	10	SE SW SE	41.8867		S 33.9		1960/10/07	*WATSTORE	•
89 TROUT CREEK RANCH WELL	EL 46N		02	SW SE	41.9027		W 21		75 1972/02/13	MOORE AND EAKIN, 1968	
90 NILE SPRING	EL 47N	70E	30	SW SW S	41.9283	114.0687	S 43			MARINER AND OTHERS, 1974, 1975	
91 HOT SPRING	HU 35N		11		40.9202		S hot			HOT POT 7.5' QUAD	
92 NEW SPRING	W 34N		18		40.8317		5 29		1952/05/18	GROSE AND KELLER, 1975B	
93 POODLE SPRING	W 34N	22E			40.8244		<u>\$ 29</u>		1975/01/01	WATSTORE	
94 spring 95 BUFFALO SPRING	WA W 31N	205	06	·	40.6711 40.5932		S 29.4		1975/	LAWRENCE LIVERMORE LABORATORY, 1976 WARING, 1965	<del></del>
96 BUCKBRUSH SPRING	W 29N	20E	11		40.3960		S warm			WARING, 1965	
97 JACK BONHAM RANCH WELL	W 28N		12	NE	40.3300		S 23		1963/04/16	GLANCY AND RUSH, 1968	- <u></u>
98.1 FISH SPRING	W 26N		19	SE SE	40.1008	and the second	s 23		1952/09/18	RUSH AND GLANCY, 1967	
98.2 Fish Spring	WA				40.1024	119.8836	S 21		1975/	LAWRENCE LIVERMORE LABORATORY, 1976	
99 THE NEEDLES - WESTERN GEOTHERMAL WELL	WA				40.1500	119.6750	W 115.5			*WHITE, D., USGS, MENLO PARK	
100 THE NEEDLES	WA				40.1460		S 56			MARINER AND OTHERS, 1974, 1975	
101 SEVENMILE SPRING	W 25N	_	10	BCD	40.0483		S 18		1969/07/30	WATSTORE	
102 SPRING	W 26N		10	ADA	40.1344		S 18.5 S 25		1969/07/30	WATSTORE	<u> </u>
104 LOWER STONEHOUSE SPRING	PE 27N		08	DD	40.2178		S 28		1969/08/22	WATSTORE	
105.1 Amor II well 43-21	W 29N		21		40.3692		W 135		85.4	*NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
105.2 Amor II well 43-21	W 29N	23E	21		40.3692	119.4039	W 135		85.4	*NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
106 SAN EMIDIO DESERT - UNNAMED HOT SPRING	W 29N	23E	09,16		40.3917	119.4067	S 79	30	1956/02/22	MARINER AND OTHERS, 1976A	VEGETABLE DRYING
107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S	W 32N	23E	15	NW	40.6600		S 86			MARINER AND OTHERS, 1974, 1975	SPA
108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING	W 32N	23E	10	SW NW	40.6650		S 89.5	100		MARINER AND OTHERS, 1976A	
109 GREAT BOILING SP ORIF 46	WA W 33N	00E	23	С	40.6608		S 88.6 S 26	390.5	1980/01/28 1975/01/01	WATSTORE WATSTORE	
			34	A	40.7220		W 26			WATSTORE	
111 GRANITE CREEK BANCH WELL			04		· · · · ·					WATSTORE	
111 GRANITE CREEK RANCH WELL	W 34N PE 33N		10	в	40.7447	119.1731	W 33.5		1961/06/12		
111 GRANITE CREEK RANCH WELL         112 WELL         113 UNNAMED HOT SPRING NEAR TREGO	PE 33N		10	_ <u>B</u>	40.7447 40.7667		W 33.5 S 84.5	150	1961/06/12	MARINER AND OTHERS, 1976A	
112 WELL	PE 33N	25E	10 02	<u> </u>		119.1167		150	1961/06/12		······
112 WELL 113 UNNAMED HOT SPRING NEAR TREGO	PE 33N PE	25E 23E		B	40.7667	119.1167 119.3417	S 84.5			MARINER AND OTHERS, 1976A	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS	PE 33N PE W 34N W 34N HU 36N	25E 23E 23E 26E	02 01 34	NW NW	40.7667 40.8633 40.8606 40.9700	119.1167 119.3417 119.3181 119.0100	S         84.5           W         80           S         94           S         57.8		1968/06/00 1975/01/01 1972/03/29	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) • WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL	PE 33N PE W 34N W 34N HU 36N PE 29N	25E 23E 23E 26E 29E	02 01 34 06	NW NW D	40.7687 40.8633 40.8608 40.9700 40.4058	119.1167 119.3417 119.3181 119.0100 118.7675	S         84.5           W         80           S         94           S         57.8           W         20.5	500	1968/06/00 1975/01/01 1972/03/29 1961/09/14	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING	PE 33N PE W 34N W 34N HU 36N PE 29N PE 29N	25E 23E 23E 26E 29E 28E	02 01 34 06 05	NW NW D B	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18	500	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACK WELL         118       PORTER SPRING         119       COLADO WELL NO. 1	PE 33N PE W 34N W 34N HU 36N PE 29N PE 29N PE 28N	25E 23E 23E 26E 29E 28E 32E	02 01 34 06 05 33	NW NW D B SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60	715	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE *MARINER, R., USGS, MENLO PARK	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING	PE 33N PE W 34N W 34N HU 36N PE 29N PE 29N PE 28N PE 29N	25E 23E 23E 26E 29E 28E 32E 34E	02 01 34 06 05 33 34	NW NW D B	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3367	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24	500	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE "MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL	PE 33N PE W 34N W 34N HU 36N PE 29N PE 29N PE 28N	25E 23E 23E 26E 29E 28E 32E 34E 35E	02 01 34 06 05 33 34 01	NW NW D B SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot	715	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1968/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE *MARINER, R., USGS, MENLO PARK	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE	PE         33N           PE         W         34N           W         34N         HU           HU         36N         PE           PE         29N         PE         29N           PE         28N         PE         29N           PE         28N         PE         29N           PE         28N         PE         29N           PE         29N         PE         29N	25E 23E 23E 26E 29E 28E 32E 34E 35E 38E	02 01 34 06 05 33 33 34 01 28	NW NW D B SE SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3367 40.0613	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78	500 715 8	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1968/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) • WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILH HOLE         122       HYDER (HYDRA) HOT SPRINGS	PE         33N           PE         W         34N           W         34N         HU         36N           PE         29N         PE         29N           PE         28N         PE         29N           PE         28N         PE         29N           PE         28N         PE         29N           PE         28N         PE         28N           PE         25N         PE         25N	25E 23E 23E 26E 29E 28E 32E 34E 34E 34E 38E 38E	02 01 34 06 05 33 33 34 01 28	NW NW D B SE SE SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3367 40.0613 40.0033	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977 117.7167 117.7247	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78	500 715 8	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1968/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WASTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1976A	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING S         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING (LOWER RANCH)	PE 33N PE W 34N W 34N HU 36N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N PE 25N PE 25N	25E 23E 23E 26E 29E 32E 32E 34E 35E 38E 38E 39E 39E	02 01 34 06 05 33 34 01 28 29 19 16	NW NW D B SE SE SE SE SE NW NW	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3367 40.0613 40.0613 40.0895 40.0267 40.0350	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         60           S         78           S         78           S         73           S         28           S         40	500 715 8 102 189	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE "MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1975A MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) • WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GLEBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED SPRING         126       SPRING, J.S. RANCH (MCCOY)	PE 33N PE W 34N HU 36N PE 29N PE 28N PE 28N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N	25E 23E 23E 26E 28E 32E 32E 34E 35E 38E 38E 39E 39E 39E	02 01 34 06 05 33 34 01 28 29 19 16 33	NW NW D B SE SE SE NW SE NW NW SW	40.7667 40.8633 40.8608 40.9700 40.4056 40.4178 40.2450 40.3367 40.0613 40.0033 40.0035 40.0267 40.0350	119.1167 119.3417 119.3181 119.0100 118.7875 118.6878 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033 117.6000	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         78           S         78           S         78           S         78           S         28           S         48.3	500 715 8 102 189 2536	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/06/04	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE, AND SCHILLING, 1979 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) • WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED SPRING         126       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N	25E 23E 26E 29E 32E 34E 35E 38E 38E 38E 39E 39E 39E 39E 40E	02 01 34 06 05 33 34 01 28 29 19 16 33 28	NW NW D SE SE SW SE NW NW SW SW	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3387 40.0613 40.0033 40.0895 40.0267 40.0357 40.0787	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.7167 117.7167 117.7247 117.6483 117.6033 117.6000 117.4900	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         78           S         73           S         28           S         48.3           S         48.3           S         29	500 715 8 102 189 2536 20	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/08/04 1957/05/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED SPRING         126       SPRING, J.S. RANCH (McCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 28N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 27N	25E 23E 23E 26E 29E 32E 34E 35E 38E 38E 39E 39E 39E 39E 39E 39E 38E	02 01 34 06 05 33 34 01 28 29 19 16 33 28 02	NW NW D B SE SE SE SW SE NW NW SW SW NW	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.0033 40.0613 40.0287 40.0287 40.0267 40.0350 40.0767 40.1790 40.2450	119.1167 119.3417 119.3417 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6030 117.6030 117.6900 117.6783	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         73           S         28           S         40.3           S         28           S         29           W         22	500 715 8 102 189 2536	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1952/09/16 1950/06/04 1957/05/13 116 1963/01/07	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974A COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (MYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (McCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       SPRING, J.S. RANCH (MELL	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 27N PE 27N CH 26N	25E 23E 23E 29E 28E 32E 34E 35E 38E 39E 39E 39E 39E 39E 39E 39E	02 01 34 06 05 33 34 01 28 29 19 16 33 28 02 29	NW NW D B SE SE SE SE SE NW NW SW SW NW D	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.0387 40.0613 40.0035 40.0285 40.0267 40.0350 40.0767 40.2450 40.2450	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033 117.6033 117.6900 117.6783 117.8099	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         73           S         28           S         40           S         48.3           S         23           S         28           W         22           W         221	500 715 8 102 189 2536 20	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/08/04 1957/05/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED SPRING         126       SPRING, J.S. RANCH (McCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL	PE 33N PE W 34N HU 36N PE 29N PE 29N PE 29N PE 20N PE 20N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 27N PE 27N PE 27N PE 29N	25E 23E 23E 29E 28E 32E 34E 35E 38E 39E 39E 39E 39E 39E 39E 39E 39E 39E 39	02 01 34 06 05 33 34 01 28 29 19 16 33 28 02 29 12	NW NW D B SE SE SW SE NW NW SW SW NW NW D NW NW	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.03367 40.0613 40.0085 40.0267 40.0267 40.0767 40.2450 40.2450 40.02453 40.04083	119.1167 119.3417 119.3181 119.0100 118.7675 118.6676 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033 117.6033 117.6783 117.6783 117.6999 117.8850	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         205           S         48.3           S         48.3           S         48.3           S         228           W         221           S         95.6	500 715 8 102 189 2536 20	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/18 1980/08/04 1957/05/13 116 1963/01/07 32.6 1963/07/23	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974A COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (McCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         129       J.S. RANCH WELL         130       KYLE HOT SPRINGS	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 27N PE 27N CH 26N	25E 23E 23E 26E 29E 32E 34E 34E 34E 34E 34E 34E 34E 34E 34E 34	02 01 34 06 05 33 34 01 28 29 19 16 33 28 02 29	NW NW D B SE SE SE SE SE NW NW SW SW NW D	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.0387 40.0613 40.0035 40.0285 40.0267 40.0350 40.0767 40.2450 40.2450	119.1167 119.3417 119.3181 119.0100 118.7675 118.8678 119.3850 118.1367 117.9977 117.7167 117.7247 117.6033 117.6033 117.6000 117.6783 117.6783 117.6099 117.8850	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         73           S         28           S         40           S         48.3           S         28           W         22           W         22           W         21           S         95.6	500 715 8 102 189 2536 20 38	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1952/09/16 1950/06/04 1957/05/13 116 1963/01/07	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE SANDERS AND MILES, 1974	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GLEERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED SPRING         126       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       SPRING, ULL YAREA - UNNAMED HOT SPRING         129       J.S. RANCH WELL         120       J.S. RANCH WELL         121       J.S. RANCH WELL         125       J.S. RANCH WELL         126       SPRING ULL         127       J.S. RANCH WELL         128       SPRING WELL         129       J.S. RANCH WELL         130       KYLE HOT SPRINGS	PE 33N PE W 34N HU 36N PE 29N PE 29N PE 29N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 25N PE 27N CH 26N PE 29N	25E 23E 23E 26E 29E 32E 33E 33E 39E 39E 39E 39E 39E 39E 39E 33E 33	02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 19 16 33 28 02 29 12 01 30	NW NW D B SE SE SE NW NW SW SW SW NW NW D NW NW C	40.7667 40.8633 40.8608 40.9700 40.4058 40.4178 40.2450 40.3367 40.0613 40.0813 40.0285 40.0287 40.035 40.0267 40.1790 40.2450 40.2450 40.2450 40.2451	119.1167 119.3417 119.3181 119.0100 118.7875 118.6876 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033 117.6033 117.6039 117.8850 117.8850	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         28           S         48.3           S         48.3           S         29           W         221           S         95.8           S         666	500 715 8 102 189 2538 20 38	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1962/07/31 1952/09/16 1960/06/04 1957/05/13 116 1963/01/07 32.6 1963/07/23 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         129       J.S. RANCH WELL         130       KYLE HOT SPRINGS         133       BUFFALO SPRINGS         134       BUFFALO SPRINGS         135       BUFFALO SPRINGS	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N P	25E 23E 23E 26E 29E 28E 32E 33E 33E 33E 33E 39E 39E 39E 39E 38E 39E 36E 36E 36E 36E 36E 36E	02 01 34 06 05 33 34 01 28 29 19 16 33 28 02 29 19 16 328 02 29 12 01 30 06 23	NW NW D B SE SE SE SW SE NW NW SW SW NW D D NW NW C DDD NE SW NW SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.0387 40.0613 40.0033 40.0267 40.0350 40.0767 40.2450 40.2450 40.2450 40.2451 40.2452 40.4053 40.4053	119.1167 119.3417 119.3417 119.3181 119.0100 118.7675 119.3850 118.1367 117.39977 117.7167 117.7167 117.7247 117.6483 117.6030 117.4900 117.8831 117.6397 117.4585 117.3255	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         73           S         26           S         48.3           S         28           W         21           S         95.6           S         66           S         22           W         21           S         95.6           S         65.5	500 715 8 102 189 2538 20 38	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/08/04 1957/05/13 116 1963/01/07 32.6 1963/07/23 1977/05/08 1977/01/01 1963/ 1962/03/10	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE SANDERS AND MILES, 1974 WATSTORE WALSTORE WALSTORE WALENBERG AND OTHERS, 1977 *WHITE, D., USGS, MENLO PARK	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         130       KYLE HOT SPRINGS         131       HOTTEST KYLE HOT SPRINGS         132       SOUTH WELL         133       BUFFALO SPRING         134       BUFFALO SPRINGS         135       OH3D WELL	PE 33N PE W 34N HU 36N PE 29N PE 29N PE 29N PE 29N PE 29N PE 20N PE 25N PE 25N	25E 22E 23E 26E 28E 32E 34E 35E 38E 39E 39E 39E 39E 39E 39E 39E 39E 39E 39	02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 19 16 33 28 29 19 19 16 33 28 29 19 19 16 33 28 29 19 19 16 20 2 29 19 19 14 20 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	NW NW D B SE SE SW SE NW NW SW SW NW D NW NW C D DD NW NW SE ABC	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.03367 40.0613 40.0085 40.0267 40.0767 40.0767 40.2450 40.2450 40.2450 40.4083 40.4083 40.4083 40.4058 40.3670 40.35617	119.1167 119.3417 119.3181 119.0100 118.7675 118.6676 119.3850 118.1367 117.9977 117.7167 117.7247 117.6483 117.6033 117.6033 117.6397 117.4583 117.6397 117.4585 117.6397 117.45683	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         20.5           S         18           W         60           W         24           W         hot           S         73           S         28           S         48.3           S         28           S         48.3           S         28           W         22           W         21           S         95.6           S         665.5           S         65.5.1	500 715 8 102 189 2536 20 38	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/06/04 1957/05/13 116 1963/01/07 32.6 1963/07/23 1977/05/08 1977/05/08 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE "MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WALLENBERG AND OTHERS, 1977 "WHITE, D., USGS, MENLO PARK WATSTORE	
112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (McCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         130       KYLE HOT SPRINGS         131       HOTTEST KYLE HOT SPRINGS         132       EUFFALO SPRING         133       BUFFALO SPRINGS         134       BUFFALO VALLEY HOT SPRINGS	PE 33N PE W 34N W 34N PE 29N PE 29N PE 29N PE 29N PE 29N PE 25N PE 25N P	25E 23E 23E 23E 26E 29E 28E 34E 33E 33E 39E 39E 39E 39E 39E 39E 39E 39	02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 19 16 33 28 02 29 12 01 30 06 23 14 09	NW NW D B SE SE SE SW SE NW NW SW SW NW D D NW NW C DDD NE SW NW SE	40.7667 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.2450 40.0387 40.0613 40.0033 40.0267 40.0350 40.0767 40.2450 40.2450 40.2450 40.2451 40.2452 40.4053 40.4053	119.1167 119.3417 119.3181 119.0100 118.7675 118.6678 119.3850 118.1367 117.9977 117.7167 117.7247 117.6033 117.6033 117.6099 117.6783 117.6899 117.8850 117.6397 117.4156 117.3255 117.6683 117.7256	S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         73           S         26           S         48.3           S         28           W         21           S         95.6           S         66           S         22           W         21           S         95.6           S         65.5	500 715 8 102 189 2536 20 38 7.6	1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/08/04 1957/05/13 116 1963/01/07 32.6 1963/07/23 1977/05/08 1977/01/01 1963/ 1962/03/10	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE SANDERS AND MILES, 1974 WATSTORE WALSTORE WALSTORE WALENBERG AND OTHERS, 1977 *WHITE, D., USGS, MENLO PARK	

# NAME 139 NORTHERN EAST RANGE AREA	CO T	RSC	QSEC	NLAT	WLONG		EMP	FLOW	DEPTH CDATE	REFERENCE	USE
139 NONTHERN EAST HANGE AREA	HU 35N 3 PE 30N 3	6E 28 3E 20	NE NW NE	40.8850	117.9383		27.8 varm		· · · · · · · · · · · · · · · · · · ·	COHEN, 1963 CROFUTT, 1872	· · · · · · · · · · · · · · · · · · ·
141-HUMBOLDT (RYE PATCH) AREA - PHILLIPS PETROL, CAMPI							62.8		565 1970/09/01	GARSIDE AND SCHILLING, 1979	
42 Florida Canyon Mine well		3E 03		40.5833	118.2542		14.4		505 1910/09/01	Trexler and others, 1990	HEAP LEACHING
3.1 SPRINGS	PE 33N 3			40.7050	118.0553		varm			WARING, 1965	
2 BLUE MOUNTAIN DRILL HOLE		4E 23	с	40.9805	118.1292		87.8	227.1	137 1986/	PARR AND PERCIVAL, 1991	
44 CALIFORNIA PACIFIC UTILITIES CO. WELL		8E 30	NE SW SE	40.9600	117.7433		22.8		151 1970/10/07	COHEN, 1962	
45 UNNAMED SPRING	HU 36N 3	7E 13	SE NE SW	40.9928	117.7620		33.9		1954/10/05	COHEN, 1962	
46 BLM WELL		8E 26	SW NE SE	40.9642	117.6612	_	22.8		16.8	COHEN, 1962	<u> </u>
47 UNNAMED HOT SPRING NEAR GOLCONDA		0E 29	SW SW SE	40.9610	117.4938	S	74	750		MARINER AND OTHERS, 1974, 1975	
48 GOLCONDA TUNGSTEN MINE DRILL HOLE 302		0E 36	SW	40.9497	117.4238		61.7		78.6	GARSIDE AND SCHILLING, 1979	· · · ·
49 UNNAMED HOT SPRING		0E 05	SE	40.7617	117.4922	S	85	100		MARINER AND OTHERS, 1974, 1975	
50 SULPHUR SPRING		1E 34		40.8643	117.3491	s	hot			KERR, 1940	
51 BROOKS SPRING		1E 13	NE NW NE	40.8317	117.3067	S	34		1962/07/15	TREXLER AND OTHERS, 1979	
52 HOT POT SPRING		3E 10	NE NE SE	40.9228	117.1100	S	58		1912/11/16	MARINER AND OTHERS, 1974, 1975	
53 MOUND SPRING		4E 07		40.3125	117.0695	s	32	· · · · ·	1950/01/05	*WHITE, D., USGS, MENLO PARK	
54 UNN HOT SP VLLY OF MOON		3E 23	BCC	40,1911	117,1056	s	53		1974/01/01	WATSTORE	
55 IZZENHOOD RANCH SPRING		5E 10	SW NE NW	40.9287	116.8953	s	31		1962/07/05	TREXLER AND OTHERS, 1979	
56 DEE 3 WELL		9E 03	CDD	41.0194	116.4247	w	45		1990/08/27	WATSTORE	
57 BW2 WELL		0E 19	BCC	40.9831	116.3739		51.5		402.3 1990/08/29	WATSTORE	
58 BRAHMA SPRING		1E 30	DDCB	40.8872	116.2794		18.5		1990/08/30	WATSTORE	
59 NEWMONT WELL MC2		1E 26	DDD	40.7981	116.2017		31.5		1989/04/11	WATSTORE	
0 UNNAMED SPRING		3E 08	NW	40.7642	116.0408	S	64		1970/10/07	TREXLER AND OTHERS, 1979	
81 UNNAMED SPRINGS NEAR CARLIN	EL 33N 5		SE SW	40.6972	116.1333	s	79			MARINER AND OTHERS, 1979	(SPACE HEATING)
62 TYROL SPRING		2E 05	CDBA	40.6844	116.1539	s			1950/05/24		(SFACE REATING)
82 FINOL SPRING	EU 31N 5		CDBA				22		1990/06/13	WATSTORE	
64 MACK CREEK FARM WELL		9E 10	ACDD	40.5892 40.7494	116.1515		varm		470.0 4000/00/04	BRADBURY AND ASSOCIATES, 1964	·····
65 WHITE ROCK SPRINGS		······	ACOD		· · · · · · · · · · · · · · · · · · ·	W	26		172.2 1990/08/24	WATSTORE	
56 HOT SPRING		7E 08		40.7493	116.7011		varm		····- <u></u>	WARING, 1965	
		6E 06		40.6745	116.8415	5	hot				
BATTLE MOUNTAIN CITY WELL		5E 17	SW SW	40.6463	116.9342		23.3	946	221 1970/09/01	SCOTT AND BARKER, 1962	
BEOWAWE - SPRING 51		8E 17	N 1/2	40.5583	116.5833	5	96	283.9		*WHITE, DONALD, U.S.G.S.	ELECTRIC POWER
BEOWAWE HOT SPRING		8E 08	SE	40.5667	116,5667	<u>s</u>	98	100		MARINER AND OTHERS, 1974B, 1975	
O HORSESHOE RANCH HOT SPRINGS		9E 33	SW	40.6017	116.4600	<u>s</u>	58	3.8	1967/11/10	ROBERTS AND OTHERS, 1967	
11 HOT SPRINGS POINT		8E 11	NE NE	40.4035	116.5167	<u>s</u>	54	125	1948/10/21	MARINER AND OTHERS, 1974, 1975	
12 HOT SPRINGS POINT		8E 11	NE NE	40.4033	116.5167	S	60		1974/08/05	*WHITE, DONALD, U.S.G.S.	
73 SPRING		9E 10	NW NW N	40.3150	116.4317		85.5	9.5	1968/00/00	GARSIDE AND SCHILLING, 1979	
74 CARLOTTI RANCH SPRING, SULFUR SPRING		2E 24	SE	40.2900	116.0500	5	39	378.5		WARING, 1965	
75 HOT CREEK SPRINGS AREA		2E 12	NW	40.3283	116.0717		26.1	6000	1972/00/00	MARINER AND OTHERS, 1974B	
76 BRUFFEY'S HOT SPRINGS		2E 14	NE SE	40.2192	116.0683		65.5	189	1964/07/16	ROBERTS AND OTHERS, 1967	
77 FLYNN RANCH SPRINGS		3E 06		40.0792	116.0350	<u>S</u>	26	38	1972/00/00	WARING, 1965	
78 Elko Heat Company Well	EL			40.825	115.775	<u>. w</u>	80		1989/	Flynn and Buchanan, 1990	SPACE HEATING
9 HOT HOLE (ELKO HOT SPRINGS)		5E 21	NE	40.8185	115.7755	s	56	75	1950/05/24	MARINER AND OTHERS, 1974, 1975	
0 WARM SPRING	EL 34N 5			40.7824	115.3828		Varm			SOLDIER PEAK 7.5' QUAD	
1 SULPHUR HOT SPRINGS (HOT SULPHUR SPRINGS)		9E 11	NE NW	40.5867	115.2847	5	93	75	1974?	MARINER AND OTHERS, 1974, 1975	
2 UNNAMED HOT SPRING NEAR RUBY MARSH		8E 02	NW	40.2500	115.4010	S	65		1949/09/08	MARINER AND OTHERS, 1974, 1975	
3 UNNAMED SPRING		5E 15	NE	40.1275	116.8853		22.2			EVERETT AND RUSH, 1966	
4 UNNAMED HOT SPRING (VALLEY OF THE MOON)		3E 23	NE	40.1987	117.1008	S	53		1980/05/25	MARINER AND OTHERS, 1974, 1975	
5 UNNAMED HOT POOL		5E 25		40.1833	116.8617	S	50		1967/03/10	*WHITE, D., USGS, MENLO PARK	
BE UNNAMED SPRING		6E 28?	<u>NW</u>	40.1867	116.8042		22.2		1975/08/00	EVERETT AND RUSH, 1966	
7 Warm spring at Warm Creek Ranch	EL 33N 6			40.7505	115.0354	S w	varm	7570		Eakin and others,1951	
8 UNNAMED SPRING NEAR WARM SPRINGS RANCH		4E 04.	NW NE N	40.9517	114.7500	S	30	189	1964/10/23	*WILSON, 1960	
9 JOHNSON RANCH (BIG SPRINGS)	EL 36N 6	6E 28	SW SW SE	40.9708	114.5067	S	22.7	113.6	1949/10/12	WARING, 1965	
0 COLLAR AND ELBOW SPRING	W 26N 6	5E 33		40.0835	114.6343	S	22		1940/11/03	*NEVADA BUREAU OF MINES AND GEOLOGY	
1 THE NEEDLE ROCKS - ANAHO ISLAND SPRING	W 24N 2			39.9483		w ·	48.9		1979/10/15	WARING, 1965	
2 THE PYRAMID HOT SPRING	W 24N 2	2E 03		39.9803	119.5012	Ŝ w	varm			*GARSIDE, L., NBMG	
3 WARM SPRINGS	W 23N 2	0E 22		39.8462	119.7161	S	68.3			*GARSIDE, L., NBMG	
4 MCCULLOCH CORP. WELL	W 22N 2	1E 07	SE NW	39.7900	119.6667	W	43.3		1962/03/21	*DESERT RESEARCH INSTITUTE, 1973	
5 COTTONWOOD SPRING	W 23N 2	1E 26		39.8327	119.5917	S w	varm			WARING, 1965	
6 GEOTHERMAL WELL	CH 23N 2	6E 13		39.8575	119.0118					HOT SPRINGS FLAT 7.5' QUAD	
7 SPRING	CH 22N 2	6E 11	ADA	39.7883	119.0233	S	58	0.0	1981/02/20	WATSTORE	
8 Bradys Hot Springs	СН			39.787	119.012		141		1989/	Flynn and Buchanan, 1990	VEGETABLE DRYI
9 BRADY HOT SPRINGS	CH 22N 2	6E 12	NE NE SW	39.7883	119.0167	S	94		1966/00/00	*WHITE, D., USGS, MENLO PARK	
0 Eagle Salt Works Spring	CH 22N 3			39.7301	119.0387	s				Adams, 1944	
1 HAZEN AREA (PATUA HOT SPRINGS)	LY 20N 2		SW	39.5967	119.1033	_	86.1	·	1966/11/12	MARINER AND OTHERS, 1975	
2 Patua Hot Spring	LY			39.597	119.113	S	86		1989/	Flynn and Buchanan, 1990	
3 UNNAMED WELL	W 19N 1	8E 17		39.5150	119.9850	Ŵ	26		10 1978/08/17	DESERT RESEARCH INSTITUTE, 1973	······································
4 LAWTON HOT SPRINGS	W 19N 1		SW NE	39.5150	119.9017		48,9			COHEN AND LOELTZ, 1964	(SPA)
	W 19N 1		NENW	39.5017	119.7983		47,2		1957/05/15	BATEMAN AND SCHEIBACH, 1975	SPACE HEATING
5 MOANA AREA - PEPPER MILL MOTEL	AA (RUA U										

# NAME 207 MOANA AREA - MOORE WELL	CO T W 19N	R SC 19E 26	OSEC NE SE	NLAT 39.4817	WLONG 1 119,8100 W		FLOW	DEPTH CDATE	REFERENCE BATEMAN AND SCHEIBACH, 1975	USE SPACE HEATING, POOL
208 Steamboat/Ormat Well	WA			39.395	119.715 W			1989/	Flynn and Buchanan, 1990	ELECTRIC POWER
209 WELL	-W-18N-	the second s		39.3817	119,7233 W			36	BATEMAN AND SCHEIBACH, 1975	SPACE HEATING
210 STEAMBOAT SPRINGS - SPRING 25		20E 33	NE	39.3833	119,7333 8		50	1970/09/01	MARINER AND OTHERS, 1974, 1975	
211 UNNAMED WELL		20E 07 21E 15	CABD	39.3500 39.4258	119.7717 W		1.7	<u> </u>	GARSIDE AND SCHILLING, 1979	
213 BOWERS MANSION (FRANKTOWN) HOT SPRING - MAIN SPRIN		19E 03	NW	39.2833	119,8367 5		644	1974/02/04	WHITE AND OTHERS, 1963	SWIMMING POOL
214 UNNAMED WELL		20E 06		39.2750	119,7800 W			24 1974/00/00	*DESTERT RESEARCH INSTITUTE, 1973	
215 COMSTOCK MINING DISTRICT-NEW YELLOW JACKET SHAFT		21E 32	SW SE	39.2900	119.6467 W	76.7		914 1964/06/05	BECKER, 1882	
216 SPRING 6	ST 17N		DCBC	39.3342	119.5914		5.1	1970/09/30	WATSTORE	
217 SUTRO TUNNEL 218 UNNAMED	LY 16N		NE NE SE	39.2750	119.5850 5			1950/04/26	GLANCY AND KATZER, 1975	
219 CARSON CITY WELL NO 7		22E 07 20E 06	NW SE NW DAAC	39.2683	119,5600 W 119,7714 W			<u>31 1953/05/11</u> 138.7 1988/05/25	GLANCY AND KATZER, 1975	
220 CARSON CITY WELL NO 4		20E 17	DDDA	39.1523	119.7517 W		•	184.1 1988/09/08	WATSTORE	
221 NOBLE MURRAY WELL		20E 23		39.1433	119.6983 W				*NEVADA BUREAU OF MINES AND GEOLOGY	SPACE HEATING
222 CARSON HOT SPRING	CC 15N	20E 05	SE NE	39.1917	119,7517 5	50		1921/11/00	*NEVADA BUREAU OF MINES AND GEOLOGY	SPA, POOL
223 SARATOGA HOT SPRING	and the second se	20E 21	SW SE	39.0567	119,7400 \$	50		1958/01/27	*NEVADA BUREAU OF MINES AND GEOLOGY	
224 WETLANDS, WARM WELL		20E 20	DAA	39.0619	119.7514 W			7.9 1983/08/26	WATSTORE	
225 HOBO HOT SPRINGS		19E 23	SE SE	39.0550	119.8083 5		473	1929/02/24	GLANCY AND KATZER, 1975	(AQUACULTURE)
226 HASTIE WELL 227 UNNAMED WELL		20E 02 23E 25	CBB	39.0183	119.7119 W 119.3667 W		1533	53.6 1988/05/20 165 1979/11/15	WATSTORE	
228 NEVADA STATE PRISON SPRING		20E 16	SE SE	39.1600	119,7350 5		1000	1967/07/25	*NEVADA BUREAU OF MINES AND GEOLOGY	(AQUACULTRUE)
229 WABUSKA AREA		25E 28	SE NE	39.1367	119,1817 W		57	305 1953/05/11	HUXEL, 1969	(ETHANOL PRODUCTION)
230 WABUSKA HOT SPRINGS	LY 15N	25E 16	SE	39.1615	119.1827 5			1958/04/25	MARINER AND OTHERS, 1974, 1975	(AQUACULTURE)
231 WABUSKA HOT SPRINGS - MAGMA POWER CO. NO. CB 1 WEL		25E 15	NW SW	39.1617	119,1767 W		5731	149 1965/11/02	HUXEL, 1969	ELECTRIC POWER
232 DE WELL	CH 22N	27E 21	AACD	39.7642	118,9478 V			1987/07/09	WATSTORE	
233 Desert Peak 86-21 Well 234 CHURCHILL DRILLING CORP. TCID No. 1 WELL	CH CH 22N	20E 45		39.758 39.7791	118.946 W 118.6023 W			1989/	Flynn and Buchanan, 1990	ELECTRIC POWER
235 USBM HEAT FLOW HOLE		30E 15 31E 10		39.7918	118,4905 W			153	GARSIDE AND SCHILLING, 1979 OLMSTED AND OTHERS, 1975	· · · · · · · · · · · · · · · · · · ·
236 DIXIE COMSTOCK MINE		35E 14		39.8661	118.0165 M				VANDERBURG, 1940	· · · · · · · · · · · · · · · · · · ·
237 DIXIE HOT SPRINGS	CH 22N	35E 05	SE	39.7977	118.0673 5	72	200		MARINER AND OTHERS, 1974, 1975	
238 KENNAMETALS WELL		28E 01	ABB	39.6350	118.7889 V			191.1 1978/12/12	WATSTORE	
239 CDDH-48A-USGS	CH 21N		DDC	39.6494	118.7603 V			31.4 1978/11/06	WATSTORE	
240 SHALLOW RESEARCH WELL (SODA LAKE), 4 241 Soda Lake 33-14 Well	CH 20N CH	28E 28	SW	39.5633 39.564	118.8533 V 118.859 V			1958/05/25 1989/	MARINER AND OTHERS, 1975 Flynn and Buchanan, 1990	ELECTRIC POWER
242 CDDH-41A	CH 20N	28E 14	DCC	39.5919	118.8064 W			125.0 1976/05/20	WATSTORE	ELECTIVOTORE
243 USGS CDR-21		28E 12	ABAC	39.4450	118.7858 V			4.6 1988/07/12	WATSTORE	
244 INDIAN HEALTH SERVICE WELL	CH 19N	29E 29	BACB	39.4853	118.7603 V	20.5		20.7 1989/03/01	WATSTORE	
245 FLOWING WELL IN STILLWATER	CH 19N	31E 07	SW	39.5215	118.5522 V	96		1967/01/18	MARINER AND OTHERS, 1974, 1975	
246 CDD-117A										
		31E 07	DCD	39.5211	118.5461 V			19.8 1978/04/19	WATSTORE	
247 CDPW-44A	CH 19N	30E 06	BCB	39.5433	118.5461 V 118.5547 V	93.7	071 7	56.7 1978/04/21	WATSTORE	·····
247 CDPW-44A 248 USFWS WELL 3 NR EAST CAN	CH 19N CH 20N	30E 08 32E 20	BCB CAC	39.5433 39.5825	118.5461 W 118.5547 W 118.4183 W	93.7 25	271.7	58.7 1978/04/21 213.4 1989/04/03	WATSTORE	······
247 CDPW-44A	CH 19N CH 20N CH 17N	30E 06	BCB	39.5433	118.5461 V 118.5547 V	93.7 25 25.5	271.7	56.7 1978/04/21	WATSTORE	
247 CDPW-44A 248 USFWS WELL 3 NR EAST CAN 249 DR-SW-LY-9-L1	CH 19N CH 20N CH 17N	30E         06           32E         20           29E         06           30E         07	BCB CAC BCAD	39.5433 39.5825 39.3686	118.5461 W 118.5547 W 118.4183 W 118.7767 W	93.7 25 25.5 77	271.7	56.7 1978/04/21 213.4 1989/04/03 0.6 1985/08/20	WATSTORE WATSTORE WATSTORE	
247 CDPW-44A 248 USFWS WELL 3 NR EAST CAN 249 DR-SW-LY-9-L1 250 CARSON LAKE CORRAL 251 EIGHTMILE FLAT, BORAX SPRING 252 GEOTEHRMAL WELL	CH 19N CH 20N CH 17N CH 16N CH 16N CH 17N CH 17N	30E         06           32E         20           29E         06           30E         07           30E         14           30E         36	BCB CAC BCAD BACB	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935	118.5461 W 118.5547 W 118.4183 W 118.7767 W 118.6642 S 118.5783 S 118.5723 W	93.7 25 25.5 77 81.1	271.7	56.7 1978/04/21 213.4 1989/04/03 0.6 1985/08/20	WATSTORE WATSTORE WATSTORE WATSTORE	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N	30E         06           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06	BCB CAC BCAD BACB NE	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786	118.5461         W           118.5547         W           118.5547         W           118.7767         W           118.6642         S           118.5783         S           118.5723         W           118.432         S	93.7 25 25.5 77 81.1 160.0 hot		56.7 1978/04/21 213.4 1989/04/03 0.6 1985/08/20 1987/07/08 2000	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N CH 16N	30E         06           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06           29E         34	BCB CAC BCAD BACB NE SW NW	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092	118.5461         W           118.5547         W           118.5547         W           118.7767         W           118.6642         S           118.5783         S           118.5723         W           118.432         S           118.5723         S           118.4332         S           118.7232         S	93.7 25 25.5 77 81.1 160.0 hot 88	128	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00	WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N CH 16N CH 21N	30E         08           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06           29E         34           34E         36	BCB CAC BCAD BACB NE SW NW SW	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092 39.6392	118.5461         W           118.5547         W           118.4183         W           118.7767         W           118.6642         S           118.5723         W           118.5723         W           118.7232         S           118.1083         W	93.7 25.5 77 81.1 160.0 hot 88 22.8	128 3785	56.7 1978/04/21 213.4 1989/04/03 0.6 1985/08/20 1987/07/08 2000 1966/11/00 61 1973/03/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N CH 16N	30E         08           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06           29E         34           34E         36	BCB CAC BCAD BACB NE SW NW	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092	118.5461         W           118.5547         W           118.5547         W           118.7767         W           118.6642         S           118.5783         S           118.5723         W           118.432         S           118.5723         S           118.4332         S           118.7232         S	93.7 25.5 77 81.1 160.0 hot 88 22.8 21.7	128	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00	WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON-WELL NO. 1	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N CH 16N CH 21N CH 21N	30E         08           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06           29E         34           34E         36           35E         20	BCB CAC BCAD BACB NE SW NW SW NE	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092 39.6392 39.6767	118.5461         W           118.5547         W           118.7767         W           118.7768         S           118.5783         S           118.5723         W           118.723         S           118.723         S           118.723         S           118.723         S           118.723         S           118.603         S           118.063         W           118.0617         W	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 21.7 28	128 3785	56.7 1978/04/21 213.4 1989/04/03 0.6 1985/08/20 1987/07/08 2000 1966/11/00 61 1973/03/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL	CH 19N CH 20N CH 17N CH 17N CH 17N CH 17N CH 17N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 22N	30E         06           32E         20           29E         06           30E         07           30E         14           30E         36           32E         08           29E         34           34E         36           35E         20           29         10           43E         27	BCB CAC BCAD BACB NE SW NW SW NE SW SW	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092 39.6392 39.6767 39.1739 39.9537 39.9200	118.5461 W 118.5461 W 118.5547 W 118.4183 W 118.7767 W 118.6642 S 118.5723 W 118.5723 W 118.4332 S 118.7232 S 118.7232 W 118.60617 W 118.60617 W 118.733 S 117.8597 W 117.1250 W	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 21.7 28 21.7 28 231 38.9	128 3785	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Danti, 1982 "MEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON. WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring	CH 19N CH 20N CH 17N CH 16N CH 17N CH 17N CH 17N CH 16N CH 21N CH 20N CH 20N CH 20N CH 20N CH 20N CH 20N CH 20N CH 20N CH 17N CH 16N CH 16N CH 17N CH 16N CH 17N CH 16N CH 17N CH 16N CH 17N CH 16N CH 17N CH 17N CH 16N CH 17N CH 16N CH 21N CH 17N CH 16N CH 21N CH 21N CH 21N CH 17N CH 16N CH 21N CH 21N CH 17N CH 16N CH 21N CH 17N CH 16N CH 21N CH 16N CH 17N CH 16N CH 21N CH 16N CH 17N CH 16N CH 21N CH 16N CH 16N CH 16N CH 21N CH 16N CH 15N CH 16N	30E         06           32E         20           29E         06           30E         07           30E         14           30E         36           32E         06           29E         34           34E         36           35E         20           29         10           43E         27           25E         17	BCB CAC BCAD BACB NE SW NW SW NE SW SW NW SE	39.5433 39.5825 39.3686 39.3561 39.3417 39.2935 39.2786 39.2092 39.6392 39.6767 39.1739 39.9537 39.9200 39.4234	118.5461         W           118.5547         W           118.6547         W           118.767         W           118.767         W           118.7767         W           118.5723         W           118.5723         W           118.7232         S           118.7232         S           118.7033         S           118.00617         W           117.8597         W           117.250         W           119.1997         S	93.7 25 25.5 77 61.1 160.0 hot 88 22.8 21.7 28 21.7 28 231 38.9 34	128 3785 151	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Danti, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON.WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL	CH 19N CH 20N CH 17N CH 16N CH 17N CH 16N CH 17N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N	30E         06           32E         20           28E         06           30E         14           30E         36           32E         06           32E         06           28E         34           34E         36           35E         29           10         29           43E         27           28E         17           38E         06	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW NW SE SE	39.5433 39.5825 39.3666 39.3561 39.3417 39.2766 39.2092 39.6392 39.6767 39.1739 39.9537 39.92537 39.9202 39.4234	118.5461 V 118.5547 V 118.4183 V 118.7767 V 118.7767 V 118.6783 S 118.5783 S 118.5723 V 118.4332 S 118.7232 S 118.7232 S 118.7333 S 118.0617 V 118.0617 V 118.7333 S 117.7400 V	93.7 25 25.5 77 81.1 160.0 hot 22.8 21.7 28 21.7 28 231 38.9 34 24.4	128 3785 151	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007           4.6         1918/           31         1966/11/21	WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Danti, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "ARSIDE, L., NBMG EVERETT, 1964	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL         282       SMITH CREEK VALLEY WELL	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 16N CH 21N CH 21N CH 21N CH 15N CH 21N CH 20N LA 20N	30E         06         32E         20           32E         20         30         14         30E         36         32E         06         22E         34         34E         36         35E         20         29         10         29         10         43E         27         25E         17         35E         26         40E         36         40E         36         40E         36         40E         36         40E         36         40E         36	BCB CAC BCAD BACB NE SW NW SW NE SW SW NW SE	39.5433 39.5825 39.3668 39.3561 39.3247 39.2935 39.2766 39.2092 39.6392 39.6787 39.1739 39.9537 39.9200 39.6233 39.6233	118.5461 V 118.5547 V 118.4183 V 118.7767 V 118.7767 V 118.7767 V 118.6783 S 118.5723 V 118.4332 S 118.7723 V 118.7333 S 118.7333 S 118.7333 S 117.6597 V 117.1250 V 117.4278 V	93.7 25 25.5 77 81.1 160.0 hot 22.8 21.7 28 21.7 28 23.9 33.9 33.9 34 24.4 29.4	128 3785 151 4 189	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6         1918/           31         1966/11/21         1971/12/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1985 MARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Dantl, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1984 EVERETT AND RUSH, 1964	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON.WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 20N LA 20N LA 17N	30E         06         32E         20           32E         20         20E         20E         20E         30E         30E         30E         30E         30E         33E         30E         33E         32E         06         32E         06         32E         34E         34E         34E         36E         35E         20         29         10         32E         14E         27         28E         17         38E         06         39E         11         34E         33E         11         33E         33E         33E         11         33E         33E         11         33E         33E	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW NW SE SE	39.5433 39.5625 39.3666 39.3561 39.3561 39.2935 39.2786 39.2092 39.6787 39.6787 39.9537 39.9200 39.4234 39.62633 39.5500	118.5461         W           118.5547         W           118.5547         W           118.767         W           118.7767         W           118.5783         S           118.5783         S           118.5783         S           118.5723         W           118.7232         S           118.7232         S           118.083         W           118.083         W           118.083         W           118.0637         W           118.0637         W           118.0637         W           118.0637         W           118.0637         W           118.0597         W           117.1250         W           117.1250         W           117.7400         Y           117.5583         S	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 22.8 22.8 22.8 22.8 22.8 23.1 38.9 34 23.4 23.4 86	128 3785 151	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007           4.6         1918/           31         1966/11/21	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1964 WARING, 1965 EDMISTON AND BENOIT, 1964 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Danti, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1964 EVERETT, AND RUSH, 1964 MARINER AND OTHERS, 1974, 1975	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         261       TOM ORMECHEA WELL         262       SMITH CREEK VALLEY WELL         263       UNNAMED HOT SPRING	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 16N CH 21N CH 21N CH 21N CH 15N CH 21N CH 20N LA 20N	30E         06           32E         20           32E         06           30E         14           30E         36           32E         06           32E         06           32E         06           32E         06           32E         06           32E         06           43E         20           29         10           43E         27           25E         17           38E         06           40E         36           39E         11           39E         12	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW NW SE SE	39.5433 39.5825 39.3668 39.3561 39.3247 39.2935 39.2766 39.2092 39.6392 39.6787 39.1739 39.9537 39.9200 39.6233 39.6233	118.5461 V 118.5547 V 118.4183 V 118.7767 V 118.7767 V 118.7767 V 118.6783 S 118.5723 V 118.7232 S 118.7723 V 118.7232 S 118.7733 S 118.7333 S 117.6597 V 117.1250 V 117.4278 V	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 22.8 22.8 22.8 23.1 38.9 34 24.4 29.4 29.4 86 86	128 3785 151 4 189	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           4.6         1918/           31         1966/11/21           1971/12/00         1989/04/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1985 MARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Dantl, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1984 EVERETT AND RUSH, 1964	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON. WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL         262       SMITH CREEK VALLEY WELL         263       JUNNAMED HOT SPRING         264.1       TWIN SPRING         264.1       UNNAMED SPRING	CH 19N CH 20N CH 17N CH 17N CH 17N CH 17N CH 17N CH 16N CH 21N CH 21N CH 21N CH 15N CH 20N LA 24N LA 20N LA 17N LA 18N	30E         06           32E         20           32E         20           32E         06           30E         14           30E         34           32E         06           29E         34           34E         36           35E         29           43E         27           25E         17           38E         06           40E         36           39E         11           39E         27           43E         27           43E         34	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW NW SE SE	39.5433 39.5825 39.3666 39.3561 39.2935 39.2786 39.2935 39.2786 39.2092 39.6767 39.6767 39.9577 39.9577 39.9200 39.4234 39.5528 39.3500 39.3500	118.5461         W           118.5547         W           118.5547         W           118.757         W           118.7767         W           118.7767         W           118.7767         W           118.7763         S           118.5723         W           118.5723         W           118.733         S           118.1083         W           118.0617         W           118.733         S           117.8597         W           117.1250         W           117.7400         W           117.5583         S           117.5583         S           117.5791         S	93.7 25 25.5 77 81.1 180.0 hot 88 22.8 22.8 22.8 22.8 22.8 22.8 22.1 38.9 38.9 38.9 34 24.4 29.4 866 866 87.9	128 3785 151 4 189	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           4.6         1918/           31         1966/11/21           1971/12/00         1989/04/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENCIT, 1984 WARING, 1965 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Danit, 1982 *NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 *GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 EVERETT AND RUSH, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965.	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       MATTON.WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL         262       SMITH CREEK VALLEY WELL         263       UNNAMED HOT SPRING         264.1       TWIN SPRING         265.2       LITTLE HOT SPRING         265.2       LITTLE HOT SPRING	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 20N LA 20N LA 17N LA 23N	30E         06         32E         20           32E         20         2	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW SW SW SW SW	39.5433 39.5825 39.3668 39.3561 39.3561 39.2935 39.2768 39.292 39.6392 39.6392 39.6392 39.6787 39.1739 39.9537 39.9200 39.4234 39.6233 39.5588 39.3500 <b>59.3901</b> 39.3162 39.3937	118.5461         V           118.5547         V           118.5547         V           118.6767         V           118.767         V           118.6783         S           118.5783         S           118.5783         S           118.5723         V           118.5723         V           118.7232         S           118.0617         V           118.0617         V           118.7333         S           117.6597         V           117.1250         V           117.4278         V           117.5583         S           117.5593         S           117.5693         S           117.1367         S           117.4278         S           117.5435         S           117.5447         S           118.6481         S	93.7 25 25.5 77 81.1 180.0 hot 88 22.8 21.7 28 23.1 38.9 34 24.4 24.4 29.4 86 87 87 9 92 hot	128 3785 151 4 189	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           1918/         1976/11/21           1971/12/00         1969/04/00	WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 COHEN AND EVERETT, 1984 WARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Dantil, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1984 EVERETT AND RUSH, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1985 "NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 LITTLE HOT SPRINGS 7.5' QUAD	ELECTRIC POWER
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       MATTON.WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         261       TOM ORMECHEA WELL         263       Spring         264.1       TOM ORMECHEA WELL         263       UNNAMED HOT SPRING         264.1       TWIN SPRING         265.2       LITLE HOT SPRING         265.2       LITLE HOT SPRING         265.2       LITLE HOT SPRINGS         266       HOT SPRINGS	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 20N LA 20N LA 17N LA 17N LA 23N LA 24N	30E         06         32E         20           32E         20         20E         20E         32E         30E         30E         33E         33E         33E         33E         33E         32E         32E	BCB CAC BCAD BACB NE SW NW SW NE SW NE SW NW SW NE SW NW SE SE NW	39.5433 39.5625 39.3666 39.3561 39.295 39.2786 39.2092 39.6392 39.6767 39.9200 39.4773 39.9537 39.9200 39.4234 39.5538 39.5500 99.3500 99.3901 39.0283 39.3162 39.0283 39.3920	118.5461         V           118.5547         V           118.757         V           118.767         V           118.7767         V           118.7767         V           118.6783         S           118.6783         S           118.5783         S           118.5723         V           118.4332         S           118.7232         S           118.1083         V           118.063         V           118.063         V           118.0617         V           117.1250         V           117.1250         V           117.1250         V           117.5583         S           117.5791         S           117.5467         S           117.5467         S           117.5467         S           116.6481         S           116.6814         S	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 21.7 28 231 38.9 34 24.4 23.4 23.4 23.4 86 87.9 92 60 61 92 10 92 10 92 10 92 10 92	128 3785 151 4 189 75	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           31         1966/11/21           1971/12/00         1969/04/00           1969/04/00         1959/03/15	WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1964 WARING, 1965 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 *GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 EVERETT, AND RUSH, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965 *NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 UTTLE HOT SPRINGS 7.5' QUAD WARING, 1965	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         263       Spring         264       TOM ORMECHEA WELL         265       Syning         266       WATH CREEK VALLEY WELL         263       UNNAMED HOT SPRING         264.1       TWIN SPRING         265.2       LITLE HOT SPRINGS         265.2       LITLE HOT SPRINGS         265.2       LITLE HOT SPRINGS         266       HOT SPRINGS         267       WALTI HOT SPRINGS	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N CH 20N LA 24N LA 20N LA 17N LA 17N LA 23N LA 24N EU 24N	30E         04           32E         20           32E         20           32E         06           30E         14           30E         34           32E         06           22E         34           34E         36           35E         20           29         10           43E         27           28E         17           38E         06           39E         11           39E         27           43E         34           39E         12           47E         15           48E         33	BCB CAC BACD BACB NE SW NW SW SW SW SW SW SW SW NW SE SE NW NW SE SE NW	39.5433 39.5625 39.3666 39.3561 39.2935 39.2786 39.2935 39.2786 39.2092 39.6767 39.6767 39.9577 39.9557 39.9200 39.4234 39.5523 39.5500 39.3500 39.3500 39.3500 39.3901 39.9283 39.3162 39.8937 39.9423	118.5461         W           118.5547         W           118.5547         W           118.5547         W           118.767         W           118.5783         S           118.5783         S           118.5783         S           118.5783         S           118.5723         W           118.7232         S           118.1083         W           118.0637         W           118.0637         W           118.0637         W           118.0637         W           117.1250         W           117.1250         W           117.1250         W           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5467         S           118.6481         S           118.6481         S           118.5870         S	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 22.8 22.8 22.8 22.8 22.8 23.1 38.9 34 24.4 29.4 86 86 87.9 92 hot hot	128 3785 151 4 189 75 300	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           1918/         1976/11/21           1971/12/00         1969/04/00	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENCIT, 1984 WARING, 1965 EDMISTON AND BENCIT, 1984 WARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Danit, 1982 *NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 *GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 EVERETT, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965 *NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 LITTLE HOT SPRINGS 7.5' QUAD WARING, 1965 MARINER AND OTHERS, 1974, 1975	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL         262       SMITH CREEK VALLEY WELL         263       UNNAMED HOT SPRING         264.1       TWIN SPRING         265.1       UNNAMED SPRING         265.2       LITTLE HOT SPRINGS         266       HOT SPRINGS         267       WALTI HOT SPRINGS         268       SHIPLEY HOT SPRINGS         268       SHIPLEY HOT SPRINGS	CH 19N CH 20N CH 20N CH 17N CH 17N CH 17N CH 17N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 24N LA 24N LA 17N LA 17N LA 12N LA 24N LA 24N EU 24N EU 24N	30E         06           32E         20           32E         20           32E         06           30E         14           30E         34           32E         06           28E         34           32E         06           29         10           43E         27           25E         17           38E         06           40E         36           39E         11           39E         27           43E         27           43E         27           43E         27           43E         27           43E         27           43E         27           44E         34           39E         11           39E         12           43E         34           39E         15           47E         15           44E         33           52E         23	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW SE NW NE SW SE SE NW	39.5433 39.5825 39.3686 39.3561 39.2935 39.2786 39.2935 39.2786 39.2092 39.6392 39.6392 39.6392 39.55767 39.9200 39.4234 39.0537 39.9200 39.4234 39.5588 39.3568 39.3961 39.3951 39.3901 39.3921 39.3923	118.5461         V           118.5547         V           118.5547         V           118.6767         V           118.6767         V           118.6767         V           118.6767         V           118.6763         S           118.6723         V           118.5723         V           118.7232         S           118.7232         S           118.0617         V           118.7333         S           117.6597         V           117.1250         V           117.7400         V           117.5583         S           117.5583         S           117.5467         S           116.6814         S           116.6814         S           116.670         S           116.670         S           116.0733         S	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 22.8 22.1 38.9 34 24.4 29.4 86 231 38.9 34 24.4 29.4 86 86 92 hot hot 72 32.2	128 3785 151 4 189 75	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           1971/12/00         1969/01/02           1959/03/15         1961/08/10	WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Dantil, 1982 "MEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 EVERETT, 1964 EVERETT, 1964 EVERETT, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965 "NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 LITLE HOT SPRINGS 7.5' QUAD WARING, 1965 MARINER AND OTHERS, 1974, 1975 EAKIN, 1062A	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         261       TOM ORMECHEA WELL         263       SMITH CREEK VALLEY WELL         264.1       TWIN SPRING         265.2       LITCLE HOT SPRING         266.1       UNNAMED SPRING         265.2       LITLE HOT SPRINGS         266.4       TOS SPRING         267.5       WITLE HOT SPRINGS         268       HOT SPRINGS         269.7       WALTI HOT SPRINGS	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N CH 20N LA 24N LA 20N LA 17N LA 17N LA 23N LA 24N EU 24N	30E         06         32E         20           32E         20         2	BCB CAC BACD BACB NE SW NW SW SW SW SW SW SW SW NW SE SE NW NW SE SE NW	39.5433 39.5625 39.3666 39.3561 39.2935 39.2786 39.2935 39.2786 39.2092 39.6767 39.6767 39.9577 39.9557 39.9200 39.4234 39.5523 39.5500 39.3500 39.3500 39.3500 39.3901 39.9283 39.3162 39.8937 39.9423	118.5461         W           118.5547         W           118.5547         W           118.5547         W           118.767         W           118.5783         S           118.5783         S           118.5783         S           118.5783         S           118.5723         W           118.7232         S           118.1083         W           118.0637         W           118.0637         W           118.0637         W           118.0637         W           117.1250         W           117.1250         W           117.1250         W           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5583         S           117.5467         S           118.6481         S           118.6481         S           118.5870         S	93.7 25 25.5 77.7 81.1 180.0 hot 88 22.8 21.7 28 23.1 23.9 34 24.4 29.4 86 87.9 9 22 4 29.4 86 87.9 9 22 hot hot 53 22.3 5	128 3785 151 4 189 75 300	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           31         1966/11/21           1971/12/00         1969/04/00           1969/04/00         1959/03/15	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENCIT, 1984 WARING, 1965 EDMISTON AND BENCIT, 1984 WARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Danit, 1982 *NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 *GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 EVERETT, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965 *NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 LITTLE HOT SPRINGS 7.5' QUAD WARING, 1965 MARINER AND OTHERS, 1974, 1975	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.H. STARK WELL         256       HATTON WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         260       spring         281       TOM ORMECHEA WELL         282       SMITH CREEK VALLEY WELL         283       UNNAMED HOT SPRING         284.1       TWIN SPRING         285.2       LITTLE HOT SPRINGS         285.2       LITLE HOT SPRINGS         286.3       HOT SPRINGS         287       WALTI HOT SPRINGS         288       SHIPLEY HOT SPRINGS         289.1       SIRIPLASE         289.2       SULFUR SPRINGS         280.4       SIRIPLASE         281       MARCHER WELL         282       SULFUR SPRINGS         284.3       SHIPLEY HOT SPRINGS	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 17N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 24N LA 24N LA 20N LA 17N LA 23N LA 24N LA 24N EU 24N EU 24N	30E         06         32E         20           32E         20         20E         20E         32E         30E         30E         31E         30E         36E         32E         06         32E         32E         34E         33E         34E         36E         32E         32E	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW NW SE SE NW NW SE SE SW SE SW	39.5433 39.5825 39.3666 39.3561 39.3417 39.2935 39.2786 39.2092 39.6392 39.6392 39.6392 39.6392 39.9200 39.4234 39.9200 39.4234 39.5588 39.3500 39.3961 39.0283 39.3162 39.3941 39.9283	118.5461         V           118.5547         V           118.6547         V           118.6767         V           118.767         V           118.767         V           118.6783         S           118.6783         S           118.7737         V           118.7232         S           118.7233         S           118.0617         V           118.7333         S           117.6597         V           117.1250         V           117.4278         V           117.5583         S           117.5593         S           117.5593         S           117.5487         S           116.6814         S           116.6814         S           116.5870         S           116.0430         V	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 23.7 28 23.1 38.9 34 24.4 29.4 86 warm 87.9 922 hot hot hot 72 33.2 33 3	128 3785 151 4 189 75 300 25500	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           1971/12/00         1969/01/02           1959/03/15         1961/08/10	WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1965 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1983 SDESERT AT COLD SPRING Katzenstein and Dantil, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L. NBMG EVERETT, 1984 EVERETT, 1984 EVERETT, 1985. "NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1974, 1975 WARING, 1985. "NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1979 LITTLE HOT SPRINGS 7.5' QUAD WARING, 1985 MARINER AND OTHERS, 1974, 1975 EAKIN, 1082A HARRILL, 1968	
247       CDPW-44A         248       USFWS WELL 3 NR EAST CAN         249       DR-SW-LY-9-L1         250       CARSON LAKE CORRAL         251       EIGHTMILE FLAT, BORAX SPRING         252       GEOTEHRMAL WELL         253       SPRING         254       LEE HOT SPRINGS         255       E.M. STARK WELL         256       MATTON-WELL NO. 1         257       Stinking Spring         258       Oxbow Geothermal Corp. No. 52-18         259       JAMES LITSTER WELL         261       TOM ORMECHEA WELL         262       SMITH CREEK VALLEY WELL         263       UNNAMED HOT SPRING         264.1       TWIN SPRING         264.1       UNNAMED SPRING         265.2       LITTLE HOT SPRINGS         265.2       LITTLE HOT SPRINGS         265.4       HOT SPRINGS         265.2       SPRING         265.2       SPRING         265.2       SPRING         265.2       SPRINGS         266.4       SPRINGS         267       WALTH HOT SPRINGS         268       SHIPLEY HOT SPRINGS         269.1       SIRI RANCH SPRING, (WATER WELL)	CH 19N CH 20N CH 20N CH 17N CH 16N CH 17N CH 16N CH 17N CH 16N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 21N CH 20N LA 24N LA 20N LA 20N LA 17N LA 23N LA 23N LA 24N EU 24N EU 24N EU 24N EU 24N	30E         04           32E         20           32E         06           30E         14           30E         34           32E         06           32E         10           29         10           43E         27           28E         06           43E         27           43E         36           39E         11           39E         27           43E         34           39E         27           43E         34           39E         27           44E         33           52E         33           52E         23           52E         23           52E         36           52E         36           50E         05	BCB CAC BCAD BACB NE SW NW SW NE SW SW SW SW SE SE NW NW SE SE NW NW SE SE NW	39.5433 39.5625 39.3666 39.3561 39.295 39.2766 39.292 39.6392 39.6392 39.6797 39.1739 39.6767 39.1739 39.6757 39.9200 39.4234 39.6233 39.5588 39.3500 39.3961 39.3981 39.3981 39.39941 39.9947 39.9947 39.9917 39.9917 39.9917 39.9917	118.5461         V           118.5547         V           118.6547         V           118.6767         V           118.767         V           118.6763         S           118.6763         S           118.6783         S           118.5783         S           118.5723         V           118.6783         S           118.723         S           118.003         V           117.6597         V           117.7400         V           117.5503         S           117.75791         S           117.5407         S           118.6814         S           118.6814         S           118.0870         S           118.0870         S           118.0662         S	93.7 25 25.5 77 81.1 160.0 hot 88 22.8 22.8 22.8 23.1 38.9 34 22.4 23.1 38.9 34 24.4 29.4 86 86 warm 87.9 92 hot hot 72 32.2 35 23.3 44.3 24.4 46.7	128 3785 151 4 189 75 300 25500	56.7         1978/04/21           213.4         1989/04/03           0.6         1985/08/20           1987/07/08           2000           1966/11/00           61         1973/03/00           49         1971/08/09           3007         4.6           31         1966/11/21           1971/12/00         1969/04/00           1959/03/15         1961/08/10           1958/02/11         1958/02/11	WATSTORE WATSTORE WATSTORE WATSTORE WARING, 1965 EDMISTON AND BENOIT, 1984 WARING, 1985 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 SDESERT AT COLD SPRING Katzenstein and Danti, 1982 "NEVADA BUREAU OF MINES AND GEOLOGY WARING, 1918 "GARSIDE, L., NBMG EVERETT, 1964 EVERETT, 1964 MARINER AND OTHERS, 1974, 1975 WARING, 1965 "NEVADA BUREAU OF MINES AND GEOLOGY TREXLER AND OTHERS, 1974, 1975 WARING, 1965 MARINER AND OTHERS, 1974, 1975 EAKIN, 1062A HARRINEL, 1968	

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# NAME	CO T R SC	QSEC	NLAT		T TEMP		DEPTH CDATE	REFERENCE	USE
273 BARTHOLOMAE CORP. WATER WELL 274 BARTHOLOMAE CORP. WATER WELL	EU 18N 51E 18 EU 18N 51E 30	SW	39.4367 39.4133		W 23.3 W 22.2	53	204 1972/00/00	RUSH AND EVERETT, 1964	
275-BARTHOLOMAE HOT SPRINGS	EU 18N 50E 28	SE	39:4133		S 54	151	1972/00/00	MARINER AND OTHERS, 1974, 1975	·····
276 UNNAMED WELL	LA 18N 47E 08	SW	39.4033		W 21.7		1975/08/00	RUSH AND EVERETT, 1964	
277 MONITOR VALLEY WELL	LA 18N 47E 20	SE NE	39.3881		W 21.7		1973/10/12	RUSH AND EVERETT, 1964	
278 SPENCER HOT SPRINGS	LA 17N 45.5E 11	NE NE	39.3269		5 72	50	1962/04/28	MARINER AND OTHERS, 1974, 1975	······································
279 UNNAMED WELL	LA 16N 44E 24	NW	39.2375		W 28.9	22.7	36.6 1971/07/10	FIERO, 1968	
280 POTT'S RANCH HOT SPRING	NY 14N 47E 02	NE	39.0783		S 45	125	1972/00/00	MARINER AND OTHERS, 1974, 1975	
281 DIANA'S PUNCH BOWL	NY 14N 47E 22	SE	39.0283		S 59		1972/00/00	MARINER AND OTHERS, 1974, 1975	
282 FISH CREEK SPRINGS	EU 16N 53E 08	BCBB	39.2769		S 19	15129.0	1981/07/17	WATSTORE	
283 THOMPSON RANCH SPRING	EU 23N 54E 03	DBD	39.9008	115.8678	S 21	3600.0	1981/07/14	WATSTORE	
284 WARM SPRINGS RANCH	W 22N 56E 01	NE NE	39.8117	115.6083	S 22.6		1974/02/20	*NEVADA BUREAU OF MINES AND GEOLOGY	
285 WELL AT ALLIGATOR RIDGE	W 22N 57E 25	CCCC	39,7408	115.5119	W 34		200.9 1984/04/24	WATSTORE	
286 BIG BLUE SPRING	W 14N 56E 23		39.0627	115.6412	S warm			WARING, 1965	
287 UNN HOT SP CHERRY CREEK	W 23N 63E 06		39.8950	114.8908	S 61		1974/01/01	WATSTORE	
288 SHELL OIL CO. STEPTOE UNIT NO.1 WELL	W 24N 64E 19	NE NE	39.9433	114.7717	W 151.1		2562	GARSIDE AND SCHILLING, 1979	
289 UNNAMED SPRING	W 24N 65E 31	NE	39.9168	114.6600	S 28	1703		SNYDER, 1963	
290 BORCHERT JOHN (WARM) SPRING	WP		39.7778	114.8497	S 18		1978/08/25	WATSTORE	
291 SHELLBOURNE SPRINGS	W 22N 64E 12		39.7933	114.6883	S 24.6		1972/00/00	*NEVADA BUREAU OF MINES AND GEOLOGY	
292 UPPER SHELLBOURNE SPRING	W 22N 65E 08	SE NW	39.8000	114.6550	S 25	1703	1964/06/28	MIFFLIN, 1968	
293 WELL	W 23N 66E 31	AB	39.8303		W 28.2		1983/07/27	WATSTORE	·····
294 MELVIN HOT SPRING (MONTE NEVA)	W 21N 63E 24		39.6667		S 79			CLARK AND OTHERS, 1920	
295 SPRING, KERN MOUNTAINS	W 21N 70E		39.6891		S warm			WARING, 1965	
296 STEPTOE WARM SPRING	WP		39.5386		S 24		1978/08/25	WATSTORE	
297 MCGILL WARM SPRINGS	W 18N 64E 21	SE NW	39.4150		<u>S 29</u>	17034	1945/08/14	CLARK AND OTHERS, 1920	SWIMMING POOL
298 SCHOOLHOUSE SPRING	W 18N 65E 03	DA	39.4537		S 26	17320.0	1981/07/15	WATSTORE	
299 ELY-LACKAWANNA ZONE - LACKAWANNA HOT SPRINGS	W 16N 63E 03	NE	39.2850		<u>S 35</u>			EAKIN AND OTHERS, 1967	
300 ELY WARM SPRINGS	W 16N 63E 10		39.2683		S 29	83	1975/00/00	CLARK AND OTHERS, 1920	
301 WALLEYS HOT SPRINGS (GENOA HOT SPRINGS)	DG 13N 19E 22	SW NW NE	38.9812		S 81	75		MARINER AND OTHERS, 1974, 1975	SPA
302 WALLEYS HOT SPRING	DG 13N 19E 22	SW NW NE		_	S 63	57	1934/02/07	*WHITE, D., USGS, MENLO PARK	
303 BENSON SPRING - SOUTH OR	DG 12N 19E 26	ACC	38.8747		S 22		1981/06/10	WATSTORE	
304 DOUD SPRING	DG 11N 21E 20	SE SW	38.7950		S 21.1	681.3	1962/07/23	GLANCY AND KATZER, 1975	
305 NEVADA HOT SPRINGS	LY 12N 23E 16	SE	38.8995		S 61	200	1970/07/01	MARINER AND OTHERS, 1974, 1974	
306 AMBASSADOR WELL, ARTESIA LAKE AREA	LY 13N 23E 25	NW SW	38.9567		W 27.8		165 1949/08/09	SCOTT AND BARKER, 1962	······································
307 WELLINGTON WELL	LY 10N 23E 02	NW SE	38.7533		W 47.2		61 1912/09/28	LOELTZ AND EAKIN, 1953	
308 WILSON HOT SPRINGS	LY 11N 25E 34		38.7672		S warm	0		GARSIDE AND SCHILLING, 1979	
309 HOT SPRING 310 GRANT VIEW HOT SPRINGS	LY 12N 25E 34	• • • • •	38.8598		S hot		1077107111	WILSON CANYON 7.5' QUAD	· · · · · · · · · · · · · · · · · · ·
311 DOUBLE SPRING	M 13N 29E 25		38.9900		S 53		1977/05/11	WATSTORE	
312 Deadhorse Wells (dry)	M 13N 29E 20 M 12N 32E 21	··	38.9647 38.8959		S warm W hot		· · · · · · · · · · · · · · · · · · ·	WARING, 1965	
313 WEDELL SPRING NO.1	M 12N 34E 07	sw	38.9191		W hot S 62.2	859	1957/05/25	Miller and others, 1953 EAKIN, 1962C	
314 hot well	NY NY		38.9869		W hot	009	1837/03/23	Mount Annie 7.5'	·····
315 hot drill hole	MN		38.8333		W hot		······	*GARSIDE, L., NBMG	<u> </u>
316 UNNAMED	LY 07N 27E 04	SW SE	38.4917		S 43.3		1966/10/13	DAVIS, 1954; WARING, 1965	
317 CITY OF HAWTHORNE WELL	M 08N 30E 27	sw	38.5200		W 26.7		184 1950/04/26	SCOTT AND BARKER, 1962	
318 WELL NO. 3	M 08N 31E 32		38.5067		W 34		1971/12/29	*WHITE, D., USGS, MENLO PARK	· · · · · · · · · · · · · · · · · · ·
319 U. S. BUREAU OF LAND MANAGEMENT WELL	M 05N 31E 19	NE	38.2800		W 43.3		105 1974/02/18	EVERETT AND RUSH, 1967	<u> </u>
320 BUREAU OF LAND MANAGEMENT NO, 2 WELL	M 03N 31E 07	NE SW	38.1317		W 25.6		20 1953/05/11	VANDENBURGH AND GLANCY, 1970	······································
321 SODAVILLE SPRINGS, SODA SPRINGS	M 06N 35E 29	SE	38.3417		S 35	100	1949/00/00	MARINER AND OTHERS, 1974, 1975	
322 GENE SAWYER WELL	NY 13N 36E 28	NE SW	38.9617		W 54		84 1967/10/06	TREXLER AND OTHERS, 1979	······································
323 GABBS AREA	NY 12N 36E 27	NW	38.8817	the second s	W 47.8		66 1958/02/11	EAKIN, 1962B	MINERAL EXTRACTION?
324 CHARNOCK (BIG BLUE) SPRINGS	NY 13N 44E 16		38.9914		S 26.7	1703	1946/01/30	WARING, 1965	
325 BIG BLUE, CHARNOCK SPRING	NY 13N 44E 32	NE	38.9483		S 32		1962/08/18	TREXLER AND OTHERS, 1979	
326 DARROUGH'S WELL	NY 11N 34E 07		38.8200		W 90.5		244	*NEVADA BUREAU OF MINES AND GEOLOGY	HEAP LEACHING
327 DARROUGH'S NORTH SPRING	NY 11N 34E 07		38.8250		S 71.2		1958/01/27	*NEVADA BUREAU OF MINES AND GEOLOGY	
328 WARM SPRING	NY 08N 38E 12	SW	38.5698		S warm			BLACK SPRINGS 7.5' QUAD	
329 UNNAMED WELL	M 06N 36E		38.3333		W 40		1968/06/00	TREXLER AND OTHERS, 1979	· · · · · · · · · · · · · · · · · · ·
330_hot drill hole_	MN		38.2000	117.9700				*GARSIDE, L., NBMG	·
331 STANLEY A TANNER WELL	NY 07N 40E 28		38.4372		W warm			RUSH AND SCHROER, 1970	
332 INDIAN SPRINGS	NY 07N 42E 34		38.4210		S warm			WARING, 1965	·
333 HALL MINE WELL, ANACONDA MOLYBDENUM PROJECT	NY 05N 42E 07		38.3083		S 27.7		1954/09/04	*NEVADA BUREAU OF MINES AND GEOLOGY	
334 WELL	NY 02N 43E 01	ACB	38.0650		W 28		1967/05/08	WATSTORE	
335.1 WELLS	NY 12N 47E 20		38.8704		W hot			MOSQUITO CREEK 7.5' QUAD	
335.2 BELMONT MINE, 1500 FT LEVEL	NY 03N 42E 36		38.0750	117.2217			457 1964/10/23	BASTIN AND LANEY, 1918	
336 MOSQUITO RANCH SPRINGS	NY 11N 47E 06	SE NE	38.8250		S 31.6		1941/07/03	*NEVADA BUREAU OF MINES AND GEOLOGY	
337 SPRING	NY 10N 49E 22	CAA	38.6972		S 40		1967/05/10	WATSTORE	
338 TEST HOLE UCE-10	NY 10N 49E 22	CAA	38.6878		W 48		903.1 1967/08/03	WATSTORE	
339 SPRING	NY 08N 49E 21	CDC	38.5361		S 35		1967/07/31	WATSTORE	
340 OLD DUGAN PLACE HOT SPRING	NY 08N 49E 25	NW NE	38.5300		S 38.1		1975/08/20	GARSIDE AND SCHILLING, 1979	

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# NAME	COTRSC	QSEC	NLAT	WLONG	T TEMP	FLOW	DEPTH CDATE	REFERENCE	USE
341 HOT CREEK RANCH SPRING	NY 08N 50E 29	SE SE	38.5200	116.3600	S 62.8	2888	1957/05/13	SANDERS AND MILES, 1974	
342 HOT CREEK VALLEY SPRING	NY 07N 51E 30		38.4367	116.2767	S 61.1			WARING, 1965	
343- WARM-SPRING-	NY-06N =47E -= 38-			- 116.6600	S 26.1	19	1948/01/26	FIERO, 1968	
344 SALISBURY SPRING	NY 05N 46E 28	SW SE	38.2533		S 30		1950/01/05	GARSIDE AND SCHILLING, 1979	<u></u>
345 SPRING	NY 05N 46E 33	CD	38.2389		S 21		1967/07/30	WATSTORE	
346 UPPER? MUD SPRING	NY 04N 46E 26	CA	38.1722	116.7917	S 25.5		1967/07/30	WATSTORE	
347 SPRING 348 SPRING	NY 04N 47E 29	10	38.1722		<u>S 25</u>		1967/07/27	WATSTORE	•
348 SPHING 349 WARM SPRINGS	NY 02N 47E 14 NY 04N 50E 20	AC SW	38.0278		<u>S 29</u>		1967/07/28	WATSTORE	
350 SPRING	the second s	D	38.1867		S 63	170	1007/00/00	*WHITE, D., USGS, MENLO PARK	••••••••••••••••••••••••••••••••••••••
350 SPRING	NY 02N 51E 02 NY 02N 50E 28	ACC	38.0472		\$ 22 \$ 25		1967/08/03	WATSTORE	
352.1 DUCKWATER AREA	NY 13N 56E 32		37.9944 38.9508	<u> </u>	S 25 S 33.9		1967/08/02 1950/04/26		AQUACULTURE
352.2 WILLIAMS HOT SPRINGS	W 13N 60E 33	NE	38.9533		S 51.8		1976/11/10	GARSIDE AND SCHILLING, 1979 *NEVADA BUREAU OF MINES AND GEOLOGY	AGOACOLIONE
353 PRESTON SPRINGS	W 12N 61E 02	SW NE	38.9308		S 22.7		1954/07/31	*NEVADA BUREAU OF MINES AND GEOLOGY	
354 BIG SPRING	NY 08N 55E 15	AC	38.5528		S 38	· · · · ·	1967/08/07	WATSTORE	
355 BLUE EAGLE SPRINGS	NY 08N 57E 11	DDB	38.5631		S 29	7030.0	1981/07/17	WATSTORE	· · · · · · · · · · · · · · · · · · ·
356 MOORMAN SPRING	NY 09N 61E 32	DABC	38.5947		S 37	1294.0	1981/07/18	WATSTORE	
357 EMIGRANT SPRING	W 09N 62E 19	AC	38.6250		S 19.5	5247.0	1981/07/18	WATSTORE	
358 FLAG SPRING NO 3	NY 07N 62E 33	BCCC	38.4214	115.0222	S 22.8	5247.0	1984/01/17	WATSTORE	
359 BUTTERFIELD (FLAG, SUNNYSIDE) SPRINGS	NY 07N 62E 28	NE	38,4450		S 23.9	7571	1960/09/26	WARING, 1965; MAXEY AND EAKIN, 1949; ADAMS, 1944	
360 HOT CREEK RANCH SPRINGS	NY 06N 61E 18		38.3817		S 26.7		1960/11/08	EAKIN, 1966	
361 MOON RIVER SPRINGS	NY 06N 60E 25	BDAD	38.3517	115.1808	S 32.5		1982/04/27	WATSTORE	
362 Bacon Flat 24-17 oil well	NY 07N 57E 17		38.4600		W 113	·······	1653	Hulen and others, 1994	
363 CHIMNEY HOT SPRINGS	NY 07N 55E 16	DC	38.4633	115.7900	S 60		1967/08/07	WATSTORE	
364 SPRING	NY 06N 54E 11	c	38.3889	115.8694	S 45		1967/08/07	WATSTORE	
365 SPRING	NY 06N 54E 24	CA	38.3639		S 46			WATSTORE	
366 GEYSER RANCH SPRINGS	LI 09N 65E 01		38.6750	114.6233	S 18	189	1979/11/15	CARPENTER, 1915	·····
367 LOWER PONY SPRING	LI 05N 66E 05	CBCC	38.3197		S 20		1981/07/23	WATSTORE	······
368 HAMMOND RANCH AREA	LI 05N 69E 17		38.2967	114.2733	S 28.9		1967/10/16	CARPENTER, 1915; WARING, 1965	
369 SAND SPRING	ES 01N 34E 27	SE SE	37.9053	118.1732	S 23.3			RUSH AND KATZER, 1973	
370 FISH LAKE VALLEY	ES 02N 36E 28	SW SW S	37.9931	117.9848	S 27.2	4	1978/08/03	*NEVADA BUREAU OF MINES AND GEOLOGY	
371 GAP SPRING	ES 02N 36E 32	SW SE	37.9797	117.9927	S 23	38	1975/08/00	VANDENBURGH AND GLANCY, 1970	
372 EMIGRANT WELL	ES 01N 38E 06	NW	37.9717	117.8067	W 25		1970/10/07	TREXLER AND OTHERS, 1979	
373 FISH LAKE VALLEY WELL	ES 01N 36E 20	015	37.9233	118.0058	W 25		1965/07/12	RUSH AND KATZER, 1973	
374 R.G. PENNEBAKER WELL	ES 01S 35E 09	SW SW	37.8640	118.1015	W 23.3		91 1961/12/13	RUSH AND KATZER, 1973	
375 NEVADA OIL AND MINERALS VRS NO. 1 WELL	ES 01S 36E 16	SW NE NE	37.8567	117.9800	W 158.8		2797	GARSIDE AND SCHILLING, 1979	
376 FISH LAKE VALLEY	ES 01S 36E 19	NE	37.8425	118.0150	W 25		1961/07/20	*DESERT RESEARCH INSTITUTE, 1973	
377 FISH SPRING	ES 02S 35E 25	NW SW	37.7425	118.0457	S 24			RUSH AND KATZER, 1973	
378 Gradient well 42-7	ES 01S 36E 07		37.8720		W 47.5	757	301	*NEVADA BUREAU OF MINES AND GEOLOGY	
379 SILVER PEAK HOT SPRINGS, WATERWORKS SPRINGS	ES 02S 39E 15	SE SE	37.7600		S 34.2	1892		WARING, 1965	
380 PEARL HOT SPRINGS	ES 01S 40E 25		37.8222		S 36.7		1963/04/15	*DESERT RESEARCH INSTITUTE, 1973	
381 ALKALI HOT SPRINGS	ES 01S 41E 26	NE	37.8267		S 50.5	95		*WHITE, D., USGS, MENLO PARK	
382 SARCOBATUS FLAT AREA	NY 07S 44E 28	NW SW	37.2967		W 22.2		62	MALMBERG AND EAKIN, 1962	
383 NONE GIVEN	ES 11S 43E 06	NW	37.0162		S 25			*DESERT RESEARCH INSTITUTE, 1973	
384 FISHLAKE LIVESTOCK Co. WELL	ES 01S 39E 05		37.8767		W hot		50.3	RUSH AND SCHROER, 1970	
385 CEDAR SPRING	NY 02S 51E 21	SE	37.7508		S 25	9		VANDENBURGH AND RUSH, 1974	
386 CLIMAX SEEP	NY		37.2244		W 41.5		1978/03/07	WATSTORE	
387 TIPPIPAH SPRING NO 2	NY		37.0433		S 22	<u></u>	1979/06/19	WATSTORE	
388 YUCCA FLAT TEST WELL 84-69,(TEST WELL E)	NY		37.0550		W 42.2		572 1957/09/02	SCHOF F AND MOORE, 1964	
389 YUCCA FLAT WELL 79-69A, TESTWELL C	NY		36.9950		W 37.2		519 1916/10/10	SCHOFF AND MOORE, 1964	
390 SARCOBATUS FLAT-BEATTY AREA	NY 09S 46E 35	NE	37.1142		W 22.2		4444	MALMBERG AND EAKIN, 1962	
391 SPRING	NY 01N 56E 35	DD	37.8986		<u>S 21</u>	·····		WATSTORE	
392 SAND SPRING	LI 02S 55E 26 LI 03S 55E 19		37.7400		S 30	1	1927/08/05	VANDENBURGH AND RUSH, 1974 VANDENBURGH AND RUSH, 1974	
393 N. J. GUNDERSON WELL		SE SE	37.6692		W 28.3				
394 G.C. ENGLEMAN WELL	LI 04S 55E 08		37.6188		W warm		76.3	VAN DENBURGH AND RUSH, 1974	
395 HIKKO SPRING AREA 396 CRYSTAL SPRINGS AREA	LI 04S 60E 14 LI 05S 60E 10	•	37.5975		<u>\$ 26.7</u> <u>\$ 27.2</u>	11167	<u>1950/04/26</u> 1954/09/04	COHEN, 1966	
	LI 065 61E 06	NW NW N				20004	1945/07/30		(SPA)
397 ASH (ALAMO) SPRINGS AREA	LI 065 61E 06	1444 1494 P4	37.4600	115.1867	S 31.1 S 21	32894	1945/07/30		(OF M)
399 FLATNOSE SPRING	L 01N 69E 35	cc	37.8961	114.2258	S 25		1985/04/08		· · · · · · · · · · · · · · · · · · ·
400 DELMUE'S SPRINGS AREA, TWO SPRINGS.	LI 01S 68E 13		37.8558		<u>5</u> 21.1	757	1903/04/00	HARDMAN AND MILLER, 1934	
401 PANACA WARM SPRINGS AREA	LI 025 68E 04		37.8083	114.3800	S 29.5	18472	1040/06/00	RUSH, 1964	
402 BENNETT SPRING	LI 023 68E 04	CD	37.7842	114.5281	<u>5</u> 28.5 5 24	10472		WATSTORE	
402 BENNETT SPRING 403 CALIENTE MINERAL SPRING, CALIENTE HOT SPRINGS	LI 04S 67E 08	NE	37.6217	114.5033	S 47.8		1962/07/29		(SPACE HEATING)
404 AQUA CALIENTE WELL NO. 3	LI 045 67E 08	NW NW	37.6283		W 67	5299	27 1970/10/07	TREXLER AND OTHERS, 1979	SPA
405 HICKS (BURRELL) HOT SPRINGS	NY 11S 37E 21		36.9667		S 38	19	1978/08/18		<del>,</del>
406 BEATTY MINERAL SPRINGS	NY 125 47E 05	SW	36.9167		S 24.4	379		SCOTT AND BARKER, 1962	
407 TW- F WELL	NY 145 52E		36.7594	· · · · · · · · · · · · · · · · · · ·	W 64	883.0	1036.0 1980/03/12	WATSTORE	
408 WELL	NY 15S 50E 25	8D	36.6208	116.4125			32.0 1973/04/03		

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AMAGE         CO         T         B         CO         CO         T         B         CO         VLANG         T         TEUP         FLOW         DEFTH         CDATE         REFERENCE         USE           40         CARDBANKS SPRING         MT 165         See 57         GEN         SA574         118.3623         See 77         See 77 <th></th>	
410         ARABANKS SPRING         NY 175         50E         92         92.4473         15.4333         5         27.2         193402/16         NAFF, 1973           411         ADORGS SPRINGS         NY 175         50E         22         NEW NE         36.4473         115.3203         5         27.4         1996060/0         DUELY AND LARSCN, 1970           413         LUNAGKS SPRING         NY 175         50E         25         NEW NE         36.4473         115.3203         5         27.4         1996060/0         NAFF, 1973           414         SCHUGES SPRING         NY 175         50E         25         55 EW NE         36.4471         110.2685         3         1990060/0         NAFF, 1973           414         SCHUGE         NY 175         50E         35         SW WE EW A6427         110.2685         3         1990060/0         NAFF, 1973           415         DERUS AGRIS FAING         NY 175         50E         35         SW WE EW A6427         110.2685         33         1990060/0         NAFF, 1973           415         DERUS AGRIS FAING         NY 155         56         67.4427         110.2605         33         1990060/0         NAFF, 1973           416         DERUS AGRIS FAING	£ .
441       COOGERES SPRINGS       NY 173       Del 5       NY 175       Del 71       Set 473	
112       LONGSTREET SPINIG       NY 178       SOE       22       NK NK W W       50 4643       110.3200       5       27.8       1960/02/10       NK FL 1/072         141       LUNANAUK       NY 178       SOE       36 W RE W W       56 4431       110.3207       5       30       1960/02/10       NKFT, 1/073         141       DEVLIS FRING       NY 178       SOE       36 W RE W W       36 4497       110.3207       5       30       1960/02/10       NKFT, 1/073         141       DEVLIS FRING       NY 168       SIE       07       NW SE       36.407       110.3207       5       30       1960/02/10       NKFT, 1/073         141       DECLIS APRING       NY 168       SIE       07       NW SE       36.307       110.2777       5       40       1960/02/10       NKFT, 1/073         141       DIG SPRING, SAH MEADOWS SPRING; DEEP SPRING       NY 168       SIE       08.307       110.2777       5       40       1967/02/15       NKFT, 1/073       170         142       DIG SPRING, SAH MEADOWS SPRING; DEEP SPRING       NY 168       SIE       07       NK 168       SIE       07       NK 168       SIE       07       NK 168       SIE       07       NK 168       S	
113       UNNAMED SPRING       NY 175       Sole       26       SW NE NW 80.468.1       110.3133       6       77       196.000/12       NAFF, 1973         141       SCHUGS SPRING       NY 175       Sole       36       SE 59 WI Se       36.4017       110.2003       5       33       196500017       NAFF, 1973         141       DOILY FOCK (MIG) SPRING       NY 185       Sie       6       SW 20       36.4017       110.2017       5       32       196200070       NAFF, 1973         141       DOILY FOCK (MIG) SPRING       NY 185       Sie       6       SW 207       110.2017       5       30       1972000       DUILST AND LAISON, 1978         141       DIOLSTRING, SAH MEZADOWS       NY 185       Sie       0       SK 200       110.2017       X       26       19791215       MAFF, 1973       X       19920000       DUILST, NAD LAISON, 1978         142       DEVISTAL SPRING       NY 185       Sie       20       SK 200	. 27. 1
41 & SCRUGGS SPRING       NY 175       905       35       95       96       900 (000)       NAFF, 1973         415       DEVIT OF ROCK (NING) SPRING       NY 155       91       90 (000)       NAFF, 1973         416       DEVIT OF ROCK (NING) SPRING       NY 155       915       94,499       110,2977       5       32       4399       196400/13       HUGHES, 1965,MIFFLIN, 1988         417       JACK ARABET SPRING       MY 155       916       66 RW SE       88,3907       110,2717       5       32       1967/02/00       UDLEY AND LARSON, 1978         418       DIGS SPRING, ASH MEADOWS SPRING, DEEP SPRING       NY 165       50       30       1970/12/15       NAFF, 1973         419       CHSTAL, SPRING       NY 165       50       0       NE SE WW       36.3377       116,2717       S       30       1970/12/15       NAFF, 1973         410       CHSTAN SPRING       NY 165       50       20       NE SE WW       36.338       116,2177       S       30       1970/12/15       NAFF, 1973         410       USGS TRACEH WELL       NY 115       50       60       CDB       38.481       118.491       30       1970/12/15       NAFF, 1973       30       1970/12/16       NATSI CORE<	
415       DEVIL'S HOLE       NY 12       Sole       38       98 / 35 / 33       1995/00/75       NAFE, 1973         416       PONT OF ROCK (KNG) SPRING       NY 18       Sole       34 / 40 / 11 / 1277       S       28       1996/2016       NAFF, 1973         417       JACK FABBIT SPRING       NY 18       Sie       65 / 60 / 77       S       28       1996/2016       NAFF, 1973         418       BIO SPRING, SEM MACOWS SPRING, DEEP SPRING       NY 18       Sie       98 / 77       110 / 277       S       28       1997/02/06       NAFF, 1973         419       CHYSTAL SPRING       NY 185       Sie       27       N E NE NW       36 / 330       110 / 3200       S       30       1997/02/06       NULEX ND L/RSCM, 1970         421       CHERN YF ATCH WELL       NY 165 / 516 / 506       CO / 50 / 506	
410       POINT OF ROCK KINKIG SPRING       NY 16       51:       07       NW 5E       38.3767       110.2717       S       32       4399       1994/04/13       HUFFES, 1995; MIFFEN, 1996         417       JACK RABDIT SPRING       MEAD CASES       Search       110.2717       S       32       1994/04/13       HUFFES, 1995; MIFFEN, 1996         418       BIG SPRING, ASH MEAD CASES SPRING; DEEP SPRING       NY 165       Site       19       Site       19       Site       19       Site       19       Site       10 <td></td>	
117       JACK RABBIT SPRING       NY 185       SEE       16       SE NY SEE       392 and 7       116 2717       S       25       19710200       DUDLEY AND LARSON, 1976         118       BIO SPRING       NY 185       SEE       10       SW RE       38.03 and 7       116 2717       S       25       19710200       DUDLEY AND LARSON, 1976         420       USGS TAGES MELL 2       NY 185       SEE       03       ALSE NUMBER       38.4163       116.2017       W       30.0       1980/0723       DUDLEY AND LARSON, 1976         420       USGS TAGES MELL 2       NY 185       SEE       W       36.4163       116.2017       W       30.0       1980/0723       UDLEY AND LARSON, 1976         420       USGS TAGES MELL 2       NY 185       SEE       W       30.6117       115.6683       S       26.1       5675       1960/0731       HADMAN AND MILLER, 1934         421       MANSE RANCH SPRING       NY 215       SEE       30.2177       115.6783       S       25       1960/0731       HADMAN AND MILLER, 1934         428       PARITUMP SCOMUNITY CHURCH WELL       NY       SEE       30.2075       115.6783       S       25       1960/0731       HADMAN AND MILLER, 1934         429	
118       BIG SPRING, ASH MEADOWS SPRING; DEEP SPRING       NY 165       51E       19       SW NE       39.3767       119.2717       S       28       1971/02/00       DUDLEY AND LARSON, 1976         419       CRYSTAL SPRING       NY 165       51E       27       NE BE NW       36.3861       116.2017       % 0.6       1968/0262       DUDLEY AND LARSON, 1976         421       CHERRY PATCH WELL       NY 175       52E       60       CDB       36.4141       116.2017       % 0.6       1968/0262       DUDLEY AND LARSON, 1976         421       CHERRY PATCH WELL       NY 175       52E       60       CDB       36.4141       116.2017       % 0.6       55.15       1546       1967/01/10       CARPENTER, 1915         422       INDIAN SPRING       NY 215       54E       03       52F.15       1546       1977/01/10       CARPENTER, 1914         424       PARIDUMP POMUNITY CHURCH WELL       NY       36.2211       115.9783       S       25       1985/02/18       WATSTORE       1943         427       PAGD PAGO BAR WELL       CL       20       56.1       1976/01/10       WATSTORE       1945       1976/01/10       WATSTORE         427       PAGD PAGO BAR WELL       CL       20       <	
110       CHYSTAL SPRING       NY 185       Sofe       01       NY 185       Sofe       01       NY 185       Sofe       02       NK 55       NK 55       1086/02/15       NAFF, 1973         420       UGST RACER WELL       NY 185       Sofe       02       NK 111       116.4300       %       30.6       1086/02/15       NAFF, 1973         420       CHERRY PATCH WELL       NY 175       Sofe       03       64.11       116.4302       %       27.5       85.5       15090/02/14       NATSTORE         421       CHERRY PATCH WELL       NY 125       Sofe       03       64.11       116.4833       %       27.5       85.5       15090/02/14       NATSTORE         422       CHARUMP SPRINGS       NY 215       Sofe       136.8075       115.8883       \$       28       144.21       10970/02/15       NATSTORE         428       PARHOUNP SPRINGS       NY 215       Sofe       11       56.87       114.890       28       104       1090/03/11       HADMAN AND MILLER, 1934         429       PAROD KARMING       CL 205       Sofe       36.1742       115.4780       Sof       104.090/03/11       HADMAN AND MILLER, 1934         420       PAROD KARSPRING       CL 20	
420       USGS TRACER WELL 2       NY 165       51E       27       NE NE NW       36.5383       116.2317       W       30.6       1960/06/25       DUDLEY AND LARSON, 1978         421       CHERRY PATCH WELL       NY 175       526       60       CDB       36.414       116.482       W       27.5       1564       1567       1546       15675       1546       15675       1547       1647       1667       1577       16777       16777       16777       16777       16777       16777       16777       16777       16777       16777       167777       167777       167777       1	
421       CHERNY PATCH WELL       NY 175       526       08       CDB       36.4914       116.1492       W       27.5       66.5       1990/06/24       WATSTORE         422       INDIAN SPRING       CL 165       566       36.517       115.6883       5       28.1       5675       1946       1997/06/16       HARDMAN AND MILLER, 1934         424       PAHRUMP SPRINGS       NY 205       585       14       SE E ME       38.1577       115.8883       S       28.1       1970/07/16       HARDMAN AND MILLER, 1934         424       PAHRUMP SPRINGS       NY 205       585       14       SE E ME       38.1742       115.9783       S       25       1940       1992/06/10%       WATSTORE         427       PAGO PAGO BAR WELL       CL 205       585       38.1742       115.4786       S       25       1940       1982/07/16       WATSTORE         427       PAGO PAGO BAR WELL       CL 205       616       31       38.1445       115.4786       S       26       1982/02/16       WATSTORE         428       LAV Vegas Springs       CL 205       616       31       38.1445       115.498       W 29       644       120       1972/02/13       MAXEY AND JAMESON, 1944	······
422       INDIAN SPRING       CL 165       56E       36.5617       115.6683       \$       28.1       5875       1546       1967/11/10       CARPENTER, 1915         422       MANSE RANCH SPRINGS       NY 205       54E       0.3       SE NE       36.557       115.6886       \$       26       4542       197708/18       HARDMAN AND MILLER, 1934         425       PAHRUMP SPRINGS       NY 205       55E       14       SE SE       36.207       115.7983       2       197708/18       HARDMAN AND MILLER, 1934         425       PAHRUMP SCMMUNIT CHURCH WELL       NY       36.2117       115.8886       5       198509/02       WATSTORE         427       PAGO PAGO BAR WELL       CL       36.23117       115.0631       W       28       61.0       198206/16       WATSTORE         428       LAV Egas Springa       CL 205       61E       03       NE NE SW       36.0633       115.1663       W       28       61.0       198206/16       WATSTORE         430       GLADSTORE CORPCARTION WELL       CL 225       61E       0       NE NE SW       30.6003       115.1463       W       33.3       1609       99       197300(00       MAXEY AND JAMESCON, 1948         431       T.	
422       MANSE RANCH SPRINGS       NY 215       54E       03       SE NE       36.1557       115.8886       S       25       4542       1976/09/18       HARDMAN AND MILLER, 1934         424       PAHRUMP SPRINGS       NY 205       53E       14       SE BL       36.2075       115.9783       S       25       1440       1960/06/31       HARDMAN AND MILLER, 1934         426       PAHRUMP COMMUNITY CHURCH WELL       NY       36.2075       115.9783       S       25       1985/06/31       WARDMAN AND MILLER, 1934         428       PARTMUMP COMMUNITY CHURCH WELL       CL       36.1742       115.4786       S       25       1985/06/28       WATSTORE         429       PAGD DAR WELL       CL       36.1742       115.4786       S       26       10982/05/16       WATSTORE         429       H. NICKERSON WELL       CL       22       61E       30       NE NES W       36.0633       115.1669       S       26.1       5015       Scott and Barker, 1982         420       H. NICKERSON WELL       CL 225       61E       10       NE SW       36.0633       115.043       W       33.1       1000       MAXEY AND JAMESON, 1948         430       GLADSTONE CORPORATION WELL       CL 225	
424       PAHRUMP SPRINGS       NY 205       552       14       SE SE       36.2075       115.9783       S       25       1840       1990/06/31       HARDMAN AND MILLER, 1834         425       PAHRUMP COMMUNITY CHURCH WELL       NY       36.2171       115.9783       S       25       1940       1997/60/1/09       WATSTORE         426       WHTE ROCK SPRINGG       CL 205       S6E       38.1742       115.4786       S       25       1996/07/20       WATSTORE         427       PAGO PAGO BAR WELL       CL       CL       38.2817       115.0783       W 28       61.0       1982/05/16       WATSTORE         428       Las Vegas Springs       CL 205       61E       03       NE NESW       30.033       115.468       W 28       644       120       1972/02/13       MAXEY AND JAMESON, 1946         430       GLADSTONE CORPORATION WELL       CL 228       61E       0       NE ENW       30.0604       115.468       W 33.3       1609       99       1973/00/00       MAXEY AND JAMESON, 1946         431       T.A. WELLS WELL       CL 128       63E       29       DABB       36.8764       114.9456       W 34       1986/02/05       WATSTORE         432       VF-2 WELL	
425       PAHRUMP COMMUNITY CHURCH WELL       NY       36.211       115.488       V       27       1976/01/09       WATSTORE         426       WHTE ROCK SPRING       CL 205       56E       38.1442       115.4786       5       25       1995/09/26       WATSTORE         427       PAGO DAN WELL       CL       CL       205       61E       31       36.1645       115.1639       W       28       61.0       1982/09/26       WATSTORE         428       Las Vegas Springs       CL 205       61E       31       36.1645       115.1689       S       26.1       5015       Scott and Barker, 1982         429       H. NICKERSON WELL       CL 225       61E       03       NE NE SW       36.0603       115.1458       W       29       644       120       1972/00/0       MAXEY AND JAMESON, 1948         431       T.A. WELLS       WELL       CL 225       62E       01       SW NW S       36.0608       115.043       W       32.8       346       MAXEY AND JAMESON, 1948         432       VF-2 WELL       CL 126       63E       23       DA 85 RW       35.5       20.3.9       1981/07/22       WATSTORE         433       FUGROCOYOTE VDEP WELL       CL 136       <	
428         WHITE ROCK SPRING         CL 203         58E         38.1742         115.4786         \$         25         1985/06/26         WATSTORE           427         PAGO PAGO BAR WELL         CL         38.2361         115.0531         W         28         61.0         1982/05/18         WATSTORE           428         Las Vegas Springs         CL 205         61E         31         38.1642         15.1699         28.1         5015         Scott and Barker, 1982           429         Las Vegas Springs         CL 205         61E         31         38.1645         15.1689         29         644         120         1972/02/13         MAXEY AND JAMESON, 1948           430         GLADSTONE CORPORATION WELL         CL 225         61E         10         SV NW         36.0600         15.043         W         33.3         1609         99         1973/000         MAXEY AND JAMESON, 1948           431         T.A. WELLS         WELL         CL 225         61E         30         86.760         114.9456         W         33.5         28.4         140.070/20         MAXEY AND JAMESON, 1948           432         FUGRO COYOTE V DEEP WELL         CL 135         63E         29         DABB         36.7761         114.8922	
428       WHITE ROCK SPRING       CL 20S       58E       38.1742       115.4786       S       25       1985/06/26       WATSTORE         427       PAGO PAGO BAR WELL       CL       36.104       115.0531       W       22       61.0       1982/05/18       WATSTORE         427       PAGO PAGO BAR WELL       CL 20S       61E       31       36.1645       115.0531       W       22       61.0       1982/05/18       WATSTORE         429       H. NICKERSON WELL       CL 20S       61E       31       NE NE SW       36.0630       115.1458       W       23       644       120       1972/02/13       MAXEY AND JAMESON, 1948         430       GLADSTONE CORPORATION WELL       CL 22S       61E       10       NE SE NW       36.0600       115.1483       W       33.3       1609       99 J973/000       MAXEY AND JAMESON, 1948         431       T.A. WELLS WELL       CL 12S       62E       01       SW NW       36.0600       115.043       W       35.5       20.3       140       MAXEY AND JAMESON, 1948         433       FUGRO COYOTE V DEEP WELL       CL 13S       64E       35       ACAA       36.766       114.8922       W       35.5       224.7       1986/02/05       <	
427       PAGO PAGO BAR WELL       CL       36.2361       115.0531       W       28       61.0       1982/05/18       WATSTORE         428       Las Vegas Springs       CL 205       61E       31       36.1645       115.1699       S       28.1       5015       Scott and Barker, 1992         429       H. NICKERSON WELL       CL 225       61E       03       NE NE SW       36.060       115.1483       W       33.3       1609       99       1973/00/00       MAXEY AND JAMESON, 1948         430       GLADSTONE CORPORATION WELL       CL 225       62E       01       SW NW S       36.0600       115.1483       W       33.3       1609       99       1973/00/00       MAXEY AND JAMESON, 1948         431       T.A. WELLS WELL       CL 235       62E       01       SW NW S       36.0600       114.962       W       32.8       348       MAXEY AND JAMESON, 1948         432       VF-2WELL       L1       128       63E       23       DD       36.7956       114.9450       W       34.5       20.3.9       1981/07/22       WATSTORE         433       FUGRO COYOTE V DEEP WELL       CL 135       63E       23       ACDA       36.7956       114.8920       W 41       237.7	
428       Las Vegas Springs       CL 205       61E       31       36.1645       115.1899       S       28.1       5015       Scott and Barker, 1982         429       H. NICKERSON WELL       CL 225       61E       03       NE NE SW       36.0630       115.1456       W       29       644       120       1972/02/13       MAXEY AND JAMESON, 1946         430       GLADSTONE CORPORATION WELL       CL 225       61E       10       NE SE NW       36.0630       115.1483       W       33.3       1609       99       1973/00/00       MAXEY AND JAMESON, 1946         431       T.A. WELLS WELL       CL 225       62E       01       SW NW       36.0660       115.1483       W       33.4       1986/02/05       WATST AND JAMESON, 1948         432       FUGRO COYOTE V DEEP WELL       CL 135       63E       23       DA       36.7866       114.9452       W       34.5       203.9       1981/07/22       WATST ORE         434       USGS-MX CE-DT-6       CL 145       63E       28       ACDC       36.6908       114.9450       W       41       237.7       1986/0/205       WATST ORE         434       USGS-MX CE-DT-6       CL 145       65E       14       MARC AND       33.5	<u></u>
429       H. NICKERSON WELL       CL 22S       61E       03       NE NE SW       36.0633       115.1456       W       29       644       120       1972/02/13       MAXEY AND JAMESON, 1948         430       GLADSTONE CORPORATION WELL       CL 22S       61E       10       NE SE NW       36.0600       115.1463       W       33.3       1609       99       1973/00/00       MAXEY AND JAMESON, 1948         431       T.A. WELLS WELL       CL 22S       62E       01       SW NW S       36.0608       115.043       W       32.8       346       MAXEY AND JAMESON, 1948         432       VF-2 WELL       LI       12S       63E       23       DABB       36.6760       114.9456       W       34       1986/02/05       WATSTORE         434       USGS-MX CE-DT-6       CL 135       64E       35       ACAA       36.7678       114.7869       W       33.5       264.7       1986/09/28       WATSTORE         435       CSV-3       CL 145       65E       18       NW NE 18.6.707       114.7152       S       32.2       12250       1950/08/27       EAKIN, 1964; MIFFLIN, 1968         437       IVERSON SPRING       CL 145       65E       18       NW WE 18.6.7097       114.7	
430       GLADSTONE CORPORATION WELL       CL 225       61E       10       NE SE NW       36.0600       115.1483       W       33.3       1809       99       1973/00/00       MAXEY AND JAMESON, 1948         431       T.A. WELLS WELL       CL 225       62E       01       SW NW S       36.0608       115.043       W       32.8       346       MAXEY AND JAMESON, 1948         432       VF-2 WELL       L1       125       63E       29       DABB       36.8750       114.9456       W       34       1986/02/05       WATSTORE         433       FUGRO COYOTE V DEEP WELL       CL 135       64E       35       ACAA       36.7676       114.9456       W       33.5       204.9       1986/02/05       WATSTORE         434       USGS-MX CE-DT-6       CL 145       65E       28       ACDC       36.6908       114.9250       W       41       237.7       1987/10/07       WATSTORE         435       FUGRO COYOTE V DEEP WELL       CL 145       65E       18       NW SW NE       36.0609       114.9250       W       41       237.7       1987/10/07       WATSTORE         435       UARM SPRING       CL 145       65E       21       NW NE NE       36.029       114.71	<u></u>
431       T.A. WELLS WELL       CL 225       62E       01       SW NW S       36.0608       115.0043       W       32.8       346       MAXEY AND JAMESON, 1948         432       VF-2 WELL       L1       125       63E       29       DABB       36.8750       114.9456       W       34       1998/02/05       WATSTORE         433       FUGRO COYOTE V DEEP WELL       CL 135       64E       35       DD       36.7956       114.9456       W       33.5       203.9       1991/07/22       WATSTORE         434       USGS-MX CE-DT-6       CL 135       64E       35       ACAA       36.7956       114.9220       W       33.5       284.7       1986/09/28       WATSTORE         435       CSV-3       CL 145       63E       28       ACDC       36.690       114.9250       W       41       237.7       1987/10/2       WATSTORE         436       WARM SPRING       CL 145       65E       18       NW WN E       36.7097       114.7142       S       31.6       3940       1995/05/19       EAKIN, 1964         437       IVERSON SPRING       CL 155       69E       14       BAA       36.6369       114.9475       S       26       1985/05/19	
432       VF-2 WELL       LI       125       63E       29       DABB       36.8750       114.9456       W       34       1986/02/05       WATSTORE         433       FUGRO COYOTE V DEEP WELL       CL       135       63E       23       DD       36.8750       114.9456       W       35.5       203.9       1981/07/22       WATSTORE         434       USGS-MX CE-DT-6       CL       135       63E       23       DD       36.7676       114.9892       W       33.5       284.7       1986/09/28       WATSTORE         435       CSV-3       CL       145       64E       35       ACAA       36.7077       114.7169       W       33.5       284.7       1986/09/28       WATSTORE         436       WARM SPRING       CL       145       65E       16       NW SW NE       36.7097       114.7142       S       31.6       3840       1986/01/25       WATSTORE         437       VERSON SPRING       CL       145       65E       21       NW NE NE       36.7097       114.7142       S       31.6       3840       1986/01/25       WATSTORE         439       DAY LAKE       CL       155       69E       14       BAA       36.63	
433       FUGRO COYOTE V DEEP WELL       CL 133       83E       23       DD       36.7966       114.8922       W       35.5       203.9       1981/07/22       WATSTORE         434       USGS-MX CE-DT-6       CL 133       64E       35       ACAA       36.7676       114.7869       W       33.5       284.7       1986/09/28       WATSTORE         435       CSV-3       CL 145       63E       28       ACDC       36.6908       114.9250       W       41       237.7       1987/10/07       WATSTORE         436       WARM SPRING       CL 145       65E       16       NW SW NE       36.7222       114.7152       S       32.2       1925/09/27       EAKIN, 1964; MIFFLIN, 1968         437       IVERSON SPRING       CL 145       69E       14       BAA       36.6307       114.7142       S       31.6       3840       1988/05/05/0       EAKIN, 1964; MIFFLIN, 1968         439       DRY LAKE       CL 175       64E       21       CB       36.4550       114.8439       S       29       1988/01/25       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 175       67E       30       NW SW       36.4233       114.4338       35.1       197	
434       USGS-MX CE-DT-6       CL 135       64E       35       ACAA       36.7678       114.7869       W       33.5       284.7       1986/09/28       WATSTORE         435       CSV-3       CL 145       63E       28       ACDC       36.6908       114.9250       W       41       237.7       1987/10/07       WATSTORE         436       WARM SPRING       CL 145       65E       18       NW SW NE       38.7222       114.7152       S       32.2       12250       1950/09/27       EAKIN, 1964; MIFFLIN, 1968         437       IVERSON SPRING       CL 145       65E       18       NW NE NE       36.7097       114.7142       S       31.6       3840       1958/05/19       EAKIN, 1964; MIFFLIN, 1968         438       JUAINTA SPRING       CL 15S       69E       14       BAA       36.6369       114.4715       S       28       1996/01/25       WATSTORE         439       DRY LAKE       CL 17S       64E       21       CB       36.4233       114.4339       S       35.1       1985/07/01       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 17S       67E       30       NW SW       36.4233       114.4328       S       35.1	
435       CSV-3       CL 14S       63E       28       ACDC       36.6908       114.9250       W       41       237.7       1987/10/07       WATSTORE         436       WARM SPRING       CL 14S       65E       16       NW SW NE       36.7222       114.7152       S       32.2       12250       1950/08/27       EAKIN, 1964; MIFFLIN, 1968         437       IVERSON SPRING       CL 14S       65E       21       NW NE NE       36.7097       114.7142       S       31.6       3840       1958/05/19       EAKIN, 1964; MIFFLIN, 1968         438       JUANITA SPRING       CL 14S       65E       21       NW NE NE       36.7097       114.7142       S       31.6       3840       1958/05/19       EAKIN, 1964         439       DRY LAKE       CL 17S       64E       21       CB       36.6369       114.2475       S       29       1956/07/01       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 17S       67E       30       NW SW       36.423       114.433       S       35.1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 18S       67E       12       DDA       36.3775       114.433       S	
436       WARM SPRING       CL 14S       65E       16       NW SW NE       36.7222       114.7152       S       32.2       12250       1950/09/27       EAKIN, 1964; MIFFLIN, 1968         437       IVERSON SPRING       CL 14S       65E       21       NW NE NE       36.7097       114.7152       S       31.6       3840       1958/05/19       EAKIN, 1964; MIFFLIN, 1968         438       JUANITA SPRING       CL 15S       69E       14       BAA       36.6369       114.2475       S       26       1986/01/25       WATSTORE         439       DRY LAKE       CL 17S       64E       21       CB       36.4550       114.8439       S       29       1985/07/01       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 17S       67E       30       NW SW       36.4233       114.5483       S       35.1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 18S       68E       06       DCC       36.3897       114.433       S       30       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 18S       68E       06       DCC       36.3975       114.433       S       30       1977/05/04	
437       IVERSON SPRING       CL 14S       65E       21       NW NE NE       38.7097       114.7142       S       31.6       3840       1958/05/19       EAKIN, 1964         438       JUANITA SPRING       CL 15S       69E       14       BAA       36.6369       114.2475       S       26       1986/01/25       WATSTORE         439       DRY LAKE       CL 17S       64E       21       CB       36.4550       114.8439       S       29       1985/07/01       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 17S       67E       30       NW SW       36.4233       114.4328       S       35.1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 18S       68E       06       DCC       36.3697       114.433       S       30.0       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 18S       68E       06       DCC       36.3775       114.433       S       30       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 18S       68E       08       263.311       114.9287       W       31       1986/03/0       WATSTORE         443       G.P.	
438       JUANITA SPRING       CL 155       69E       14       BAA       36.6369       114.2475       5       26       1986/01/25       WATSTORE         439       DRY LAKE       CL 175       64E       21       CB       36.4550       114.8439       S       29       1986/01/25       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 175       67E       30       NW SW       36.4233       114.5483       S       35.1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 185       67E       12       DDA       36.3775       114.4333       S       30       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 185       67E       12       DDA       36.3175       114.433       S       30       1977/05/04       WATSTORE         443       G.P. APEX WELL       CL 185       67E       12       DDA       36.311       114.9287       W       31       1986/09/30       WATSTORE         444       NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL       CL 215       65E       09       NW SE       36.1412       114.7220       W       28.9       114       61       RUSH, 1968B	
439       DRY LAKE       CL 17S       64E       21       CB       36,4550       114,8439       S       29       1985/07/01       WATSTORE         440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 17S       67E       30       NW SW       36,4233       114,5483       S       35,1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 18S       68E       06       DCC       36,3897       114,4328       S       29       4075.0       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 18S       67E       12       DDA       36,3775       114,433       S       30       1977/05/04       WATSTORE         443       RAPEX WELL       CL 18S       67E       12       DDA       36,317       114,433       S       30       1977/05/04       WATSTORE         443       NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL       CL 21S       65E       09       NW SE       36,1412       114,7220       W       28.9       114       61       RUSH, 1968B         444       HOOVER DAM HOT SPRING       CL 22S       65E       29       SW       36,0100       114,750       S       42.2       1966/07/27	
440       WATER FOUNTAIN VALLEY OF FIRE, NEV.       CL 175       67E       30       NW SW       36.4233       114.5483       5       35.1       1971/03/15       SWANBERG AND OTHERS, 1977         441       BLUE POINT SPRING       CL 185       68E       06       DCC       36.3897       114.4328       S       29       4075.0       1977/05/04       WATSTORE         442       ROGERS SPRING       CL 185       67E       12       DDA       36.3775       114.433       S       30       1977/05/04       WATSTORE         443       G.P. APEX WELL       CL 185       63E       33       DBB       36.3411       114.9267       W       31       1980/930       WATSTORE         444       NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL       CL 215       65E       9       NW SE       36.1412       114.7220       W       28.9       114       61       RUSH, 1968B         445       HOOVER DAM HOT SPRING       CL 225       65E       29       SW       36.0100       114.750       5       42.2       1966/07/27       SWANBERG AND OTHERS, 1977	
441         BLUE POINT SPRING         CL 18S         68E         06         DCC         36.3897         114.4328         S         29         4075.0         1977/05/04         WATSTORE           442         ROGERS SPRING         CL 18S         67E         12         DDA         36.3775         114.433         S         30         1977/05/04         WATSTORE           443         G.P. APEX WELL         CL 18S         63E         33         DBB         36.3411         114.9267         W         31         1986/09/30         WATSTORE           444         NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL         CL 21S         65E         09         NW SE         36.1442         114.7220         W         28.9         114         61         RUSH, 1968B           444         HOOVER DAM HOT SPRING         CL 22S         65E         29         SW         36.0100         114.750         S         42.2         1966/07/27         SWANBERG AND OTHERS, 1977	
442         ROGERS SPRING         CL 18S         67E         12         DDA         36.3775         114.4433         S         30         1977/05/04         WATSTORE           443         G.P. APEX WELL         CL 18S         63E         33         DBB         36.3411         114.9267         W         31         1986/09/30         WATSTORE           444         NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL         CL 21S         65E         09         NW SE         36.1442         114.7220         W         28.9         114         61         RUSH, 1966B           445         HOOVER DAM HOT SPRING         CL 22S         65E         29         SW         36.0100         114.750         S         42.2         1966/07/27         SWANBERG AND OTHERS, 1977	
443         G.P. APEX WELL         CL 18S         63E         33         DBB         36.3411         114.9267         W         31         1986/09/30         WATSTORE           444         NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL         CL 21S         65E         09         NW SE         36.1442         114.7220         W         28.9         114         61         RUSH, 1968B           445         HOOVER DAM HOT SPRING         CL 22S         65E         29         SW         36.0100         114.750         S         42.2         1966/07/27         SWANBERG AND OTHERS, 1977	
444         NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL         CL 21S         65E         09         NW SE         36.1442         114.7220         W         28.9         114         61         RUSH, 1968B           445         HOOVER DAM HOT SPRING         CL 22S         65E         29         SW         36.0100         114.7450         S         42.2         1966/07/27         SWANBERG AND OTHERS, 1977	
445 HOOVER DAM HOT SPRING CL 22S 65E 29 SW 36.0100 114.7450 S 42.2 1966/07/27 SWANBERG AND OTHERS, 1977	
	<del></del>
446 BLACK CANYON AREA CL 23S 65E 05 SE NW SW 35,9800 114,7467 S 30 848 1960/00/00 *WATSTORE	
446         BLACK CANYON AREA         CL 23S         65E         05         SE NW SW         35.9800         114.7467         S         30         848         1960/00/00         *WATSTORE           447         BLACK CANYON AREA SPRING         CL 23S         65E         21         NE SW NW         35.9467         114.7333         S         25.6         19         1978/08/18         *WATSTORE	
Hard Deck Control Hiller String         CL 225         65E         21         NE 3W NW         33.9467         114.733         3         2.50         19         197/06/75         MATORIZAL           448         MONITOR WELL 116         CL 325         66E         14         DBDB         35.1583         114.5664         W 29         91.4         1991/08/06         WATSTORE	
449 SUNDANCE SHORES WELL CL 325 66E 24 BBA 35.1497 114.5803 W 32 146.3 1974/08/14 WATSTORE	

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ففشمته تعترها

•	ڈ سے									APPER	DIX 2									
	#	рН	Na	К	Са	Mg	Fe	SiO2	в			CO3	SO4	Cl	F	TDSm	TDSc	ChgBal	delD	delO18
-	1						_			5.8										
_	_2	8.90	58	3.9	5.8	0.34		41			106		23	23			207	1.03		
_	3		<u>.</u>																	
_	4		21	4	3.2	0.3		53	0.08	0.01	50	0	11	5.9	0.6		124	0.96		_
_	5		29	0.4	3.7	0.1		32	0.08	0.03	64	0	12	4.7	1.8	•	115	0.96		
_	6		31	2.8	2.1	0.1		57	0.07	0.02	74	0	9	5	0.9		144	0.97		
	7	9.1	_110_	1	4	0		51	1_	0	63		119	39	4.6	362	393	1.03	-127	-15.4
_	88				····															
_	9	7.70	32	6.3	1.4	0.1		67		0.46	68		13	7			160	1.03		
_	10					· · · … ·			<u> </u>					. <u>.</u>						
	<u>11_</u>	;																		
_	12	8.40	78	0.6	0.4			51	0.66		113	6	41	15	2	262	250	1.00		
·	<u>13</u>		180	8.6	14	0.2		130	2	0.2	163	0	220	48	6.6		690	0.98		
_	14	8.60	74	1	3.5	1.1		63	0.6	0.667	90	3	35	18	12	275	255	1.02		_
_	15	8.60	74	1.1	3.1	<0.1	<0.02	63	0.64		92	3	41	18	12		261	0.94	-129.9	-16.56
_	<u>1</u> 6	7.60	76	1.3	2.6	1.4		65	1		96	<u>N</u>	39	21	10	272	265	1.02		
	17	8.5	74	1	4	1		63	0.6		90	3	35	18	12		256	1.02		_ <u>_</u>
-	<u>18</u>	8.20	55	0.6	6.4	0.2		34	0.32	<u></u>	120	<u>N</u>	15	11	0.3	186	182	1.05		
_	<u>19</u>	7.65	320	25	4.6	0.1	0.06	160	6.9	0.45	436	2	130	160	14		1038	0.98	-128.2	-14,13
_	20	7.20	325	26	19	0.3		155	7		500	1	120	160	14		1073	0.99		
<u>-</u>	21		<u> </u>											<u> </u>						_
3	22												<u> </u>							<u> </u>
· _	23		74	10	23	8.4		74	0		107		22	32	0.1	256	296	1.70		<u> </u>
_	24	7.80	78	11	9.6	2.8		79			165		28	28	1.8		319	1.05		
	25	7.1	_230	5	17	0.1		130	2.1	<u></u>	280	0	120	110	10		762	1.03		
	26	7.60	_230	4.5	17	0.1		130	2.1		280	N	120	110	10		761	1.02	·	
	27	8.86	150	8.7	2.7	0.2	0.01	80	0.64	0.03	224	8	49	52	2.3		464	1.05	-123	-15.8
. <u> </u>	28	8.8	210	4.4	1.5	0.04	0.01	64		0.032	280	9	120	76	0.1		623	0.98	-131	-16.1
_	29							<u> </u>		. <u></u>										
_	32		210	6.2	3.2	1.5		125	2.9		358	7	67	54	14	660	667	0.98		
_	33		146	3.7	3.2	0		83	0.41		218	16	76	6	8.9	470	450	1.04		
_	34	8.10	455	9.9	30	6.3		51	1.3	0.5	948	N	204	69	9.8	1290	1303	0.99		
·	35		_416	11	32	5.2	0.04	39	1.7	0.36	885	N	184	59	0.9	1180	1184	1.02		<u>.</u>
_	36		34	4.8	18	2.4		65	0.11		104		25	15	0.6	244	216	1.01		
_	37	9.30	91	2	2.4	0.5		84	0.26	<u></u>	52	39	64	14	7.9	324	331	0.97		
	38	7.30	28	6.3	14	2.8		53		0.03	94		14	15			179	1.02		
	39		27	6.3	25			54	0.1	<u></u>	117		20	22	0.1		212	0.87		
	40		146	12	46	9.7		63	0.87		204		94	157	0.3	640	629	1.00		. <u></u>
_	41	9.00	197	18	2.2	0.8		4.8		1.5	211	36	70	106	1.4	541	540	1.00		
_	42	7.30	123	3.5	6.4	0.5	•	65	0.78		182	<u>N</u>	61	27	10	387	387	1.05	· · · · · · · · · · · · · · · · · · ·	
	43		89	3.4	7.8	1.8		56	0.35		178		49	19	5.3		319	0.95		<u></u>
	44		58	12	5.8	0.2	N	110	0.37	0.4	119		26	14	2.6	322	288	1.04		
· _	45		334	<u>.</u>	: 26	8.5			2.5		920		34	26		. 930	884	1.00		
	46	8.00	296	36	10	8		55			881		36	26			900	0.94	-134.6	-16.44

•				-		_		_						_			<b>.</b>		
#	рН	Na	ĸ	Ca	Mg	Fe	SiO2	<u> </u>	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
47	· · · · ··	450		06						1000		-74				1000	1.00		
48		452	26	26	11	<u></u>	<u>.</u>	1.4		1230		71	16			1209	1.02		
49	9.20	620	3.5	2		N	34	4.6		1080	142	98	46	16	1500	1409	1.02		<u> </u>
<u>50</u> 51	9.20	620	3.5		<u>N</u>		34	4.0		1060	143	90	40		1500	1498	1.02		
52	_ ·							· · · · · ·	<u> </u>										
52 53																· · · · · -			· · ·
54	······		·····																
<u>55</u>																			
<u>55</u>									<0.2						<u>, , , , , , , , , , , , , , , , , , , </u>	· ··· ·			
57	<u> </u>																		
<u> </u>	8.10	157	16	13	0.2	N	166	0.81		338	N	75	9	9.4	631	613	1.01		
<u>59</u>	7.00	390	41	49	13		84	0.77		1180		18	<del></del> 40	.7.2		1224	1.01	-134.9	-16.78
<u> </u>	7.40	110	8.3	29	7.7	<u>.</u>	23	0.22	<u> </u>	380		36	4.4	3.4		409	0.97	-140.8	-18.21
<u>61</u>	7.20	130	22	48	12		40	0.67		482		40	14	5.2		549	1:02	-140.2	-17.85
62	7.60	134	4	8.4	N	0.04	96	0.07	N	260	N	46	11	14	442	442	1.02		-17.00
63			T					0.41		200								<u> </u>	
64							· · · ·		<u> </u>										
65	8.00	450	36	3.1	0.45	•	151		<u> </u>	1149		2	31	21		1260	0.99	<u></u>	
66	7.70	358	33	6.5	0.8		132			959		2	25			1029	1.02	<u> </u>	
67	6.70	236	43	41	14	-	38			867		10	20			829	0.97		
68								<u></u>			•								
69										<u></u>						·			
70	7.30	300	31	75	37		105			1135		32	27	7.2		1173	1.01		
71	6.6	370	46	48	13	0.02	86	0.73	0.72	1135		12	37	7.4		1179	1.02	-136.6	-16.95
72																			
73	8.40			49	17					426	18	69	30			393	0.39		
74									·····										
75	8.20			74	27					278	N	103	117			458	0.59		
76									·····		-								
77			• .																
78	8.8	78	2.4	2.4	0.6		75	0.53	0.16	78	17	49	11	8.8		283	1.00		
79	9.10	75	2.2	1.6	< 0.01		83	0.47		108		45	15	8.9		284	0.94	-139	-17.61
80	8.10	13	3.9	25	8.6	N	18	N		132	N	11	3.9	0.5	149	149	1.04		
81	9.1	75	2.2	1.6	0.01		83	0.47	0.2	108		45	15	8.9		285	0.94	-139	-17.61
82	7.90	17	8.4	37	8.6		20	<u> </u>	0.205	184	N	20	1.8	0.7	205	204	1.00		
83	7.3	18	8.9	38	9.2		20	0.03	0.06	180	0	22	2.5	0.7		208	1.04		<u> </u>
84	7.8	8	4.8	34	10		20	0	0.02	160		23	2.1	0.4		181	0.94	~~~	
.85	8.00	19	6.6	35	11		21			190	<b>-</b>	19	2			207	1.02		
86					••		<u></u> :				<u>.</u>								·
87	8.30	24	5.6	16	5.7	0.18	21			118	1	22	2	0.6	157	156	0.98		
88	7.20	9.6	4.6	29	8.1	0.10	23			144	<u>'</u>	13	3.3	0.4	162	162	0.97		
89	7.90	8:5	5.4	30	8	0.06	27			142	N	13	3.5	0.4	166	166	0.98		
90	7.20	10	5.6	40	11.5		31	< 0.02		149		37	8.7	0.4		218	1.01	-139.1	-18.24

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#	pH	Na	ĸ	Ca	Mg	Fe	SiO2	B	Li	НСОЗ	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
91																			
92	7.80	25	7	32			86		5.7	0.40	<u> </u>		28			178	3.63	<u> </u>	<u> </u>
93	7.8	25	7	<u>32</u> 2	0.2		. 86			240	0	15	28			311	0.57		
94	8.4	113	N	2				- <u></u>		98	24	49	60			296	0.98		
<u> </u>															· · · · ·				
90	8.00		. <u></u>									500	840			1400	0.05		
98.1	8.00			3				**	N		N	528				<u>1493</u> 112		<u></u>	
98.2	<u>8.00</u> 9	83	N	3	<u> </u>	0.004			N	179	40	10	18				0.12		
90.2	8.50	1050	29	245		0.004	25 	7.2		<u>170</u> 11	<u>48</u> 6	<u>18</u> 293	0.01		3870	<u>262</u> 3563	0.81		
<u>99</u>		<u>    1100                              </u>		260	0.1		<u> </u>	<u> </u>		26-	0	<u>340</u>	1900		3070	-3892-	<u> </u>	-106.5-	-6.33
101	0.40	1100	-100	32	7	<0.02		0.1	0.04	200		21	<u>1900</u> 19			177	0.51	-100.5	-0.00
101				<u> </u>	3					200		18	19			144	0.51		
102				56	22					200	<u> </u>	70	34			318	0.13		
103				86	28			<u> </u>		286	<del></del>	132	126			513	0.60		
105.1		1400	120	148	0.17	0.34	208	5.85		49		220	2320	5.2		4455	1.00		·
105.1		1298	110	140	0.17	<u> </u>	208	5.85		22	<u>3</u>	220	2320	5.2		4226	0.97		
105.2	6.70	1400	110	140	1.5	0.01	203	<u> </u>		92		230	2300	5.2		4478	0.97	-105.3	11 54
100	7.20	1400	130	68	1.5	0.02	165	9.9		83	<1	400	2200	4.5		4470	0.99	-100.5	-11.54 -10.83
107	7.60	1400	86	58	<u> </u>	< 0.02	145	7.1		<u>68</u>		350	2050	4.5		4135	0.94	-106.5	-11.65
108	7.80	1400	120	70	1.1	0.02	210	8.2	1.7	96		380	2030	<u>4.0</u> 5.1		4343	0.99	-105.	-11.05
109	<u>7.3</u> 9.1	152	21	1	4	0.04	45	1.8	1.7	230	0	52	192			<u>+343</u> 582	0.98	-105	-10.4
111	7.5	132	3.5	19	3.8	<u></u>	18	0.1	·	284		9	21	0.1		232	0.73		
112	1.5	272	8.4	13	0.6		94			93	0	156	278	2.8		871	1.00		
113	7.90	430	8.6	11	0.0	< 0.02	79	5		162	<u> </u>	180	500	4.1		1298	0.94	-127.6	-14.87
114	7.90	340	17	31	4.2	0.13	82	1.9		464		45	240	<u></u> 7		997	1.09	-120.7	-14.72
115	7.2	405	17	22	0.2		90	0.5		455	0	205	250	<b>'</b>		1214	1.00	120,1	-14.72
116	7.90	486	13	18	1.9		62	2.8		902	N	130	155	8.9	1330	1321	1.02		
117	1.00	27	9.8	46	4.1		70	0.1		99		61	38	0.3	1000	305	/1.02		
118				24	11	<u></u>				110		26	38			153	0.62		
119	7.56	1450	120	110	6.5	< 0.02	85	8.7		197	<1	120	2400	4.6		4402	0.98	-125.5	-14.01
120	7.40	33	1.3	50	9.3	0.05	20	0.18		210		23	29	0.1	271	269	1.00	120.0	
121																	1.00		
122	6.80	390	20	41	10	<0.02	63	4.1				120	45	8.6		702	4.82		
123		165	26	110	22		65		0.08	312		370	75	0.0		987	1.01	-130	-16.24
124	0.10	100		110					0.00	012							1.01		10.21
125	8.10	143	12	31	15		42		1.2	456		63	29			559	0.97		
125	0.10	110	· <u> </u>				<u>те</u> ,		0.0574				23				0.31		·
	7.10	180	20	36	4.4	0.08	110	1.9	1.3	375		150	40	7.8		735	0.97	-129.5	-15.58
127		101	6.4	46	19	0.08	39	0.3	1.0	205	N	69	124	0.5	503	506	1.01	-120.0	-10.00
129	1.30	182	11	79	17		58	1.1		407		154	127	1.9	826	831	1.00		
130	7.00	518	80	97	20	0.02	155			544	N	48	775	6.3	1968	1967	0.97		
131	6.9	540	82	95	20	0.02	110	· · · -	~	~ 490	0	66		5.7	1300	1952	1.00		
132		130	8.2	73	17		40	0.63	0.22	480		65	70	1.4	551	642	0.97	· · · · · · · · · · · · · · · · · · ·	

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•		pН	Na	ĸ	Ca	Mg	Fe	SiO2	В	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
	133		277	27	28		< 0.25	81						26			439	19.27		
	134	7.50	304	33	7.6	20		74	3		818		93	20	5.5		963	0.99		
	135	8.1	180	12	13	2.1		8.3	0.54	0.24	457	3	26	23	4.3		497	0.99		
	136	7.64	110	4.7	91	32		26	0.36	0.06	180	0	190	180	0.7	734	723	1.00	-124.4	-15.15
	137	7.40	160	13	8.8	0.5	< 0.02	135	1.2		368		53	29	7.8		589	0.93	-128.6	-15.7
_	138	8.6	270	14	8.5	2		17	1.8	0.81	365	8	110	140	6.2		758	0.99	-134	-16.4
	139	8.30	920	94		40	0.01	50	15		1940	41	121	381	12	2650	2645	0.99		
	140		_											-				·····		
	141				_															
	142		1350	240	120	4		340			202		18	2250	6	4530	4427	1.05		
	43.1																<u>_</u>			
1	43.2																			
	144	7.90	60	6.5	56	19	N	51	0.4		260	N	72	58	0.3	452	451	0.96		
<u> </u>	145	7.70	74	2	179	58	N	25	0.4		211	N	390	191	0.3	1040	1024	1.00		
~	146	8.00	42	3.5	102	30	0.04	10	0.1		166	N	85	178	0.3	536	533	0.99		·····
	147	6.50	130	22	33	6.8	0.22	66	1.1	0.08	429	1	56	18	1.8		547	0.95	-125.5	-15.65
	148											<u> </u>								
	149	8.40	200	18	16	0.9	0.18	125	2.6		385		140	41			733	0.97	-131.4	-15.74
	150																			
	151	7.00	157	15	58	16		44			533		84	34	1.7		672	0.99		
	152	8.00	288	33	29	5		80			823		60	28			928	0.98		
	153	7.10	105	28	70	27		40	2	5	507	N	94	17	2.5		635	1.01		<u> </u>
	154	8	118	21	20	9		40			333		64	21		••••	457	1.00	-127.8	-16.28
	155	7.10	38	5.6	33	4.1		51			136		36	25	1.9		262	1.00		
	156	6.4	77	22	100	25	0.18	34		0.33	537	<u></u>	64	14	1.1	582	602	1.04		
<u></u>	157	6.2	80	23	96	22	0.37	41		0.35	548		67	14	1.2	589	615	0.99		
	158	6.6	10	2.3	8.5	1.9	0.12	26	<u> </u>	0.004	51		5.7	3.9	0.1	96	84	1.01		
	159	7.4	39	11	59	20	0.069	28		0.19	318	0	50	14	0.6		378	0.98	-128	-16.9
	160	6.90	231	27	15	5.9		52		· · · · · ·	690		25	10			705	0.99		
	161	7.60	45	16	60	15		70			335		52	12			435	0.95	-132.7	-16.64
	162	7.51	27	7.6	43	8.8	0.004	67		0.028	180		38	17	0.5		297	1.00		<u></u>
	163				<u></u>				•											
	164	7.3	47	13	56	11	0.009	51		0.088	234	·····	84	19	0.5	379	397	0.99		
	165									· · · · · · · · · · · · · · · · · · ·										
	166		· · · · · · · · · · · · · · · · · · ·														····			
	167	8.00	50	8	26	5.8	N	85			164	N	37	22	0.4	318	315	1.01		
•••	168	9.50	230	16	0.8	N	0.04	373	2		116	149	89	30	15	1000	962	1.01		
	169	8.90	230	16	1	< 0.1	< 0.02	320	2.1		321	32	130	69	17		975	0.88	-130	-14.76
	170	7.00	136	17	22	5.8		58	0.81		378	N	62	27	5	526	520	0.93		
	171	6.60	230	58	53	35	< 0.02	67	2.1		915	<1	7	1	6.6		910	1.10	-136.1	-15.97
	172	6.90	285	56	46	40		70	2.9		949		116	48	7		1138	0.99		
	173									<u> </u>				·•	<b>_</b>	• • • • • • • • • • • • • • • • • • • •				<u></u>
	174																			
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	175	7.30	10	2.1	46	23.5		20	0.03	0.8	226	1	27	4.6	0.1		246	1.06		

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• #	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	СОЗ	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
176		39	8.7	52	16		0.58	0.25		287	N	27	14	0.7	380	299	1.02		
177									0.75										
178	6.6	110	35	63	12.3		65	0.9	0.3	493		70	15	2	582	867	0.98	-149	-18.1
179	7.20	120	39	60	15.5	< 0.02	65	0.7		488	1	72	16	1.9		631	1.04	-144.7	-15.31
180	)																		
181	8.50	135	8.9	1	0.03	< 0.02	210	0.2		224	15	40	23	17.7		561	0.93	-130.1	-16.09
1.82	8.00	58	14	45	12		50		1.8	377		24	6.5			395	0.89	-132.8	-16.24
183	7.90			54	18					396	N	95	18	7		380	0.47		
184	8.00	118	21	20	9	<0.02	40		0.113	333		64	21			457	1.00	-127.8	-16,28
185	7.00	114	22	41	22.4		39	2.4	0.08	443		68	20	4.5		551	0.99		
186	7.80			141	61					540	N	315	332			1115	0.49		
187				52	20		35	0.8		334		39	23	1	398	335	0.61		
188																			
189	)																		
190	7.74	8.4	4	49	17		24	_	t	226		20	5.1	0.334		239	1.01		
191									0.1										
192																			
193																			
194				16	1					56	8	168	114	3	788	338	0.11		
195						<u> </u>													
196						· = ==	· .										····		
197		780	42	56	2.6	0.037	110	4.3	2	170	1	67	1100	2.9		2251	1.07	-126	-14.3
198		694	53	35	0.2		210	4.4	1.5	112		323	872	5.5	2120	2311	1.00	-127	-14.2
199		730	62	22	<u>N</u>	<u>N</u>	226	4.7		67	N	315	910	7.3	2360	2310	1.02		
200			·····	32	2		259			31	19	334	955		2495	1616	0.05		
201		620	38	70	1.5	0.02	150	5.6		100		400	820	4.2		2159	0.95	-121.5	-13.3
202		656	52	52	0.6		198	6.1	<u> </u>	93		405	829	4.7	2100	2298	0.97	-121	-12.4
203		<b>.</b>				···							5			5	0.00		
204		117	5.4	6.2	0.1	<u>N</u>	46	193		12	20	144	57	2.5	361	597	0.99	<u> </u>	
205		139	4.7	5.2	0.3		85	0.76		136		171	20	0.81	567	494	1.01		
206		277	8	27	0		126	2	0.2	93		528	55	4.1	950	1120	0.95	-126	-15.9
207		248	7.1	20	0.3		104	1.7		95		419	53	4.9	959	905	1.00		
208		611	58	15	0.3		278	41.8	6.9	369		120	790	2	2056	2292	0.93	-121	-12.4
209		679		32	8			·		361	· .	234	750	1.2	2056	1882	0.99		
210		680	66	16	0.7	< 0.02	270	47		368		73	837	2.1		2173	1.03	-116.7	-12.16
211		19		24	9					151	N	3	5		211	134	1.03		
212			<u> </u>	37	19					212		47	13	0.1	281	220	0.71		
213		49	0.4	2.8	1		44	0.2	0.667	34	26	35	5.4			181	1.03		
214				13		0.27			1.4	120	6		7	7	253	92	0.24		
215																· · · · · · · · · · · · · · · · · · ·			<u></u>
216				47	14					232		5	7	0.1	249	187	0.85		····
217		67	4.6	267	53	3.3	34	0.03		312	<u>N</u>	732	8.2	0.6	1320	1323	1.01		
218				102	1	0.13			8.4	149	N	192	21		583	389	0.74		
219	8.21	25	1.4	17	0.9	0.003	33	0.04	0.011	107	0	8.6	3	0.3		142	1.01	-109	-14.8

#         PH         Na         K         Ca         Mg         Fe         SNO2         B         L         HC03         CO3         SO4         C.7         F         TDSs.         CPgBal         delD         de																					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	•	#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	НСОЗ	СОЗ	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-	220	8.06	28	0,9	15	1.1	0.11	27	0.06	0.004	93	0	16	4.7	0.6		139		-112	-14.9
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	_	221	7.26	173	5.9	270	0.14	0.116	44	1.4			26	843	34	4.1		1402	1.08	-130	-16.2
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	-				1.6	2.2		0.03			. <u></u>	57	13	89	27			329	1.02	-127	-14.9
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-									1.4		4.5	11	617	39			1039		-130	-16.2
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	_							······	35	1		39		470	38		798	815	0.94		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-																				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	·									0.16			<u> </u>								
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-							0.03			0.309		4			· · · · ·	244				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-			82	2				33							5.8					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-										7.1										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-																		·	-131.5	-16.01
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-				13							52	12	642			1210				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-				040			0.015									7570				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-			2230	249	87	0.2		319	15.0	3			70	3740	4.3	/5/0	6754	1.00	-114	+,2.1
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-																				<u>.</u>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-			·				·····									<u> </u>				<u> </u>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-		9 60	100	6.5	26	0.00	<0.00	115	0.80	0.04				106	16			0.07	106.1	15.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							<0.02													
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							••••••••••••••••••••••••••••••••••••••									<u> </u>				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							0.05					2								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· -							0.05									6140				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	· · -		5.7														0140		·		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-		7 34					0.007													
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-																				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							0.022			0.012										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-			·							2									110.2	12.00
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							······································			·····										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-							0.18									8490			-97	-10.5
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-																				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-																			-107	-11.7
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-																				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$											·····										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-			_																	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-		7.40	450	26	44	0.6	< 0.02	180	2.4	0.1	114	<1	470	380	7.9		1617	0.99	-125.8	-13.21
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-																297				
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-							0.04				98									
258       8.9       363       34.6       3       1.1       342       7.4       279       13.5       118       321       5.8       1347       1.00         259       64       5       42       768       N       77       34       863       600       0.24         260       261       7.4       180       8       74       19       252       0.71         262       8.40       42       20       180       8       74       19       252       0.71         263       7.70       170       8.4       4.8       0.06       <0.02	-			4400				0.25	24		0.3	575								······	
259       64       5       42       768       N       77       34       863       600       0.24         260       261       261       262       8.40       42       20       180       8       74       19       252       0.71         263       7.70       170       8.4       4.8       0.06       <0.02	-																				
260         261         262       8.40       42       20       180       8       74       19       252       0.71         263       7.70       170       8.4       4.8       0.06       <0.02	-					64								•••••••			863				
262         8.40         42         20         180         8         74         19         252         0.71           263         7.70         170         8.4         4.8         0.06         <0.02	-																				·
263 7.70 170 8.4 4.8 0.06 <0.02 110 0.66 0.04 256 5 102 22 8.9 558 1.04 -130.4 -16.68	-	261																			
	-	262	8.40			42	20	-				180	8	74	19			252	0.71		
	-	263	7.70	170	8.4	4.8	0.06	< 0.02	110	0.66	0.04	256	5	102	_22	8.9		558	1.04	-130.4	-16.68
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	#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	HCO3	СОЗ	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
	264.1																			
· · · ·	264.2	8.59	525	38	10	2.5	0.14	107	3.5		1380	40	65	48	12		1530	0.90	-132	-17.7
	265.1	7.7	156	8	6.2	0.14		116			243		108	24	8.8		547	0.99		
	265.2																			
	266							_										•		
_	267	6.50	44	14	56	12	<0.02	68	0.12		264	<1	64	12	2.5		403	0.99	-129.8	-16.87
	-268-	-7:20 -	29	-5:9		21	0.01	40	_ 0.26 _		279	N	35	21	0.2	346	347	1.01		
	269.1	8.00	15	3.4	51	20	N	25	N	0.5	255	N	25	10	0.4	276	275	0.99		
_	269.2																			
	270	7.47	37	12	69	17		37			334		25	9	0.889		371	1.07		
	271	·				<u> </u>														
	272																			
_	273									1.2				· <b>-</b>						
	274	8.70	36		24	7.8					135	12	28	7			181	1.00		
	275	9.30	64	0.7	1	<0.1		85		N	144		18	6.3			246	0.98	-127.9	-16.28
	276																			
	277	7.80	36		62	12				0.76	160	N	88	43			320	1.00		
	278	6.50	200	36	43	9.4	0.06	77	2.6		673		51	22	4.7		777	0.97	-135.8	-16.01
	279																			
	280	6.60	47	13	52	11	< 0.02	36	0.17		249	<1	57	10	2		230	3.58	-127.5	-16.28
	281	7.10	55	15	50	11	<0.02	46	0.21		278		59	8	2.8		384	1.00	-124.9	-16.24
	282	6.72	27	7.5	65	28	0.01	24	0.1	0.063	370		31	8.3	0.5		374	0.99	-120.5	-15.6
	283	6.85	21	4.6	69	22	0.01	21	0.07	0.083	320		53	6.9	0.4		356	0.96	-122	-15.9
	284	8.65	18	6.7	42	20		20		0.527	217	6.5	35	6.7	0.319		262	1.00		
	285	7.2	19	6.5	60	23	0.006	26		0.083	286		52	6.7	1		· 335	0.98	-127	-16.6
	286																			
	287	7.8	150	4.8	12	0.3	0.02	105	0.35	0.65			1	16	1.2		291	13.58	-127.8	-16.2
	288																			
	289																			
	290	7.8	4.8	1	49	21	0.01	11	_		180	0	17	4	0.1		196	1.29		
	291	8.29	4.3	1.4	56	17		23			232		19	3.6	0.265		239	1.02		
	292									0.008										
	293	8	20	9.5	26	8.7	0.007	71		0.019	130		9	21	0.4		230	1.07	-126	-16.5
	294		162		13	1.1	0.12	100			375	7.7	17	17	0.75	518	503	1.07		
	295																			
	296	7.3	9.3	3.4	51	21	0.01	19			250	0	18	4.4	0.4		250	1.03		
	297				54	21	0.1	32			267	N	21	4.3		266	264	0.90		
	298	6.8	8.2	2.3	51	16	0.01	21	0.03	0.017	220		19	3.2	0.2		229	1.04	-121.5	-16.2
	299	8.00			32	25					148	N	83	10			223	0.82		
	300				51	23	0.22	37			222	N	68	7.5	0.67	314	297	0.84		
	301	8.70	145	3.6	10	0.01	< 0.02	58	1.2		50	9	235	44	4.9		535	0.92	-119.5	-15.55
	302	9.10	137	2.9	9.6	0.5	0.01	61			12	24	200	46	5	499	492	0.98		
	303													1.2			1	0.00	-116	-15.6

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#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	СОЗ	SO4	CI	 F	TDSm	TDSc	ChgBal	delD	delO18
305	8.7	102	2.5	4.5	0.01	0.06	52	0.19	0.07	54	7	169	17	3.1		384	0.90	-123.2	-16.01
306	8.50	69	3.4	2	0.2	0.03	36	,	7.1	146	4	23	6.2	1		217	0.99		·
307							62	1		41	22	157	28	3.5		294	0.00		
308																			
309																	· ·		
310	8.5	200	2.2	26	0.1	0.02	34			38	0	380	49	8.4		718	0.97		
311-																			
312		70		48	13					88	10	190	43			- 417	0.94_		· · ·
313		262		16	Ň			1.6		210		315	78			776	1.00		<u> </u>
314																			
315																			
316																			
317	7.40	148	6.4	82	14	0.01	25		75	82	N	403	79	0.7	810	798	0.99		
318	8.00	245	10	32	6.1	0.66	54	2.3		118		374	102	6.8	891	891	1.01		
319				6	0.9		37		0.22	47	9	109	64	4.8	370	254	0.07		
320	7.70			26	8		0/		6.1	144	<u>_</u> N	23	11			139	0.62		
321	7.60	305	16	40	3.3	0.07	46	2.3		112	<1	597	87	7.4		1159	0.93	-130.3	-16.13
322	8,70	160	2.7	7		0.07	63			68		238	33	11		548	0.97	100.0	
323	0.70	100	2.1						0.8						<u>.</u>	540	0.31		
323									<u> </u>										
325	7.50	74	13	23	0.95	a	94		0.18	202		38	12	4		358	1.03		
325	8.77	99	3,3	1.1	<0.95	0.03	122	0.7	0.10	119	21	47	12	4		379	0.95	-131	-8.4
320	8.72	99	2.7	1.1	<0.05	0.03	112	0.575		126	17	53	12	14		369	0.93	-130	-6.7
	0.12		2.1	1.4	<0.05	0.04	112	0.575		120						309	0.00	-130	-0.7
328	7.00		4.0		10	<u> </u>				000				0.01			1.01		
329	7.60	55	4.8	26	13		28			239		41	1	0.31		287	1.01		<u> </u>
330													·					=	
331																	· · · · · · · · · · · · · · · · · · ·		
332							400	<u> </u>						0.700		045	4.00		
333	8.23	57	13	15	0.924		108			130		44	12	0.738		315	1.06		
334	7.6	43	9	28	4.2	0.02	76	0.18	0.04	147	0	34	21	0.7	300	288	1.03		
335.1								<u> </u>											
335.2		80	5	20	4.4	3	68			51	36	106	35		367	382	0.97		
336	9.12	43	1.9	7.2	0.512		68			83	9.3		7.7			197	1.00		
337	7.9	13	4.2	37	12	0.008	28	0.01	0.01	168	0	36	3.7	0.6	221	217	0.96		
338	7.8	17	5.8	45	11	0.15	31	0.045	0.02	158	0	64	4.8	0.4	269	257	0.99		
339	7.6	38	0.8	4.7	0.1	0.01	46	0.1	0	80	0	19	7	0.4	148	155	1.00		
340	7.70	49	6.8	70	22	0.007	32	0.33	2.1	358	N	55	19	1	444	431	1.00		
341	8.00	197	13	51	15	0.04	135		<u>N</u>	545	<u>N</u>	86	42	8	823	815	1.03		
342												<u></u>							
343									N										
344	8.10	65	2.5	1.6	0.1	0.014	76	0.16	7.6	132	N	26	10	1.2	229	248	0.98		
345	7.8	66	3.5	25	3.4	0.01	70	0.3	0.03	184	0	42	18	1.2	313	320	1.01		
346	7.4	46	4.4	17	2	0.027	46	0.2	0.04	124	0	27	15	0.5	208	219	1.03		
347	7.4	41	7.9	25	2.6	0.009	72	0.34	0.05	156	0	21	12	0.8	261	259	1.02		
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#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal-		delO18
348	7.8	276	27	58	18	0.015	25	0.61	0.95	702	0	222	36	6.2	945	1015	0.98		
349	7.20	194	24	76	22		53	0.44		702	N	99	31	3	833	848	1.00		
350	7.7	45	1.1	68	6	0.005	42	0.19	0.03	284	0	31	22	0.2	376	355	0.99		
351	7.7	36	0.3	5.8	1	0.002	40	0.01	0.04	94	0	9.5	6.3	0.3	143	146	1.01		
352.1	8.00	28	6.5	62	22	0.06	25	0.12		321	N	47	8.6	0.6	380	358	0.97		
352.2	9.98	52	1.5	0.723	0.06		70			43	29	14	10	4.8		203	0.94		
353-			- 3.3 -	40	18		22		1.5	185		38	16	0.22		241	0.95		
354	8.1	54	12	57	17	0.008	32	0.44	0.25		0	17		2.8	380	388	1.00		
355	6.88	36	5.5	71	23	0.01	24	0.13	0.11	380		29	9,5	0.9		386	1.00	-114	-15
356	7.03	24	5.9	58	19	0.01	27	0.14	0.075	290		47	9,9	1.3		335	0.93	-119	-15.7
357		5.3	1.6_	67	24	0.01	13	0.03	0.018	300		14	2.9	0.2	·	276	1.05	-108	-14.5
358	7.5	10	3.4	50	21	0.003	26		0.022	270	······		6,6	0.2_		262	0.97	-105	-14.3
359				40	23		46		10	178		27	18	····· ·	283	242	0.98		
360	7.60	24	5.1	60	24	0.01	28	0.1	0.85	300		43	9	1	343	342	1.00		
361	7.38	22	4.4	55	22	0.009	25	0.11	0.053	260	0	44	9.3	1.2		311	1.02	-119.5	-15.8
362	9	1680	18	7.1	5.4		20	18.4	0.95	1590	200	425	937	7.68	4920	4101	1.09		
363	7.8	68	17	56	17	0.008	51	0.4	0.24	350	0	47	26	2	405	457	1.00		
364	8	123	25	91	31	0.1	37	0.8	0.33	698	0	59	9.8	2.4	700	723	1.00		
365	7.6	120	22	100	26	0.002	27	0.62	0.3	673	0	51	15	2.7	732	696	1.02		
366				44	37	0.1	11		0.324	124	N	11	2		132	166	2.26		
367																		-101	-13.2
368																			
369	7.20			1.1	0.6			0.02		50	<u>N</u>	22	2	0.2		51	0.08		
370	7.00	792			00	0.0		0.0		700			578		0500	578	0.00		
371	7.90	875	 2.5	<u>38</u> 71	<u>38</u> 2	0.8	<u>23</u> 48	9.8		720	<u>N</u>	323	860	3.2	2500	2502	0.96		
<u> </u>	7.10	075	2.5	48	7.4		40	1.7		<u> </u>	NI	<u>1120</u> 98	625	<u>5.6</u> 4.2		<u>2777</u> 259	0.99	·	
373	7.90			17	2.7			0.06		128	<u>N</u> N	12	<u>70</u> 3	<u>4.2</u> 0.2			0.58		
374	7.50	<u></u>		<u> </u>	2.1			0.00		120	11	12	<u> </u>	0.2			0.44		
375	7.00			49	9.6	0.17	<u> </u>	<b></b>		614	N	120	74	4.3	940	559	0.22		
377	8.30			13	<u> </u>	0.17		0.42		158	1	38	7	1.5	340	143	0.22	·	······
378	8.3	430	45	37	4		140	9.4		224	0	80	460	3.1	1494	1319	1.19		<u> </u>
379	0.0							0.4				00	400		1434	1010	1.10		<del></del>
380											·····				<del>w</del>				
381	7.10	334	16	47	2.7	0.12	62	1.4		328	N	487		7	1180	1119	1.10		<u></u>
382	7.90			48	4.9	<u> </u>				266		106	54	2.7	560	346	0.34		
383	1.00			9.6	2.4				0.65			100	47	<u> </u>		59	0.51		
384				0.0	<u> </u>				0.00						· · · ·		0.01		
385	7.70	47	2.5	62	5.9	0.03	38	0.18		240	N	48	23	0.8	346	345	1.01		
386	7.75	240	0.4	220	0.4		17		0.25	110	0	890	49	0.8	1600	1472	0.99		
387	7.05	49	0.9	21	1.3	0.06	55		0.02	160	0	21	7.8	0.3	229	235	1.00		
388	9.00	81	2.6	1.6	N		61	······	<u> </u>	187	N	16	6	0.6	287	261	1.02		
389	7.00	142	15	74	27	1	30			577	N	71	34	0.9	624	679	1.05		
390	8.20			11	5.8	N		·		155	N	24	55	4.5	427	177	0.21		
			7																

•	(ja																			
	#	pH	Na	K	Ca	Mg	Fe	SiO2	В	Li	HCO3	CO3	<u> </u>	CI	F	TDSm	TDSc	ChgBal	delD	delO18
-	891	7.7	45	2.8	57	7.7		37		0.05	231	0	48	23	0.6	396	335	1.01		
	92	8.00			36	22					357	N	25	5			264	0.55		<u></u>
	93							· · ·									_	·		
	94				· · · · · · · · · · · · · · · · · · ·															
	95	8.00	29	7.2	44	23		33	0.1		260	<u>N</u>	36	11	0.5		312	1.03		
	96	8.40	23	5.2	45	23	<u>N</u>	28	0.2	N	272	N	27	8	0.5	295	294	1.00		
	97	8.10	32	6.8		<u> </u>		31	0.1	5.6	231	N	34	9.7	0.5	286	285	1.04		
_	98	8.3	3.8	0.9	55	31	0.006	14		0.013	289		8.9 -	4.1	0.1 -		260	<u> </u>	-97	-12.9
	99	8	34	5.6	26	3.5	0.009	55		0.057	146		18	10	1.3		225	1.03	-101	-13.4
	00															+				
	01	8.10	-38-	6.8	31	9.8	N	51	0.1		189		29	15	1.6	271	275	0.99	·	<del></del>
	02	7.5	6.5	1.5	56	26	0.042	14		0.016			6.9	7.9			119_	14.14	<u>-103</u>	-13.7
	03	8.20	46	15	43	6.2	<0.01	91			239	N	<u>42</u>	12	1.4	380	374	0.97		
4	04	7.20	39	14	34	4.8		106			200		30	8	1.4		336	0.99		
4	05	7.90	169	3	18	1.5		69	0.4		254		127	45	5	564	563	1.01		
4	06	8.20	106	5.8	14	1.9	0.12	68			194	<u>N</u>	69	27	4	368	391	1.01		
4	07	7.35	64	9.7	44	16	0.023	38		0.11			75	20	3	372	270	2.87		
4	80	8	50	2.2	22	1	0.05	22	_	0.05	147	0	40	7.6	0.9	210	218	0.97		
4	09	7.6	120	11	44	16	0.006	28			270		150	27	3.8	537	533	1.06		
4	10	7.30	71	8	51	18	N	20	0.51		300	N	80	22	2.2	552	420	1.00		
4	11		69	7.8	47	21		23	0.31	0.11	302	N	78	21	1.5	547	417	1.00		
4	12		69	7.8	48	19		22	0.26	0.0958	300	N	75	17	1.7	419	407	1.02		
4	13	7.90	69	6.8	45	20		29		0.6	285	N	81	21	1.3	528	413	1.01		
4	14	7.60	71	7.8	46	19		28		0.0419	283	N	80	22	1.2	529	414	1.02		
4	15		65	7.6	50	24	N	22	0.32		310	N	76	20	1.6	555	419	1.02		
4	16	7.20	69	7.7	49	21	0.02	23	0.1		310		80	21	1.4	425	425	0.99		
4	17		68	7.8	45	21		22	0.38		300	. /	78	20	1.5	541	411	0.99		
4	18		97	8.6	44 .	19		28	0.44		318	N	105	25	1.3	480	485	1.00		
	19	7.40	80	8.8	48	20		26		0.0463	311	N	92	32	1.4	593	461	0.97		
4	20		62	7.8	45	18		22	0.27		284	N	64	21	2.1	400	382	0.99		
4	21	7.3	300	9.5	76	39	0.006	26			346		500	130	1.7	1260	1252	1.02		
4	22		21	9.7	48	15	0.16	17			239	N	28	5		330	261	1.03		
4	23				55	29		18			239	N	42	4.9		268	266	1.04		
4	24		8.2		50.3	22.2					243.8	N	32.9	0.7		358.1	234	1.00		
	25		5.7	1.2	47	23	0.02	13			235		35	4.5	0.2		245	0.96		
	26	7.03	8.4	1.8	94	29	0.007	13		0.013	201		180	16	0.2		441	1.00	-91	-12.5
	27	7.35	29	3.7	26.7	44.2	0.01	29.1	0.2		280		91	27	0.44	409	389	0.87		
	28	7.4	8.1	3.6	48	25	0.05	14			222	0	51	6.5	0.2	266	266	1.00	·····	
	29				150	44		21			171	<u>N</u>	453	22		863	774	0.86		
÷	30				155	50	···.	30	<u>,                                     </u>	1.2	205	N	405	35		857	776	0.93		
	31		•		106	20			·.·		84	N	1027	112		1785	1306	0.27		· · ·
	32	7.4	81	11	47	21	0.006	34		0.11	303	····	90	34	1.7		469	1.00	-101	-12.95
	33	7.15	78	11	46	20	0.01	33	0.31	0.13	300	· · · · ·	100	34	1.9		472	0.95	-100	-12.9
	34	7.16	88	11	58	25	0.006	30		0.14	272		160	53	2.1		561	0.96	-97	-12.95
				•••																

		NI.	K	0-	N. 4	<b>F</b> .	0.00												
#	pH	Na	<u> </u>	Ca	Mg	Fe	SiO2	<u>B</u>	Li	HCO3	CO3	<u>SO4</u>	CI	F	TDSm	TDSc	ChgBal	delD	delO18
435	7.35	38	10	51	25	0.01	24		0.11	239		54	26	1.2		347	1.12	-75	-10.35
436		99	10	65	28		31	0.3		288	N	174	60	2.4	614	611	0.99		
437		101	11	70	26		29	0.3	0.6	274	N	179	64	2.3	620	617	1.02		
438	7.3	25	5.3	130	43	0.08	29		0.039			370	15	1		618	1.38	-87	-11.65
439	7.27	120	13	110	48	0.043	21		0.19	210	•	360	170	2.1		948	0.95	-97.5	-13.3
440	9.60	36	2.7	5	0.7	<0.15	0.64	0.57		37	N	64	8.1	0.1	160	136	0.89		
441	8.1	340	- 26 -	500	1-70 -	0:01	17	1.3	0.66	160	0	1900	380	1.5		3415	1.03		
442	7.9	300	20	450	140	0.03	17	1.1	0.6	160	0	1600	340			2949-		- · -	
443	6.96	130	13	120	47	0.004	23		0.21	226		380	200	1.4		1026	0.91	-94	-13.45
444	7.00			298	113	N	38			98		1200	1190	1.5	3720	2889	0.40		
445	8.12	271	7.4	62.7-		-<0.15-		0.58		113.8	N	431.3	143.6	4.05	1040	1018	1.01		
446	7.90	680	17	290	4.8	0.01	40	1.4		41	N	730	1000	3.9	2790	-2787-	1-01		
447	7.60	160	3.1	37	6.9	0.01	25	0.7		79	N	180	180	1.4	··· ···	633	0.93	<u> </u>	·
448	7.3	350	8.3	220	75	0.02	28	0.82		203		570	600	1	2090	1953	1.01		
449	7.9	160	4	58	16		27			156	0	190	180			712	0.97		

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# Nevada Geothermal Resource Use — 1993 Update

by Larry J. Garside and Ronald H. Hess Nevada Bureau of Mines and Geology University of Nevada, Reno

#### Geology

Nevada is well-endowed with both high- and low-temperature geothermal resources. Over 40 percent of the state is believed to have potential for the discovery of high-temperature (>90°C) geothermal resources, and another 50 percent has potential for low- to moderate-temperature (<°90C) resources (see Figure 1). Surface and subsurface indications of these resources are the more than 1,000 thermal springs and wells in the state. Realistically, this number of individual springs and wells represents several hundred resource areas.

Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of groundwater along faults to deep levels in a region of higher-than-average heat flow. In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (for example, warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for dozens to hundreds of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

#### **Exploration and Development**

Two hundred and eighteen geothermal well permits were issued from 1988 through 1993 by the Nevada Division of Minerals. They include 58 industrial-class production wells, 30 domestic class, 88 observation or gradient wells, 10 commercial-class, and 25 injection wells. During this same period 109 geothermal wells are reported to have been drilled, with a total amount drilled of approximately 86,500 m. Forty-five of the wells drilled were production wells, with a total amount drilled of approximately 44,800 m. Figure 2 and Table 1 illustrate the number of power generating wells and pace of drilling since 1980.

From 1989 through 1992 noncompetitive and competitive federal geothermal leases in Nevada generated \$1,699,282 in

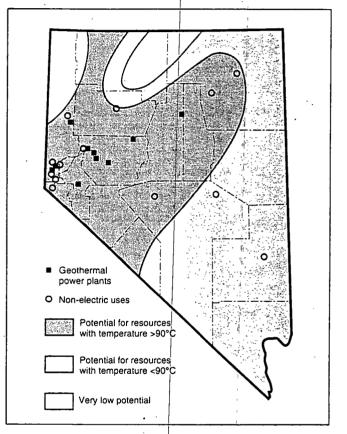


Figure 1. Generalized locations for Nevada's geothermal resources.

rental fees, \$849,641 of which was returned to the State of Nevada. Federal production royalties during the same period generated \$7,485,000, of which \$3,742,500 was returned to the State. Geothermal lease returns (\$849,641) and royalty returns (\$3,742,500) to Nevada totaled \$4,592,141. By regulation, half of all funds collected by the Bureau of Land Management from federal geothermal leases and production royalties is returned to the state.

#### **Geothermal Electric Power Generation**

Electric power is generated using geothermal resources at 10 plants in northern Nevada (Table 2, Figure 1). The state's



Figure 4. Steam separators and power house at Brady Hot Springs plant (Brady Power Partners), Churchill County, NV. Larry Green photo.

Plant name	Production	1992 Prod	luction (MWh)		0
(year on line)	capacity <sup>1</sup> (MW)	Gross	Net (sales)	Location	Operator
Beowawe (1985)	16.0	138,196	104,415	S13,T31N,R47E	Oxbow/Beowawe Geothermal Power Co. P.O. Box 6 Beowawe, NV 89821
Bradys Hot Springs (1992)	21.1	69,999	54,563	S12,T22N,R26E	Oxbow Power Services, Inc. P.O. Box 649 Ferniey, NV 89408
Desert Peak (1985)	8.7	85,364	76,906	S21,T22N,R27E	Western States Geothermal Co. P.O. Box 2627 Sparks, NV 89432-2627
Dixie Valley <sup>2</sup> (1988)	66.0	535,220	483,307	S7,T24N,R37E S33,T25N,R37E	Oxbow Geothermal Corp. 5250 South Virginia St. Suite 304 Reno, NV 89502
Empire (1987)	3.6	17,783	12,752	S21,T29N,R23E	OESI/AMOR II P.O. Box 1650 Failon, NV 89407
Soda Lake No. 1 (1987) and Soda Lake No. 2 (1991)	16.6	107,315	84,419	S33,T20N,R28E	OESI/AMOR III P.O. Box 1650 Fallon, NV 89407
Steamboat I, I-A (1986) and Steamboat II, III (1992)	31.1	104,574	79,790	S29,T18N,R20E	S.B. Geo, Inc. P.O. Box 18087 Reno, NV 89511
Stillwater (1989)	13.0	72,707	59,692	S1,T19N,R30E S6,T19N,R31E	OEŞI/AMOR IV P.O. Box 1650 Fallon, NV 89407
Wabuska (1984)	1.2	6,262	3,860	S15,16,T15N, R25E	Tad's 10 Julian Lane Yerington, NV 89447
Yankee Caithness (1988)	14.4	82,280	76,096	S5,6,T17N,R20E	Yankee Caithness J.V.L.P. P.O. Box 18160 Reno, NV 89511
TOTAL	191.7	1,219,700	1,035,800		

 Table 2. Total number of all classes of geothermal wells drilled and number of industrial-class geothermal wells drilled by year, 1988 through 1993. Source: Hess, 1993; Nevada Division of Minerals, 1993.

<sup>1</sup>Production capacity from currently developed geothermal resources. <sup>2</sup>Gross output of the Dixie Valley plant occasionally exceeds 66 MW. *Source:* Hess (1993). The plant uses 5.4 million pounds of brine per hour produced from six of eight production wells. The production zone is 300 to 425 m deep with a resource temperature of between 172 and 182°C. The wells supply two high pressure turbines and one low pressure turbine in a two stage system that produces 21.1 MW gross output. Geothermal fluids are injected into three of five available injection wells (Ettinger and Brugman, 1992; GRC BULLETIN, v. 21, no.1).

# Desert Peak

The Western States Geothermal Co., Desert Peak plant went online in 1985. It was designed by Phillips Petroleum Co. and uses a biphase turbine built by TransAmerica Corp. Production capacity from the currently developed resource is 8.7 MW. The resource temperature is approximately 205°C and wellhead temperature is 165°C.

#### Dixie Valley

The largest single geothermal power plant in Nevada, Oxbow Geothermal Corp. Dixie Valley plant, came online in 1988 producing 55-59 MW (net). (Gross output sometimes exceeds 66 MW, as listed on Table 2.) The power is produced in a double-flash turbine generator and purchased by Southern California Edison Co. Oxbow estimates a geothermal energy reserve in Dixie Valley sufficient to supply 200 MW for 30 to 60 years (GRC BULLETIN, June 1987; Reno Gazette-Journal, August 6, 1988).

#### Empire/San Emidio Desert

The OESI/AMOR II Empire plant came online in 1987 and consists of four Ormat Energy Converter Modules with a gross output of 3.6 MW from currently developed geothermal resources. Production is from a liquid-dominated geothermal source at 129 to 137°C. San Emidio Resources continued their geothermal program in the San Emidio Desert near Gerlach, Nevada. Early in 1991 San Emidio Resources signed a 5 MW, 30-year geothermal power supply contract, effective 1992, and a 20 MW, 30-year geothermal power supply contract, effective 1995, both with Sierra Pacific Power Co. (GRC BULLETIN, February 1991). The initial price paid for produced electricity under the long-term contracts is reported to be approximately 5 cents per kWh. At that time plans called for construction of a 6.5 MW binary plant to be online by November 1992. Since then San Emidio Resources requested and was granted a suspension of the 5 MW project in order for Sierra Pacific Power Co. and San Emidio Resources to determine the feasibility of combining the 5 and 20 MW projects into one project. In July 1993, Sierra Pacific Power Co. executed an amendment to the long-term power purchase agreement with San Emidio Resources. The agreement now calls for a 30 MW geothermal power plant to be online by November 1, 1995 (Public Service Commission of Nevada).

#### Fallon

In early 1992 the U.S. Navy issued a request for proposal to construct an 80 to 90 MW geothermal power plant at the Fallon Naval Air Station. If this plant is constructed, it will be Phase I of the Navy's geothermal program. Phase II will consist of a second 80 to 90 MW facility to be constructed within 10 years of completion of the Phase I project. The Navy estimates that the potential geothermal resource in the area will be able to produce 300 to 500 MW. The exploration drilling and reservoir testing performed during the initial phase of this project will be used to better define the geothermal potential of this area. Based on previous exploration information it is expected that the resource will be in the 175 to 205°C range.

#### Fish Lake Valley

Fish Lake Power Co. continued their extensive drilling efforts to develop a geothermal resource in the Fish Lake Valley area of Esmeralda County. If a geothermal generating facility is built, the electricity would be delivered to California under a Standard Offer No. 4 Contract.

#### Hot Sulfur Springs

Earth Power Energy and Minerals has requested an avoided-cost purchase contract agreement with Idaho Power Co. If a contract were obtained, a 9.9 MW geothermal power plant could be constructed at Hot Sulfur Springs, Elko County, Nevada (*Reno Gazette-Journal*, October 10, 1993).

#### Rye Patch

The Rye Patch Limited Partnership (OESI) is currently nearing completion of a 12.5 MW binary generating plant at their site near Rye Patch reservoir. The company has a signed purchase agreement with Sierra Pacific Power Company with an anticipated plant online date of November 30, 1993. This has been delayed while the company continues to develop sufficient and continuous geothermal resources to fuel the plant.

#### Soda Lake

On August 19, 1991, the 13 MW OESI/AMOR III Soda Lake No. 2 geothermal power plant completed commercial operations testing and went online. This plant is adjacent to the 3.6 MW OESI Soda Lake No. 1 plant that came online during 1987 (GRC BULLETIN, October 1991). Both plants are producing from a liquid-dominated geothermal source at 160°C.

# Steamboat Springs

Two 12 MW, air-cooled, binary geothermal power plants, Steamboat II and III, operated by S.B. Geo, Inc., were brought online in December 1992, adding 24 MW of produc-

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tion to the existing 7.1 MW S.B. Geo Steamboat plant, for a combined gross production capacity of 31.1 MW.

The geothermal fluid cycle at the new plants is completely contained and the fluids are injected back into the ground (closed binary-cycle system). The existing resource is expected to last 30 years or more and can support an additional 36 MW of production capacity. Based on this, plans are currently being formulated to determine the feasibility of installing an additional 24 MW facility in the near future. In December 1993, S.B.Geo, Inc. received a \$7.2 million grant from the U.S. Department of Energy to develop a pilot project known as the Kalina Pilot Plant. The purpose of the project is to increase the efficiency of extracting heat from hot geothermal fluids.

Yankee Caithness J.V.L.P. operates a 14.4 MW (gross) flash turbine system producing from a 170°C resource. The Yankee Caithness Steamboat plant came online in 1988, and the produced power is purchased by Sierra Pacific Power Co. on a 30 year contract.

#### Stillwater

OESI/AMOR IV, Stillwater Geothermal plant came online in April 1989. Total project cost was \$36 million. The aircooled plant consists of 14 Ormat Energy Converters that have a combined gross generating capacity of 13 MW. The plant uses a liquid-dominated geothermal source ranging in temperature from 155 to 170°C. The plant operates on a closed system; all geothermal liquids are injected (Ormat Fact Sheet, 1989; Geo-Heat Center, Fall 1989).

#### Wabuska

Tad's Wabuska plant came online in 1984. Current production capacity is 1.2 MW produced from two Ormat Energy Converter modules. The plant operates on fluids at 107°C. produced from a depth of 107 m (GRC BULLETIN, July, 1987).

# Non-Electric Low- and Moderate-Temperature Applications

The majority of Nevada's population is concentrated in two areas, Reno-Carson City and Las Vegas. Many of the state's geothermal resources are remote from any population centers, thus limiting some potential applications. Although 50 or more small-to-large communities are located within 8 km of geothermal resources, only a few of these areas have been able to use these resources effectively. The reasons for this under-utilization are varied. Although some reasons relate to technical and engineering problems (resource size and temperature, heat loss during transport, etc.), many more are economic (high capital outlays, long payout, under-capitalization of projects) and perceptual (unconventional vs. conventional technology, short vs. long-term cost evaluations, uncertainties about long-term economic risks). There have been attempts to use Nevada's low- and moderate-temperature geothermal resources in more than 20 areas, mainly in the past 5-10 years. Additionally, economic and/or technical appraisals of more areas have been conducted, but for a variety of reasons projects were not completed.

#### Moana Geothermal Area

Moana Hot Springs, located in the southwestern part of Reno, have not flowed at the surface for at least 15 years. The springs were the discharge point for an area of thermal groundwater that has been used for a spa, swimming pool, and home heating for nearly 100 years. Recent use for home space heating began in the 1960s. The area today is predominantly residential. We estimate that the area of thermal groundwater encompasses at least 9 km<sup>2</sup>. In this area there are more than 300 homes that use geothermal fluids for space heating. One hundred and thirty of these homes are part of a district heating system, while most of the rest use downhole heat exchangers in individual wells. A smaller district heating system has retrofitted 12 homes for geothermal heat, and plans to add another four in the spring of 1994. A large hotel, a motel, about three apartment or townhouse complexes, five churches, and a county swimming pool also use the resource. The Veterans Administration Hospital, located about 2 km northeast of the geothermal area, drilled a deep well several years ago and encountered approximately 43°C water. The well was plugged and abandoned.

#### Steamboat Hot Springs

The Steamboat geothermal area consists of a deep, hightemperature (215 to 240°C) geothermal system, a shallower, moderate-temperature (160 to180°C) system, and a number of shallow, low-temperature (30 to 80°C)" subsystems (Goranson and others, 1991). The higher temperature systems are used for electric-power generation (see the preceding section). A number of low-temperature thermal groundwater anomalies are in an area of approximately 30 km<sup>2</sup> centered on the hot spring area (Goranson and others, 1991), but these thermal areas are not well known and are little used. A few homes in the Steamboat area have used lowtemperature fluids for over 40 years, and one or more spas have been active in the springs area since the 1860s. Presently probably less than a dozen homes use the low-temperature geothermal fluids for space heating or domestic hot water (including swimming pools). About one domestic geothermal well permit has been issued per year over the last 5 to 7 years.

#### Bower's Hot Springs

A large outdoor swimming pool and smaller children's pool at the Washoe County Park at Bower's Mansion (lo-

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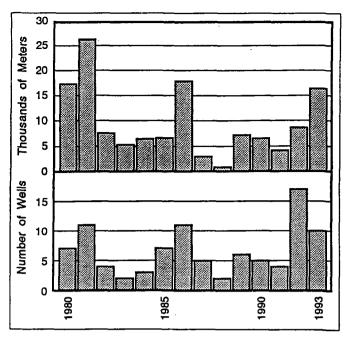


Figure 2. Industrial-class (power generating) wells drilled in Nevada, 1980-1993.

total installed geothermal generating capacity is second only to California.

In 1993 the state-wide peak power demand was 3,755 MW; the total installed generating capacity of Nevada's two major utilities (which supply most of the state's customers) is nearly 2,600 MW (Public Service Commission of Nevada). Thus, geothermal energy provides about 7 percent of the total electricity generated within Nevada (although only about 3 percent of the peak load). Over 40 percent of Nevada's geothermal electric power is exported to California.

From 1989 to 1992, total Nevada geothermal electrical production was 4,076,616 megawatt-hours with an approximate sales value of \$307,410,000. Production capacity in 1988 from eight geothermal power plants was 115.8 MW (gross) while current power production from 10 existing geothermal power plants in Nevada is 191.7 MW gross (Table 1). These values represent a 17 percent increase in sales value of the power sold from 1988 to 1992 and an increase in installed gross power production capacity of 60 percent over 1988.

It is important to note that in 1988 Nevada had nearly a threefold increase over 1987 in the amount of online geothermal generating capacity (Figure 3). The primary reason for this increase was the Dixie Valley 60 MW Oxbow Geothermal plant being put online. The OESI plants at Empire (4.8 MW) and Soda Lake No. 1 (3.6 MW) were also brought online during this period.

According to a 1991 Department of Energy estimate, under stable market conditions and with continuing technologic advancements in the geothermal industry, Nevada's projected electrical production capacity from known geothermal resources by the year 2010 should be at least 600 MW (Energy Information Administration, 1991). It is esti-

Table 1. 1992 directory of Nevada geothermal power plants.

Year	Total # drilled	Total depth(m)	No. Industrial wells drilled	Total depth(m)
1988	11	4,268	3	1,098
1989	15	14,817	6	7,317
1990	12	11,280	5	6,707
1991	14	12.561	4	4,268
1992	36	17,988	17	8,841
1993	21	25,596	10	16,686
TOTAL	109	86,510	45	44,917
	<u> </u>			

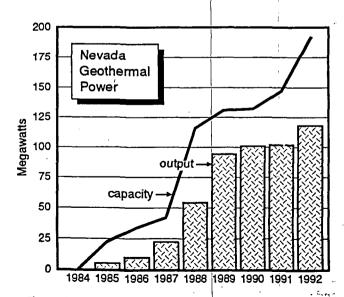
mated that, for the Basin and Range province as a whole, aggressive exploration activity and continued rapid geothermal technologic advancements could add up to 2,000 MW of production capacity from known resources and new discoveries over the next 10 to 20 years (Wright, 1992). These relatively optimistic future scenarios should be tempered by today's reality of low-priced natural gas, increases in efficiency of fossil fuel generating equipment, and anticipated changes in power sales contracts. The future is bright for Nevada's high-temperature resources, but the pace of development will depend on many factors not related to the viability of the geothermal resource.

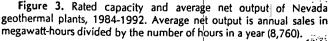
#### Beowawe

The Oxbow/Beowawe Geothermal Power Co., Beowawe plant came online in 1988. It is a 16 MW (gross), dual-flash plant, which uses geothermal fluids from three wells with a resource temperature of 221°C.

#### Brady Hot Springs

The Brady Hot Springs geothermal power plant (Figure 4) came online in July 1992. Plant operation and maintenance is being performed by Oxbow Power Services, Inc.





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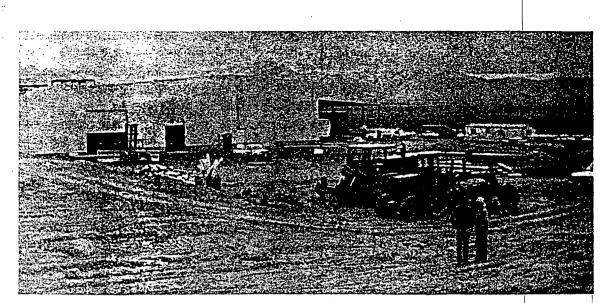


Figure 5. Vegetable-dehydration plant under construction in the San Emidio Desert. Larry Green photo.

wells are used in a heat exchanger to transfer heat to cyanide heap-leach solutions (Trexler and others, 1990).

## Carlin

Carlin Hot Springs, located near the Humboldt River southwest of the town, have a reported temperature of 80°C (Trexler and others, 1982). The Carlin High School used 31°C geothermal fluid from 280 m well from 1986 to 1992 in a closed-loop space heating system. The well was abandoned in 1992, apparently in part because of scaling problems with iron and manganese.

#### Elko Area

Hot springs south of the town of Elko were first used in a bath house in the 1860s (Garside and Schilling, 1979). Thermal groundwater was known to exist to the north of the springs under a part of the town, but no use was made of it until the Elko Heat Company began supplying geothermal fluid for space heating to several downtown buildings in 1982 (Rafferty, 1988). The company has continued to grow; in 1993 it served 16 commercial customers and two residential customers (Mike Lattin, oral commun., 1994).

The Elko County School District, in conjunction with the Elko General Hospital, developed a district geothermal heating system in 1986. The system supplies heat to eight buildings (two schools, a municipal swimming pool complex, a gym, a convention center, a hospital, a city hall, and a school administration building). In 1988 the estimated combined savings to all users was \$300,000 per year (Rafferty, 1988; Richard Harris, oral communication, 1994).

#### Jackpot Area

Two wells drilled in 1988 at the Y3 Ranch about 7 km southeast of Jackpot, were used for raising catfish. The maxi-

mum reported well temperature was 40°C (Lund and others, 1990). The catfish-raising operation was not active in late 1993, reportedly due to insufficient geothermal fluid.

#### Wells Area

Warm springs about 1.5 km north of the present town of Wells were referred to by travelers on the emigrant trail in the 1850s as Humboldt Wells (from which the town name is derived). Thermal (32 to 34°C) groundwater is used by an elementary school and the Wells Rural Electric Co. in heat pump applications for space heating.

#### Duckwater (Big Warm) Springs

A geothermal catfish-growing facility has been operated at this site since 1982. The facility was purchased in 1992 by Robert and Jeff King (Valley Fish) of Preston, Idaho. The facility, located about 110 km west of Ely, produces over 300,000 pounds of prime 8-ounce catfish filets per year that are shipped to Idaho for sale (*Geo-Heat Center Quarterly Bulletin*, December 1992).

#### Caliente Hot Springs

The town of Caliente in Lincoln County derives its name from the local hot springs. A number of wells in the area have reported temperatures from 40 to 80°C (Garside and Schilling, 1979; Lienau and others, 1988). A motel supplies geothermal well water to bathing pools and individual room whirlpool baths, and a trailer park supplies hot water to individual mobile homes. The Lincoln County Hospital (20 beds) was heated using 39°C water from a well on the site, but reduced temperatures (to 28°C) forced reliance on electric resistance heating. The hospital plans to use the lowertemperature fluids from its well for heating and cooling using heat-pump technology. The city swimming pool used cated between Reno and Carson City), are supplied with warm water from a geothermal well located near the spring.

#### Carson City Area

Water from a well at the site of Carson Hot Springs in northern Carson City is used directly in a swimming pool. In southeast Carson City, thermal groundwater is found in the State Prison/Pinyon Hills area. In the past, there have been a few attempts to use the thermal groundwater from domestic wells in that area for space heating. Geothermal space heating has been considered, but not implemented, for at least two schools in the area.

#### Saratoga Hot Springs

A California company, Lobsters West, has proposed raising lobsters near the warm springs located about 15 km southeast of Carson City. The geothermal fluids would be used to heat tanks in which the lobsters would grow to full size. The experimental study is proposed to last 4 years; live lobsters would be shipped twice a month to local markets (*Reno Gazette-Journal*, November 4, 1993).

#### Hobo Hot Springs

These hot springs, located about 15 km south of Carson City, were used to raise tropical fish and Malaysian prawns in the late 1980s. Lobster raising was also considered. The water temperature is slightly over 40°C. The site is presently inactive.

#### Walley's Hot Springs

Walley's Hot Springs, located near Genoa, about 20 km south of Carson City, was the site of a large spa in the late 1800s and early 1900s (Garside and Schilling, 1979). A modern spa was built on the site in the early 1980s. In addition to use of the geothermal fluids for bathing and domestic hot water, the buildings are heated with geothermal energy (Lienau and others, 1988).

#### Gerlach

Hot springs located just west of the town of Gerlach (Great Boiling Springs) have been used for bathing for many years. The Gerlach General Improvement District built a bath house using geothermal fluids in 1989. The facility was planned for use by tourists and local residents. The facility has been unable to obtain a permit from the health department because sediment from the well plugged water filters. Future plans are for a geothermal heat exchanger system to heat city water for the spa. Geothermal groundwater apparently extends under at least part of the town, as at least two Gerlach homes use geothermal wells for space heating. The water in one well is reported to be 35 to 36°C (unpublished data, Nevada Division of Minerals).

#### San Emidio Desert

A vegetable dehydration plant is under construction in the San Emidio Desert area southwest of Gerlach (Figure 5). The plant is a few kilometers north of the Empire (OESI/AMOR II) Electric-Power plant. Integrated Ingredients (Spice Islands, Fleischmann's, and other brands), part of international food manufacturer Burns Philp, is contracting for the construction of the facility, which will employ about 25 persons when completed in early 1994. The number of employees may increase to about 65 after 18 months. Onions and garlic will be dehydrated and stored at the plant (*Reno Gazette-Journal*, August 31 1993). The plant will use approximately 150°C geothermal fluid.

# Brady Hot Springs

A geothermal vegetable dehydration plant has been operated at this site, about 80 km northeast of Reno, since 1978. The facility uses a moderate-temperature (132°C) geothermal well on site. Since 1993, additional geothermal fluid has been supplied by the nearby Brady Power Partners electric power generation plant, operated by Oxbow Power Services, Inc.

#### Wabuska Hot Springs

In addition to the rather low-temperature electric-power generation plant operated at Wabuska by Tad's Enterprises, several non-electric applications have been located in the area, but none are active today. A hydroponic geothermal greenhouse operation (tomatoes, cucumbers, etc.) was built on the site in the early 1970s, but few vegetables were grown. Tad's Enterprises has in the past operated a geothermal ethanol facility, a plant to grow algae (*Spirulina*) for human consumption, and facilities to raise Malaysian prawns, catfish, and tropical aquarium fish. Some of these were pilot facilities, rather than actual production facilities.

#### Rye Patch Geothermal Area

Florida Canyon Mining Co. operates a large open-pit gold mine and heap-leach gold recovery facility about 50 km northeast of Lovelock, and 7 km north of the area presently under development by Rye Patch Limited Partnership for geothermal electric power production. A 180 m well produces fluids at approximately 100°C; these fluids provide makeup water for the cyanide extraction solutions. Heat from heat exchangers is also extracted to heat the solutions. The heating of cyanide solutions aids extraction during cold weather, and may somewhat enhance total gold recovery.

#### Darrough's Hot Springs Area

Round Mountain Gold Corp. operates a large open-pit gold mine and heap-leach gold recovery facility near the Darrough's Hot Springs geothermal area in Nye County. Geothermal fluids from shallow (approximately 300 m)

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geothermal heat in the past, but was damaged during the winter of 1992 and will probably be replaced. The City of Caliente has a grant from the Rural Development Administration to use the local geothermal resources. A nearby perlite processing plant may be the first user of plant process heat. If more funding is found, the city plans to provide heat to the hospital, swimming pool, and eventually an elementary school and youth training facility (Glen Van Roekel, oral communication, 1994).

#### Ash Springs

Thermal waters (31 to 36°C) at Ash Springs, located about 10 km north of Alamo, in Lincoln County, have been used in the past at a spa on the site. The facility is presently closed.

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Mail Stop 178 Reno, Nevada 89557 (0088 Telephone: (702) 784-6691 LAX: (702) 784-1709

# NEVADA BUREAU OF MINES AND GEOLOGY

November 16, 1992

Howard P. Ross Project Manager University of Utah Research Institute 391 Chipeta Way, Suite C Salt Lake City, UT 84108-1295

Dear Howard:

I have enclosed with this letter a formal proposal for NBMG's Low-Temperature Geothermal Resource Program. I have included my resume, as Principal Investigator, as well as copies of the University's regulations on travel, the motorpool rates for vehicles, and a copy of UNR's negotiated indirect-cost agreement. Please note that the audit agency (Dept. of Health and Human Services), and the representative's name and telephone number are on this document. The Statement of Work that you supplied to me is agreeable to NBMG and the University. I and NBMG will be supplying time and other services to the project that are not accounted for in the budget, and can certainly be considered as cost sharing. I hope that I have supplied enough detail on the budget items; I think they are mostly pretty straightforward.

Please contact me if you need more information. I look forward to working with you and the geothermal research team at UURI.

Sincerely yours,

Larry Garside Research Geologist

LJG/hs

encl.



# THE BOARD OF REGENTS UNIVERSITY AND COMMUNITY COLLEGE SYSTEM OF NEVADA on behalf of the

# UNIVERSITY OF NEVADA, RENO

Office of the Associate Vice President for Research Mail Stop 326, Getchell Library, Reno, Nevada 89557-0035

SPONSORING<br/>AGENCYOregon State System of Higher Education<br/>Oregon Institute of Technology

TTILE OF PROPOSED PROJECT	Nevada Low Temperature Geothermal Resources
PERIOD OF PROPOSED PROJECT	December 1, 1992 - December 31, 1993
TOTAL Proposed project	\$55,000
PRINCIPAL INVESTIGATOR(S)	Larry J. Garside
DEPARTMENT COLLEG	E Nevada Bureau of Mines and Geology Mackay School of Mines
Administrative representative to be notified upon award declination.	
Kenneth W. Hunter, Jr. Associate Vice President for R Graduate School Mail Stop 326 University of Nevada, Reno Reno, NV 89557-0035 (702) 784-4040	esearch
AX: (702) 784-6064	Associate Vice President for Research

## ADDENDUM TO STANDARD CONTRACT AGREEMENT for STATE GEOTHERMAL ENERGY RESEARCH, DEVELOPMENT, AND DATABASE COMPILATION

#### between

# THE OREGON STATE SYSTEM OF HIGHER EDUCATION OREGON INSTITUTE OF TECHNOLOGY

#### and

# THE NEVADA BUREAU OF MINES AND GEOLOGY, THE UNIVERSITY OF NEVADA, RENO

# STATEMENT OF WORK

# 1.0 INTRODUCTION

The United States Department of Energy - Geothermal Division (DOE/GD) supports the development of indigenous and environmentally advantageous energy alternatives to the traditional fuels. There is a very large, nearly unused supply of low- and moderate-temperature geothermal resources in the United States that could be brought on line over the next decade. The increased use of Geothermal Heat Pumps (GHPs) could also reduce the need for traditional fossil fuel consumption for space heating and cooling.

The U.S. Congress has appropriated funds for a program of Low-Temperature Geothermal Resources and Technology Transfer and DOE/GD has funded EG&G, Idaho to establish contracts with the Oregon Institute of Technology - Geo-Heat Center (OIT-GHC), the Idaho Water Resources Research Institute (IWRRI) and the University of Utah Research Institute (UURI) to implement this program.

Important parts of this program are to bring the inventory of the nation's low- and moderatetemperature resources up to date, to complete a collocation study of these resources and communities and other potential users, and to collect and disseminate information necessary to expand the use of GHPs. OIT-GHC will have the lead role in the collocation study and will establish subcontracts with the state resource teams. UURI will work with the State Teams on gathering, documenting, and assembly of low- and moderate-temperature hydrothermal resource data and will assist in technical monitoring of the State Team efforts and publications. IWRRI will be responsible for establishing the hydrothermal resource data for Idaho and for performing geothermal reservoir evaluations throughout the western United States.

The technical tasks described herein may be considered Phase I of the Low-Temperature Geothermal Resources and Technology Transfer program. If Phase I proves successful, and additional funds are appropriated by Congress, the program may be expanded and continued. Phase II would likely include detailed resource evaluations of priority areas identified in Phase I.

Funding for the Low-Temperature Geothermal Resources and Technology Transfer Program is limited, and the success and continuation of the program is dependent upon a productive Phase I effort. Participating State Teams are encouraged to seek state or organization cost shares (in cost or in-kind) to enhance this contract effort.

# 2.0 TECHNICAL TASKS

The following technical tasks will be accomplished under this subcontract.

- 2.1 Complete an updated inventory of low- and moderate-temperature resources for the State of Nevada, current to June 1, 1992. Review drilling records and other information to identify new resources and verify temperatures and flow rates of springs and wells which may have changed substantially since the previous statewide geothermal resource inventory. Identify geological, geophysical, geochemical, and hydrologic studies which relate to these resources. The minimum temperature for a low-temperature resource is defined to be 10°C above the mean annual air temperature at the surface and should increase by 25°C/km. Occurrences to 150°C will be included.
- 2.2 Conduct a fluid geochemistry study of the more important resource areas for which existing data are questionable or unavailable. UURI will provide up to ten (10) quantitative fluid chemical analyses in support of this study.
- 2.3 Complete a computer database listing compatible with Lotus 123 or other acceptable format tabulating for each occurrence: name, location (T,R,S), county, longitude, latitude, depth, flow, temperature, chemistry, and other data as appropriate and available.
- 2.4 Review OIT-GHC geothermal resource and demographic data for the State of Nevada for accuracy and completeness, as part of the collocation study.
- 2.5 Assist OIT-GHC, UURI, and IWRRI in studies to prioritize low- and moderatetemperature resource areas for new development. Develop conceptual geologic models and groundwater data for selected resources.

# 3.0 REPORTS, DATA, AND OTHER DELIVERABLES

- 3.1 A geothermal database listing in hardcopy and diskette form will be submitted to UURI. The listing will include all known low- and moderate- temperature spring and well occurrences in the State of Nevada. Principal facts will include location, depth (well), flow rate (if known), etc.
- 3.2 Letter reports and memoranda reviewing collocation data and priority rankings will be submitted to OIT-GHC and UURI.
- 3.3 A final summary report, not to exceed 50 pages, describing all tasks and their results, and documenting any new temperature, geologic, geochemical or geophysical data will be submitted to UURI, OIT-GHC, and IWRRI. This report may incorporate interim letter reports and memoranda as appendices. The report will include a geothermal resource occurrence map of the state, black and white, scale 1:1,000,000 or acceptable alternative.
- 3.4 Interim progress reports will be submitted to UURI and OIT-GHC quarterly.

# 4.0 SCHEDULE OF PERFORMANCE AND REPORTING

4.1 The period of performance for this agreement will terminate on December 31, 1993, unless modified by letter agreement and signed by the University of Nevada - Reno, OIT-GHC, and UURI.

- 4.2 A review of the OIT-GHC collocation study will be completed and a letter report or memorandum of comment submitted to OIT-GHC and UURI within one month after receipt of the draft document from OIT-GHC.
- 4.3 A preliminary database listing of geothermal resource occurrences will be submitted to UURI within four months after the execution of this agreement.
- 4.4 A final database listing of geothermal resource occurrences will be submitted to UURI within twelve months after the execution of this agreement.
- 4.5 A final report documenting all new data and activities completed under this agreement will be submitted to UURI and OIT-GHC not later than December 31, 1993.

# 5.0 **RESPONSIBLE PARTIES**

- 5.1 The Principal Investigator for this agreement will be Larry J. Garside, Nevada Bureau of Mines and Geology, University of Nevada, Reno.
- 5.2 The Technical Project Managers for this agreement will be Howard P. Ross, UURI and Paul J. Lienau, OIT-GHC.
- 5.3 The Contracting Officer for this agreement will be Douglas Yates, OIT.

# 6.0 FUNDING

This contract agreement provides for funding not to exceed \$55,000.00 for the completion of all technical tasks and submittal of all required deliverables.

Salaries	
Professional (\$48.25 x 320 hr)	\$15,440
Support Staff (\$20.31 x 240 hr)	4,875
Students (\$7.00 x 1183 hr)	<u>8,281</u>
	28,596
Other Personnel Expenses Fringe benefits (Professional @ 3%)	463
Fringe benefits (Support Staff @35%)	1,706
Fringe benefits (Students @1.2%)	99
	2,268
Other Direct Costs Travel Conferences (GRC, '93) Supplies, field Supplies, lab and office Supplies, computer hardware, software Reproductions	2,307 200 586 2,500 1,358 <u>300</u> 7,251
Total Direct Costs	38,115
Indirect Costs @ 44.3%	16,885
Total	<u>\$55,000</u>

**BUDGET** NBMG - LOW TEMPERATURE GEOTHERMAL RESOURCES

1

# Distribution by tasks

		Hours	Salary	Travel	Total
Task 1	Resource inventory	1,226	\$22,300	\$1,300	\$22,000
Task 2	Fluid Chemistry	168	2,775	1,000	3,375
Task 3	Review Collocation	133	2,200	-	-
Task 4	Prioritize resources	<u>    115</u>	1,900	-	-
		1,642			

Proposed Manpower

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	Months(hours)
Professional	1.7 (320)
Support Staff	1.5 (240)
Students	7.1 (1183)

#### Travel Detail (\$2,307)

- 1) One 3-day trip to OIT (one person): Lodging \$240; Per Diem -\$102; Mileage - \$195. Total = \$377.
- 2) One 5-day trip for one person to GRC meeting in San Francisco, Oct 3-6: Lodging - 240; Per Diem - \$120; Air Fare - \$250. Total = \$610.
- 3) Two 5-day trips for one person to various springs in eastern Nevada: Lodging - \$340; Per Diem - \$240; Mileage - \$740. Total = \$1,320.

#### Supplies Detail

- 2) Supplies, field: Bottles, maps, filters, reagents, film, etc. Total = \$586.
- 3) Supplies, lab and office: Approx. 800 topographic maps @ \$2.5 ea. - \$2,000; copying, tele., paper, miscl. office supplies. Total = \$2,500.
- 4) Supplies, computer hardware, software: Computer maintenance costs (Sun work station @ \$1,000 per month); PC maintenance @ \$100 per year; plotter paper, repairs, pens, tape cartridges, RBASE, etc. Total = \$1,358.

#### COLLEGES AND UNIVERSITIES

UNIVERSITY OF NEVADA, RENO CLARK ADMINISTRATION BUILDING F.ENO, NV 89557-0025 DATE: March 20, 1992 FILING REF.: The preceding agreement was dated

Feb. 06, 1992 U50228

The rates approved in this Agreement are for use on grants, contracts and other agreements with the Federal Government, subject to the conditions contained in Section II.

#### SECTION I: RATES

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	Effective		<b>D</b>		
Type	From	<u>To</u>	<u>Rate</u>	<u>Location</u>	<u>Applicable To</u>
INDIRECT	COST RATE	<u>S*</u>		3	
Indirect	Cost Rate	s Applicable	to Awards	Effective Price	r to July 1, 1992:
Pred.	07/01/92	06/30/93	48.0%	On-Campus	Research
Pred.	07/01/92	06/30/93	29.7%	Off-Campus	Research
Pred.	07/01/92	06/30/93	50.0%	On-Campus	Instruction
Pred.	07/01/92	06/30/93	33.0%	Off-Campus	Instruction
Pred.	07/01/92	06/30/93	24.2%	On-Campus	Other Sponsored A
Pred.	07/01/92	06/30/93	20.1%	Off-Campus	Other Sponsored A
Pred.	07/01/92	06/30/93	16.7%	On-Campus	SNJCC
Indirect	Cost Rate	s Applicable	to Awards	Effective On o	r After July 1, 199
red.	07/01/92	06/30/93	44.38	On-Campus	Research
Pred.	07/01/92	06/30/93	26.0%	Off-Campus	Research
Pred.	07/01/92	06/30/93	50.0%	On-Campus	Instruction
Pred.	07/01/92	06/30/93	26.0%	Off-Campus	Instruction
Pred.	07/01/92	06/30/93	24.28	On-Campus	Other Sponsored A
Pred.	07/01/92	06/30/93	20.1%	Off-Campus	Other Sponsored A
Pred.	07/01/92	06/30/93	16.7%	On-Campus	SNJCC
-	07 (01 (03	0.0100100			_
Prov.	07/01/93	06/30/95	44.38	On-Campus	Research
Prov.	07/01/93 07/01/93	06/30/95 06/30/95	26.0%	Off-Campus	Research
Prov. <sup>2</sup> Prov.	07/01/93	06/30/95	50.0% 26.0%	On-Campus	Instruction
Prov.	07/01/93	06/30/95	24.28	Off-Campus	Instruction
Prov.	07/01/93	06/30/95	24.28	On-Campus Off-Campus	Other Sponsored Ac
Prov.	07/01/93	06/30/95	16:7%	On-Campus	Other Sponsored Ac
ETOA .	01101133	00/30/33	10.12	on-campus	SNJCC

\*BASE: Modified total direct costs consisting of salaries and wages, fring benefits, materials and supplies, services, travel, and subgrant and subcontract up to \$25,000 each.

# TREATMENT OF PAID ABSENCES

Vacation, holiday, sick leave pay and other paid absences are included in salaries and wages and are charged to Federal projects as part of the norma charge for salaries and wages. Separate charges for the cost of these bsences are not made.

# TREATMENT OF OTHER FRINGE BENEFITS

This organization charges the actual cost of each fringe benefit direct to Federal projects. However, it uses a fringe benefit rate which is applied to salaries and wages in budgeting fringe benefit cost under project proposals. The following fringe benefits are treated as direct costs: STATE RETIREMENT, HEALTH INSURANCE, UNEMPLOYMENT COMPENSATION AND NEVADA INDUSTRIAL INSURANCE.

#### SPECIAL REMARKS

The rates in this agreement have been negotiated or revised, as appropriat to reflect the administrative cap provisions of the revision to OMB Circul A-21 published by the Office of Management and Budget on October 3, 1991. No rate affecting the institution's fiscal periods beginning on or after October 1, 1991 contains total administrative cost components in excess of that 26 per cent cap. A. LIMITATIONS: The rates in this Agreement are subject to any statutory or administrative limitations and apply to a given grant, contract or other greement only to the extent that funds are available. Acceptance of the ites is subject to the following conditions: (1)  $Onl_Y$  costs incurred by is organization were included in its indirect cost pool as finally accept such costs are legal obligations of the organization and are allowable unde the governing cost principles; (2) The same costs that have been treated as indirect costs are not claimed as direct costs; (3) Similar types of costs have been accorded consistent accounting treatment; and (4) The information provided by the organization which was used to establish the rates is not later found to be materially incomplete or inaccurate.

B. ACCOUNTING CHANGES: If a fixed or predetermined rate is in this Agreement, it is based on the accounting system purported by the organization to be in effect during the Agreement period. Changes to the method of account ing for costs which affect the amount of reimbursement resulting from the use of this Agreement require prior approval of the authorized representative of the cognizant agency. Such changes include, but are not limited to changes in the charging of a particular type of cost from indirect to direc Failure to obtain approval may result in cost disallowances.

C. FIXED RATES: If a fixed rate is in this Agreement, it is based on an estimate of the costs for the period covered by the rate. When the actual costs for this period are determined, an adjustment will be made to a rate of a future year(s) to compensate for the difference between the costs used to establish the fixed rate and actual costs.

D. USE BY OTHER FEDERAL AGENCIES: The rates in this Agreement were oproved in accordance with the authority in Office of Management and Budge rcular A-122, A-21 or HHS Hospital Cost Principles, as appropriate, and should be applied to grants, contracts and other agreements covered by the appropriate regulation, subject to any limitations in A above. The organization may provide copies of this Agreement to other Federal Agencies to give them early notification of this Agreement.

BY THE ORGANIZATION University of Nevada, Reno	BY THE COGNIZANT AGENCY ON BEHALF OF THE FEDERAL GOV DEPARTMENT OF HEALTH AND HUN	
(ORGANIZATION)	(Agency)	
Upin M. Currey	Diedon	
(Signature)	(Signature) David S. Low	. :
Joseph N. Crowley		
(Name)	(Name) Director, Division of Cost	Allocation
President		
(Title)	(Title)	
- 4-6-92	March 20, 1992	
(Date)		K. Hohulin
P-CU-H)	Telephone: (415) 556-1704	

## UNIVERSITY OF NEVADA, RENO INDIRECT COST RATES FOR THE PERIOD JULY 1, 1992 THROUGH JUNE 30, 1993

	ORGAN	IZED RESE	ARCH		INSTRUC	TION	(	OTHER SPOI	N PROJ	•
		ON-	OFF-		ON-	OFF-		ON- ·	OFF-	
	<u>-</u>	CAMPUS	CAMPUS		CAMPUS	CAMPUS		CAMPUS	CAMPUS	SNJ
BUILDING AND EQUIPMENT		5.30			3,50			1.40		
OPERATION & MAIN		11.30			7.70			1.60		
GEN ADMIN	7.70			4.90			7.70			7.70
DEPT ADMIN	20.10			14.50			11.20			0.00
SPONSORED PROJ ADMIN	<u>1.90</u>			<u>0.10</u>			<u>1.20</u>			<u>0.00</u>
ADMIN COMPONENTS	29.70	*26.00	26.00	19.50	19.50	26.00	20.10	20.10	20.10	7.70
UBRARY		1.60			11.60			1.10		
STUDENT SERVICES		<u>0.10</u>			<u>7.70</u>			<u>0.00</u>		
TOTAL		<u>44.30</u>	<u>26.00</u>		<u>50.00</u>	<u>26.00</u>		<u>24.20</u>	<u>20.10</u>	1

THE ABOVE RATES ARE APPLICABLE TO AWARDS EFFECTIVE ON OR AFTER JULY 1, 1992

(\*ADMINISTRATIVE COMPONENTS LIMITED TO 26.0% IN ACCORDANCE WITH OMB A-21, DATED OCTOBER 3, 1991.)

CONØ **EGNATURE** 

<u>President</u>

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1

<u>4-6-92</u> DATE EXHIBIT A



1

Office of the Regional Director

MAR 31 1992

Region IX 50 United Nations Plaza San Francisco, CA 94102

# RECEIVED

# APR 2 1992

CONTROLLER'S OFFICE

Thomas L. Judy, Controller University of Nevada, Reno Clark Administration Building Reno, NV 89557-0025

Dear Mr. Judy:

The original and one copy of a revised indirect cost Negotiation Agreement are enclosed. This Agreement reflects an understanding reached between your organization and a member of my staff concerning the rate(s) that may be used to support your claim for indirect costs on grants and contracts with the Federal Government. Please have the <u>original</u> signed by a duly authorized representative of your organization and return it to me, retaining the copy for your files. We will reproduce and distribute the Agreement to the appropriate awarding organizations of the Federal Government for their use.

Sincerely,

1\_\_\_\_(X) David S. Low

Director Division of Cost Allocation

Enclosures

PLEASE SIGN AND RETURN THE ORIGINAL OF THE NEGOTIATION AGREEMENT.



Physical Plant Department 482 Reno, Nevada 89557-0057 (702) 784-0514

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\* 1

MAY 7, 1991

J,

TO: ALL FACULTY AND STAFF

FROM: JIM DUNCAN, FISCAL OFFICER, PHYSICAL PLANT

SUBJECT: REVISED MOTOR POOL RATES

Please be advised that effective July 1, 1991 the rates for the University Motor Pool fleet and services will be as follows:

#### ASSIGNED VEHICLES

VEHICLE TYPE	RATE	MILEAGE AFTER 400 MILE ALLOWANCE
SEDANS	\$185.00/MO.	.23/MI
PICK-UP TRUCKS AND STATION WAGONS	\$222.00/MO	.25/MI
FOUR WHEEL DRIVES, SUBURBANS AND VANS	\$264.00/MO	. 27/MI

VEHICLE TYPE	RATE	MILEAGE AFTER 40 MILE ALLOWANCE		
SEDANS	\$15.00/DAY	.23/MI		
PICK-UP TRUCKS AND STATION WAGONS	\$18.00/DAY	.25/MI		
FOUR WHEEL DRIVES, SUBURBANS AND VANS	\$20.00/DAY	.27/MI		

Applicable Motor Pool labor charges will be \$29.00 per hour for University of Nevada, Reno vehicles and \$34.00 per hour for all other UNS vehicles.

If you have any questions regarding the Motor Pool Rate or Operational Policies, please feel free to call me at ext. 6514.

# TRAVEL

1,401 Out-of-State Travel 1,40
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# Out-of-State Approval

An Employee's Travel Request form must be forwarded for approval by the appropriately designated vice president, at least ten (10) days prior to an out-of-state trip, except as noted below. In the event it is not possible to submit a travel request ten days prior to the trip, a written explanation must be attached to the request.

Upon approval, the Employee's Travel Request will be sent to the Controller's office for verification of availability of funds and the preparation of an advance check, if requested.

The only exception to the rule as stated is for trips lasting 24 hours or less and for travel of coaches for pre-scheduled intercollegiate athletic events. In such cases, it is not necessary to file an Employee's Travel Request. It is necessary, however, to have advance approval of the department head and dean or director.

# Out-of-State Advances

The Employee's Travel Request form provides for the requesting of a travel advance. The ten (10) day requirement noted above will normally provide sufficient time to prepare advance checks, but should the request be late, at least three working days will be required to prepare the advance check. Advances will not be made for less than \$50.00. Advances must be cleared within ten days after completion of the trip by filing a Claim for Employee Travel Expense (see section 1,420). An advance will not be made if a previous advance has not been cleared. Advances will be released three working days prior to the trip. No advances will be made for air fare.

# Out-of-State Allowable Travel Expenses

Persons on travel status out-of-state shall receive \$5.00 for breakfast, \$6.00 for lunch, and \$13.00 for dinner and lodging up to \$60.00 with a receipt, except for New York City and Washington, D.C. and vicinity, which is up to \$75.00 with a receipt. A receipt will not be required for out-of-state lodging reimbursement up to the approved lodging rate for in-state travel (\$34.00). Receipts are not required for meals. When registration fees provide for meals, employees should not request additional reimbursement for the meal.

All amounts above include tax. Meals exceeding state reimbursement rates will not be allowed as a part of the registration form. Meals served in flight as part of the air fare may not be claimed for reimbursement. Foreign travel per diem is based on federal per diem rates. These rates change quite frequently. Check with the Controller's office for current per diem rates.

# TRAVEL

1,401	Out-of-State Travel, Continued	1,401	

Exceptions to the maximum out-of-state lodging rates may be approved in advance by the individual authorized to approve such travel. A letter requesting approval of out-of-state lodging rates in excess of currently authorized rates should be submitted with the out-of-state travel request form prior to the trip to the individual authorized to approve such travel.

Time limitations for both in-state and out-of-state travel are as follows:

Must leave <u>before</u> 6:00 a.m. or return <u>after</u> 8:00 a.m. to claim breakfast. Must leave <u>before</u> 11:00 a.m. or return <u>after</u> 1:00 p.m. to claim lunch. Must leave <u>before</u> 5:00 p.m. or return <u>after</u> 7:00 p.m. to claim dinner.

Only meals which have been paid for by the traveler may be claimed.

Departments are requested to refrain from scheduling more than three employees to attend the same outof-state meeting unless it is within 300 miles of the official station or in Los Angeles, San Francisco, Boise or Salt Lake City. Travel to these cities or other relatively nearby areas by two or more employees should be by agency or Motor Pool automobile, unless the total public transportation cost is cheaper. Verification of cost comparisons should be submitted when submitting claims.

1,403		In State Travel	1,403
1,403		In-State Travel	1,403
	•		

In-State Approval

College or departmental regulations must be followed for in-state travel. Notice to the Controller's office is not necessary unless a travel advance is requested.

# In-State Advances

If an advance is desired, an Employee Travel Request form must be filed in the Controller's office at least three working days prior to the time the check is needed. Advances will not be made for less than \$50.00. Advances must be cleared within ten days after completion of the trip. An advance will not be made if a previous advance has not been cleared. Advances will be released three working days prior to trip. No advances will be made for air fare.

# TRAVEL

1,403	In-State Travel, Continued	1,403
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## In-State Allowable Travel Expenses

Persons traveling in-state shall receive travel reimbursement at a per diem rate of \$58.00 per day. The \$58.00 is based upon \$5.00 for breakfast, \$6.00 for lunch, \$13.00 for dinner, and \$34.00 for lodging. Lodging should only be claimed if the traveler incurred lodging expenses. The allowance for travel by private vehicle is 12¢ per mile, unless use of the private vehicle is required for reasons of university convenience in the transaction of state business, in which case, the allowance would be 24¢ per mile and written justification is required.

Time limitations for both in-state and out-of-state travel are as follows:

Must leave <u>before</u> 6:00 a.m. or return <u>after</u> 8:00 a.m. to claim breakfast. Must leave <u>before</u> 11:00 a.m. or return <u>after</u> 1:00 p.m. to claim lunch. Must leave <u>before</u> 5:00 p.m. or return <u>after</u> 7:00 p.m. to claim dinner.

When employees receive free meals or lodging, no reimbursement is allowed; when registration fees provide for meals, no additional reimbursement will be allowed for meals. Meals exceeding the state reimbursement rates will not be allowed as part of the registration fee when listed as an optional item on the registration form. Meals served in flight as part of the air fare may not be claimed for reimbursement.

Exceptions to the approved maximum in-state lodging rates will not be allowed.

# 1,405 Overnight Lodging Within 50 Miles of Principal Station 1,405

Per diem <u>and</u> overnight lodging in areas less than 50 miles from a principal station must be justified in writing (<u>in advance</u>) and will not be allowed unless:

- 1. Inclement weather conditions make travel difficult.
- 2. Late official meetings are required.
- 3. Individuals involved are conference hosts responsible for meeting arrangements.

Send justification for approval to the individual authorized to approve such travel.

TRAVEL

1,410	Method of Travel	1,410

Advanced planning for travel will allow for the purchase of airline tickets at discount rates. Such rates usually involve a penalty in the event the trip is not taken. Employees may be held responsible for a penalty incurred if a trip is not taken as a result of their own actions. The university will be responsible for determining whether the penalty was incurred as a result of employee action or circumstances beyond the employee's control before submitting the claim for payment.

1,411	Use of Rental Cars	1,411

The motor pool should be used when practicable before rental cars. A rental car may be used in Carson City, Reno, and Las Vegas only when the state motor pool gives written notice that no motor pool car is available. When renting a car in-state, the rental company with whom the state has a contract should be used.

For out-of-state travel, rental cars should be used only when necessary and the rental company should be one with whom the state has a contract.

Avis, Budget, Dollar, Hertz and National have all agreed to provide what the Risk Management Division has determined to be minimum acceptable coverages, and State Purchasing has developed agreements with each of them. Use of any company not authorized by State Purchasing may expose the state to increased liability in the event of an accident, and is prohibited.

All state travelers should consider cost in renting vehicles and utilize those companies offering lower costs when they are located in the destination city and where cars are available. Vehicles must be rented in the name of the individual, and the State of Nevada rental agreement number should be referenced. Always use the state agreement (and price) to obtain insurance coverage. Reservations may be made direct or through your travel agent.

Rate information and rental agreement numbers for each company may be obtained by contacting the Controller's office.

1,412 Additional Insurance Charges to Waive Collision Deductible on 1,412 Rental Cars

Additional insurance charges to waive collision deductibles on rental cars are not an approved expenditure. If the individual wishes to purchase the deductible, it will be at the individual's expense. The only exceptions are board or commission members who are not full-time and contractors whose contract allows the use of rental vehicles.

If an employee driving a rental car on state business is involved in a collision, the agency will be responsible for the deductible charges (\$50.00 comprehensive, \$100.00 collision).

TRAVEL

1,413 Private Automobile Usage	1,413
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An employee shall not use a private vehicle for transportation of students on official trips without informing his/her insurance company and to verify that the vehicle is properly covered. In the event of an accident, the private vehicle insurance is primary to all state coverages.

#### For the Employee's Convenience

If a private car is used for the convenience of the employee, the employee shall be reimbursed 12  $\ell$  per mile. Air fare in lieu of the 12  $\ell$  per mile allowance should only be used when it is the least expensive method of travel.

If the city is not serviced by an airline, the employee is entitled to reimbursement of meals en route. If the city is serviced by an airline, the employee must be on either annual or compensatory leave for the extra travel time involved and meals and/or expenses en route will not be reimbursed. The travel claim should indicate that the employee was on annual or compensatory leave or include a statement from the department head or supervisor justifying why the employee was not on annual or compensatory leave.

#### For the University's Convenience

An employee using his own personal vehicle for the convenience of the university will be allowed reimbursement at the rate of 24 é per mile. Use of a personal vehicle will be considered to be for the convenience of the university when:

- 1. The vice president or dean approves, in writing, the employee's use of a personal car for the convenience of the university, or
- 2. The motor pool provides the employee with a slip indicating a motor pool car was unavailable.

The university approval or motor pool slip must be attached to the claim when submitted to the Controller's office. Employees will also be entitled to per diem reimbursement when the president or his designee approves, in writing, the use of a personal car for the convenience of the university.

If two employees travel in a private vehicle on university business, only one employee is entitled to mileage reimbursement.

TRAVEL

1,415	Airlines and Travel Arrangements	i	1,415	

An agreement has been reached with selected local travel agencies in the Reno-Sparks area whose services, lowest-fare guarantees and discounts would be most beneficial to the university. These travel agencies will also provide hotel arrangements.

When making travel arrangements, provide the travel agent with a university account number and a social security number to which travel should be charged. When making lodging reservations or car rental arrangements, do not have the expenses billed directly to the university.

The traveler should pay for the lodging and/or car rental. Then submit the <u>itemized lodging receipt</u>, <u>and/or the itemized car rental agreement</u> for reimbursement on a Claim for Employee Travel form. The airline tickets and the travel itinerary will be delivered directly to the department. Under no circumstances may travel for non-university business be charged to a university account.

1,416	Bonus Flight Coupons	1,416

Several commercial airlines distribute free bonus flight coupons to travelers based on miles flown or as an inducement to schedule travel with that particular airline.

Any such coupons received by university units or employees as a result of the university-paid air travel are considered university property and should be used by the university unit to meet travel needs.

In the event that the university unit cannot use the coupons to meet their intended travel needs, they should forward the coupons to the office of Planning, Budget and Analysis for redistribution to university units on an as-needed, first-come-first basis.

As with other travel regulations, this requirement applies to travel under all funding sources.

Separating university and personal travel expenses poses certain auditing problems for the travel processor in the Controller's Office. Employees who incorporate private and university travel must demonstrate the costs born by the university are not increased by the personal travel. The employee must clearly delineate the private and university charges when submitting a Claim for Employee Travel Expense. When university and private travel is not clearly delineated, the travel processor will determine the reimbursement due the employee. If in doubt about the calculation of reimbursement, contact the travel processor in the Controller's office.

## TRAVEL

1,420	Travel Expense Reimbursement Procedure	1,420
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Within ten (10) days after completion of a trip, a Claim for Employee Travel Expense must be filed in the Controller's office. If an advance has been received, indicate the total cost of the trip, amount of advance received, and the amount either due to the traveler or due to the university. The account to be charged must be specified and must agree with the information on the travel request form where used. The Claim for Travel Expense form must be routed through the proper administrative channels. If bus, airplane, or railroad were used, the traveler's portion of the ticket must be attached to the claim form.

If travelers use their personal funds for the purchase of airline tickets or the payment of conference/workshop registration fees, reimbursement cannot be made until completion of the travel and submission of a travel claim to the Controller's office.

An Employee Travel Request should be prepared and submitted whenever airline tickets are ordered from travel agencies or when funds are requested for payment of conference/workshop registration fees to allow the Controller's office to make payment on a timely basis. Special arrangements can be made to pay the travel agency for tickets well in advance of the trip to secure super saver rates. However, the Controller's office must be notified of any cancellations or changes in flight plans.

Conference registration fees must be charged as an operating expense, not travel.

Claims for Employee Travel Expense must be approved by the employee's supervisor, they do not necessarily have to be approved by a dean or vice-president.

1,430 Duplication of Per Diem Items		1,430
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Claims for per diem allowance must take into consideration meals or lodging included in conference registration fees and for meals served on public transportation without additional cost to the traveler.

1,440 Parking or Vehicle Storage Fee	1,440
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Parking or storage fees will be allowed when considered necessary by the department chair for either university or private cars. Charges should be itemized in the detail column of a Claim for Employee's Travel Expense form and the amount entered in the transportation cost column.

1,445 Co	mmercial Transportation Receipts	1,445
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Traveler's portion of bus, taxi, airporter, railroad or airplane tickets must be original and must be attached to the Claim for Employee's Travel Expense if the individual paid for the tickets and is asking reimbursement.

TRAVEL

1,450	Non-Travel Items	1,450
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Travel claims filed in conformity with these regulations shall be considered full compensation for all meals and lodging, including tips, and for minor miscellaneous expenses such as local telephone calls from pay booths or hotel rooms. Charges for baggage handling are not reimbursable. Toll calls may be itemized on the Claim for Employee Travel Expense form and reimbursement claimed, but the person and place called must be stated and the claim must be supported by a receipt.

1,460	Travel to Conferences and Meetings	1,460

Staff members attending conferences or meetings may be reimbursed less than the amounts listed if so specified by the dean or President before the trip is undertaken.

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4 470	Research, Extension or Public	Complete Development Trees	4 4 7 0
1,470	Research, Extension of Public	Service Personnel Trav	/el 1,470

Personnel on research, extension, or public service assignments may be reimbursed for travel at rates not to exceed \$58.00 per day for in-state and allowed state rates for out-of-state trips, as determined by the dean or director concerned. In these cases, charges for individual meals and lodging may not exceed the limits established.

	1,480	Travel Expenses for Applicants for Professional Positions	1,480
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Revision to be submitted later.

1,490 Team or Group Trav	rel 1,490
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Team travel is defined as any student group travel whose group is a team, class or other organization directly affiliated with and sponsored by the university. Team travel may include travel expense of university employees who are required to accompany the student group and is appropriately chargeable to team travel expense.

Cash advances for team travel may be secured by submission of a Request for Check form at least 72 hours prior to the time the check is required. Within five (5) days after the completion of the trip, an expense report on a Claim for Team Travel Expenses form must be filed in the Controller's office. All items on the expense report must be supported by either a vendor's receipt or Receipt for Team Travel Expenses - List.

1,490

## TRAVEL

1,490	Team or Group Travel, Continued	1

## Team or Group Travel Per Diem Rates and Lodging

Expense of meals and lodging may not exceed the amounts prescribed for state employees i.e., \$58.00 for a calendar day in-state and allowed state rates for out-of-state; or for less than a full day, \$5.00 for breakfast, \$6.00 for lunch, \$13.00 for dinner, and \$34.00 for lodging in-state, and \$5.00 for breakfast, \$6.00 for lunch, \$13.00 for dinner, and up to \$60.00 with receipt for lodging for out-of-state (\$75.00 is allowed in New York City and Washington, D.C.).

A receipt will not be required for out-of-state lodging for reimbursement up to the approved lodging rate for in-state travel (currently \$34.00). Lodging expense over \$34.00 submitted will continue to require a receipt in accordance with existing policy.

Exceptions to the maximum out-of-state lodging rates may be approved in advance by the individual authorized to approve such travel. A letter requesting approval of out-of-state lodging rates in excess of currently authorized rates should be submitted prior to the trip with an out-of-state travel request form to the individual authorized to approve such travel.

## 1,495 Application for Travel Support to Attend Scholarly Meetings 1,495

Faculty at the University of Nevada, Reno may apply to the Graduate School for support of travel expenses to attend national or international meetings for the purpose of presenting scholarly work as senior author or exhibitor.

The Graduate School travel budget for each fiscal year will be divided between the fall and spring semesters, with half the funds available between July 1 and December 31, and the other half available between January 1 and June 30. Applications for fall travel support will be accepted no earlier than May 1 of the preceding fiscal year. Spring travel support can be requested no earlier than November 1 of the present fiscal year.

Faculty holding at least 0.5 FTE appointments can apply for transportation support to one domestic meeting per year, and to one international meeting every third year (in place of that year's domestic trip). A faculty member may elect to apply present year domestic trip dollars toward an international trip without losing entitlement to apply for a full international trip every third year. A cap of \$300 will be placed on domestic travel, and \$750 on international travel.

Travel funds will be distributed on a first come/first served basis. However, so that faculty who happen to attend late fall or late spring meetings are not penalized, requests for travel support may be submitted prior to acceptance of a research paper. Information about the meeting and the probable title of the paper should be indicated on the travel request form. However, if the Graduate School office does not receive notice of formal acceptance of the research paper by one month prior to the meeting, the earmarked travel funds will be returned to the travel pool.

# TRAVEL

# 1,495 Application for Travel Support to Attend Scholarly Meetings, 1,495 Continued

Faculty are encouraged to plan their travel well in advance to obtain discount fares. Under no circumstances will fares other than tourist or coach be allowed.

One copy of the Application for Travel Support (GS-R2) with supporting material should be submitted to the Graduate School <u>in advance</u> of the proposed travel. No retroactive requests will be considered.

Travel papers should be processed through the Graduate School for signature and account number assignment. Upon return from the trip a travel claim form should be submitted. These forms can be obtained from the Controller's office.



# UNIVERSITY OF NEVADA-RENO

Thomas L. Judy Assistant Vice President and Controller Reno, Nevada 89557-0025 (702) 784-6662 FAX (702) 784-6680

÷.,

October 11, 1991

## MEMORANDUM

TO: Deans, Directors, and Department Chairs

FROM: Tom Judy

SUBJECT: Approval of Hotel Rates

The purpose of this memorandum is to clarify the approval process for hotel rates which exceed the state guidelines.

#### IN-STATE TRAVEL:

The reimbursement for hotel costs in Nevada may not exceed the state maximum of \$34.00.

#### OUT-OF-STATE TRAVEL:

Approval to exceed the state maximum hotel reimbursement of \$60.00, with a receipt, per day (\$75.00, with a receipt, in Washington, D.C. and New York City) has been delegated to the Vice Presidents and/or Deans. Please note that such approval must be given prior to the trip. Approvals given after the trip will <u>not</u> be honored in accordance with state procedures.

The complete travel rules may be found in the UNR Administrative Manual section 1401-1490.

If you have any questions regarding this subject or others that relate to travel, you may contact the travel desk at x4167 or me.

mk

cc: Vice President Dhingra Vice President Hoover Vice President Page Vice President Miltenberger Travel Desk

a:travelre.tom

#### Larry J. Garside

#### Professional Summary

#### PERSONAL

Born May 2, 1943, Omaha, Nebraska Married

Business address: Nevada Bureau of Mines and Geology Mackay School of Mines University of Nevada, Reno Reno, Nevada 89557-0088

Business	telephone:	(702)	784-6691
FAX:		(702)	784-1709

#### EDUCATION

B.S.	Geology,	Iowa State	University, 19	65
M.S.	Geology,	University	of Nevada, Ren	1968

#### AREAS OF EXPERTISE

- A. Geologic mapping, especially at scales of 1:24,000 -1:100,000
- B. Volcanic geology, especially western Nevada Mesozoic and Tertiary
- C. Energy resources geology (uranium, petroleum, geothermal, coal, oil shale)
- D. Geology and trace-element geochemistry of metallic ore deposits
- E. Volcanism and hydrothermal mineralization
- F. Isotopic dating of igneous rocks and mineralization

## PROFESSIONAL WORK EXPERIENCE

Economic Geologist, Rank IV Nevada Bureau of Mines and Geology University of Nevada, Reno (1983-present)

Acting Associate Director Nevada Bureau of Mines and Geology University of Nevada, Reno, Mackay School of Mines (1987-1988)

- Chief Geologist, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mackay School of Mines (1986-1987)
- Deputy Director for Research, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mackay School of Mines (1985-1986)
- Economic Geologist, Rank III, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mackay School of Mines (1976-1983)
- Economic Geologist, Rank II, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mackay School of Mines (1971-1976)
- Economic Geologist, Rank I, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Mackay School of Mines (1968-1971)
- Research Assistant, Nevada Bureau of mines and Geology, University of Nevada, Reno, Mackay School of Mines (1965-1968)
- Laboratory Assistant, Iowa State University (summer) (1965)
- National Science Foundation grant for undergraduate research (summer 1964)

#### PROFESSIONAL SOCIETIES

American Association of Petroleum Geologists (Active Member, member Energy Resources Division) Geological Society of America (Fellow) Society of Economic Geologists Association of Exploration Geochemists (Associate Member)

#### HONOR SOCIETIES

Phi Kappa Phi

- Listed in the Twenty-third Edition of Marquis Who's Who in the West
- Listed in the Seventeenth Edition (1989-90) of American Men and Women of Science

#### PUBLICATIONS

#### Peer-Reviewed Reports Published by Geological Surveys

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- Hess, R. H., and Garside, L. J., 1989, Geothermal energy, <u>in</u> The Nevada Mineral Industry, 1988: Nevada Bureau of Mines and Geology Special Publication MI-1988, p. 53-58.
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- Garside, L. G., and Schilling, J. H., 1977, Wells drilled for oil and gas in Nevada through 1976: Nevada Bureau of Mines and Geology Map 56.
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- Garside, L. J., 1974, Geothermal exploration and development in Nevada through 1973: Nevada Bureau of Mines Report 21, 12 p.
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- Sillitoe, R. H., and Camus, F. (leaders), assisted by: Sarnic, N., Bonham, H. F., Jr., and Garside, L. J., 1991, Gold/Silver deposits of Chile: Itinerary and guidebook for a field conference sponsored by the Association of Exploration Geochemists and the Society of Economic Geologists, April 13-24, 1991.
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Abstracts

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- Schweickert, R.A., Stewart, J.H., Dilles, J.H., Garside, L.J., Greene, R.C., Hardyman, R.F., Harwood, D.S., and Silberling, N.J., 1991, Triassic-Jurassic magmatic arc of western Nevada and eastern California - Part I: Geology [abs.], in Good, E.E., Slack, J.F., and Kotra, R.K., USGS Research on mineral resources - 1991 program and abstracts: U.S. Geological Survey Circular 1062, p. 67-68.
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### <u>Databases</u>

Hess, R. H., Fleming, K. L., Garside, L. J., and Lohn, H. L., 1987, NVOILWEL - A computer database of Nevada oil and gas data.

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- Bonham, H.F., Jr., Desilets, M., Garside, L.J., and Hsu, L.C., 1991, Project Report - Preble Formation, Geochemical Sampling and Characterization Program: 153 p.
- Bonham, H.F., Jr., Desilets, M., Garside, L.J., and Hsu, L.C., 1991, Project Report - Mesozoic rocks in the Winnemucca 30x60 minute quadrangle, Geochemical Sampling and Characterization Program.
- Bonham, H.F., Jr., Desilets, M., Garside, L.J., and Hsu, L.C., 1991, Project Report - Paleozoic rocks in the Winnemucca 30x60 minute quadrangle, Geochemical Sampling and Characterization Program.

- Garside, L. J., and Bell, J. W., Progress report for COGEOMAP Contract 14-08-0001-A0654: Geologic studies conducted in the Olinghouse, Wadsworth, and Minden quadrangles, Nevada during the period June 1, 1989 to May 31, 1990.
- Tingley, J. V., and Smith, P. L., 1982, A mineral inventory of the Eureka-Shoshone resource area, Battle Mountain district, Nevada: Final report for contract No. Y-553-CTI-1058, U.S. Department of the Interior (BLM). Assisted by J. L. Bentz, L. J. Garside, J. Quade, and R. B. Jones.
- Garside, L. J., 1982, Uranium resource evaluation, McDermitt quadrangle, Nevada: U.S. Department of Energy, PGJ/F-045(82) 29 p.

#### THESIS

1968, Geology of the Bishop Creek area, Elko County, Nevada: MS thesis, University of Nevada, Reno, 51 p.

SPECIAL LECTURING, COURSES TAUGHT, AND TESTIMONY

Garside, L. J., 1984, Nevada Geothermal Energy, <u>in</u> Geothermal Energy Developments in Nevada's Great Basin: Hearings before the subcommittee on energy and mineral resources of the U.S. Senate committee on energy and natural resources, Sparks, Nevada, April 17, 1984, p. 229-233.

Testimony, before the Nevada Senate Finance Committee (1987, 1989) and Assembly Ways and Means Committee (1987) on the Mining Cooperative Fund.

#### OTHER PROFESSIONAL ACTIVITIES

Nevada Oil and Gas Conservation Commission (Exec. Sec., 1974-75) Geological Society of Nevada (Sec.-Treas., 1969-70; Pres., 1973-74)

Geothermal Resources Council (Pres., local section, 1983-84) Nevada Petroleum Society (Sec.-Treas., 1986) Attended numerous local, regional, national, and international

Attended numerous local, regional, national, and international professional meetings on general geology, mineral resources, petroleum, and geothermal energy

- Served on organizing committees for several professional meetings; acted as session chairman, field trip chairman, field trip leader, etc.
- Visited over 150 mining districts in Nevada as well as numerous districts elsewhere in the U.S., Canada, Mexico, Australia, New Zealand, China, and Chile

Acted as reviewer for many NBMG bulletins and reports, proposals to several funding agencies, as well as a number of USGS and other publications on Nevada geology

## UNIVERSITY OF NEVADA, RENO COMMITTEES

- Served on several University boards and committees, including: Arboretum, Appeals, Wittell, Library, Parking and Traffic (chairman, 1979), Handicap Access, Salary and Benefits, Faculty Senate
- Served on numerous College and NBMG committees, including: Museum, Thin Section, Dean evaluation, Bylaws, Personnel, Space, Summer Field Camp
- Served on search committees (often chaired) for the following positions: Dean, Field Technician, Editor, Engineering Geologist, Junior Geologist, Computer Geologist, Industrial Minerals Geologist, Economic Geologist, Interim Dean, Dean, Hydrogeologist, Geologic Mapper

#### RESEARCH SUPPORT

- U.S. Geological Survey (Reno Field Office), Account 1-1-330-5300-186, July 1990 to October 1990, \$5,000, Mineral resources of the Nevada portion of the Susanville BLM District. (principal investigator)
- U.S. Geological Survey (COGEOMAP), Account 1-1-330-5655+663, June 1991 to June 1992, \$25,000, Large-Scale Geologic Mapping in the Reno-Carson City area, Nevada. (co-principal investigator)
- U.S. Geological Survey (Reno Field Office), Account 0-1-330-5300-186, July 1990 to October 1990, \$7,500, Triassic-Jurassic Mineral Systems, Western Nevada and Eastern California (Peavine Sequence). (principal investigator)
- U.S. Geological Survey (COGEOMAP), Account 0-1-330-5655+602, June 1990 to June 1991, \$10,000, Large-Scale Geologic Mapping in the Reno-Carson City area, Nevada. (co-principal investigator)
- Various Nevada mining companies, Account 0-1-331-5655-956 and 0-1-331-5308-559, March 1990 to December 1990, Geochemical Sampling and Characterization Program, \$109,191. (coprincipal investigator)
- U.S. Geological Survey (Reno Field Office), Account 9-1-330-5300-186, July 1989 to June 1990, \$5,300, Triassic-Jurassic Mineral Systems, Western Nevada and Eastern California (Peavine Sequence). (principal investigator)

- U.S. Geological Survey (COGEOMAP), Account 9-1-330-5655-602, June 1989 to June 1990, \$10,000, Large-Scale Geologic Mapping in the Reno-Carson City area, Nevada. (co-principal investigator)
- Nevada Department of Minerals, Account 9-1-331-5655-502, September 1988 to January 1989, \$4,076, Economic Impacts of Nevada Mining. (co-principal investigator)
- Bendix Field Engineering (DOE), Account 8-1-331-5655-705, March 1978 to January 1980, \$220,045. National Uranium Resource Evaluation-McDermitt 1x2-degree sheet. (principal investigator)

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September 28, 1992

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Dr. Larry J. Garside University of Nevada Nevada Bureau of Mines & Geology Reno, NV 89557-0088

Dear Larry:

Enclosed is a draft copy of the proposal Statement of Work for the Nevada Bureau of Mines and Geology participation in the current Department of Energy - Geothermal Division Low Temperature Geothermal Resource program. The Statement of Work, when finalized, will be an Addendum to a Standard Contract Agreement issued by the Oregon State System of Higher Education.

I understand that you have had some earlier discussions with Marshall Reed (DOE/GD) concerning this program. Please review the attached SOW and let me know if this project is still of interest to the Nevada Bureau of Mines and Geology, if the work can be done in the time described and for the funding available. Also, please inform me of any problems you may have with this SOW.

Sincerely,

Howard Joss

Howard P. Ross Project Manager

HR/mt cc: M. J. Reed P. M. Wright

### ADDENDUM TO STANDARD CONTRACT AGREEMENT for STATE GEOTHERMAL ENERGY RESEARCH, DEVELOPMENT, AND DATABASE COMPILATION

### between

# THE OREGON STATE SYSTEM OF HIGHER EDUCATION OREGON INSTITUTE OF TECHNOLOGY

and

# THE NEVADA BUREAU OF MINES AND GEOLOGY, THE UNIVERSITY OF NEVADA, RENO

# STATEMENT OF WORK

# 1.0 INTRODUCTION

The United States Department of Energy - Geothermal Division (DOE/GD) supports the development of indigenous and environmentally advantageous energy alternatives to the traditional fuels. There is a very large, nearly unused supply of low- and moderate-temperature geothermal resources in the United States that could be brought on line over the next decade. The increased use of Geothermal Heat Pumps (GHPs) could also reduce the need for traditional fossil fuel consumption for space heating and cooling.

The U.S. Congress has appropriated funds for a program of Low-Temperature Geothermal Resources and Technology Transfer and DOE/GD has funded EG&G, Idaho to establish contracts with the Oregon Institute of Technology - Geo-Heat Center (OIT-GHC), the Idaho Water Resources Research Institute (IWRRI) and the University of Utah Research Institute (UURI) to implement this program.

Important parts of this program are to bring the inventory of the nation's low- and moderatetemperature resources up to date, to complete a collocation study of these resources and communities and other potential users, and to collect and disseminate information necessary to expand the use of GHPs. OIT-GHC will have the lead role in the collocation study and will establish subcontracts with the state resource teams. UURI will work with the State Teams on gathering, documenting, and assembly of low- and moderate-temperature hydrothermal resource data and will assist in technical monitoring of the State Team efforts and publications. IWRRI will be responsible for establishing the hydrothermal resource data for Idaho and for performing geothermal reservoir evaluations throughout the western United States.

The technical tasks described herein may be considered Phase I of the Low-Temperature Geothermal Resources and Technology Transfer program. If Phase I proves successful, and additional funds are appropriated by Congress, the program may be expanded and continued. Phase II would likely include detailed resource evaluations of priority areas identified in Phase I.

Funding for the Low-Temperature Geothermal Resources and Technology Transfer Program is limited, and the success and continuation of the program is dependent upon a productive Phase I effort. Participating State Teams are encouraged to seek state or organization cost shares (in cost or in-kind) to enhance this contract effort.

# 2.0 TECHNICAL TASKS

The following technical tasks will be accomplished under this subcontract.

- 2.1 Complete an updated inventory of low- and moderate-temperature resources for the State of Nevada, current to June 1, 1992. Review drilling records and other information to identify new resources and verify temperatures and flow rates of springs and wells which may have changed substantially since the previous statewide geothermal resource inventory. Identify geological, geophysical, geochemical, and hydrologic studies which relate to these resources. The minimum temperature for a low-temperature resource is defined to be 10°C above the mean annual air temperature at the surface and should increase by 25°C/km. Occurrences to 150°C will be included.
- 2.2 Conduct a fluid geochemistry study of the more important resource areas for which existing data are questionable or unavailable. UURI will provide up to ten (10) quantitative fluid chemical analyses in support of this study.
- 2.3 Complete a computer database listing compatible with Lotus 123 or other acceptable format tabulating for each occurrence: name, location (T,R,S), county, longitude, latitude, depth, flow, temperature, chemistry, and other data as appropriate and available.
- 2.4 Review OIT-GHC geothermal resource and demographic data for the State of Nevada for accuracy and completeness, as part of the collocation study.
- 2.5 Assist OIT-GHC, UURI, and IWRRI in studies to prioritize low- and moderatetemperature resource areas for new development. Develop conceptual geologic models and groundwater data for selected resources.

# 3.0 REPORTS, DATA, AND OTHER DELIVERABLES

- 3.1 A geothermal database listing in hardcopy and diskette form will be submitted to UURI. The listing will include all known low- and moderate- temperature spring and well occurrences in the State of Nevada. Principal facts will include location, depth (well), flow rate (if known), etc.
- 3.2 Letter reports and memoranda reviewing collocation data and priority rankings will be submitted to OIT-GHC and UURI.
- 3.3 A final summary report, not to exceed 50 pages, describing all tasks and their results, and documenting any new temperature, geologic, geochemical or geophysical data will be submitted to UURI, OIT-GHC, and IWRRI. This report may incorporate interim letter reports and memoranda as appendices. The report will include a geothermal resource occurrence map of the state, black and white, scale 1:1,000,000 or acceptable alternative.
- 3.4 Interim progress reports will be submitted to UURI and OIT-GHC quarterly.

# 4.0 SCHEDULE OF PERFORMANCE AND REPORTING

4.1 The period of performance for this agreement will terminate on December 31, 1993, unless modified by letter agreement and signed by the University of Nevada - Reno, OIT-GHC, and UURI.

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- 4.2 A review of the OIT-GHC collocation study will be completed and a letter report or memorandum of comment submitted to OIT-GHC and UURI within one month after receipt of the draft document from OIT-GHC.
- 4.3 A preliminary database listing of geothermal resource occurrences will be submitted to UURI within four months after the execution of this agreement.
- 4.4 A final database listing of geothermal resource occurrences will be submitted to UURI within twelve months after the execution of this agreement.
- 4.5 A final report documenting all new data and activities completed under this agreement will be submitted to UURI and OIT-GHC not later than December 31, 1993.

# 5.0 **RESPONSIBLE PARTIES**

- 5.1 The Principal Investigator for this agreement will be Larry J. Garside, Nevada Bureau of Mines and Geology, University of Nevada, Reno.
- 5.2 The Technical Project Managers for this agreement will be Howard P. Ross, UURI and Paul J. Lienau, OIT-GHC.
- 5.3 The Contracting Officer for this agreement will be Douglas Yates, OIT.

# 6.0 FUNDING

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This contract agreement provides for funding not to exceed \$55,000.00 for the completion of all technical tasks and submittal of all required deliverables.

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# Larry J. Garside

Nevada Bureau of Mines and Geology

### **EDUCATION**

- B.S. Geology, Iowa State University, 1965
- M.S. Geology, University of Nevada, Reno, 1968

## **AREAS OF EXPERTISE**

- A. Geologic mapping, especially at scales of 1:24,000 1:100,000
- B. Volcanic geology, especially western Nevada Mesozoic and Tertiary
- C. Energy resources geology (uranium, petroleum, geothermal, coal, oil shale)
- D. Geology and trace-element geochemistry of metallic ore deposits
- E. Volcanism and hydrothermal mineralization
- F. Isotopic dating of igneous rocks and mineralization

## PROFESSIONAL WORK EXPERIENCE

Economic Geologist, Rank IV Nevada Bureau of Mines and Geology (1983-present)

Acting Associate Director Nevada Bureau of Mines and Geology (1987-1988)

Chief Geologist, Nevada Bureau of Mines and Geology, (1986-1987)

Deputy Director for Research, Nevada Bureau of Mines and Geology (1985-1986)

Economic Geologist, Rank III, Nevada Bureau of Mines and Geology, (1976-1983)

Economic Geologist, Rank II, Nevada Bureau of Mines and Geology, (1971-1976)

Economic Geologist, Rank I, Nevada Bureau of Mines and Geology, (1968-1971)

# PROFESSIONAL SOCIETIES

American Association of Petroleum Geologists (Active Member, member Energy Resources Divisioo)

P. 03

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Geological Society of America (Fellow) Society of Economic Geologists Association of Exploration Geochemists (Associate Member)

# HONOR SOCIETIES

Phi Kappa Phi

# PUBLICATIONS

About 100 publications, excluding abstracts, predominantly on the geology and mineral resources of Nevada.

# **OTHER PROFESSIONAL ACTIVITIES**

Nevada Oil and Gas Conservation Commission (Exec. Sec., 1974-75) Geological Society of Nevada (Sec.-Treas., 1969-70; Pres., 1973-74) Geothermal Resources Council (Charter Member; Pres., local section, 1983-84)

Nevada Petroleum Society (Sec.-Treas., 1986)

Attended numerous local, regional, national, and international professional meetings on general geology, mineral resources, petroleum, and geothermal energy Served on organizing committees for several professional meetings; acted as session chairman, field trip chairman, field trip leader, etc.

Visited over 150 mining districts in Nevada as well as numerous districts elsewhere in the U.S., Canada, Mexico, Australia, New Zealand, and China

Acted as reviewer for many NBMG bulletins and reports, proposals to several funding agencies, as well as a number of USGS and other publications on Nevada geology Listed in the Seventeenth Edition (1989-90) of American Men and Women of Science

# UNIVERSITY OF NEVADA, RENO COMMITTEES

Served on several University boards and committees, including:

Arboretum, Appeals, Wittell, Library, Parking and Traffic (chairman, 1979). Handicap Access, Salary and Benefits

Served on numerous College and NBMG committees, including:

Museum, Thin Section, Dean evaluation, Bylaws, Personnel

Served on search committees (often chaired) for the following

positions: Dean, Field Technician, Editor, Engineering Geologist, Junior Geologist, Computer Geologist, Industrial Minerals Geologist, Economic Geologist, Interim Dean, Dean, Hydrogeologist, Geologic Mapper

## RESEARCH SUPPORT

Funded research awards from the U.S. Geological Survey, mining companies, U.S. Department of Energy, Nevada Department of Minerals, U.S. Fish and Wildlife Service, U.S. Corps of Engineers, Washoe County (Nevada),

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NEVADA BUREAU OF MINES AND GEOLOGY

### FACSIMILE TRANSMITTAL SHEET

Zang

DATE: September 30, 1994

FROM: Larry Garside

TO: Howard Ross

FAX NUMBER BEING CALLED: (801) 584-4453

NUMBER OF PAGES (including transmittal sheet): 3

COMMENTS:

Dear Howard:

I have attached to this FAX a two page summary from a longer resume. It's not exactly a paragraph, but was already available. My entire career has been at the Nevada Bureau of Mines and Geology, as you can see. Some of my first research projects were related to Nevada's energy resources, and I have published bulletins on petroleum, geothermal, and uranium. I first started collecting information for a commodity summary bulletin on Nevada geothermal resources (with John Schilling, published as NBMG Bulletin 91) in the mid 1970's. I well remember presenting a state summary of geothermal resources and activity at the first GRC meeting in El Centro during this time.

Please get back to me if you need anything else.

If there are any problems with the reception of this FAX, please notify us at 702/784-6691 or FAX number 702/784-1709. Thank you.

SENT BY:\_\_\_\_\_

TIME:\_\_\_\_\_

# NEVADA LOW-TEMPERATURE GEOTHERMAL RESOURCE ASSESSMENT: 1994

By: Larry J. Garside

FINAL REPORT

Prepared for

The Oregon Institute of Technology GeoHeat Center

Prepared as part of a study of low- to -moderate temperature geothermal resources of Nevada under the U.S. Department of Energy Low-Temperature Geothermal Resources and Technology Transfer Program

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Plate 1. Million-scale map of geothermal resource occurrences

#### INTRODUCTION

#### Previous Geothermal Assessments

A statewide inventory of the geology and geochemistry of Nevada's geothermal resources was begun at the Nevada Bureau of Mines and Geology (NBMG) in the late 1970s. NBMG had previously published a 1:1,000,000-scale map of hot springs, sinters, and volcanic cinder cones (Horton, 1964b) and several brief summaries of Nevada's geothermal resources (Horton, 1964a; Garside and Schilling, 1972; Garside, 1974). This inventory, published as NBMG Bulletin 91 (Garside and Schilling, 1979), followed a format used in a number of NBMG publications on mineral commodities of Nevada. The bulletin contained descriptions, by county and hot spring area, of the better known geothermal areas. These descriptions included, where available, maps and other data on the geology, and descriptions of historical and present use. Temperature and water chemistry data were presented in an appendix having about 1,400 individual entries (records). These records commonly included multiple entries for the same or adjacent springs as well as numerous well records from geothermal areas which have a larger areal extent than individual spring sites. A 1:1,000,000-scale map was included in the pocket of NBMG Bulletin 91; nearly 400 geothermal sites (springs, spring groups, well groups, etc.) were included on that map. The lower temperature cut-off for inclusion of data in Bulletin 91 was 70°F (21.1°C).

The location, chemical data, and references for the geothermal springs and wells listed in Bulletin 91 were collected by an extensive and relatively complete search of the available literature. These data were entered by hand on data-collection forms, and these forms were used to typeset the listing of data in the bulletin (Appendix 1). A source of unpublished data was a computer database of water-quality data maintained by the Desert Research Institute at Reno.

GEOTHERM is an acronym for a U.S. Geological Survey (USGS) computerized information system designed to maintain data on the geology, geochemistry, and hydrology of geothermal sites primarily within the United States (Teshin and others, 1979; Bliss, 1983). The system was first proposed in 1974, and was active until 1983. The system utilized a mainframe computer, and most of the data were entered by use of key-punch cards. Key punching was done from a rather extensive data-entry form. When the GEOTHERM database was taken off line, a number of products were published or made available to preserve the data. These include basic data for thermal springs and wells on a state-bystate basis (for Nevada, see Bliss, 1983a) and a listing of each record on a state-by state basis, as microfiche (for Nevada, see Bliss, 1983b). The GEOTHERM database was also filed with the National Technical Information Service (NTIS) as digital data. A 9-track one-half inch reel-to-reel tape in ASCII format of this GEOTHERM database was provided to NBMG after the start of this project by Howard Ross at the University of Utah Research Institute (UURI). This tape, containing 8,082 records, was originally from NTIS.

GEOTHERM contained 1367 records for Nevada when it was taken off line in 1983; the is the number of Nevada records on the NTIS tape as well. The great majority of these records are from the published sources used to compile Appendix 1 of Bulletin 91. Unpublished site data and analyses from the files of D.E. White (USGS) make up a significant section of the database also. About 75% of this GEOTHERM data was added to the original database during 1978 and 1979 by personnel at NBMG as part of the U.S. Department of Energy State Coupled Program (see Trexler and others, 1979a). In addition to the entry of new data and the editing and verifying of existing data in GEOTHERM, the longitude and latitude locations of springs and wells were determined by plotting them on 1:250,000-scale maps and hand digitization (Trexler and others, 1979a). New analyses were done during this period, and these data were added to GEOTHERM.

The database available in GEOTHERM during the early 1980s was used, along with other data developed from specific geothermal site studies funded by the U.S. Department of Energy (see numerous reports by Trexler and co-workers, 1980-83) to produce two 1:500,000-scale maps illustrating Nevada's geothermal resources (Trexler and others, 1979, 1983). No statewide resource studies were done after the publication of the 1938 NOAA map (Trexler and others, 1983). A nationwide assessment of lowtemperature geothermal resources (USGS Circular 892) included data for Nevada, and an open-file report (Reed and others, 1983) included about 350 records for Nevada that were used in that assessment. These records were selected from the GEOTHERM database by use of charge balance determinations and other screening methods (Marshall Reed, written commun., 1993). During this period of time, an increase in exploration for geothermal resources by private industry (mainly for electric-power generation) resulted in the drilling of thousands of gradient and slim holes, and several hundred larger diameter wells for industrial and commercial use (space heating, electric power generation, etc.). Developments in Nevada's geothermal industry are documented in yearly summaries of the Nevada mineral industry, published yearly by NBMG since 1979 (e.g, Hess, 1993). Information that is available on geothermal drilling in Nevada has been summarized by Barton and Purkey (1993).

### Need for a New Assessment

Low- and moderate-temperature geothermal resources are widely distributed in the western United States. Although there has been

a substantial increase over the last decade in utilization of these resources in direct-heat applications, the large resource base is greatly underutilized (Ross and others, 1994). Previous studies have demonstrated that Nevada is well endowed with geothermal resources, and much of the state must be considered as having potential for direct use. As Ross and others (1994) describe, the expanded use of low- and moderate-temperature geothermal resources requires, as a start, a current inventory of the resources. Such an inventory, combined with collocation studies (the study of resource location near population centers or areas of potential industrial users), will provide some of the basic information that the potential developers of the geothermal resources need to make sound economic decisions. Collocation factors are of particular significance in Nevada, as well as a number of other western states, because people and most industries are concentrated in a few areas; geothermal resources, on the other hand, are rather widely distributed.

There are many factors that can affect the viability of directuse geothermal applications. These include not only the suitability of the fluid and the resource for the application (water temperature, chemistry, amount of available heat, etc.) but also the information available to the developer on the technology of the proposed application, and contractual and other economic factors less closely related to the geothermal resource. The collection of data on these geothermal resources and their present uses is only one factor in encouraging their increased use. Other components of the 1992-1993 low-temperature program include development of better techniques to discover and evaluate the resources, and technical assistance to potential developers (Ross and others, 1994).

#### Nevada Assessment Program

Data compilation for the low-temperature program is being done by State Teams in ten western states. The Nevada program, under the direction of Larry J. Garside at the Nevada Bureau of Mines and Geology at the University of Nevada began data collection in early 1993 (the contract for the research between the University of Nevada and the Oregon Institute of Technology was signed on March 23, 1993). The original contract was to end on December 31, 1993, but was later extended to June 30, 1994. The Technical Project Managers for the agreement were Howard P. Ross (University of Utah Research Institute) and Paul J. Lienau (Oregon Institute of Technology - GeoHeat Center).

The final products of the study include the following: 1) a geothermal database, in hardcopy and as digital data (diskette) listing information on all known low- and moderate-temperature springs and wells in Nevada; 2) a 1:1,000,000-scale map displaying these geothermal localities, and; 3) a bibliography of references on Nevada geothermal resources. The format for presentation of these data was worked out through discussions among State Teams and the Project Managers during the first half of the contract period; the model for this database has been described by Blackett (1993).

### DATA SOURCES

Information on Nevada's geothermal resources is widely distributed in published reports, in unpublished and limiteddistribution sources (commonly referred to as "gray literature"), and as digital information in databases such as GEOTHERM and WATSTORE. The sources of data and methods of data manipulation are discussed below, followed by a description of the bibliography.

Preliminary Data Compilation

The Nevada geothermal database (Appendices 1 and 2) includes "records" (that is, single reports of chemistry, temperature, location, etc. that are represented by a single spreadsheet row) for all known (reported or suspected) geothermal sites in the state. A number of preliminary databases and spreadsheets were compiled before selection of records for the final listing (Appendices to this report). To get the data from various sources into a common format for comparison required months of work using a variety of computer hardware and software available at NBMG. In the following paragraphs I have summarized the major sources of information, the techniques used to modify and utilize them effectively, and some of the sources of error and other problems that were encountered.

#### GEOTHERM

The history of the GEOTHERM database is summarized above under the description of previous assessments. Because the database was taken off line in 1983, it does not contain data collected after that date. A tape GEOTHERM records that was obtained from UURI was read on to a large magnetic disk at NBMG. Information supplied by NTIS with this tape gave the field lengths of each field in the database. With this information, computer database specialists at NBMG were able to design a database having fixedlength fields and read the GEOTHERM ASCII file into that database. The database on tape contained over 8000 records, with approximately 120 fields for each record. The database software used for this database was INFO, a subset of the ARC/INFO software utilized in many GIS (Geographic Information Systems) applications; hardware was a UNIX-based SUN SPARC II workstaion. The database in INFO was nearly 19 MB (megabytes). From this database, the 1367 Nevada records could be exported, by use of PC

ARC/INFO, in a format compatible with modern database-management software (such as dBASE). We used PC-File (a product of ButtonWare, Inc.) as the PC-based database software. The Nevada GEOTHERM database in PC-File is about 3.2 MB, and has a number of problems that make it difficult to use. One of the most notable problem is that in the PC-File format (essentially a dBASE format), most of the numerical data (temperature, water chemistry, etc.) are preceded by a five sided graphic figure which resembles the outline of a small house (or a baseball field "home plate"). This non-ASCII character was apparently a pad character or "punch" symbol in the original database that acted as a space. It can not be searched for, and was only eliminated after a short version of the database was retrieved into spreadsheet software (Quattro Pro, a product of Borland International, Inc.). In addition, some records had data reported in different units from other records (for example ppm or epm); the units used were reported in a separate database field. Fortunately, these problems were overcome in the shortened (spreadsheet) version.

Additionally, a number of other operations were done on a short database of GEOTHERM data that contained only the fields required for this study (Appendix 1). These include: 1) replacing the county name with a two-letter code (abbreviation) for each county, 2) conversion of numerical data from labels to values and insertion by hand of certain qualifiers on some analyses (N for not detected, t for trace, < for less than), 3) addition of calculated columns for ion balance, total calculated dissolved solids, and a major constituents test (is Na>K and Ca>Mg and Cl>F?), 4) rearrangement of columns into final format. Before final column rearrangement, formulas were converted to values, and a fixed number of decimal places was selected for display. About 455 records were finally selected from this spreadsheet to be included in the final tables listed in the Appendix.

#### WATSTORE

The acronym WATSTORE stands for the National <u>WAT</u>er Data <u>STO</u>rage and <u>REtrieval</u> System, a large-scale computerized system developed for the storage and retrieval of water data collected as part of the activities of the USGS, particularly the Water Resources Division (from a 1981 pamphlet, U.S. Government Printing Office: 1981 - 341-618:52). The system was begun in 1971, and contains a very large set of data on surface and groundwater in the U.S. The water-quality file alone is reported to have (in 1991) 34 million observations from over 200,000 stations; 5,000 parameters (major and trace elements, pesticides, organics, etc.) are included. The database contains information on the analyzing and collecting agency, but does not report whether the data has been published or list references. The WATSTORE database can be searched through arrangements with USGS Water Resources district offices or through a national system of water data exchange (NAWDEX); assistance centers for NAWDEX are also commonly located at USGS Water Resources District Offices. The NAWDEX database also has access to other Federal agency water data, for example the Environmental Protection Agency (EPA), in addition to WATSTORE.

Water quality and other WATSTORE database file information is also available through a commercial outlet, EarthInfo, Inc. of Boulder, Colorado. EarthInfo makes certain data from WATSTORE available on CD-ROMs along with a software retrieval system that can be used by IBM-compatible personal computers. NBMG obtained a CD-ROM that included all Nevada data (current to early 1993) from EarthInfo. Personnel at NBMG (particularly Ron Hess) were able to search the CD-ROM and extract the parameters required for this study (water quality, location, site name, etc.) for all springs and wells having a measured temperature of 18°C or greater. To avoid the combination of parameters (e.g., water chemistry analyses) from different collection dates for the same site, a combination number was created (consisting of the site and collection date numbers) so that a later relational combination of the data would produce records that represent one site visit. These geothermal data were converted to a dBASE format and PC-File was used to eliminate records having temperatures less than 20°C for the area of Nevada south of 38° latitude. At this point, the database consisted of 1,708 records. These records were imported into a spreadsheet format using Quattro Pro software, and a multitude of operations were performed on the data to make it similar to the planned format for the final tables (Appendices 1 and 2). These operations include: 1) conversion of longitude and latitude to decimal degrees, 2) addition of calculated fields for ion balance, total calculated dissolved solids, major constituents test (is Na>K and Ca>Mg and Cl>F?), 3) conversion of depth in feet to meters and flow from cubic feet per second to liters per minute, 4) addition of a reference column for listing of WATSTORE as the reference, 5) convert GW (groundwater) to W (well) and SP to S (spring), 6) conversion of the state-county FIPS code to a two-letter abbreviation (see listing below), 7) conversion of the collection date format to the year/month/ day format, 8) re-arrangement of columns, and 9) a sort of rows (records) by longitude and latitude.

A number of additional operations were later performed on about 140 WATSTORE records selected for the final tables. These include: 1) conversion of Fe, and B from micrograms per liter to milligrams per liter (essentially equivalent to parts per million - ppm), and 2) separation of the site name column into two columns (one for name and one for the legal land location, if reported). Following this, Li, oxygen and hydrogen isotope data, and  $HCO_3-CO_3$  concentrations were added to the short spreadsheet of WATSTORE records. Li, and the <sup>2</sup>H and <sup>18</sup>O were inadvertently left out of the first search of the EarthInfo CD-ROM. The search for  $HCO_3-CO_3$  data in WATSTORE presented a more complicated problem, as these constituents are reported as several different parameters (fields) in the database. A number of the records generated by the first search were lacking data for these constituents; a second search was done for data in all possible related parameters (about eight of them, including bicarbonate and carbonate field results, laboratory results, dissolved, incremental titration, titration to pH 4.5 and pH 8.3, and alkalinity (field and laboratory). The data were entered by hand into the intermediate spreadsheet of WATSTORE records destined for the final tables.

Table 1. County names for Nevada, FIPS (Federal Information Processing Standard) code (32 is Nevada), and abbreviations used in this report.

<u>County Name</u>	FIPS Code	<u>Abbreviation</u>
Churchill	32001	СН
Clark	32003	CL
Douglas	32005	DG
Elko	32007	EL
Esmeralda	32009	ES
Eureka	32011	EU
Humboldt	32013	Hu
Lander	32015	LA
Lincoln	32017	LI
Lyon	32019	LY
Mineral	32021	MN
Nye	32023	NY
Pershing	32027	PE
Story	32029	ST
Washoe	32031	WA
White Pine	32033	WP
Carson City	32510	CC

# Topographic Map Digital Data

A complete examination was made by David Davis at NBMG of the approximately 1,900 7.5-minute topographic maps for Nevada. The entire state has this coverage, and a visual examination was made of each map for any mention of hot or warm springs, geothermal wells, etc. In addition, a 1981 version of GEOTHERM was available in paper copy (Jim Bliss, written commun., 1981) and this was used to identify other geothermal spring and well locations on these topographic maps. About 2700 individual points were marked on the maps, and the locations were digitized in the NBMG GIS laboratory using ARC/INFO software, a CalComp 9500 digitizer, and digital map coordinate data (TIC file) from the USGS. A database of the location and other data collected for this part of the project was created, and about a dozen records in the final table were from the spreadsheet equivalent of that database. In general, the records from this database were for locations where no data were available in other sources. The references are usually the 7.5-minute quadrangle map that the spring or well appears on. Additionally, when more precise longitude and/or latitude locations were required for records taken from any of the other sources used, the appropriate information from this database was entered in intermediate spreadsheets of selected records.

### Other Data Sources

During the selection of records for the final database, if water quality or other data in WATSTORE or GEOTHERM was lacking, incomplete, or appeared to be of poor quality, other sources of information were checked for possible inclusion in the database. Some of these sources were originally cited in NBMG Bulletin 91, but no record of a particular site was ever entered in GEOTHERM. A number of such records refer to dubious thermal spring locations, but must be included in any database that is purported to be complete. Other sources used for one or two sites include Hulen and others (1994), Trexler and others (1990), and Lawrence Livermore Laboratory (1976). Unpublished information in NBMG files and field notes of L. Garside for this and previous geothermal studies was also used. In particular, a number of good analyses and locations reported by Flynn and Buchannan (1990) were used. Their Table 3.1 was scanned, imported into Quattro Pro, and parsed into a spreadsheet of similar format to others used during this study. Also available in spreadsheet format to be checked during the data selection process were the analyses reported by Reed and others (1983) from the GEOTHERM database, and digital data on water analyses done in some areas of Nevada for the NURE (National Uranium Resource Evaluation) program (Hoffman and others, 1991).

### Selection Criteria

In the early stages of this study, it became apparent that the bulk of the data on Nevada's low- an moderate-temperature geothermal resources was contained in two databases, GEOTHERM and WATSTORE. Usually, for individual thermal springs and wells, the best one or two records available from either WATSTORE or GEOTHERM was selected. If the data in these databases were incomplete or nonexistent, other known sources were checked.

The process of record selection for the final database began with hardcopy printouts of the spreadsheets described above (e.g., GEOTHERM, WATSTORE, and the topographic maps). Digital files of the longitude and latitude information for these three databases were used to plot the geothermal localities on 1:1,000,000-scale maps of Nevada in NBMG's GIS lab, using ARC/INFO software. Each of the points or point groups on these maps was checked in a regular fashion for possible errors of location. The 1:1,000,000scale maps were examined, on 1° by 1° blocks of latitude-

longitude (about 34 partial or complete blocks for Nevada). Every 7.5-minute topographic map that was shown to have a geothermal locality was re-examined, and the locations displayed on the million-scale maps were compared to those on the 7.5-minute quadrangles. From the available records for a particular spring, the best one, or in a few cases, two records was selected. For groups of springs that are found over several square kilometers, several records were commonly selected to best represent the geographic range and provide a more varied data set of water chemistry. The records selected were numbered, notes were taken on any problems recognized, and the number was written on a million-scale map and on the hardcopy of the appropriate database. This record selection process proceeded from west to east across the state, beginning in northwest Nevada and ending at its southern tip. The selection of the "best" records was somewhat subjective, but generally proceeded as follows. If a point on the maps was determined to be a valid geothermal site, GEOTHERM and WATSTORE records of that site or site area were examined. Selection from one of these databases was generally based on having an ion balance between 0.90 and 1.10, and a check to see if Na>K and Ca>Mg and Cl>F. The ion balance formula used was

Na\*0.04350+K\*0.02558+Ca\*0.04990+Mg\*0.08229/Cl\*0.02821+F\*0.05264+H CO<sub>3</sub>\*0.01639+CO<sub>3</sub>\*0.03333+SO<sub>4</sub>\*0.02082; resulting in a value in milliequivalents per liter, cations/anions. For those records that met these criteria, selection was based on completeness of the other analytical data (temperature, pH, minor constituents. etc.).

During the record selection process, spring and well records that did not meet certain minimum temperature criteria were eliminated from further consideration. According to the statement of work for this project, the minimum temperature for a low temperature resource is defined to be 10°C above the mean annual air temperature at the surface, and should increase by 25°C/km with depth (for wells). The mean annual air temperature in Nevada varies from somewhat less than 7°C to over 18°C (Houghton and others, 1975, figure 17; see figure 1 below). This variation is an effect of both latitude and elevation; southern Nevada's higher mean annual temperature results from its lower latitude and its lower average elevation (Houghton and others, 1975). Based on this map of mean annual temperature, a lower spring and well temperature limit was set for certain latitude ranges in the state. For springs, the decision whether to include or not was relatively simple - if the spring temperature was at or above the set limit, it was included. For wells, only those were considered for inclusion that fell above a gradient of 25°C per kilometer with a beginning (surface) temperature at or above the minimum selected for that latitude range. The total well depth provided in the database was used to calculate this gradient. The following temperature limits were applied during record selection: 1) north of 39° latitude, 18°C or above; 2) 38° to 39°

latitude, 19°C and above (20°C was used for some sites, mostly wells, in the 38°-38.5° range, 3) 37° to 38° latitude, 20°C or above, and 35° to 37° latitude, 25°C and above. No upper temperature limit was used to restrict inclusion in the final data compilation. The statement of work for this project listed an upper limit of 150°C for occurrences to be included in the compilation. Seven occurrences with temperatures above 150°C were included in the database; mainly for completeness. The only data available for some geothermal occurrences was the analysis and associated location information for the high-temperature fluid. It is obvious that lower temperature geothermal fluids are available at these sites (in peripheral areas or, in the case of electric-power generation areas, as condensed steam or reinjection fluids). Because analyses of these lower temperature fluids were not often available, the high temperature fluid analysis was listed as a substitute.

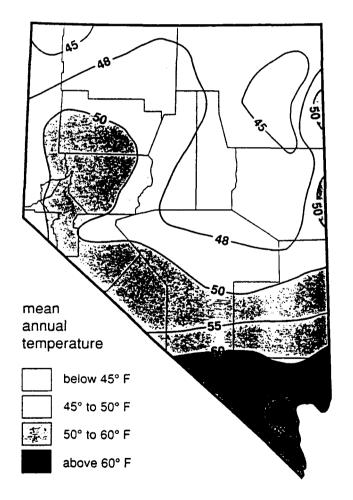


Figure 1. Map of mean annual temperatures in Nevada (from Houghton and others, 1975).

A number of problems were noted for both the GEOTHERM and WATSTORE databases as each plotted point on the million-scale maps was checked to see if it matched a known geothermal site. In quite a number of cases, certain geothermal locations were found to have an incorrect longitude or latitude or both. These were commonly discovered when the 7.5-minute topographic map was compared to the million-scale plot. In some cases, the legal description (section-township-range) was correct, but the longitude or latitude had an error of, for example, one whole degree or one whole minute. These inaccurate site locations were noted, but not corrected in the individual databases unless the record was needed for the final table.

### DATA FORMAT

Data on Nevada's low- to moderate-temperature geothermal resources are presented in Appendices 1 and 2. The data in these tables are in spreadsheet format, and the digital data used to produce them (and provided separately on diskette) can be searched and otherwise manipulated in a great variety of ways utilizing a number of commercially available spreadsheet and database management software packages. Although there are two Appendices, they were printed from a single spreadsheet. The software and data manipulation methods used at NBMG during this study are further described above, under data sources. The format of the tables and, thus, the spreadsheets, in most respects follows rather closely that of Blackett (1993).

The column headings and data in the columns are generally selfexplanatory, but a few comments should be made. Each column heading is listed below, with a description of the data and a discussion of format and problems.

# The site number is used to identify the site on the 1:1,000,000-scale map. It was added to the record when that record was selected for inclusion in the final database. The process of record selection was done in 1-degree blocks, proceeding from west to east, beginning in northwestern Nevada. Sites added later may not entirely follow this numbering progression, and to prevent renumbering of many of the sites, some added sites use decimal tenths (e.g., 143.1 and 142.2).

**NAME** The site name is commonly that listed in the source reference. In some cases, corrections, additions, or modifications were made to provide more information.

**CO** The two-letter abbreviation for one of Nevada's 17 counties is listed here. These abbreviations are listed above, under the Data Sources heading, with their FIPS code.

**T, R, SC** The legal land description, Township, Range, and Section are listed under these columns. These were commonly taken from the cited source, but some additions and corrections were made during the data evaluation. Because some of these location data were derived (in the original studies) from maps of varying ages or scales, or by projecting section lines into unsurveyed areas, there is a chance for error. Although some of these errors were noted and corrected, there are certainly many that were not. The best location data for the sites is generally the longitude and latitude; however, if correct, the section-township-range location can be used to confirm a site on topographic maps. Some section locations were determined by use of 1:100,000-scale topographic maps, on which the protracted sections are commonly displayed.

**QSEC** The data in this column, if present, describe the portion of the section in which the geothermal site is located. The quarter-quarter-quarter system (for example: NE SE NW) indicates an approximately 10 acre parcel in the 1 square mile section (640 acres) that is located in the northeast quarter of the southeast quarter of the northwest quarter. For data from the WATSTORE database, letters are used to indicate (from left to right) the quarter section, quarter-quarter section, and so on; the letters A, B, C, and D designate the northeast, northwest, southwest, and southeast quarters, respectively. Thus, for example, ABC would represent the southeast(C) quarter of the northwest quarter(B) of the northeast(A) quarter. The A-B-C-D system thus lists the largest quarter first, followed by progressively smaller quarters; the NE-NW-SW-SE system lists the smallest quarter section first.

**T** This column lists the type of occurrence, either spring (S) or well (W). In a few cases, the original listing did not fall into these two categories, and it was modified. For example, a hot pool was listed as a spring, and mine shafts or mineral exploration drill holes were listed as wells.

**TEMP** The reported temperature of the well or spring is listed, in degrees Celsius, in this column. Many of these reported temperatures were measured and originally reported in degrees Fahrenheit; those converted to 'C were rounded to one decimal place after conversion. If the only information reported on temperature is "warm" or "hot" (for example, from a topographic map), this is listed. The reported temperature is that of the cited reference. It is not necessarily the highest temperature reported in all of the available data for a particular spring or well; a particular record may have been selected because of its complete analysis, rather than because it had the highest reported temperature.

**FLOW** The flow, in liters per minute (L/min) is shown in this column. For wells, this value is commonly the discharge during pumping. Values are reported to one decimal place.

**DEPTH** For wells, the depth in meters is listed, if available

from the original source.

**CDATE** The date of collection is listed here, in the format: year/month/day. For many records that list only the year of collection, this was added during this study, based on other information.

pH The reported pH is listed here.

Chemical constituents (Na, Cl, etc.) For most of the chemical constituents, they are listed as reported in the original references or databases. The reporting units are milligrams per liter (mg/L); these are essentially equivalent to parts per million at the concentration levels of the fluids listed in the Appendix. For some analyses, constituent values originally reported in  $\mu$ gm/L (micrograms per liter or parts per billion ppb) were converted to mg/L. If the original source listed a particular constituent as less than a certain value, this was reported using the symbol "<". Similarly, "t" indicates that a trace amount was detected, and "N" indicates the constituent was analyzed for but not detected. The number of decimal places displayed for each element is generally based on that reported in the sources of data. For most of the reported analyses, bicarbonate (HCO<sub>3</sub>) and carbonate (CO<sub>3</sub>) are listed as reported in the sources. Carbonate values are usually only found in waters with a pH of 8.2 or greater. A few sources (e.g., Lawrence Livermore Laboratory, 1976) report total alkalinity; these values were recalculated and reported as bicarbonate, as were the values reported in a HCO<sub>3</sub> + CO<sub>3</sub> column of Table 3.1 of Flynn and Buchannan (1990). Some analyses are noted to be relatively complete, but lack Na and K values. Commonly, the reason for this absence is that the original analysis reported Na + K as a single value, and thus, no data was entered in the Na and K fields in databases such as GEOTHERM.

**TDSm, TDSc** These columns present the total dissolved solids, measured and calculated. The measured value, if present, is from the original data source (presumed to be a residue on evaporation at 105°C). The calculated value was determined by summing the constituents reported. Thus, the TDSc value reported for incomplete analyses only represents a partial sum. A few analyses were summed before Li was added, and may be one to several ppm low. The HCO<sub>3</sub> value was multiplied by 0.492 to make the calculated TSDS values comparable with residue values.

**ChgBal** The electroneutrality of the analysis was evaluated using a charge (ion) balance formula (described further in the section on selection criteria). No value is reported for records which have no or extremely limited analytical data, as such a calculation would be meaningless. The most common reason for a charge balance that varies considerably from 1.00 is a lack of data for  $HCO_3$ . Other missing major ions can also result in a "poor" charge balance.

**delD, delO18** These columns contain isotopic compositions for the stable isotopes <sup>18</sup>O and deuterium ( ${}^{3}$ H). Data are reported to zero or one decimal place for <sup>18</sup>O and one or two decimal places for deuterium.

**REFERENCE** The reference citation in this column is that for the source of the data. The records that were taken from the GEOTHERM database include the reference listed therein. The WATSTORE citation is from the database search described above under data sources. An asterisk (\*) precedes some citations; this was used in the GEOTHERM database to indicate unpublished data from individuals or agencies (for example, \*WHITE, D., USGS, MENLO PARK or \*DESERT RESEARCH INSTITUTE, 1973). The \*NEVADA BUREAU OF MINES AND GEOLOGY citation includes unpublished data from that agency's files entered into the original GEOTHERM database as well as some entries made during this study. The \*WATSTORE reference refers to data from GEOTHERM that originated from a WATSTORE search, probably in the late 1970s.

**USE** This data category lists the geothermal application for which the thermal water is presently used, or has been used for in the recent past but is not presently (in parentheses). The source of most of this data is Garside and Hess (1994), with some later additions during the later part of this study. Garside and Hess (1994) is reproduced as Appendix 3. No attempt was made to list uses of only the water but not the contained heat (livestock watering, for example). At least a dozen hot spring areas in Nevada have had hotel spas at them; most were built in the late 19th and early 20th Centuries. These were not listed as a past use, but present spas, swimming pools, etc., were reported.

### FLUID CHEMISTRY

The geochemistry of thermal water in Nevada (and adjacent areas) has been discussed by a number of authors (e.g., Mariner and others, 1983; Flynn and Buchanan, 1990; Welch and Preissler, 1990; Young and Lewis, 1982). A simplification of the pattern of chemistry exhibited by Nevada thermal water is that eastern Nevada geothermal fluids are calcium bicarbonate dominated, central and northern Nevada has mainly sodium bicarbonate type fluids, and the western part of the state has mostly sodium chloride and sodium sulfate types. The reasons for this pattern are, no doubt, relatively complex; however, water-rock interactions are certainly a significant factor. Thus, eastern Nevada calcium bicarbonate geothermal fluids are strongly influenced by the presence of a regional carbonate aquifer. At least some of the sodium bicarbonate geothermal fluids of the central and north-central parts of the state may result from the exchange of sodium (possibly from volcanic rocks) for calcium in

fluids that were originally calcium bicarbonate in character. Western Nevada sodium chloride and sodium sulfate waters may reflect increased water-rock interaction (and thus generally higher temperatures) as well as possible evaporative concentration of fluids prior to deep circulation and/or extraction of salts from Quaternary playa lake deposits.

### DISCUSSION

Nevada is well endowed with both high- and low-temperature geothermal resources. Based on a generalized map of known and potential geothermal resource areas of the United States (e.g., Lienau, 1988) over 40% of the state is believed to have potential for the discovery of high-temperature geothermal resources, and another 50% has potential for low -to moderate-temperature resources. This potential is well illustrated by the 1:1,000,000scale map of geothermal occurrences produced during this study (Plate 1). The database for this study consists of 455 individual records, representing more than 300 resource areas. The geothermal springs and wells are distributed over the entire state, with an increased concentration in the northwestern part of the state (Figure 3). Maximum spring and well temperatures are higher in the north and northwest parts of the state. Geothermal occurrence temperatures greater than 75°C are confined to the northwestern half of the state, a pattern that closely follows that of heat flow (see Sass and others, 1981). The distribution of reported temperature vs. number of occurrences is shown below (Figure 2). About 400 springs and wells plot in 11 temperature ranges; additionally 30 sites are listed as "warm" and 23 as "hot".

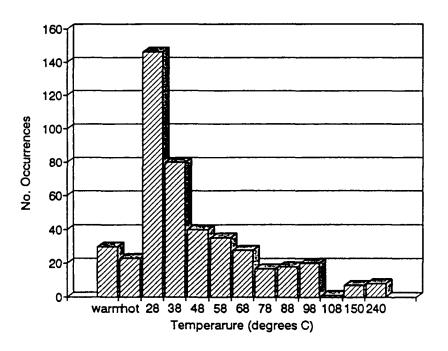
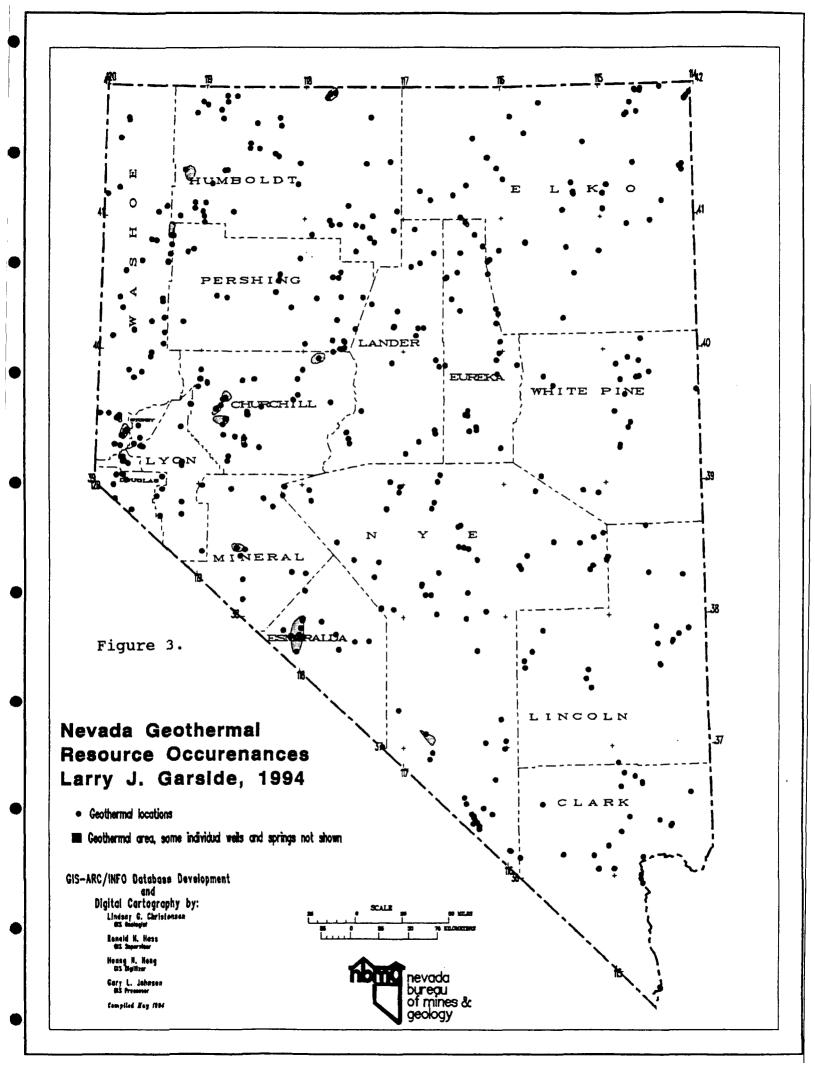


Figure 2. Bar graph of temperature vs. number of geothermal occurrences.



Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of ground water to deep levels along faults in a region of higher-than-average heat flow (the Battle Mountain heat flow high). In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (like warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for hundreds to thousands of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

The Eureka heat flow low, a region of less than 1.5 HFU (heat flow units; 41.8 milliWatts per square meter, mWm<sup>-2</sup>) located in eastern Nye and northwestern Lincoln Counties, is centered on the Nevada portion of a large area of Middle Cambrian to Lower Triassic carbonate rocks (the carbonate rock province). This carbonate rock province underlies southern and eastern Nevada and northeastern Utah (Plume and Carlton, 1988). The Eureka Low is most likely a regional-scale hydrologic feature, representing colder groundwater recharge to regional aquifers.

#### SUMMARY

Nevada is a large state with sparse but locally concentrated population. It has a wide range in average annual temperature, and thus a wide range in the lower limit of temperatures considered anomalous for geothermal fluids. The state's complex pattern of geology and heat flow results in geothermal resource areas of diverse character located throughout the state.

There have been many studies, both general and specific, on Nevada's geothermal resources (see Bibliography). Considerable data are available on specific geothermal spring and well sites but some remote areas are still poorly understood and information on their geothermal resources are incomplete or possibly inaccurate. There are many accurate and complete water analyses and associated location information for well-studied geothermal areas. However, many remote individual springs and wells throughout the state lack complete analyses, and some lack good location information; in some cases, there is uncertainty about the existence of certain springs. For example, Appendix 1 lists over 50 sites for which the only temperature information is "warm" or "hot."

In Nevada, as in many arid areas of the west, most water (whether thermal or nonthermal) has been put to use. Some nonthermal applications actually require cooling before use. Present and recent past uses of the contained heat of Nevada thermal waters are quite varied (see Appendix 3). However, more such use is feasible if potential developers are well informed and encouraged to be conservative in their use of fossil fuels.

#### RECOMMENDATIONS

There are many remote geothermal sites for which no complete data set could be found in the sources examined. For completeness, some of these should be visited and sampled but most of them are unlikely to be put to any low-temperature use because of their remoteness. Having a more complete data set would, however, be useful in regional studies, and might result in the discovery of previously unknown higher temperature resources.

No attempt was made during this study to combine trace-element water chemistry data from more than one analysis into a single record. For example, analyses of B, Li, and F may have been reported in a analysis with poor ion balance while the best analysis in terms of major constituents may have been lacking some of the trace-element data. Some of this type of traceelement data could be added to the final database, but it seemed like a poor practice for this original compilation.

Some sources of information on geothermal springs and wells that were not used during this study might be useful to pinpoint previously unknown (especially low-temperature) geothermal sites. However, the mass of data available and its concentration in populated areas (where good information already exists), make searching such data relatively unproductive. Some examples of such available data include the water well records (submitted by well drillers) for the state available from the Nevada Division of Water Resources. These water well records have many errors (especially in location); searching and confirming previously unknown geothermal sites would take considerable effort. Other sources of water data that are likely to have similar potential errors include the analyses of agencies like the Nevada Division of Health, the Nevada Division of Environmental Protection, and the U.S. Environmental Protection Agency. One source of information that might have a higher potential for adding to the geothermal database is the largely confidential files of geothermal exploration companies. Thousands of shallow to moderately deep (100 to 1000 m) geothermal gradient and "slim holes" were drilled in the search for high temperature geothermal resources (for electric power generation) over the last 30 years. This source of geothermal data was suggested by a number of industry representatives at a March 1994 symposium sponsored by the Geothermal Resources Council on the geothermal resources and exploration of the Basin and Range Province. The extent of the data is not presently known.

Finally, increased future use of geothermal energy in low- to moderate-temperature applications will require not only studies that demonstrate the availability of the resource but also dissemination of information (such as case histories) that illustrate the details of these uses. Such case histories should be understandable by the general public, but also make available details of the technical data. Because some uses, such as district heating systems, require considerable front-end investment compared to individual fossil fuel heating units, projects that can bring together several funding sources have a better chance of success.

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One task of the study was the identification of geological, geophysical, geochemical, and hydrologic studies that have been done since the last resource assessment. The bibliography (Appendix 4) is the result of that literature search. There are 907 citations listed in the bibliography; of these, nearly onehalf are from the bibliography in Garside and Schilling (1979). This bibliography was nearly exhaustive, at least for published sources, through about 1978. That bibliography was scanned and converted with text-recognition software to a format useable by word-processing software. The references from this 1979 bulletin included general references to the geology of geothermal areas as well as references specific to geothermal resources. The additional references in Appendix 4 were obtained from a variety of sources; most were entered in the document by hand, rather than taken directly from other digital data sources. Several methods were used to find these additional references. The bibliography for GEOTHERM (Bliss, 1983 a) was checked for references not in Garside and Schilling (1979). Additionally, the geothermal files in the Public Information Office of the Nevada Bureau of Mines and Geology were a good source, especially for unpublished reports. My own library of geothermal references was searched, and the CD-ROM for GeoRef (the bibliographic database of the American Geological Institute) was searched for any Nevada geothermal references. A similar search was done of the WolfPAC NALIS library information system (the Northern Nevada Academic Libraries Information System). The Geothermal Resources Council Bulletin and Transactions, and the GeoHeat Center Quarterly Bulletin were also scanned for any Nevada references.

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## • APPENDIX I

		• APPE	NDIX I		
# NAME	CO T R SC QSEC	NLAT WLONG	T TEMP FLOW	N DEPTH CDATE	REFERENCE USE
1 TWIN SPRING, VYA SPRING	W 42N 19E 04 NW	41.5933 119.8650	S 22 715		WARING, 1965
2 HILL'S WARM SPRING	W 44N 20E 18 NE SE		<u>5 28</u>	1961/08/08	TREXLER AND OTHERS, 1979
3 UNNAMED SPRING	W 44N 19E 12		<u>S 23 16</u>		SINCLAIR, 1963B
4 VIRGIN VALLEY BANCH 10	HU		W 21		WATSTORE
5 VIRGIN V CAMP GROUND 1	HU 45N 26E 02		W 32	1975/08/05	WATSTORE
6 ROADSIDE REST AREA 3	HU 46N 26E 31 C		W 18	1975/08/05	WATSTORE
7 Surprise Valley Hot Spring 8 WARM SPRING	WA	and the second	<u>s 47</u>	1969/	Flynn and Buchanan, 1990
9 WARM SPRINGS	W 39N 19E 33	the second s	S warm	105 4 107 107	WALL CANYON RESERVOR 7.5' QUAD
10 McGEE MOUNTAIN			<u>\$ 40</u>	1954/07/27	TREXLER AND OTHERS, 1979
	HU 45N 27E		<u>S 42.2</u>	61	WENDELL, 1970
11 BOG HOT WELL	HU 46N 28E 31		W hot		BOG HOT SPRINGS 7.5' QUAD
13 BALTAZOR HOT SPRING 9			<u>S 55.6 3785</u> S 63		SINCLAIR, 1963B
14 SOLDIER MEADOWS AREA HOT SPRING	HU 46N 28E 18 B HU 40N 24E 23	the second s	<u>\$ 83</u> \$ 54 68	1975/08/05	GROSE AND KELLER, 19758
15 SOLDIERS MEADOW AREA - UNNAMED HOT SPRING	HU 40N 24E 23		<u>s 54 50</u> S 54 50		MARINER AND OTHERS, 1974, 1975
16 SOLDIER MEADOW AREA HOT SPRING	HU 40N 24E 23		<u>5 48</u>	10000013	GROSE AND KELLER, 19758
17 SOLDIER MEADOW 1	HU 40N 24E 23		S 54	1975/01/01	WATSTORE
18 CANE SPRING	HU 39N 27E 30 NE		<u> </u>		SINCLAIR, 1963A
19 WEST PINTO HOT SPRING	HU		S 92	1974/01/01	WATSTORE
20 EAST PINTO HOT SPRING				18/4/01/01	GROSE AND KELLER, 1975B
21 WARM SPRING		warman warma warma warma warma ka ka sa			
	W 37N 22E 35		S warm	···· <del>·································</del>	LEADVILLE 7.5' QUAD
22 LEADVILLE SPRINGS	W 37N 23E		S warm		SMITH, 1956
23 CANE SPRINGS	HU 36N 24E 16 A		<u>\$ 21</u>		WATSTORE
24 WHEELER RANCH WELL	HU 37N 25E 10 SE		W 36.1	1965/09/21	SINCLAIR, 1963A
25 DOUBLE HOT SPRING 2	HU 36N 26E 04		S 68.5	1975/01/01	WATSTORE
26 UNNAMED SPRING (D.H2)	HU 36N 26E 16 SE NE		\$ 68.5	1938/08/24	GROSE AND KELLER, 1975B
27 WW3022T1	HU 37N 24E		W 24.2 815.0	· · · · · · · · · · · · · · · · · · ·	WATSTORE
28 TH SP HARDIN CITY SE QD	HU 37N 26E 10 DCA		S 50.8 101.8	and the second	WATSTORE
29 MACFARLANE'S BATH HOUSE SPRING	HU 37N 29E 31		S 78.5 18.9	The second s	SINCLAIR, 1963A
32 SPRING	HU 42N 30E 12 A		S 40	1960/10/08	WATSTORE
33 SPRING	HU 43N 30E 25 D		S 70	1960/10/08	WATSTORE
34 UNNAMED SPRING	HU 42N 33E 19 SW SE		<u>\$ 21.1 16</u>	the second s	SINCLAIR, 1962C
35 U.S.G.S. TEST WELL NO. 21	HU 42N 33E 32 SE NE		W 24.4		MALMBERG AND WORTS, 1966
36 WELL	HU 42N 31E 11 B		W 24	107.3 1960/10/08	WATSTORE
37 HOWARD HOT SPRING	HU 44N 31E 04 SE NE	· · · · · · · · · · · · · · · · · · ·	S 57.8 189		SINCLAIR, 1962C
38 FIVE MILE SPRING	HU 45N 33E 21 SE NE		<u>8 27</u>	1975/08/21	TREXLER AND OTHERS, 1979
39 SPRING	HU 44N 33E 10 BB	and the second se	<u>\$ 28</u>	1959/06/22	WATSTORE
40 JACKSON WELL	HU 39N 35E 07 DCDA	the second s	W 19.5	1961/02/26	
41 SOD HOUSE RANCH WELL	HU 41N 35E 20 NE		W 27	34 1975/08/20	SINCLAIR, 1962A
42 CORDERO MERCURY MINE, NORTH LOWER WELL	HU 47N 37E		W 53	1967/11/11	WHITE, D., USGS, MENLO PARK
43 MENTABERRYS WELL 1	HU 47N 37E 24 BAB		W 26.5	61.0 1976/04/23	WATSTORE
44 NOQUE'S NEVADA WELL	HU 47N 38E 17 NE NE		W 33.3	214 1972/00/00	GARSIDE AND SCHILLING, 1979
15 THE HOT SPRINGS	HU 41N 41E 19 NE NE		S 57.2 227	<u>/</u>	LOELTZ AND OTHERS, 1949
	HU 41N 41E 19 NE NE		<u>\$ 58</u>		MARINER AND OTHERS, 1974, 1975
17 SPRING	HU 41N 43E		S hot		WARING, 1965
48 WELL	HU 37N 39E 03 DC	the second s	W 69	18.6 1962/04/28	WATSTORE
49 SPRINGS	HU 45N 41E		S hot		WARING, 1985
50 UNNAMED SPRING	HU 36N 41E 02 SW NE		<u>\$ 21.1 95</u>		COHEN, 1982
51 SPRINGS	HU 37N 43E 24		S warm >757	<u>/</u>	ANCTIL, 1960
52 WARM SPRING NEAR DEEP CREEK RESERVOIR	EL 43N 65E 19		S warm		CORNACOPIA RIDGE 7.5' QUAD
53 HOT LAKE	EL 38N 46E 25		S hot		SQUAW VALLEY RANCH 7.5' QUAD
54 SPRING	EL 39N 45E 36	41.2137 116.8440	S hot		WARING, 1965
55 SPRING, HEAD OF HOT CREEK	EL 36N 48E 11	41.1832 116.5014	<u>S 7</u>		WILLOW CREEK RESERVOIR 7.5' QUAD
56 UNNAMED HOT SPRING	EL 39N 50E 18	41.2571 118.3668	<u>\$ 47.2</u>	1972/00/00	HOSE AND TAYLOR, 1974
57 PETAINI (NIAGARA?) SPRINGS	EL 40N 53E 06		S warm 5960		EAKIN, 1962B
56 ELLISON RANCH SPRING	EL 41N 52E 08 NE		S 93 3.6		"WHITE, D., USGS, MENLO PARK, CA
9 HOT SULPHUR SPRINGS	EL 41N 52E 08 NE	41.4677 116.1480	S 90	1950/05/24	MARINER AND OTHERS, 1974, 1975
UNNAMED HOT SPRING (SSE PATSVILLE)	EL 45N 54E 20	41.7758 115.9207	<u> 5 41</u>		MARINER AND OTHERS, 1974, 1975
1 WILD HORSE HOT SPRING	EL 43N 55E 04 SE SE	41.6472 115.7757	8 54		MARINER AND OTHERS, 1974, 1975
2 ROWLAND HOT SPRINGS	EL 46N 56E 14 NW SW	N 41.8767 115.6260	8 77 114	4 1957/05/17	WHITE, D., USGS, MENLO PARK
3 SPRING	EL 39N 53E 03	41.2960 115.9967	S warm		MAHALA CREEK WEST 7.5' QUAD
MARM SPRINGS	EL 37N 56E 20		S werm		MORGAN HILL 7.5' QUAD
5 UNNAMED SPRING	EL 38N 59E 14 SE SW	the second s	S 36	1962/06/26	TREXLER AND OTHERS, 1979
O UNNAMED WELL	EL 38N 59E 11 SW NE		W 30		TREXLER AND OTHERS, 1979
			S 52		TREXLER AND OTHERS, 1979
37 DEVIL'S PUNCH BOWL	EL 39N 59E 15 SE SW	91.2000 110.0000			
			S 64.4 2271	1 1946/04/09	WARING, 1965
87 DEVIL'S PUNCH BOWL 88 H.D. RANCH SPRING, HOT CREEK SPRINGS 89 RAILROAD SPRING		NW 41.5762 115.1808	S 64.4 2271 S warm	1 1946/04/09	WARING, 1965 OESTERLING, 1960
58 H.D. RANCH SPRING, HOT CREEK SPRINGS	EL 43N 60E 34 SE SW	NW 41.5762 115.1808 41.0681 114.9904		1 1946/04/09	

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# NAME 72 METROPOLIS (TWELVEMILE SPRINGS)	EL 39N		R SC 27	OSEC NE NE	NLAT 41.2450		T TEMP S 38.9	FLOW DEP1 3038	1964/04/14	REFERENCE WARING, 1965	USE
73 WINE CUP RANCH WELL	EL 41N			NW SE	41.4092		<u>5 30.9</u> W 58.9		0.7 1946/03/25		
74 PAN AMERICAN PETROLEUM-COBRE MINERALS WELL	EL 37N		03	SW SE	41.1135		W 76.7	14		"NEVADA BUREAU OF MINES AND GEOLOGY	
75 GAMBLE RANCH WELL NO. 4	EL 40N	<b>89E</b>	16	SW	41.3433	114.1717	W 20		64	RUSH, 1968	
76 THOUSAND SPRINGS (GAMBLE RANCH SPRING)	EL 40N	the second s	08	SE NW NW			S 20.6	5110		MIFFLIN, 1968	
77 HOT SPRING	EL 40N		04		41.3662		S hot	<u></u>		TWELVEMILE RANCH 7.5' QUAD	
78 WELL 79 MINERAL HOT SPRINGS	EL 45N EL 45N	_	20	ACB	41.7731		<u>W 54</u>		1979/04/26	WATSTORE	
BO SAN JACINTO RANCH SPRING	EL 46N		23	NWNW	41.7882		<u>\$ 60</u> \$ 26		1966/10/13 1962/07/26	MARINER AND OTHERS, 1974, 1975 MOORE AND EAKIN, 1968	
81 MINERAL HOT SPRING	EL 45N	_	08	BBA	41.7956		S 60		1974/01/01	WATSTORE	······
82 W.D. RANCHING CO. FLOWING WELL	EL 47N	the second se	18	NW SW	41.9653		W 37.8	188	1.4 1979/12/15	MOORE AND EAKIN, 1968	
83 WHEELER (Y3) RANCH WELL	EL 47N	65E	17	CBC	41.9588	114.6344	W 36	the second s	2.5 1977/12/07	WATSTORE	
84 WHEELER (Y3) RANCH WELL	EL 47N		15	DCCD	41.9547		W 43.5		1981/04/23	WATSTORE	(AQUACULTURE)
65 SHOSHONE WARM SPRINGS	EL 47N		11		41.9717		<u>\$ 35</u>		1962/06/25	TREXLER AND OTHERS, 1979	
80 UNNAMED HOT SPRING 87 TROUT CREEK RANCH WELL, GOOSE CREEK AREA	EL 47N EL 40N	<u> </u>	09	SE NW NW NE	41.9800		<u>\$ 30</u>		1960/10/07	HOSE AND TAYLOR, 1974	
88 GOOSE CREEK AREA SPRING	EL 46N	_	15 10	SE SW SE	41.8823		W 43.3 S 33.9		75 1912/09/23 1960/10/07	MOORE AND EAKIN, 1968	
89 TROUT CREEK RANCH WELL	EL 46N	the second s	02	SW SE	41.9027		W 21		75 1972/02/13	MOORE AND EAKIN, 1968	
90 NILE SPRING	EL 47N	_	30	SW SW S	41.9283		S 43			MARINER AND OTHERS, 1974, 1975	
91 HOT SPRING	HU 35N	43E	11		40.9202	117.1091	S hot			HOT POT 7.5' QUAD	
92 NEW SPRING	W 34N	22E	18		40.8317	119.5317	S 29		1952/05/18	GROSE AND KELLER, 1975B	
93 POODLE SPRING	W 34N	22E			40.8244		5 29		1975/01/01	WATSTORE	
94 spring	WA				40.8711		5 29.4		1975/	LAWRENCE LIVERMORE LABORATORY, 1976	
95 BUFFALO SPRING	W 31N		08		40.5932	the second s	S warm			WARING, 1965	
96 BUCKBRUSH SPRING 97 JACK BONHAM RANCH WELL	W 29N W 26N	_	11	NE	40.3960 40.3150		S warm S 23		1000 10 1110	WARING, 1965 GLANCY AND RUSH, 1968	······
98.1 FISH SPRING	W 26N		19	SE SE	40.3150		<u>s 23</u>		1963/04/16 1952/09/18	RUSH AND GLANCY, 1967	
96.2 Fish Spring	WA				40.1024		<u>5</u> 21	·····	1975/	LAWRENCE LIVERMORE LABORATORY, 1976	
99 THE NEEDLES - WESTERN GEOTHERMAL WELL	WA				40.1500		W 115.5			WHITE, D., USGS, MENLO PARK	
100 THE NEEDLES	WA				40.1460	119.6748	S 56			MARINER AND OTHERS, 1974, 1975	
101 SEVENMILE SPRING	W 25N	23E	10	BCD	40.0483	119.3875	S 18		1969/07/30	WATSTORE	
102 SPRING	W 26N	_	10	DBA	40.1344		S 18.5		1969/07/30	WATSTORE	
103 SPRING	W 27N	_	16	ADA	40.2161		<u>\$ 25</u>		1969/08/22	WATSTORE	
104 LOWER STONEHOUSE SPRING 105.1 Amor II well 43-21	PE 27N W 29N		21	DD	40.2178		<u>\$28</u> W 135	85	1969/09/03	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
					40.3082				<b>, 4</b>	THEVADA BUNEAU OF MINES AND GEOLOGI	
		_			40 3602				the second s	INEVADA BUREAU OF MINES AND GEOLOGY	
105.2 Amor # well 43-21	W 29N	23E	21		40.3692	1 19.4039	W 135	85	5.4	*NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A	ELECTRIC POWER
		23E 23E		NW	40.3692 40.3917 40.6600	119.4039 119.4067			the second s	*NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975	
105.2 Amor II well 43-21 108 SAN EMIDIO DESERT - UNNAMED HOT SPRING	W 29N W 29N	23E 23E 23E	21 09,16		40.3917	119.4039 119.4067	W 135 \$ 79	85	5.4	MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46	W 29N W 29N W 32N W 32N WA	23E 23E 23E 23E	21 09,16 15 10	NW SW NW	40.3917 40.6600 40.6650 40.6608	119.4039 119.4067 119.3633 119.3667 119.3650	W         135           S         79           S         86           S         69.5           S         68.6	85 30	1956/02/22 1956/02/22 1960/01/26	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN	W 29N W 29N W 32N W 32N WA WA	23E 23E 23E 23E 23E	21 09,16 15 10 23		40.3917 40.6600 40.6650 40.6608 40.7226	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443	W         135           S         79           S         66           S         69.5           S         68.6           S         26	85 30 100	1956/02/22 1956/02/22 1980/01/28 1975/01/01	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL	W 29N W 29N W 32N W 32N WA WA W 33N W 34N	23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34	NW SW NW C A	40.3917 40.6600 40.6650 40.6608 40.7226 40.7939	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342	W         135           S         79           S         86           S         69.5           S         68.6           S         26           W         26	85 30 100	1958/02/22 1958/02/22 1980/01/28 1975/01/01 1981/12/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL	W 29N W 29N W 32N W 32N WA W 33N W 34N PE 33N	23E 23E 23E 23E 23E 23E 23E	21 09,16 15 10 23		40.3917 40.6600 40.6650 40.6608 40.7226 40.7939 40.7447	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731	W         135           S         79           S         86           S         69.5           S         68.6           S         26           W         26           W         33.5	85 30 100 390.5	1958/02/22 1958/02/22 1980/01/28 1975/01/01 1981/12/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO	W 20N W 20N W 32N W 32N WA W 33N W 34N PE 33N PE	23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10	NW SW NW C A	40.3917 40.6600 40.6650 40.6658 40.7226 40.7939 40.7447 40.7667	119.4039 119.4067 119.3633 119.3067 119.3650 119.3443 119.3342 119.1731 119.1167	W     135       S     79       S     86       S     69.5       S     68.6       S     26       W     26       W     33.5       S     84.5	85 30 100 390.5 150	1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12	MARINER AND OTHERS, 1978A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL	W 29N W 29N W 32N W 32N WA W 33N W 34N PE 33N	23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34	NW SW NW C A	40.3917 40.6600 40.6650 40.6608 40.7226 40.7939 40.7447	119.4039 119.4037 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731 119.1167 119.3417	W         135           S         79           S         86           S         69.5           S         68.6           S         26           W         26           W         33.5	85 30 100 390.5	1958/02/22 1958/02/22 1980/01/28 1975/01/01 1981/12/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL	W 20N W 20N W 32N W 32N WA W 33N W 34N PE 33N PE W 34N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09,16 15 10 23 34 10 02	NW SW NW C A	40.3917 40.6600 40.6650 40.6608 40.7226 40.7939 40.7447 40.7667 40.8633	119.4039 119.4067 119.3633 119.3667 119.3850 119.3443 119.3443 119.3342 119.1731 119.1167 119.3417 119.3181	W         135           S         79           S         86           S         69.5           S         88.6           S         26           W         28           W         33.5           S         84.5           W         80	85 30 100 390.5 150	1956/02/22 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1968/06/00	MARINER AND OTHERS, 1978A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       URNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPA FLAT SPRING 16         116       BLACK ROCK HOT SPRING 3         117       BACH WELL	W 20N W 20N W 32N W 32N WA W 33N W 33N PE 33N PE W 34N W 34N HU 36N PE 20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06	NW SW NW C A B NW NW D	40.3917 40.6600 40.6650 40.6650 40.7228 40.7239 40.7447 40.7667 40.8633 40.8606 40.9700 40.4056	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731 119.1167 119.3417 119.3417 119.3161 119.0100 118.7675	W         135           S         79           S         86           S         89.5           S         88.6           S         28           W         28           W         33.5           S         84.5           N         60           S         94           S         57.8           W         20.5	85 30 100 390.5 150 500	1958/02/22 1980/01/28 1975/01/01 1961/12/13 1961/06/12 1968/08/00 1975/01/01 1972/03/29 1961/09/14	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAJ FLAT SPRING 16         118       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING	W         29N           W         29N           W         32N           W         32N           WA         33N           PE         33N           PE         34N           W         34N           PE         34N           PE         29N           PE         29N           PE         29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05	NW SW NW C A B B NW NW D B	40.3917 40.6600 40.6608 40.7226 40.7939 40.7447 40.7667 40.8633 40.8606 40.9700 40.4056 40.4178	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731 119.1167 119.3417 119.3181 119.000 118.7675 118.8676	W         135           S         79           S         86           S         89.5           S         88.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18	85 30 100 390.5 150 500	1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/08/00 1975/01/01 1975/01/01 1972/03/29 1981/09/14 1969/11/20	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAR, 1963A WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 40 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 3 117 BACH WELL 119 COLADO WELL NO. 1	W         29N           W         29N           W         32N           W         32N           WA         32N           WA         32N           WA         32N           WA         32N           WA         34N           PE         33N           W         34N           PE         34N           PE         29N           PE         29N           PE         29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09,16 15 10 23 34 10 02 01 34 06 05 33	NW SW NW C A B B NW NW D B SE	40.3917 40.6600 40.6650 40.6608 40.7228 40.7039 40.7447 40.7667 40.8633 40.8606 40.9700 40.4058 40.4178 40.2450	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731 119.1167 119.3161 119.3161 119.0100 116.7675 118.6678 119.3850	W         135           S         79           S         86           S         89.5           S         88.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18	85 30 100 390.5 150 500 715	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/08/00 1975/01/01 1972/03/29 1981/09/14 1986/05/23	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1983A WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         33N           W         34N           PE         34N           HU         36N           PE         29N           PE         29N           PE         29N           PE         29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09,16 15 10 23 34 10 02 01 34 06 05 33 34	NW SW NW C A B B NW NW D B	40.3917 40.6600 40.6650 40.6650 40.7228 40.7239 40.7447 40.7697 40.8633 40.8606 40.9700 40.4778 40.4178 40.4178	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.1197 119.3141 119.1167 119.3161 119.0100 118.7675 118.6678 119.3850 118.1367	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24	85 30 100 390.5 150 500 715	1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/08/00 1975/01/01 1975/01/01 1972/03/29 1981/09/14 1969/11/20	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE WARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE	W         29N           W         29N           W         32N           W         32N           WA         WA           W         33N           W         34N           PE         33N           W         34N           PE         20N           PE         20N           PE         20N           PE         20N           PE         20N           PE         20N           PE         25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05 33 34 01	NW SW NW C A B B NW NW D B B SE SE	40.3917 40.6600 40.6850 40.6850 40.7226 40.7239 40.7447 40.7667 40.8603 40.8608 40.8608 40.9700 40.4056 40.4178 40.2450 40.3367 40.0813	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3443 119.3443 119.342 119.1107 119.3417 119.3181 119.0100 118.7675 119.3650 118.1367 119.3850 118.1367 117.9977	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24	85 30 100 390.5 150 500 715 8	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1975/01/01 1975/03/29 1981/09/14 1969/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOCELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1970	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         33N           PE         33N           PE         33N           PE         33N           PE         23N           PE         20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09,16 15 10 23 34 10 02 01 34 06 05 33 34	NW           SW NW           C           A           B           NW NW           D           B           SE           SE           SW	40.3917 40.6600 40.6850 40.6850 40.7235 40.7239 40.747 40.7697 40.7693 40.7693 40.7697 40.8605 40.9700 40.4058 40.4178 40.2450 40.3367 40.0337	119.4039 119.4067 119.3633 119.3667 119.3653 119.3467 119.3443 119.3443 119.342 119.1107 119.3417 119.3181 119.0100 116.7675 116.8676 119.3850 116.1367 117.0977 117.7167	W         135           S         79           S         86           S         69.5           S         86.6           S         26           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78	85 30 100 390.5 150 500 715	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1975/01/01 1975/03/29 1981/09/14 1969/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1970 MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 PORTER §PRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS	W         29N           W         29N           W         32N           W         32N           WA         WA           W         33N           W         34N           PE         33N           W         34N           PE         20N           PE         20N           PE         20N           PE         20N           PE         20N           PE         20N           PE         25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05 33 34 01 28	NW SW NW C A B B NW NW D B B SE SE	40.3917 40.6600 40.6850 40.6850 40.7226 40.7239 40.7447 40.7667 40.8603 40.8608 40.8608 40.9700 40.4056 40.4178 40.2450 40.3367 40.0813	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.1731 119.1167 119.3417 119.3161 119.0100 118.7675 118.6676 119.3850 118.1367 117.70977 117.7167	W         135           S         79           S         86           S         69.5           S         86.6           S         26           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78	85 30 100 390.5 150 500 715 8	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1975/01/01 1975/03/29 1981/09/14 1969/05/23 42 1957/02/05	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOCELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1970	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPA FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 118 BLACK ROCK HOT SPRING 16 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GILBERTS HOT SPRINGS)	W         29N           W         29N           W         32N           WA         32N           WA         33N           W         34N           PE         33N           PE         33N           PE         33N           PE         33N           PE         23N           PE         29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29	NW           SW NW           C           A           B           NW NW           D           B           SE           SE           SE           SE           SE           SE           SE	40.3917 40.6600 40.6550 40.6608 40.7236 40.7236 40.7236 40.7236 40.7247 40.7687 40.7687 40.8606 40.9700 40.4056 40.9700 40.4056 40.2450 40.2450 40.0387 40.0613 40.00805	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3443 119.3443 119.1731 119.1167 119.3161 119.0100 116.7675 118.678 119.3850 118.1367 117.7167 117.7167 117.6463	W         135           S         79           S         86           S         89.5           S         88.6           S         28           W         28           W         33.5           S         84.5           N         60           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         holt           S         78           S         73	85 30 100 390.5 150 500 715 8 102	1.4 1956/02/22 1960/01/28 1975/01/01 1981/12/13 1961/06/12 1968/06/00 1975/01/01 1972/03/29 1961/09/14 1966/05/23 1966/05/23 1962/07/31	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAJ FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GILBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MACOY)	W         29N           W         29N           W         32N           W         32N           WA         WA           W         32N           WA         WA           W         32N           W         34N           PE         33N           PE         33N           PE         20N           PE         20N           PE         20N           PE         25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 01 02 01 01 02 03 34 06 05 33 34 01 28 29 19 16 33	NW SW NW C A B B NW NW D B SE SE SE SW SE SW SE NW SW	40.3917 40.6600 40.6850 40.6850 40.7226 40.7239 40.7447 40.7667 40.8603 40.8603 40.8605 40.9700 40.4056 40.4178 40.3347 40.0613 40.0085 40.0287 40.0287	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3443 119.3443 119.1197 119.3417 119.3181 119.0100 118.7675 119.3676 119.3850 118.1367 117.7167 117.7167 117.7463 117.6003 117.6000	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hol           S         78           S         26           S         40           S         26	85 30 100 390.5 150 500 715 8 102 169 2536	1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/05/12 1988/06/00 1975/01/01 1972/03/29 1981/09/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1980/08/04	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND CHERS, 1974, 1975 COHEN AND CHERS, 1974	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GUBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 125 UNNAMED HOT SPRING (LOWER RANCH) 126 SPRING, J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         32N           W         34N           PE         33N           W         34N           PE         20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 06.16 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 16 16 33 28	NW SW NW C A B B NW NW D B SE SE SW SE SW SE NW SW SW	40.3917 40.6600 40.6550 40.6608 40.7225 40.7239 40.747 40.7697 40.7697 40.8603 40.6063 40.9700 40.4058 40.4178 40.2450 40.3367 40.0333 40.0605 40.0287 40.0287 40.0377 40.3790	119.4039 119.4067 119.3633 119.3667 119.3653 119.3443 119.3443 119.3442 119.1731 119.1187 119.3417 119.3417 119.3181 119.0100 116.7675 116.8676 119.3850 116.1367 117.7167 117.7167 117.7463 117.6033 117.6000 117.4900	W         135           S         79           S         86           S         69.5           S         86.6           S         20           W         23.5           S         84.5           W         30.5           S         94.5           S         77.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         20.5           S         46.3           S         24	85 30 100 390.5 150 500 715 8 102 189 2536 20	i.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1975/01/01 1975/02/05 1980/08/04 1952/09/16 1980/08/04 1957/05/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE WARNER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 40 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRING (GLIBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MCCOY) 127 JERSEY YALLEY AREA - UNNAMED HOT SPRING 128 DAIS WELL	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         33N           W         33N           W         34N           W         34N           PE         33N           PE         33N           PE         20N           PE         25N           PE         25N           PE         27N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 06.16 15 10 23 34 10 02 01 34 06 05 33 34 06 05 33 34 01 28 29 19 16 33 32 50 22	NW SW NW C A B B NW NW D B S S E S E S E S E S E S E S E S E S E	40.3917 40.6600 40.6550 40.5650 40.7236 40.7236 40.7236 40.7236 40.7247 40.7687 40.8606 40.9700 40.4056 40.4178 40.2450 40.0330 40.0033 40.0267 40.0350 40.0776 40.1769 40.2450	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3443 119.3443 119.3417 119.3161 119.0100 116.7675 118.6678 119.3850 118.1367 117.7167 117.7167 117.6483 117.6033 117.6033 117.6000 117.6783	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18           W         60           W         20.5           S         18           V         60           S         78           S         73           S         28           S         40.3           S         29           W         22	85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1	i.4 1956/02/22 1960/01/28 1975/01/01 1961/05/12 1965/06/00 1975/01/01 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/09/14 1966/05/23 1966/05/23 1966/05/23 1962/07/31 1952/09/16 1962/07/31 1952/09/16 1963/01/07	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE W	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (MYDRA) HOT SPRINGS 123 SOU HOT SPRING (GLBERTS HOT SPRINGS) 124 UNNAMED SPRING 125 UNNAMED SPRING (LOWER RANCH) 126 SPRING J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 J.S. RANCH WELL 120 J.S. RANCH WELL	W         29N           W         29N           W         29N           W         32N           W         32N           W         32N           W         33N           W         34N           W         34N           W         34N           PE         33N           PE         34N           HU         36N           PE         28N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 29 29 29 29	NW SW NW C A B B NW NW D B SE SE SE SE SE SW SE SE NW NW SW SW SW D	40.3917 40.6600 40.6850 40.7228 40.7228 40.728 40.7039 40.7447 40.7667 40.8633 40.8633 40.8633 40.8633 40.8633 40.8633 40.8633 40.2450 40.3387 40.0813 40.0853 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2453	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.1107 119.3141 119.1107 119.3161 119.0100 116.7675 118.6678 119.3850 118.13677 117.7167 117.7167 117.6000 117.6783 117.6009	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         73           S         28           S         48.3           S         24           W         24           W         24           W         24           W         22           W         21	85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1	i.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1975/01/01 1975/02/05 1980/08/04 1952/09/16 1980/08/04 1957/05/13	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER, AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HTDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GILBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 DARIS WELL 120 KYLE HOT SPRINGS	W         29N           W         29N           W         32N           W         34N           PE         33N           W         34N           W         34N           PE         20N           PE         20N           PE         20N           PE         25N           PE         25N           PE         25N           PE         26N           PE         25N           PE         25N           PE         26N           PE         25N           PE         26N           PE         25N           PE         25N           PE         27N           PE         27N           PE         27N           PE         27N           PE         27N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.18 15 10 23 34 10 02 01 34 05 33 34 01 28 29 19 16 18 33 28 02 29 12	NW SW NW C A B B S S S S S S S S S S S S S S S S S	40.3917 40.6600 40.6650 40.6650 40.7226 40.7226 40.7239 40.7447 40.7667 40.7667 40.6633 40.8633 40.8633 40.8636 40.9700 40.4056 40.4178 40.3367 40.337 40.0853 40.0853 40.02450 40.2450 40.2450 40.6833 40.683	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.3143 119.1107 119.3161 119.3161 119.0100 118.7675 118.6676 119.3850 118.1367 117.247 117.7167 117.6033 117.6033 117.6033 117.6039 117.6783 117.6850	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         94           S         57.8           W         20.5           S         18           W         bol           S         73           S         28           S         40.3           S         28           W         22           W         21           S         95.6	85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1968/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 1962/07/31 1952/06/16 1980/08/04 1957/05/13 16 1983/01/07 2.6 1983/07/23	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND EVERETT, 1963 MARINER AND MILES, 1974	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING 16 117 BACH WELL 118 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (MYDRA) HOT SPRINGS 123 SOU HOT SPRING (GLBERTS HOT SPRINGS) 124 UNNAMED SPRING 125 UNNAMED SPRING (LOWER RANCH) 126 SPRING J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 J.S. RANCH WELL 120 J.S. RANCH WELL	W         29N           W         29N           W         29N           W         32N           W         32N           W         32N           W         33N           W         34N           W         34N           W         34N           PE         33N           PE         34N           HU         36N           PE         28N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 29 29 29 29	NW SW NW C A B B NW NW D B SE SE SE SE SE SW SE SE NW NW SW SW SW D	40.3917 40.6600 40.6850 40.7228 40.7228 40.728 40.7039 40.7447 40.7667 40.8633 40.8633 40.8633 40.8633 40.8633 40.8633 40.8700 40.4178 40.2450 40.3387 40.0813 40.0851 40.0253	119.4039 119.4067 119.3667 119.3667 119.3667 119.3465 119.3443 119.3443 119.1197 119.3417 119.3181 119.0100 118.7675 119.3676 119.3850 118.3676 119.3850 117.247 117.7167 117.7463 117.6000 117.6783 117.6099 117.6850 117.6851	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           N         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hot           S         78           S         73           S         28           S         48.3           S         24           W         24           W         24           W         24           W         22           W         21	85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1	i.4 1956/02/22 1960/01/28 1975/01/01 1961/05/12 1965/06/00 1975/01/01 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/09/14 1966/05/23 1966/05/23 1966/05/23 1962/07/31 1952/09/16 1962/07/31 1952/09/16 1963/01/07	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER, AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 40 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRING3 117 BACH WELL 118 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRING (GLBERTS HOT SPRINGS) 124 UNNAMED SPRING 125 UNNAMED HOT SPRING (LOWER RANCH) 126 SPRING J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 SANCH WELL 129 J.S. RANCH WELL 130 KYLE HOT SPRINGS 131 HOTTEST KYLE HOT SPRINGS 132 COYOTE SPRINGS 133 BUFFALO SPRINGS	W         29N           W         29N           W         32N           W         34N           PE         33N           PE         33N           W         34N           PE         20N           PE         20N           PE         25N           PE         26N           PE </td <td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td> <td>21 09.18 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 12 20 12 01</td> <td>NW SW NW C A B S S S S S S S S S S S S S S S S S S</td> <td>40.3917 40.6600 40.6850 40.6850 40.7225 40.7239 40.7447 40.7667 40.8633 40.8605 40.8605 40.9700 40.4056 40.4178 40.2450 40.2450 40.0285 40.028</td> <td>119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.3342 119.137 119.3181 119.3181 119.0100 116.7675 118.3676 119.3850 117.0977 117.7167 117.7247 117.6483 117.6000 117.6783 117.6000 117.6783 117.6000 117.6850 117.6831 117.6397</td> <td>W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hol           S         78           S         26           S         48.3           S         26           S         40.3           S         26           S         40.3           S         25.6           S         95.6</td> <td>85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1</td> <td>1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1988/06/00 1975/01/01 1975/01/01 1975/03/29 1981/09/14 1969/11/20 1966/05/23 42 1957/02/05 1982/07/31 1952/09/16 1980/06/04 1957/05/13 18 1983/01/07 2.6 1983/07/23 1977/05/08</td> <td>MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1983A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE</td> <td>ELECTRIC POWER VEGETABLE DRYING</td>	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.18 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 12 20 12 01	NW SW NW C A B S S S S S S S S S S S S S S S S S S	40.3917 40.6600 40.6850 40.6850 40.7225 40.7239 40.7447 40.7667 40.8633 40.8605 40.8605 40.9700 40.4056 40.4178 40.2450 40.2450 40.0285 40.028	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.3342 119.137 119.3181 119.3181 119.0100 116.7675 118.3676 119.3850 117.0977 117.7167 117.7247 117.6483 117.6000 117.6783 117.6000 117.6783 117.6000 117.6850 117.6831 117.6397	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         57.8           W         20.5           S         18           W         60           W         24           W         hol           S         78           S         26           S         48.3           S         26           S         40.3           S         26           S         40.3           S         25.6           S         95.6	85 30 100 390.5 150 500 715 8 102 189 2536 20 36 1	1.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1988/06/00 1975/01/01 1975/01/01 1975/03/29 1981/09/14 1969/11/20 1966/05/23 42 1957/02/05 1982/07/31 1952/09/16 1980/06/04 1957/05/13 18 1983/01/07 2.6 1983/07/23 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1983A WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 44 110 BOWEN 111 GRANTE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HYDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GLBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MACOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 OL HOT SPRINGS 131 HOTTEST KYLE HOT SPRINGS 131 HOTTEST KYLE HOT SPRINGS 132 GOYOTE SPRINGS 133 BUFFALO SPRINGS 134 BUFFALO VALLEY HOT SPRINGS 134 BUFFALO VALLEY HOT SPRINGS 134 BUFFALO VALLEY HOT SPRINGS	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         32N           W         33N           W         34N           W         34N           W         34N           PE         33N           PE         20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.16 15 10 23 34 10 02 01 34 05 33 34 01 28 29 19 16 33 28 29 19 16 22 29 19 16 33 28 29 19 02 29 19 06 22 29 20 20 20 20 20 20 20 20 20 20 20 20 20	NW SW NW C A B B NW NW D B SE SE SE SE SE SE SE SE SE NW NW D D NW NW SW NW D NW NW SW NW SW NW SW SE NW SE	40.3917 40.6600 40.6850 40.7226 40.7226 40.7228 40.728 40.7697 40.7697 40.8533 40.8633 40.8633 40.8633 40.8633 40.8633 40.4700 40.4178 40.2450 40.3307 40.0265 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0256 40.0255 40.0256 40.0255	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.1197 119.3141 119.1167 119.3161 119.0100 118.7675 118.6678 119.3850 118.1367 117.767 117.7167 117.747 117.6033 117.6039 117.6397 117.4550 117.4550 117.4555	W         135           S         79           S         86           S         69.5           S         86.6           S         20           W         28           W         33.5           S         84.5           N         80           S         94           S         94           S         78           S         78           S         70           S         73           S         28           S         48.3           S         24           W         hot           S         73           S         28           S         46.3           S         95.6           S         665           S         65           S         65.5	85 30 100 390.5 150 500 715 8 102 169 2536 20 38 1 32 	i.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1988/00/00 1975/01/01 1972/03/29 1981/09/14 1969/11/20 1986/05/23 42 1957/02/05 1982/07/31 1952/09/16 1980/08/04 1957/05/13 1957/05/13 1977/05/08 1977/05/08 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, AND OTHERS, 1974, 1975 GARSIDE AND SCHILLING, 1979 MARINER, AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTO	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HTDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GILBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 DARIS WELL 129 ARIS WELL 120 KYLE HOT SPRINGS 131 HOTTEST KYLE HOT SPRINGS 132 LOYACH SPRINGS 133 BUFFALO SPRINGS 134 BUFFALO SPRINGS 135 CH3D WELL	W         29N           W         29N           W         32N           W         34N           PE         33N           PE         33N           W         34N           W         34N           W         34N           W         34N           W         34N           W         34N           PE         20N           PE         20N           PE         20N           PE         25N           PE         25N           PE         25N           PE         25N           PE         20N           PE         20N <td< td=""><td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td><td>21 09.18 15 10 23 34 10 02 01 34 05 33 34 01 28 29 19 16 33 32 29 19 16 16 33 32 29 19 10 10 20 29 12 01 30 00 23 31 4</td><td>NW SW NW C A B B NW NW D B SE SE SW SE SW SE NW NW SW SW SW NW NW SW SW SW SW SW SW SW SW SW SW SW SW SW</td><td>40.3917 40.6600 40.6650 40.6550 40.7225 40.7225 40.7239 40.7447 40.7667 40.8603 40.8603 40.8605 40.9700 40.4056 40.4175 40.3367 40.0813 40.0851 40.0287 40.0337 40.0853 40.0853 40.0853 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4085 40.4083 40.4083 40.4085 40.408</td><td>119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.3342 119.3141 119.1167 119.3161 119.0100 118.7675 118.6676 119.3850 118.1367 117.6967 117.7167 117.7167 117.6033 117.6033 117.6099 117.6831 117.6367 117.4158 117.6367</td><td>W         135           S         70           S         86           S         69.5           S         68.6           S         20           W         20           W         33.5           S         84.5           W         80           S         94           S         94           S         94           S         73           S         18           W         hot           S         73           S         28           S         48.3           S         28           W         20           S         48.3           S         28           S         48.3           S         295.6           S         65           S         65           S         65           S         65           S         55.5</td><td>85 30 100 390.5 150 500 715 8 102 169 2536 20 38 1 32 </td><td>1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1981/06/12 1988/06/00 1975/01/01 1972/03/29 1981/09/14 1999/11/20 1986/05/23 1982/07/31 1952/09/16 1983/07/23 1977/05/08 1977/05/08 1977/05/08 1977/05/08</td><td>MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND CHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE</td><td>ELECTRIC POWER VEGETABLE DRYING</td></td<>	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.18 15 10 23 34 10 02 01 34 05 33 34 01 28 29 19 16 33 32 29 19 16 16 33 32 29 19 10 10 20 29 12 01 30 00 23 31 4	NW SW NW C A B B NW NW D B SE SE SW SE SW SE NW NW SW SW SW NW NW SW SW SW SW SW SW SW SW SW SW SW SW SW	40.3917 40.6600 40.6650 40.6550 40.7225 40.7225 40.7239 40.7447 40.7667 40.8603 40.8603 40.8605 40.9700 40.4056 40.4175 40.3367 40.0813 40.0851 40.0287 40.0337 40.0853 40.0853 40.0853 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4085 40.4083 40.4083 40.4085 40.408	119.4039 119.4067 119.3667 119.3667 119.3667 119.3443 119.3342 119.3342 119.3141 119.1167 119.3161 119.0100 118.7675 118.6676 119.3850 118.1367 117.6967 117.7167 117.7167 117.6033 117.6033 117.6099 117.6831 117.6367 117.4158 117.6367	W         135           S         70           S         86           S         69.5           S         68.6           S         20           W         20           W         33.5           S         84.5           W         80           S         94           S         94           S         94           S         73           S         18           W         hot           S         73           S         28           S         48.3           S         28           W         20           S         48.3           S         28           S         48.3           S         295.6           S         65           S         65           S         65           S         65           S         55.5	85 30 100 390.5 150 500 715 8 102 169 2536 20 38 1 32 	1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1981/06/12 1988/06/00 1975/01/01 1972/03/29 1981/09/14 1999/11/20 1986/05/23 1982/07/31 1952/09/16 1983/07/23 1977/05/08 1977/05/08 1977/05/08 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND CHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY PANCH (WARDS HOT SPRING) - WELL         115       HUALAPAJ FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (MTRA) HOT SPRINGS         123       SOU HOT SPRINGS (GALBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       UNNAMED HOT SPRING (COWER RANCH)         126       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       UNNAMED HOT SPRINGS         131       HOTTEST KYLE HOT SPRINGS         132       COYOTE SPRINGS <tr< td=""><td>W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         32N           W         34N           PE         33N           W         34N           PE         33N           W         34N           PE         20N           PE         20N           PE         25N           PE&lt;</td><td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td><td>21 00.18 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 34 01 28 29 12 01 30 06 01 19 16 10 10 10 10 10 10 10 10 10 10</td><td>NW SW NW C A B S S S S S S S S S S S S S S S S S S</td><td>40.3917 40.6600 40.6850 40.6850 40.7225 40.7239 40.747 40.7697 40.8633 40.8603 40.8603 40.9700 40.4056 40.4178 40.2450 40.2450 40.0337 40.0813 40.0895 40.0287 40.0285 40.0287 40.2450 40.2450 40.2450 40.0387 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2455 40.4069 40.4069 40.4181 40.4079 40.5655</td><td>119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.3443 119.3342 119.1107 119.3417 119.3181 119.0100 118.7675 119.3676 119.3850 118.13677 117.6483 117.6483 117.6009 117.6783 117.6397 117.4158 117.6397 117.4158</td><td>W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         94           S         97.8           W         80           W         20.5           S         18           W         60           W         24           W         hol           S         78           S         28           S         48.3           S         28           W         21           S         95.6           S         65.5           W         55.5           W         55.1           S         20</td><td>85 30 100 390.5 150 500 715 8 102 169 2536 20 38 1 32 7.6 409</td><td>i.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1988/00/00 1975/01/01 1972/03/29 1981/09/14 1969/11/20 1986/05/23 42 1957/02/05 1982/07/31 1952/09/16 1980/08/04 1957/05/13 1957/05/13 1977/05/08 1977/05/08 1977/05/08</td><td>MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE MARINER AND OTHERS, 1974, 1975 GARSIDE AND SCHILLING, 1970 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE</td><td>ELECTRIC POWER VEGETABLE DRYING</td></tr<>	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         32N           W         34N           PE         33N           W         34N           PE         33N           W         34N           PE         20N           PE         20N           PE         25N           PE<	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 00.18 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 34 01 28 29 12 01 30 06 01 19 16 10 10 10 10 10 10 10 10 10 10	NW SW NW C A B S S S S S S S S S S S S S S S S S S	40.3917 40.6600 40.6850 40.6850 40.7225 40.7239 40.747 40.7697 40.8633 40.8603 40.8603 40.9700 40.4056 40.4178 40.2450 40.2450 40.0337 40.0813 40.0895 40.0287 40.0285 40.0287 40.2450 40.2450 40.2450 40.0387 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2450 40.2455 40.4069 40.4069 40.4181 40.4079 40.5655	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.3443 119.3342 119.1107 119.3417 119.3181 119.0100 118.7675 119.3676 119.3850 118.13677 117.6483 117.6483 117.6009 117.6783 117.6397 117.4158 117.6397 117.4158	W         135           S         79           S         86           S         69.5           S         86.6           S         28           W         28           W         33.5           S         84.5           W         80           S         94           S         94           S         97.8           W         80           W         20.5           S         18           W         60           W         24           W         hol           S         78           S         28           S         48.3           S         28           W         21           S         95.6           S         65.5           W         55.5           W         55.1           S         20	85 30 100 390.5 150 500 715 8 102 169 2536 20 38 1 32 7.6 409	i.4 1956/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1988/00/00 1975/01/01 1972/03/29 1981/09/14 1969/11/20 1986/05/23 42 1957/02/05 1982/07/31 1952/09/16 1980/08/04 1957/05/13 1957/05/13 1977/05/08 1977/05/08 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE SINCLAIR, 1963A WATSTORE MARINER AND OTHERS, 1974, 1975 GARSIDE AND SCHILLING, 1970 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
105.2 Amor II well 43-21 106 SAN EMIDIO DESERT - UNNAMED HOT SPRING 107 GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S 108 UNNAMED HOT SPRING NEAR GREAT BOILING SPRING 109 GREAT BOILING SP ORIF 46 110 BOWEN 111 GRANITE CREEK RANCH WELL 112 WELL 113 UNNAMED HOT SPRING NEAR TREGO 114 FLY RANCH (WARDS HOT SPRING) - WELL 115 HUALAPAI FLAT SPRING 16 116 BLACK ROCK HOT SPRINGS 117 BACH WELL 118 PORTER SPRING 119 COLADO WELL NO. 1 120 SOUTHWEST DREDGING CO. WELL 121 DRILL HOLE 122 HYDER (HTDRA) HOT SPRINGS 123 SOU HOT SPRINGS (GILBERTS HOT SPRINGS) 124 UNNAMED HOT SPRING (LOWER RANCH) 128 SPRING, J.S. RANCH (MCCOY) 127 JERSEY VALLEY AREA - UNNAMED HOT SPRING 128 DARIS WELL 129 NAMED HOT SPRINGS 131 HOTTEST KYLE HOT SPRINGS 132 LOYOTE SPRINGS 133 BUFFALO SPRINGS 134 BUFFALO SPRINGS 134 BUFFALO SPRINGS 135 CH3D WELL	W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         32N           W         33N           W         34N           W         34N           PE         33N           W         34N           W         34N           W         34N           W         34N           W         34N           W         34N           PE         20N           PE         20N           PE         20N           PE         25N           PE         25N           PE         25N           PE         27N           PE         27N           PE         28N           PE         27N           PE         27N           PE         28N           PE         28N           PE         28N           PE         28N           PE         29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	21 09.18 15 10 23 34 10 02 01 34 05 33 34 01 28 29 19 16 33 32 29 19 16 16 33 32 29 19 10 10 20 29 12 01 30 00 23 31 4	NW SW NW C A B B NW NW D B SE SE SW SE SW SE NW NW SW SW NW SW SW NW NW SW SW SW SW SW SW SW SW SW SW SW SW SW	40.3917 40.6600 40.6650 40.6550 40.7225 40.7225 40.7239 40.7447 40.7667 40.8603 40.8603 40.8605 40.9700 40.4056 40.4175 40.3367 40.0813 40.0851 40.0287 40.0337 40.0853 40.0853 40.0853 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4083 40.4085 40.4083 40.4083 40.4085 40.408	119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342 119.131 119.1417 119.3161 119.0100 116.7675 116.6678 119.3850 116.1367 117.7167 117.7167 117.7167 117.6463 117.6033 117.6033 117.6033 117.6033 117.6831 117.6831 117.6831 117.3255 117.6683 117.255 117.6683	W         135           S         70           S         86           S         69.5           S         68.6           S         20           W         20           W         33.5           S         84.5           W         80           S         94           S         94           S         94           S         73           S         18           W         hot           S         73           S         28           S         48.3           S         28           W         20           S         48.3           S         28           S         48.3           S         295.6           S         65           S         65           S         65           S         65           S         55.5	85 30 100 390.5 150 500 715 8 409 200 200	1.4 1958/02/22 1980/01/28 1975/01/01 1981/12/13 1981/06/12 1981/06/12 1988/06/00 1975/01/01 1972/03/29 1981/09/14 1999/11/20 1986/05/23 1982/07/31 1952/09/16 1983/07/23 1977/05/08 1977/05/08 1977/05/08 1977/05/08	MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND CHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING

J         J         J         J         J         J         J         D										-	-
19. Berling         17. Berling									N DEPTH CDATE		USE
11       11.000.001 Prot Andre J. PRILEY PRINE, APP / 10       PRIL       50       10.0000 ADD STRUCTURES ()       PRILEY				NE NW NE							
141         Control         Fig 10         Model         Fig 10         Model         <											
101       101       197824       197824       197       197824       197844       197844       197844       197844       197844       197844       197844       197844       197844       197844       197844       19784       19784       19784       197844       197844       197844       197844       197844       197844       197844       19784       19784       19784				SE					565 1970/09/01		
ULS 2       Like Abs/Trans (Pell, 1942)       Pick 2			the second s				W 114.	.4			HEAP LEACHING
141       Calcinges, FACRE UTILE CD. MPL.       No. 200       96       PT PROPER       PT PROPE											
141. UMAND PRIVA       10. 2 K K V O       10. 2 K K V O       10. 2 K K V O       10. 4					40.9805	118.1292	W 87.	.8 227.	1 137 1966/ ,	PARR AND PERCIVAL, 1991	
141       Burklish       MYAE       8       WIKE       80       PROVE (C)       100       PROVE (C)       CONTR       PROVE (C)       PROVE (			_	NE SW SE	40.9600	117.7433	W 22.	8	151 1970/10/07	COHEN, 1962	
170       UNMARE INFO SPRAND INCLUZE DAY       110       120       20       17.4       NAMEE AND OUTERS INFO UNITS         180       GOCCORD TUNING ONLINE AND UNITS       110       120       17.4       17.4       Notest AND OUTERS INFO       17.4         181       GOCCORD TUNING ONLINE AND UNITS       110       120       17.4       17.4       Notest AND OUTERS INFO       17.4         191       GOCCORD TUNING ONLINE AND UNITS       110       120       17.4 </td <td>145 UNNAMED SPRING</td> <td>HU 36N</td> <td>37E 13</td> <td>SE NE SW</td> <td>40.9928</td> <td>117.7620</td> <td>\$ 33.</td> <td>9</td> <td>1954/10/05</td> <td>COHEN, 1962</td> <td></td>	145 UNNAMED SPRING	HU 36N	37E 13	SE NE SW	40.9928	117.7620	\$ 33.	9	1954/10/05	COHEN, 1962	
141       0.0.0000 A BADD TWANG TWAI LINE 7 BAD       1.304       64.00       1.00000 A TWANG TWAI LINE 7 BAD       1.00000 A TWANG TWAI LINE 7 BAD         11       BADDED STRANG       1.914       1.91       BADDED STRANG TWAI LINE 7 BAD       1.91	140 BLM WELL	HU 36N	38E 26	SW NE SE	40.9642	117.6612	W 22.	8	16.8	COHEN, 1962	
142       UNDARED PD/ SPINPA       F1.02 M       6       6       76       MARKED PD/ SPINPA       MARKED	147 UNNAMED HOT SPRING NEAR GOLCONDA	HU 36N	40E 29	SW SW SE	40.9610	117.4938	S 74	4 75	0	MARINER AND OTHERS, 1974, 1975	
195       BAPPURI BRING       FE SM       GAMAG       17 3441       8       Not       HERDING       HER	148 GOLCONDA TUNGSTEN MINE DRILL HOLE 302	HU 36N	40E 36	ŚW	40.9497	117.4238	W 61.	.7	78.6	GARSIDE AND SCHILLING, 1979	
101       BOODE SPRING       HE WORK 6       Dis Net Work 6	149 UNNAMED HOT SPRING	HU 33N	40E 05	SE	40.7617	117.4922	5 6	5 10	0	MARINER AND OTHERS, 1974, 1975	
132       1012	150 SULPHUR SPRING	PE 35N	41E 34		40.8643	117.3491	S ho	ot		KERR, 1940	
131       MULTING SPRANG       LA BM 44       67       63.18       17.090       8       12       1990.001       NMITE 0. LESS MARCH PARAGE         131       LUMIN LOT SPRANG       LA BM 44       60       600.001       17.000       18.000	151 BROOKS SPRING	HU 34N	41E 13	NE NW NE	40.8317	117.3067	S 34	4	1962/07/15	TREXLER AND OTHERS, 1979	
19-1       Lew Priv Ser Park of Park o	152 HOT POT SPRING	HU 35N	43E 10	NE NE SE	40.9228	117.1100	S 5	8	1912/11/16	MARINER AND OTHERS, 1974, 1975	
1919       12.5 Pair-Vice Annote Service       1.4 Se	153 MOUND SPRING	LA 26N	44E 07		40.3125	117.0695	S 3	2	1950/01/05	"WHITE, D., USGS, MENLO PARK	
19-19       DE 28 MGL       EL 304       46       61       0.000       140 407       W1 600       14000000       W1000000       W1000000       W1000000       W1000000       W1000000       W1100000       W11000000       W11000000       W11000000       W11000000       W11000000       W110000000       W1100000000       W1100000000000       W110000000000000000000000       W1100000000000000000000000000000000000	154 UNN HOT SP VILLY OF MOON	LA 27N	43E 23	BCC	40.1911	117.1056	S 5	3	1974/01/01	WATSTORE	<u></u>
197       197       2012       199       2013       199       199       147       197       1472       14	155 IZZENHOOD RANCH SPRING	LA 35N	45E 10	SW NE NW	40.9287	116.6953	S 3	1	1962/07/05	TREXLER AND OTHERS, 1979	
17.9       DPU PULL       EU BA       56       9       BCC       64031       16.3726       MC       16.072       IEE MARKAGE       MC       MC<	156 DEE 3 WELL		the second s				W 4	5			
15       BANAK AFMOD       EU 34       51       Control 14 2014       6       163       TeleNotion With Tork         160       DRAMAC DEPRING       EL 34       52       00000       11.5       TERRER AND CITERE, 1974         160       DRAMAC DEPRING       EL 34       52       60       COD       4.54       14.5000       6       44       TERRER AND CITERE, 1974       COD       (BARAK DEPRING AND CITERE, 1974)       (BARAK DEPRING AN	157 BW2 WELL		_								
198         NEWMONT WELL LC2         EU AN         16         00         4 hard         11 april 1         1000007         MAREE AND OTHERS, 197         Control           10         UNALED SPRING         E. 330         BE         0         60         11000007         MAREE AND OTHERS, 197         (97) (97) (97)         (97) (97) (97)         (97) (97) (97) (97) (97)         (97) (97) (97) (97) (97) (97) (97) (97)	158 BRAHMA SPRING										·······
100         UMALADE SPINIG         EL 300         SE         90         40.742         110.500         TEXER AND OTHERS, 197         Comparing           100         UMALADE SPINIG         EL 300         SE         SE         SE 007         11.530         SE         SE 007         SE											
11       UNAMED SPRING       R. J. SH 52       25       25       10000024       UNAMED AND OTHERS, 574, 1075       (#PACE HEATING)         15       TYRG, EPRING       E1 3M 52       67       Addates       116, 153       8       22       10000017       MATSICRE       (#ALS)       (#ALS)<					_						
142       TYRGL SPRING       EL 3/N       5.8       6.9       COBA       40.444       118.158       8       2       100006/13       WATSTORE         155       SPRING       EU 31N       5.8       67       40.552       115       wurn       DAUDBUTY AND ASSCULTES, TWA       DAUDBUTY AND ASSCULTES, TWA         161       MACC CREEK FAMA WELL       EU 301       46       10       6.0542       115.01       wurn       DAUDBUTY AND ASSCULTES, TWA       DAUBAUX AND ASSCULTES, TWA         163       MATE EXCORTAN CLT Y MELL       L.330       46       172       190006/13       WATSCULTES, TWA       DAUBAUX AND ASSCULTES, TWA       DECOMPANY AND											
19.10       SPIRING       EU JAH       Deg       77       40.432       116.151       9       wem       DAVADBUY AND ASSOCIATES, 1994         19.5       MACC CREE FARW YELL       L3 XM       47       64       64.764       114.551       8       MACC CREE FARW YELL       L3 XM       47       64       64.764       114.551       8       MAISTORE       MAISTORE <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(SPACE NEATING)</td></td<>											(SPACE NEATING)
164       MACK CREEK FAMM WELL       EU 384       46       0.       ACDD       407-444       104-83       W       WARE CREEK FAMM WELL       UNASIGNE         168       MOT SPMMG       L. 139       46       00       40.74       11.64115       Not       STATUM FORT       STATUM FO				CUDA					1840/00/13		
196.         MIET ROCK SPRINGS         LA 134         472         66         40.743         11.711         8         Warm         MARING, 1083           167         BATTLE MCARTAN CITY VELL         LA 384         45         17         57.84         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         8         64.2         10.5324         10.562         10.562         11.5627         8         10.562         10.5627         10.562				AC00					170.0 1000 00101		
168       101 SPTING       L. A. SN. 46E       6       4.02/25       118 S412       Not       STONY FOUT         168       BCTWAME STANK OT YMELL       L. J. SN. 46E       17       W 12       45.02       40       221 Y00001       5CT X000 BATLE MAD CHARGE, ND BARKER, ND CHARGE, ND BARKER, ND CHARGE, ND BARKER, ND CHARGE, ND SHARKER, ND SHARK									1/2.2 1990/00/24		
197       BATTLE MOUNTAN CITY WELL       L. A. SHY. 46E       7       W W W       20       21       19700601       SCOTT AND BANKER, 1992         168       BEOWANG: SPRING 3       EU JIN 46E       64       116 5823       8       88.3       WHETE CONLD. LS. G.       ELECTRIC CONCER.         168       BEOWANG: SPRING 3       EU JIN 46E       64       82       40.001       MAINER AND CITERS, 1573.       EL         171       IOT SPRINGS POINT       EU 2014       46E       11       NE NE       40.003       110 5107       5       54       126       14641021       MAINER AND CITERS, 1973.         171       IOT SPRINGS POINT       EU 2014       46E       10       NE NWIN       43.105       110 5107       5       54       126       14641021       MAINER AND CITERS, 1974.       173       173       179 797000       MAINER AND CITERS, 1974.       174 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td>							_				
Ide         ECONVINC:         SPRING 31         EU 31N         HZ         Ide 3563         Ide 35633         Ide 3563         Ide 3				CIAL CIAL							
166       ECONAME NOT SPRING       EU 31N       462       00       MARKER AND CHIERS, 1074, 1075         171       FORSES DARCH ICO SPRINGS       EU 30N       464       35       W       4001110       116 4600       5       5       1       14641021       MARKER AND CHIERS, 1074, 1075         171       FORSES DARCH ICO SPRINGS       EU 30N       464       11       NE ME       40.005       116 5107       5       5       1       14641021       MARKER AND CHIERS, 1074, 1075         171       FORSES PORT       EU 30N       464       11       NE ME       40.005       116 5107       5       5       0.5       1464000       GA SO       5       0.5       1464000       CARSOE AND CHIERS, 1070         173       FORSENDAG       EU 20N       462       1       NW NW N       0.16000       3       30       1462000       CARSOE AND CHIERS, 1076         173       FORMACHAERS       EU 20N       45       40       6.303       116 2007       30       30       1375       1463000       MARKER AND CHIERS, 1076       DE       40       116 2007       116 2007       116 2007       116 2007       116 2007       116 2007       116 2007       116 2007       116 2007       116 2007       1											ELECTRIC DOWER
170       CONSESSIONE RANCE HAUS PRINKSS       EU 324       46g       31       EW 16       40.0017       116.400       8       54       125       1000000000000000000000000000000000000									· · · · · · · · · · · · · · · · · · ·		ELECTRIC POWER
171       HOT SPRINGS POINT       EU SW       48       11       NE NE       40.033       115       115       10441/021       MARINER AND OTHERS, 1974, 1975         171       DISPING       EU SW       462       11       NE NE       40.033       116.5147       5       50       1074.043       MARINE, 1805       CARJEDE AND SCHLLING, 1976									· · · · · · · · · · · · · · · · · · ·		
172       POT SPRINGS POINT       EU 20H       46E       11       NE NE       40 403       118 4977       5       60       1974/0060       MAINE, 1603         173       SPRING       EU 20H       5E       44       5E       40       55       45       156       168       60       041802       6430       110       174       CARLOTT RANCH SPRING, GULFUR SPRING       EU 20H       56       14       95       55       55       15       168       0000       1772       0000       MAINE, 1400       01472, 1000       MAINE, 1400       116       1172       110       111       110       111       110       1111       1111       1111											
172       SPRING       EU 284       482       10       MW NW N       40 3100       116 4377       5       85       9.5       19850000       CARSDE AND SCHLLING, 1997         172       CANCITA RAHCH SPRING, SARA       EU 284       552       116 4000       116 4000       5       39       372.3       WARKING, 1995											
17/2       CARLOTT RANCH SPRING, SULFUR SPRING       EL 201 852       24       9E       40 2000       110 6070       5       30       372.3       WARKG, 1045         178       DOT CREES SPRING SAREA       EU 201 852       11 00 477       5       30.0       100 477.5       CODO       100 477.5       CODO       100 477.5       ADDETERS, 1047			_								
173       HOT CREEK SPRINGS AREA       EU 2N       SE       12       NW       40.363       116.077       \$       8.0.1       0000       14720000       MARKER AND OTHERS, 1974         177       FULYEN KARCH SPRINGS       EU 2N       SE       04.2162       116.0563       \$       8.55       119       10640716       ROBERTS AND OTHERS, 1974       SE       SE       106.0716       Nets       Nets       SE       115       Nets			the second s								
170       BULFFEYS HOT SPRINGS       EU 2W1       S2E       14       ME SE       40.025       116.00       5       190       19720000       VARING, 1997         177       FLYNR HANCH SPRINGS       EU 2W1       S2       115.75       W       60       19920000       WARING, 1990       SPACE HEATING         178       EUNA HANCH SPRINGS       EL 34H1       SE       11       40.025       115.75       W       60       1990/574       MARINER AND OTHERS, 1974, 1975         180       MARIN SPRING       EL 34H1       SE       21       40.025       115.80       5       75       1990/574       MARINER AND OTHERS, 1974, 1975         181       SULPAIL MOT SPRINGS HOT SULPHUR SPRINGS)       EL 31H1       SE       21       NE       40.2250       115.4010       5       5       1940/0008       MARINER AND OTHERS, 1974, 1975         182       UNNAMED HOT SPRING (YALLEY OF THE MOON)       LA 27H       45       23       NE       40.1057       5       50       1940/002       MARINER AND OTHERS, 1974, 1975         183       UNNAMED HOT SPRING (YALLEY OF THE MOON)       LA 27H       45       23       NE       40.1057       5       50       1940/012       MARINER AND OTHERS, 1974, 1975         184 <td></td>											
177       FLYNR HANCH SPRINGS       EU 281       55E       66       40.072       116 3050       5       26       38       19720000       WAING, 1985         178       Ello Hans Company Weil       EL       40.85       115.75       %       56       75       19800       Figure allowsham, 1990       EPACE HEATING         178       HOT HOLE (ELK) HOT SPRINGS HOT SULPAR SPRINGS)       EL 341       55       21       N. 86       115.755       %       50       75       19800       SOURE IPEAR 7.57 VIAD       DATE									the second s		
178       Else Has Company Well       EL       40.25       115.775       W       60       1989/       Fyrn and Buchanan, 1980       SPACE HEATING         179       HOT MCG, ELSOH OT SRUPPUNG       EL SMH SSE       21       NE       40.0185       115.775       %       50       75       1550.072.01       HARINER AND OTHERS, 1974, 1975       50.0167       SUDLER PEAK 7.5 'OLAD         180       WARM SPRING       EL JIM SSE       11       NE WW       40.0407       115.322.8       Swarn       SUDLER PEAK 7.5 'OLAD       SUDLER PEAK 7.5 'OLAD         181       UNNAMED HOT SPRING (MELAR RUBY MARSH       EL ZIM SSE       15       NE       40.1275       16.401.853       S 22       EVERETT AND OTHERS, 1974, 1975         181       UNNAMED HOT SPRING (VALLEY OF THE MOCK)       LA 27N       452       21       NE       40.1875       S 22       EVERETT AND OTHERS, 1974, 1975         184       UNNAMED HOT POOL       LA 27N       452       23       NE       40.1875       S 22       EVERETT AND OTHERS, 1974, 1975         185       UNNAMED HOT POOL       LA 27N       452       29       NE       40.1875       S 22       1975,000       EVERETT AND RUSH, 1986         186       UNNAMED HOT SPRING (ANALEY OF THE MOCK)       LA 27N       <				NE SE							
179       HOT HOZE (ELXO HOT SPRINGS)       EL 34N       562       21       HE       40.845       115.7753       8       50       75       1950/07/21       MARINER AND OTHERS. 1974, 1975         160       WARM BPRING       EL 34N       562       31       40.7624       115.3263       5       93       75       19742       MARINER AND OTHERS. 1974, 1975         181       SULPHUR HOT SPRING (ALLEY OF THE MOCK)       EL 21N       582       0.75       19742       MARINER AND OTHERS. 1974, 1975         183       UMNAMED HOT SPRING (VALLEY OF THE MOCK)       LA 22N       452       0.1637       116.6633       5       1040/0000       MARINER AND OTHERS. 1974, 1975         184       UMNAMED HOT POCL       LA 22N       452       116.8017       5       1060/02/25       MARINER AND OTHERS. 1974, 1975         184       UMNAMED HOT POCL       LA 22N       452       40.1837       116.8017       5       1060/02/25       MARINER AND OTHERS. 1974, 1975         184       UMNAMED HOT POCL       LA 22N       452       40.1837       116.8017       5       1060/02/25       MARINER AND OTHERS. 1974, 1975         185       UMNAMED SPRING NACA MARM SPRINCS RANCH       EL 38N       462       40.7750       116.900/2       YMILSOR, 1960 <t< td=""><td></td><td></td><td>53E 00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>SPACE HEATING</td></t<>			53E 00								SPACE HEATING
150       WARIM SPRING       EL 24H 59E       1       40724       115.328       S. warm       SQLDER PEAK 7.3" CUAD         161       SULPHAR HOT SPRING SIOT SULPHAR PSPRINGS)       EL 31H 59E       11       NEW 40 5697       115.2417       5       93       75       1974       MARIMER AND CITHER NOT SPRING NOTAL RUBY MARSH       EL 27H 58E       02       NW       40.2500       115.4010       5       93       75       1974       MARIMER AND CITHER NOTAL RUBY MARSH       EL 27H 58E       02       NW       40.2500       115.4010       5       93       75       1974       MARIMER AND CITHER NO CITHE NO CITHE NO CITHER NO CITHE NO CITHER NO CITHER NO CI			55E 01	MC							BRAGE REATING
111       SULPHUR HOT SPRINGS (HOT SULPHUR SPRINGS)       EL 31N SPE       11       NE NW       40.5807       115.2847       S       93       75       19747       MARINER AND OTHERS, 1974, 1975         112       LINAAMED HOT SPRING       LE, 27N M4E       22       NW       40.5805       115.4010       5       5       19400000       MARINER AND OTHERS, 1974, 1975         1132       LINAAMED SPRING       LA 20N       45E       15       NE       40.1275       116.8853       S       22.2       EVENET AND PUSH.       EVENET AND PUSH.       1080       1080       S       53       1940,0052/2       MARINER AND OTHERS, 1974, 1975         114       UNNAMED HOT POCA       LA 27N       45E       23       NE       40.1867       116.8017       5       1940,70310       "MHTE, D., USGE, MELLO, PARK         116       UNNAMED HOT POCA       LA 27N       45E       287       NW       40.1867       115.0345       S       22.2       19750000       EVENET AND RUSH.       NEL       NMTE       NUTHERS, 1974, 1975       116.3017       116.3017       MARINER AND OTHERS, 1974, 1975       116.3017       NMTER AND OTHERS, 1974, 1975       116.3018       116.3017       NMTE       NUTHERS, 1974, 1975       116.3018       116.3018       116.3018       <	······································		_	<u> </u>				<u> </u>	3 <u>1800/00/24</u>	and the second	
192       UNNAMED HOT SPRING HEAR RUBY MARSH       EL 270       S6E       02       NW       40 2500       115 4010       S       05       104/00206       MARINER AND OTHERS, 1974, 1975         103       UNNAMED HOT SPRING (VALLEY OF THE MOON)       LA 27N       45E       23       NE       40,1067       117,1008       S       S3       108005/25       MARINER AND OTHERS, 1974, 1975         104       UNNAMED HOT SPRING (VALLEY OF THE MOON)       LA 27N       45E       23       NE       40,1087       117,1008       S       S3       108005/25       MARINER AND OTHERS, 1974, 1975         105       UNNAMED HOT SPRING (VALLEY OF THE MOON)       LA 27N       45E       23       NE       40,1087       117,1008       S       S0       1080/05/25       MARINER AND OTHERS, 1974, 1975         106       UNNAMED SPRING HARMED SPRING HARMED SPRING RANCH       LA 27N       46E       23       NE       40,1057       115,0354       S       10970/0000       Eakla and others, 1051         107       Warm spring at Warm Creek Ranch       EL 33N       61E       12       40,7005       113,007       S       22       1104/1012       WARLSON,0000       NEL 30N       60E       29       50/27       113,60       1040/20/27       WALSON,0000       50 <td></td> <td></td> <td></td> <td>ANT ADAI</td> <td></td> <td></td> <td></td> <td></td> <td>E 10742</td> <td></td> <td></td>				ANT ADAI					E 10742		
103       UNNAMED SPRING       LA 20N 45E       15       NE       40.1275       116.863       8       22.2       EVERETT AND RUSH. 1986         164       UNNAMED HOT SPRING (VALLEY OF THE MOON)       LA 27N 45E       23       NE       40.1807       117.1008       \$       53       1980/05/25       MARINER AND OTHERS, 1974, 1975         165       UNNAMED SPRING       LA 27N 45E       25       40.1807       118.8042       \$       50       1997/0070       Evenett AND RUSH. 1986         166       UNNAMED NOT ROLL       LA 27N 45E       25       40.1807       118.8042       \$       22.2       1975/06/00       Evenett And RUSH, 1986         167       Warm Boring at Warm Creek Ranch       EL 30N 64E       40.0657       114.7500       \$       22.2       1975/06/00       Evenett And RUSH, 1986         169       UNNAMED SPRING NEAR WARM SPRINGS RANCH       EL 30N 64E       40.0557       114.7500       \$       22.7       113.8       1949/10/12       WILSON, 1980         169       UNNAMES RUSS       EL 30N 64E       28       SW WY SE 40.9706       114.7500       \$       22.7       113.8       1949/10/12       WILSON, 1980         169       OCHAR AND ELOCWN SPRING       W 20 W 805E       30.60055       114.5007						the second s					
164       UNNAMED HOT SPRING (VALLEY OF THE MOON)       LA 27N       38       23       NE       40.1987       117.000       \$       53       1990/05/25       MARINER AND OTHERS, 197.5         185       UNNAMED HOT POOL       LA 27N       45E       25       40.1833       118.8417       \$       50       1997/03/10       "WRITE, D., USCS, MENL, DEARK         186       UNNAMED SPRING (VALLEY OF THE MOON)       LA 27N       45E       25       40.1837       118.8417       \$       50       1997/03/10       "WRITE, D., USCS, MENL, DEARK         186       UNNAMED SPRING (VALLEY OF THE MOON)       LA 27N       45E       251       114.5007       \$       30       1997/03/10       "WRITE, AND CEDORATI AND LEDORATI MARK INST       186.00       115.0554       \$       werm       757.0       Eakin and othera, 1051         180       UNNAMED SPRING (VALLEY OF THE MORS)       EL 30N       46E       40.5517       114.5007       \$       22.7       113.8       1940/1012       WARK, ABO       105.000       114.5007       \$       22.7       113.8       1940/1012       WARK, ABO       105.000       114.5007       \$       22.7       113.8       1940/1012       WARK       106.000       116.000       116.000       116.000       116.000									1949/09/08		
165       UNNAMED 107 POQL       LA 271       45E       25       40.1833       116.8617       \$       50       1967/03/10       "WHTE, D., USGS, MENLO PARK         186       UNNAMED SPRING       LA 271       46E       287       NW       40.1867       116.8042       \$       22.2       1975/05/00       EVERETT AND RUSH, 1969         187       Warm apring at Warm Creek Ranch       E. 33H       61E       12       40.7505       115.554       \$       warm       7570       Eeldin and otheral. 1691         189       UNNAMED SPRING RAARCH MERA WARM SPRINGS RANCH       EL 33H       64E       04       NW NEN       40.9517       114.7500       \$       30       169       1064/10/22       WLSON, 1800         190       COLLAR AND ELBOW SPRING       W 28H       22       113.607       \$       22.7       113.6       1964/10/22       WLSON, 1800         191       THE NEEDLE ROCKS - ANAHO ISLAND SPRING       W 28H       22       116.8012       \$       warm       "GARSUEL, L, NBMG         192       THE PREADCKS - ANAHO ISLAND SPRING       W 28H       22       39.6462       119.7161       \$       6.8.3       "GARSUEL, L, NBMG         193       WARM SPRINGS       W 28H       22       39.6462		the second s							1040 05 05		
186         UNNAMED SPRING         LA 27N         46E         287         NW         40.1867         118.8042         S         22.2         1975/08/00         EVERETT AND RUSH, 1966           187         Warm spring at Warm Creek Ranch         EL 33N         81E         12         40.7505         115.0354         S         warm         7570         Eakin and othera, 1051           189         JOHNBON RANCH (BIG SPRINGS)         EL 33N         84E         04.0517         114.3007         S         30         1969         1964/10/22         WALSON, 1960           190         JOHNBON RANCH (BIG SPRING)         EL 30N         85E         33         40.0835         114.8343         S         22         1940/11/03         "NEVADA BUREAU OF MINES AND GEOLOGY           191         THE NEEDLE ROCKS - ANAHO ISLAND SPRING         W 24N         22E         198.0403         119.5100         W 48.0         1970/10/15         WARING, 1965           192         THE PYRAMID HOT SPRING         W 24N         22E         198.0403         119.5100         W 43.3         1062/03/21         Warm         "GARSIDE, L., NBMG           193         WARIN SPRINGS         W 24N         22E         39.8462         119.7161         S         68.3         "GARSIDE, L., NBMG								the second s			
187         Warm spring at Warm Creek Ranch         EL 33N         81E         12         40.7505         115.0354         S         warm         7570         Eakin and othera.1951           166         UNNAMED SPRING NEAR WARM SPRINGS RANCH         EL 33N         64E         64         NW NE N         40.0517         114.7500         S         30         166         1064/10/23         "WILSON, 1660           169         JOHNSON RAACH BIG SPRING         EL 30H         86E         28         SW SW SE         40.7000         114.500         S         22         113.0         11400/11/23         "WILSON, 1660           190         COLLAR AND ELBOW SPRING         W 24N         22E         10         39.463         119.5100         W         46.9         1070/10/15         WARING, 1665           191         THE NEEDLE ROCKS - ANAHO ISLAND SPRING         W 24N         22E         39.4642         119.7161         S         66.3         "GARSIDE, L., NBMG           192         WARIM SPRINGS         W 24N         22E         39.4642         119.7161         S         66.3         "GARSIDE, L., NBMG           193         WARIM SPRINGS         W 24N         22E         39.4642         119.7161         S         66.3         "GARSIDE, L., NBMG <td></td>											
168         UNNAMED SPRING NEAR WARM SPRINGS RANCH         EL 35N         64E         04         NW NE N         40.9517         114.7500         S         30         109         1094/10/23         "WLSON, 1860           169         JOHNSON RANCH (BIG SPRINGS)         EL 30N         66E         28         SW SW SE         40.9531         114.3007         5         22.7         113.6         1944/10/23         "WLSON, 1860           190         COLLAR AND ELBOWS SPRING         W 20N         65E         33         40.0033         114.3017         1944/10/23         "WLSON, 1860           191         THE PYRAMID HOT SPRING         W 20N         22E         103         39.9463         119.512         %         warm         "GARSIDE, L., NBMG           192         THE PYRAMID HOT SPRING         W 24N         22E         39.9463         119.5012         %         warm         "GARSIDE, L., NBMG           193         WARIM SPRINGS         W 22N         21E         07         SE NW         30.7000         119.6017         %         warm         "GARSIDE, L., NBMG           194         MCCULLOCH CORP, WELL         W 22N         21E         26         39.757         119.0118         W         HOT SPRINGS FLAT 7.5' OUAD <td< td=""><td></td><td></td><td></td><td>NW</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>				NW							
189       JOHNSON RANCH (BIG SPRINGS)       EL 30N       66E       20       SW SVE       40.9708       114.5067       8       22.7       113.8       1949/10/12       WARING, 1985         190       COLLAR AND ELBOW SPRING       W       20N       65E       33       40.0833       114.8343       \$       22       1940/11/03       "NEXADA BUREAU OF MINES AND GEOLOGY         191       THE NEEDLE ROCKS - ANAHO ISLAND SPRING       W       24N       22E       18       39.9463       119.510       W       46.9       1970/11/13       "NEXADA BUREAU OF MINES AND GEOLOGY         192       THE PYRAMID HOT SPRING       W       24N       22E       03       39.9463       119.510       W       46.9       1970/11/13       "GARSIDE, L., NBMG         192       THE PYRAMID HOT SPRING       W       21E       07       SE NW       39.7000       119.6067       W       43.3       1982/03/21       "DESERT RESEARCH INSTITUTE, 1973         194       MCCULLOCH CORP. WELL       W       22N       28E       13       39.8775       119.0118       W       HOT SPRING SFLAT 7.5' OUAD         195       COTTON/WOOD BPRING       CH 22N       28E       13       39.8775       119.0121       W       141       1960/20/20<			and the second se				_				
190         COLLAR AND ELBOW SPRING         W 28N         66E         33         40.0835         114.8343         \$         22         1940/11/03         *NEVADA BUREAU OF MINES AND GEOLOGY           191         THE NEEDLE ROCKS - ANAHO ISLAND SPRING         W 24N         22E         10         39.9483         119.5010         W 48.9         1070/10/15         WARMOR, 1085           192         THE PYRAMID HOT SPRING         W 24N         22E         03         39.9603         119.5012         \$         warm         "GARSIDE, L., NBMG           193         WARM SPRINGS         W 24N         20E         22         39.9462         119.7161         \$         66.3         "GARSIDE, L., NBMG           194         MCCULLOCH CORP. WELL         W 22N         21E         07         SE NW         39.7000         119.8067         ¥ 43.3         1962/03/21         "DESERT RESEARCH INSTITUTE, 1973           195         COTTONWOOD SPRING         W 22N         21E         28         39.8327         119.5017         \$         warm         WARINO, 1085           195         COTTONWOOD SPRING         W 22N         21E         28         39.8327         119.5017         \$         warm         WARINO, 1085         10.75         OUAD								جغر محمد محمد محمد محمد محمد م			
191       THE NEEDLE ROCKS - ANAHO ISLAND SPRING       W 24N       22E       18       39.9483       119.5100       W 46.9       1979/10/15       WARING, 1985         192       THE PYRAMID HOT SPRING       W 24N       22E       0.3       39.9483       119.5100       W 46.9       1979/10/15       WARING, 1985         193       WARIN SPRINGS       W 24N       22E       0.3       39.9462       119.7181       S       66.3       "GARSIDE, L., NBMG         194       MCCULLOCH CORP, WELL       W 23N       21E       0.7       SE NW       39.9462       119.7181       S       66.3       "GARSIDE, L., NBMG         194       MCCULOCH CORP, WELL       W 23N       21E       26       39.8327       119.6917       S       warm       WARING, 1985         196       COTTONWOOD SPRING       W 23N       21E       26       39.8327       119.0118       W       HOT SPRINGS FLAT 7.5' QUAD         196       GEOTHERMAL WELL       CH 23N       28E       11       A9.7633       119.0118       W       HOT SPRINGS FLAT 7.5' QUAD         198       Bradys Hol Springs       CH       39.787       119.012       W 141       1969/       Flynn and Buchanan, 1990       VEGETABLE DRYING         20				SW SW SE							
192       THE PYRAMID HOT SPRING       W 24N       22E       0.3       39.9003       119.5012       S       warm       "GARSIDE, L., NBMG         193       WARM SPRINGS       W 22N       20E       22       39.8422       119.7161       S       66.3       "GARSIDE, L., NBMG         194       MCCULLOCH CORP, WELL       W 22N       22E       07       SE NW       39.8027       119.667       W 43.3       1062/03/21       "DESEARCH INSTITUTE, 1973         195       COTTONWOOD SPRING       W 22N       21E       07       SE NW       39.8327       119.5017       S       warm       WARING, 1965         196       GEOTHERMAL, WELL       CH 23N       28E       13       39.8575       119.0118       W       HOT SPRINGS FLAT 7.5' OUAD         197       SPRING       CH 22N       28E       11       ADA       39.7863       119.0123       S       56       0.0       1961/02/20       WATSTORE         198       Bradys Hot Springs       CH 22N       28E       11       ADA       39.7863       119.013       S       60.0       1961/02/20       WATSTORE         199       BRADY HOT SPRINGS       CH 22N       38E       35       39.7801       119.018       S											
193       WARM SPRINGS       W 20N       20E       22       39.8462       119.7161       \$       68.3       "GARSIDE, L, NBMG         194       MCCULLOCH CORP, WELL       W 22N       21E       07       SE NW       39.7000       119.6667       W       43.3       1992/03/21       "DESERT RESEARCH INSTITUTE, 1973         195       COTTONWOOD SPRING       W 22N       21E       07       SE NW       39.8327       119.5017       S       warm       WARING, 1965         196       GEOTHERMAL, WELL       CH 22N       28E       13       39.8575       119.0118       W       HOT SPRINGS FLAT 7.5' OUAD         197       SPRING       CH 22N       28E       11       ADA       39.7663       119.0233       S       5.6       0.0       1961/02/20       WATSTORE         198       Bradys Hot Springs       CH       39.7663       119.0127       W       141       1066/       Flynn and Buchanan, 1990       VEGETABLE DRYING         199       BRADY HOT SPRINGS       CH 22N       28E       12       NE NE SW       39.7863       119.0167       S       94       1966/00/00       "WHITE, D., USGS, MENLO PARK         200       Eagle Self Works Spring       CH 22N       36E       39.73									1979/10/15		
194       MCCULLOCH CORP. WELL       W       21E       07       SE NW       39.7800       119.6867       W       43.3       1962/03/21       *DESERT RESEARCH INSTITUTE, 1973         195       COTTONWOOD SPRING       W       23N       21E       28       39.8327       119.5917       5       warm       WARING, 1985         196       GEOTHERMAL WELL       CH 23N       28E       13       39.8575       119.0118       W       HOT SPRINGS FLAT 7.5' QUAD         197       SPRING       CH 22N       28E       11       ADA       39.7863       119.0233       5       58       0.0       1981/02/20       WATSTORE         198       Brødys Hot Springs       CH       39.7863       119.0187       W       141       1966/       Flym and Buchanen, 1990       VEGETABLE DRYING         198       Brødys Hot Springs       CH       39.787       118.0187       S       94       1966/00/00       "WHTE, D., USGS, MENLO PARK         200       Eagle Salt Works Spring       CH 22N       36E       39.7901       119.0387       S       46.1       1966/00/00       "WHTE, D., USGS, MENLO PARK         201       HAZEN AREA (PATUA HOT SPRINGS)       LY       20N 26E       18       59.5907       119.10											
195         COTTONWOOD SPRING         W 23N         21E         26         39.8327         119.5017         5         warm         WARING, 1965           196         GEOTHERMAL, WELL         CH 23N         28E         13         39.8575         119.0118         W         HOT SPRINGS FLAT 7.5' QUAD           197         SPRING         CH 22N         28E         11         ADA         39.787         119.0118         W         HOT SPRINGS FLAT 7.5' QUAD           197         SPRING         CH 22N         28E         11         ADA         39.787         119.0123         \$         58         0.0         1981/02/20         WATSTORE           198         Bradys Hot Springs         CH         39.787         119.0127         W         141         19969/0         Flynn and Buchanan, 1990         VEGETABLE DRYING           199         BRADY HOT SPRINGS         CH 22N         28E         12         NE NE SW         39.7807         119.0187         S         94         19669/0000         "WITTE, D., USGS, MENL O PARK           200         Eagle Salt Works Spring         CH 22N         36E         39.7301         119.0387         S         66.1         19669/1/1/12         MARINER AND OTHERS, 1975         202         Patue Hot Spring											
196         GEOTHERMAL WELL         CH 23N         28E         13         39.8575         119.0118         W         HOT \$PRINGS FLAT 7.5' QUAD           197         SPRING         CH 22N         28E         11         ADA         39.7863         119.0233         \$         58         0.0         1981/02/20         WATSTORE           198         Bradys Hot Springs         CH         39.787         119.012         W         141         1969/         Fiym and Buchanan, 1990         VEGETABLE DRYING           199         BRADY HOT SPRINGS         CH 22N         28E         12         NE NE SW         39.787         119.0167         \$         94         1966/00/00         "WHITE, D., USGS, MENLO PARK           200         Eagle Salt Works Spring         CH 22N         38E         35         39.7301         119.0387         \$         Adams, 1944           201         HAZEN AREA (PATUA HOT SPRINGS)         LY         281.50         119.033         \$ 86.1         1968/11/12         MARINER AND OTHERS, 1975           202         Patua Hot Spring         LY         39.5967         119.1033         \$ 86.1         1968/1         1968/1         1968/1         1968/1         1968/1         1968/1         205         Adams, 1944         10 </td <td></td> <td></td> <td></td> <td>SE NW</td> <td></td> <td></td> <td></td> <td></td> <td>1962/03/21</td> <td></td> <td></td>				SE NW					1962/03/21		
197         SPRING         CH 22N         28E         11         ADA         39.7863         119.0233         S         58         0.0         198 1/02/20         WATSTORE           198         Bradys Hot Springs         CH         39.787         119.012         W         141         1989/         Flynn and Buchanan, 1990         VEGETABLE DRYING           199         BRADY HOT SPRINGS         CH 22N         28E         12         NE NE SW         39.7863         119.0167         S         94         1986/00/00         "WHITE, D., USGS, MENLO PARK           200         Eagle Salt Works Spring         CH 22N         36E         35         39.7301         119.0387         S         Adams, 1944           201         HAZEN AREA (PATUA HOT SPRINGS)         LY 20N         28E         18         SW         39.5967         119.1033         S         86.1         1968/11/12         MARINER AND OTHERS, 1975           201         HAZEN AREA (PATUA HOT SPRINGS)         LY         39.5967         119.1033         S         86.1         1968/11/12         MARINER AND OTHERS, 1975           202         Patua Hot Spring         LY         39.5967         119.1033         S         86.1         1968/11/12         MARINER AND OTHERS, 1975								<b>n</b>			
198         Bradys Hot Springs         CH         39.787         119.012         W         141         1969/         Flynn and Buchanan, 1990         VEGETABLE DRYING           199         BRADY HOT SPRINGS         CH 22N         26E         12         NE NE SW         39.7863         119.0167         5         94         1966/00/00         "WHITE, D., USGS, MENLO PARK           200         Eagle Salt Works Spring         CH 22N         36E         35         30.7301         119.0387         5         Adams, 1944           201         HAZEN AREA (PATUA HOT SPRINGS)         LY 20N         28E         16         SW         39.5067         119.1033         5         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patua Hot Spring         LY         39.507         119.1033         5         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patua Hot Spring         LY         39.507         119.113         5         66         1966/11/12         MARINER AND OTHERS, 1975           203         UNAMED WELL         W 19N         16E         17         39.5150         119.6950         26         10         1976/69(17         DESERT RESEARCH INSTITUTE, 1973           204								•			
199         BRADY HOT SPRINGS         CH 22N         28E         12         NE NE SW         39.7863         119.0167         S         94         1966/00/00         "WHITE, D., USGS, MENLO PARK           200         Eagle Selt Worke Spring         CH 22N         36E         35         39.7301         119.0387         S         Adame, 1944           201         HAZEN AREA (PATUA HOT SPRINGS)         LY         30.5967         119.1033         S         86.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patue Hot Spring         LY         39.597         119.1033         S         86.1         1966/11/12         MARINER AND OTHERS, 1975           203         UNNAMED WELL         W         19N         16E         13         39.597         119.1033         S         86         1966/0.0/0         Flym and Buchanen, 1990           203         UNNAMED WELL         W         19N         16E         13         39.597         119.9650         263         10         1976/06/17         DESERT RESEARCH INSTITUTE, 1973           204         LAWTON HOT SPRINGS         W         19N         18E         13         SW NE         39.5150         119.9050         263         00         DESERT RESEARCH INSTITUTE, 1973     <			26E 11	ADA			_				
200         Eagle Salt Works Spring         CH 22N         36E         35         39.7301         119.0387         S         Adams, 1944           201         HAZEN AREA (PATUA HOT SPRINGS)         LY         208         39.5967         119.1033         S         86.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patua Hot Spring         LY         39.597         119.1033         S         86.1         1966/11/12         MARINER AND OTHERS, 1975           203         VINAMED WELL         W         19N         146         17         39.597         119.0950         W         26         10966/17         Flymn and Buchanan, 1944           203         UNNAMED WELL         W         19N         146         17         39.597         119.113         8         86         1966/17         Flymn and Buchanan, 1944           203         UNNAMED WELL         W         19N         146         13         50.507         119.9650         263         10966/17         Flymn and Buchanan, 1944           204         LAWTON HOT SPRINGS         W         19N         166         13         50.50         19.69050         263         109.870617         DESERT RESEARCH INSTITUTE, 1973           205         MOA					39.787	119.012			1969/		VEGETABLE DRYING
201         HAZEN AREA (PATUA HOT SPRINGS)         LY 20N         28E         18         SW         39.5967         119.1033         \$         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patue Hot Spring         LY         39.5967         119.1033         \$         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patue Hot Spring         LY         39.597         119.113         \$         66         1986/         Flynn and Buchanan, 1990           203         UNNAMED WELL         W         19N         1&         39.5150         119.9650         W         26         10         1976/08/17         DESERT RESEARCH INSTITUTE, 1973           204         LAWTON HOT SPRINGS         W         19N         18E         13         SW NE         39.5150         119.9017         \$         48.9         COHEN AND LOELTZ, 1964         (SPA)           205         MOANA AREA - PEPPER MILL MOTEL         W         19N         192.5017         119.7983         W         47.2         1957/05/15         BATEMAN AND SCHEIBACH, 1975         SPACE HEATING	199 BRADY HOT SPRINGS	CH 22N	26E 12	NE NE SW	39.7883	119.0167	5 94	4	1966/00/00	*WHITE, D., USGS, MENLO PARK	
201         HAZEN AREA (PATUA HOT SPRINGS)         LY 20N         28E         18         SW         39.5967         119.1033         \$         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patue Hot Spring         LY         39.5967         119.1033         \$         66.1         1966/11/12         MARINER AND OTHERS, 1975           202         Patue Hot Spring         LY         39.597         119.113         \$         66         1986/         Flynn and Buchanan, 1990           203         UNNAMED WELL         W         19N         1&         39.5150         119.9650         W         26         10         1976/08/17         DESERT RESEARCH INSTITUTE, 1973           204         LAWTON HOT SPRINGS         W         19N         18E         13         SW NE         39.5150         119.9017         \$         48.9         COHEN AND LOELTZ, 1964         (SPA)           205         MOANA AREA - PEPPER MILL MOTEL         W         19N         192.5017         119.7983         W         47.2         1957/05/15         BATEMAN AND SCHEIBACH, 1975         SPACE HEATING	200 Eagle Salt Works Spring				39.7301	119.0387	S			Adams, 1944	
202         Patue Hot Spring         LY         39.597         119.113         S         86         1989/         Flynn and Buchanan, 1990           203         UNNAMED WELL         W         19N         1&         1         39.597         119.113         S         86         1989/         Flynn and Buchanan, 1990           203         UNNAMED WELL         W         19N         1&         1         39.5150         119.9850         W         26         10         1978/08/17         DESERT RESEARCH INSTITUTE, 1973           204         LAWTON HOT SPRINGS         W         19N         1&         39.5150         119.9017         S         48.9         COHEN AND LOELTZ, 1964         (SPA)           205         MOANA AREA - PEPPER MILL MOTEL         W         19N         192.5017         119.7983         W         47.2         1957/05/15         BATEMAN AND SCHEIBACH, 1975         SPACE HEATING				SW				1	1966/11/12	MARINER AND OTHERS, 1975	
203         UNNAMED WELL         W         19N         1&E         17         39:5150         119:9850         W         26         10         1978/08/17         DESERT RESEARCH INSTITUTE, 1973           204         LAWTON HOT SPRINGS         W         19N         1&E         13         SW NE         39:5150         119:9017         \$         48.9         COHEN AND LOELTZ, 1964         (SPA)           205         MOANA AREA - PEPPER MILL MOTEL         W         19N         19E         24         NE NW         39:5017         119:7983         W         47.2         1957/05/15         BATEMAN AND SCHEIBACH, 1975         SPACE HEATING	202 Patue Hot Spring								1989/	Flynn and Buchanan, 1990	
204         LAWTON HOT SPRINGS         W         19N         18E         13         SW NE         39:5150         119:8017         \$         48.9         COHEN AND LOELTZ, 1964         (SPA)           205         MOANA AREA - PEPPER MILL MOTEL         W         19N         19E         24         NE NW         39:5017         119:7983         W         47.2         1957/05/15         BATEMAN AND SCHEIBACH, 1975         SPACE HEATING	203 UNNAMED WELL	W 19N	18E 17						10 1978/08/17		
205 MOANA AREA - PEPPER MILL MOTEL W 19N 19E 24 NE NW 39.5017 119.7983 W 47.2 1957/05/15 BATEMAN AND SCHEIBACH, 1975 SPACE HEATING	204 LAWTON HOT SPRINGS			SW NE							(SPA)
	والمستجد والمتحد المستجد والمتجار والمتجار ويستعين والمتحد والم					the second s			1957/05/15		
	208 Warren Estates #1 Well	WA			39.481				1989/	Flynn and Buchanan, 1990	

# NAME	<u> </u>	<u> </u>	R SC	OSEC	NLAT	WLONG	<u> </u>	TEMP	FLOW	DEPTH	CDATE	REFERENCE	USE
207 MOANA AREA - MOORE WELL	W 19N	19E	26	NE SE	39.4817	119.8100	W	80		60		BATEMAN AND SCHEIBACH, 1975	SPACE HEATING, POOL
206 Steamboat/Ormat Well 209 WELL	WA				39.395	119.715	W	113			1989/	Flynn and Buchanan, 1990	ELECTRIC POWER
210 STEAMBOAT SPRINGS - SPRING 25	W 18N		34	NE	39.3817 39.3833	119.7233	<u>w</u>	<u> </u>	50	36	1970/09/01	BATEMAN AND SCHEIBACH, 1975 MARINER AND OTHERS, 1974, 1975	SPACE HEATING
211 UNNAMED WELL	W 17N		07	SE	39.3500	119.7717	Ŵ	24		31	1910/09/01	GARSIDE AND SCHILLING, 1979	
212 SPRING Ø	ST 18N		15	CABD	39.4258	119.0111	ŝ	19	1.7		1970/10/01	WATSTORE	
213 BOWERS MANSION (FRANKTOWN) HOT SPRING - MAIN SPRIN	W 16N		03	NW	39.2633	119.8367	S	47.2	644		1974/02/04	WHITE AND OTHERS, 1963	SWIMMING POOL
214 UNNAMED WELL	W 16N	20E	06		39.2750	119.7800	Ŵ	26		24	1974/00/00	*DESTERT RESEARCH INSTITUTE, 1973	
215 COMSTOCK MINING DISTRICT-NEW YELLOW JACKET SHAFT	ST 17N	21E	32	SW SE	39.2900	119.6407	W	78.7		914	1964/06/05	BECKER, 1882	
216 SPRING 6	ST 17N		. 14	DCBC	39.3342	119.5914	S	21	5.1		1970/09/30	WATSTORE	
217 SUTRO TUNNEL	LY 16N		02	NE NE SE	39.2750	119.5850	5	27.2			1950/04/28	GLANCY AND KATZER, 1975	
218 UNNAMED 219 CARSON CITY WELL NO 7	LY 16N CC 15N		07	NW SE NW	39.2683	119.5000	W	28.7			1953/05/11	GLANCY AND KATZER, 1975	
220 CARSON CITY WELL NO 4	CC 15N	_	06	DAAC DDDA	39.1925 39.1592	119.7714	<u>w</u>	28		138.7	1988/05/25	WATSTORE WATSTORE	
221 NOBLE MURRAY WELL	CC 15N	_	23	DUUA	39,1433	119.6983	w	41		104.1	1900/09/00	"NEVADA BUREAU OF MINES AND GEOLOGY	SPACE HEATING
222 CARSON HOT SPRING	CC 15N		05	SE NE	39.1917	119.7517	5	50			1921/11/00	*NEVADA BUREAU OF MINES AND GEOLOGY	SPA, POOL
223 SARATOGA HOT SPRING	CC 14N		21	SW SE	39.0567	119.7400	5	50			1958/01/27	*NEVADA BUREAU OF MINES AND GEOLOGY	
224 WETLANDS, WARM WELL	DG 14N	20E	20	DAA	39.0619	119.7514	Ŵ	40		7.9	1983/08/28	WATSTORE	
225 HOBO HOT SPRINGS	DG 14N	19E	23	SE SE	39.0550	119.8083	5	46	473		1929/02/24	GLANCY AND KATZER, 1975	(AQUACULTURE)
220 HASTIE WELL	DG 13N	20E	02	CBB	39.0183	119.7119	W	21		53.6	1966/05/20	WATSTORE	
227 UNNAMED WELL	LY 14N		25		39.0500	119.3667	W	27.7	1533	165	1979/11/15	SCOTT AND BARKER, 1962	
228 NEVADA STATE PRISON SPRING	CC 15N	-	16	SE SE	39.1600	119.7350	8	24			1967/07/25	*NEVADA BUREAU OF MINES AND GEOLOGY	(AQUACULTRUE)
229 WABUSKA AREA	LY 15N		28	SE NE	39.1367	119.1817	<u>w</u>	30	57	305	1953/05/11	HUXEL, 1969	(ETHANOL PRODUCTION)
230 WABUSKA HOT SPRINGS	LY 15N	_	18	SE	39.1615	119.1827	<u> </u>	97			1958/04/25	MARINER AND OTHERS, 1974, 1975	(AQUACULTURE)
231 WABUSKA HOT SPRINGS - MAGMA POWER CO. NO. CB 1 WEL 232 DE WELL			15	NW SW	39.1617	119.1767	W	97.2	5731	149	1965/11/02	HUXEL, 1969	ELECTRIC POWER
232 DE WELL 233 Desert Peak 86-21 Well	CH 22N CH	2/E	21	AACD	39.7642 39.758	118.9478	W	163		<u></u>	1987/07/09	WATSTORE	ELECTRIC POWER
234 CHURCHILL DRILLING CORP. TCID No. 1 WELL	CH 22N	20F	15		39.7791	118.6023	W	hot			19081	Flynn and Buchanan, 1990 GARSIDE AND SCHILLING, 1979	Electric Foren
235 USBM HEAT FLOW HOLE	CH 22N		10		39.7918	118.4905	w	25.0		153		OLMSTED AND OTHERS, 1975	
238 DIXIE COMSTOCK MINE	CH 23N		14		39.8661	118.0165	M	hot				VANDERBURG, 1940	
237 DIXIE HOT SPRINGS	CH 22N	35E	05	SE	39.7977	118.0673	S	72	200			MARINER AND OTHERS, 1974, 1975	
238 KENNAMETALS WELL	CH 20N	28E	01	ABB	39.6350	118.7689	W	38		191.1	1978/12/12	WATSTORE	
239 CDDH-48A-USGS	CH 21N	29E	30	DDC	39.5494	118.7603	W	26.3		31.4	1978/11/06	WATSTORE	
240 SHALLOW RESEARCH WELL (SODA LAKE), 4	CH 20N	28E	28	SW	39.5633	118.8533	W	100			1958/05/25	MARINER AND OTHERS, 1975	
241 Soda Lake 33-14 Well	СН				39.564	118.859	W	183			1969/	Flynn and Buchanan, 1990	ELECTRIC POWER
242 CDDH-41A	CH 20N		14	DCC	39.5919	118.8064	W	21			1976/05/20	WATSTORE	
243 USGS CDR-21	CH 18N		12	ABAC	39.4450	118.7858	W	22.5			1988/07/12	WATSTORE	
244 INDIAN HEALTH SERVICE WELL	CH 19N		29	BACB	39.4853	118.7603	W	20.5	·····	20.7	1989/03/01	WATSTORE	
245 FLOWING WELL IN STILLWATER 248 CDD-117A	CH 19N CH 19N		07	SW DCD	39.5215 39.5211	118.5522	<u>w</u>	96 67		19.8	1967/01/18	MARINER AND OTHERS, 1974, 1975	
246 CDD-117A 247 CDPW-44A	CH 19N		06	BCB	39.5211	118.5401		93.7			1978/04/19	WATSTORE	
248 USFWS WELL 3 NR EAST CAN	CH 20N		20	CAC	39.5825	118.4183	w	25	271.7		1989/04/03	WATSTORE	
249 DR-SW-LY-9-L1	CH 17N		06	BCAD	39.3686	118.7767	W	25.5			1985/08/20	WATSTORE	
250 CARSON LAKE CORRAL	CH 16N	30E	07	BACB	39.3561	118.6642	8	77			1987/07/08	WATSTORE	
251 EIGHTMILE FLAT, BORAX SPRING	CH 17N	30E	14	NE	39.3417	118.5783	8	81.1				WARING, 1965	
252 GEOTEHRMAL WELL	CH 17N	30E	36		39.2935	118.5723	W	160.0		2000		EDMISTON AND BENOIT, 1984	
253 SPRING	CH 16N	32E	06		39.2786	118.4332	8	hot				WARING, 1965	
254 LEE HOT SPRINGS	CH 16N	29E	34	SWNW	39.2092	118.7232	Ş	88	128		1966/11/00	MARINER AND OTHERS, 1974, 1975	
255 E.H. STARK WELL	CH 21N	_	36	SW	39.6392	118,1083	W	22.8	3785		1973/03/00	COHEN AND EVERETT, 1963	
256 HATTON WELL NO. 1	CH 21N		20	NE	39.6767	118.0617	W	21.7	151	49	1971/08/09	SDESERT AT COLD SPRING	
257 Stinking Spring	CH 15N	2	10	SW	39.1739	118.7333	<u></u>	28				Katzenstein and Danti, 1952	ELECTRIC POWER
258 Oxbow Geothermal Corp. No. 52-18 250 LAMES LITSTER WELL	CH	ADE		CW.	39.9537	117.8597	<u>W</u>	231	<u> </u>	3007	1010/	*NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
250 JAMES UTSTER WELL 260 spring	LA 24N LY 18N		<u>27</u> 17	SW NW SE	39.9200	117.1250	w s	<u>38.9</u> 34	4	4.0	1918/	WARING, 1918 *GARSIDE, L., NBMG	
261 TOM ORMECHEA WELL	CH 20N		06	SE	39.6233	117.7400	Ŵ	24.4	189	31	1966/11/21	EVERETT, 1964	
262 SMITH CREEK VALLEY WELL	LA 20N	_	36	NW	39.5588	117.4278	W	29.4			1971/12/00	EVERETT AND RUSH, 1984	······································
203 UNNAMED HOT SPRING	LA 17N		11		39.3500	117.5583	s	60	75		1969/04/00	MARINER AND OTHERS, 1974, 1975	
284.1 TWIN SPRING	LA 18N	_	27		39.3981	117.5791	S	warm				WARING, 1965	
264.2 MCLEOD 88 SPRING	NY 14N		34		39.0283	117,1367	Ŝ	87.9				"NEVADA BUREAU OF MINES AND GEOLOGY	
265.1 UNNAMED SPRING	LA 17N		25	NE NW N	39.3162	117.5467	S	92			1959/03/15	TREXLER AND OTHERS, 1979	
265.2 LITTLE HOT SPRINGS	LA 23N		02		39.8937	116.6481	S	hot				LITTLE HOT SPRINGS 7.5' QUAD	
266 HOT SPRINGS	LA 24N	_	15		39.9420	116.6814	5	hot				WARING, 1965	
267 WALTI HOT SPRINGS	EU 24N		33	<u>SW</u>	39.9017	118.5870	5	72	300		1961/06/10	MARINER AND OTHERS, 1974, 1975	
268 SHIPLEY HOT SPRINGS	EU 24N		23	SE	39.9417	116.0733	8	32.2	25500			EAKIN, 1062A	
269.1 SIRI RANCH SPRING, (WATER WELL) 269.2 SULFUR SPRINGS AREA	EU 24N EU 23N		08 38	SW NE	39.9917 39.8350	116.0450 116.0662	<u>w</u>	35 23.3	75.7		1958/02/11	HARRILL, 1968	
270 BARTINE HOT SPRINGS	EU 19N		05	NENE	39.5583	110.0002	- <u>s</u> -	44.3	10.1		1945/08/24	"NEVADA BUREAU OF MINES AND GEOLOGY	
271 BARTINE RANCH WATER WELL NO. 4	EU 19N		17	NE	39.5233	116.3605	w	46.7	124.9	147.8		GARSIDE AND SCHILLING, 1979	
272 WARM SPRING	FU 19N		18			116 3885	s	warm				BEAN FLAT EAST 7.5' QUAD	

								-	-
# NAME	CO T R SC	OSEC	NLAT	WLONG	т темр	FLOW	DEPTH CDATE	REFERENCE	USE
273 BARTHOLOMAE CORP. WATER WELL	EU 18N 51E 18	SW	39.4367	118.2792	W 23.3	53	204 1972/00/00	RUSH AND EVERETT, 1964	
274 BARTHOLOMAE CORP. WATER WELL	EU 18N 51E 30	NW	39.4133	116.2758	W 22.2	757	1972/00/00	RUSH AND EVERETT, 1964	
275 BARTHOLOMAE HOT SPRINGS	EU 18N 50E 28	SE	39.4053	116.3463	S 54		1958/01/27	MARINER AND OTHERS, 1974, 1975	
276 UNNAMED WELL	LA 18N 47E 08	SW	39.4128	116.6960	W 21.7		1975/08/00	RUSH AND EVERETT, 1964	
277 MONITOR VALLEY WELL	LA 18N 47E 20	SE NE	39.3881	116.6894	W 21.7		1973/10/12	RUSH AND EVERETT, 1964	
278 SPENCER HOT SPRINGS	LA 17N 45.5E 11	NE NE	39.3289	116.8567	S 72	50	1962/04/28	MARINER AND OTHERS, 1974, 1975	
279 UNNAMED WELL	LA 16N 44E 24	NW	39.2375	116.9850	W 28.9	22.7	36.6 1971/07/10	FIERO, 1968	
280 POTT'S RANCH HOT SPRING	NY 14N 47E 02	NE	39.0783	116.6400	S 45	125	1972/00/00	MARINER AND OTHERS, 1974, 1975	
281 DIANA'S PUNCH BOWL	NY 14N 47E 22	SE	39.0283	116.6667	S 59		1972/00/00	MARINER AND OTHERS, 1974, 1975	
282 FISH CREEK SPRINGS	EU 16N 53E 08	BCBB	39.2769	116.0383	S 19		1981/07/17	WATSTORE	······
283 THOMPSON RANCH SPRING	EU 23N 54E 03	DBD	39.9008	115.8678	S 21		1981/07/14	WATSTORE	
204 WARM SPRINGS RANCH	W 22N 56E 01	NE NE	39.8117	115.6083	S 22.6		1974/02/20	*NEVADA BUREAU OF MINES AND GEOLOGY	
285 WELL AT ALLIGATOR RIDGE	and the second se	CCCC					200.9 1984/04/24		,
206 BIG BLUE SPRING			39.7408	115.5119	W 34		200.9 1904/04/24	WATSTORE	
207 UNN HOT SP CHERRY CREEK			39.0627	115.6412	S warm		10740404	WARING, 1965	
288 SHELL OIL CO. STEPTOE UNIT NO.1 WELL	the second s		39.8950	114.8908	S 61		1974/01/01	WATSTORE	· · · · · · · · · · · · · · · · · · ·
	W 24N 64E 19	NE NE	39.9433		W 151.1		2562	GARSIDE AND SCHILLING, 1979	·····
269 UNNAMED SPRING	W 24N 65E 31	NE	39.9168	114.6600	<u>\$</u> 26		<u> </u>	SNYDER, 1963	·
290 BORCHERT JOHN (WARM) SPRING	WP		39.7778	114.8497	<u>S 18</u>		1978/08/25	WATSTORE	
291 SHELLBOURNE SPRINGS	W 22N 64E 12		39.7933	114.6683	S 24.6		1972/00/00	*NEVADA BUREAU OF MINES AND GEOLOGY	
292 UPPER SHELLBOURNE SPRING	W 22N 85E 08	SE NW	39.8000	114.6550	S 25	1703	1964/06/28	MIFFLIN, 1968	
293 WELL	W 23N 66E 31	AB	39.8303	114.5550	W 28.2		1983/07/27	WATSTORE	
294 MELVIN HOT SPRING (MONTE NEVA)	W 21N 83E 24		39.6667	114.8050	S 79			CLARK AND OTHERS, 1920	
295 SPRING, KERN MOUNTAINS	W 21N 70E		39.6691	114.0809	S warm			WARING, 1965	
296 STEPTOE WARM SPRING	WP		39.5386	114.0144	S 24		1978/08/25	WATSTORE	
297 MCGILL WARM SPRINGS	W 18N 64E 21	SE NW	39.4150	114.7800	5 29		1945/08/14	CLARK AND OTHERS, 1920	SWIMMING POOL
98 SCHOOLHOUSE SPRING	W 18N 65E 03	DA	39.4537	114.7559	5 20		1981/07/15	WATSTORE	
299 ELY-LACKAWANNA ZONE - LACKAWANNA HOT SPRINGS	W 16N 83E 03	NE	39.2850	114.8633	S 35			EAKIN AND OTHERS, 1987	
00 ELY WARM SPRINGS	W 16N 63E 10		39.2663	114.8667	5 29		1975/00/00	CLARK AND OTHERS, 1920	······································
01 WALLEYS HOT SPRINGS (GENOA HOT SPRINGS)	DG 13N 19E 22	SW NW NE	38.9812	119.8325	5 61			MARINER AND OTHERS, 1974, 1975	SPA
02 WALLEYS HOT SPRING	DG 13N 19E 22	SW NW NE		119.8325	S 63		1934/02/07	WHITE, D., USGS, MENLO PARK	
03 BENSON SPRING - SOUTH OR	DG 12N 19E 20	ACC	38.8747	119.8139	\$ 03 \$ 22		1981/06/10	WATSTORE	······································
KA DOUD SPRING	DG 11N 21E 20	SE SW						GLANCY AND KATZER, 1975	
NOS NEVADA HOT SPRINGS		the statement of the st	38.7950	119.6533	<u>S 21.1</u>	681.3	1962/07/23		
	LY 12N 23E 18	SE	38.8995	119.4117	<u>S 61</u>	200	1970/07/01	MARINER AND OTHERS, 1974, 1974	
08 AMBASSADOR WELL, ARTESIA LAKE AREA	LY 13N 23E 25	NWSW	38.9567		W 27.8		165 1949/08/09	SCOTT AND BARKER, 1962	
	LY 10N 23E 02	NW SE	38.7533		W 47.2		61 1912/09/26	LOELTZ AND EAKIN, 1953	······································
08 WILSON HOT SPRINGS	LY 11N 25E 34		38.7672	119.1732	S warm	0		GARSIDE AND SCHILLING, 1979	
09 HOT SPRING	LY 12N 25E 34		38.8598	119,1749	S hot			WILSON CANYON 7.5' QUAD	
10 GRANT VIEW HOT SPRINGS	LY		38.9900	118.9761	S 53		1977/05/11	WATSTORE	·····
11 DOUBLE SPRING	M 13N 29E 25		38.9647	118.6890	S warm			WARING, 1965	
12 Deadhorae Wells (dry)	M 12N 32E 21		38.6959		W hol			Miller and others, 1953	
13 WEDELL SPRING NO.1	M 12N 34E 07	SW	38.9191	118.1953	<u>5 62.2</u>	859	1957/05/25	EAKIN, 1962C	
14 hot well	<u>NY</u>		38.9869	118.1783	W hot			Mount Annie 7.5'	
15 hot drill hole r. f	<u>MN</u>		38.8333	118.2917	W hot			*GARSIDE, L., NBMG	
16 UNNAMED	LY 07N 27E 04	SW SE	38.4917	118.9650	<u>S 43.3</u>		1966/10/13	DAVIS, 1954; WARING, 1965	
17 CITY OF HAWTHORNE WELL	M 08N 30E 27	SW	38.5200	118.6275	W 26.7		the second s		
18 WELL NO. 3							184 1950/04/28	SCOTT AND BARKER, 1962	
	M 08N 31E 32		36.5067	118.5500	W 34		184 1950/04/28 1971/12/29	SCOTT AND BARKER, 1962 "WHITE, D., USGS, MENLO PARK	
19 U. S. BUREAU OF LAND MANAGEMENT WELL	M 08N 31E 32 M 05N 31E 19	NE	38.5067 38.2800	118.5500	W 34 W 43.3		184 1950/04/28 1971/12/29 105 1974/02/18	SCOTT AND BARKER, 1962 WHITE, D., USGS, MENLO PARK EVERETT AND RUSH, 1967	
19 U. S. BUREAU OF LAND MANAGEMENT WELL 20 BUREAU OF LAND MANAGEMENT NO. 2 WELL		NE NE SW		118.5500 118.5667	W 34		184 1950/04/28 1971/12/29	SCOTT AND BARKER, 1962 "WHITE, D., USGS, MENLO PARK	
19 U. S. BUREAU OF LAND MANAGEMENT WELL 20 BUREAU OF LAND MANAGEMENT NO. 2 WELL 21 SODAVILLE SPRINGS, SODA SPRINGS	M 05N 31E 19		38.2800	118.5500 118.5667	W 34 W 43.3		184 1950/04/28 1971/12/29 105 1974/02/18	SCOTT AND BARKER, 1962 WHITE, D., USGS, MENLO PARK EVERETT AND RUSH, 1967	
19 U. S. BUREAU OF LAND MANAGEMENT WELL 20 BUREAU OF LAND MANAGEMENT NO. 2 WELL	M 05N 31E 19 M 03N 31E 07	NE SW	38.2800 38.1317	118.5500 118.5667 118.5642 118.1017	W 34 W 43.3 W 25.6	100	184 1950/04/28 1971/12/29 105 1974/02/18 20 1953/05/11	SCOTT AND BARKER, 1962 WHITE, D., USGS, MENLO PARK EVERETT AND RUSH, 1967 VANDENBURGH AND GLANCY, 1970	
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19 U. S. BUREAU OF LAND MANAGEMENT WELL 20 BUREAU OF LAND MANAGEMENT NO. 2 WELL 21 SODAVILLE SPRINGS, SODA SPRINGS 22 GENE SAWYER WELL	M 05N 31E 19 M 03N 31E 07 M 06N 35E 29 NY 13N 36E 26	NE SW SE NE SW	38.2800 38.1317 38.3417 38.9617	118.5500 118.5667 118.5642 118.1017 117.9383	W         34           W         43.3           W         25.6           S         35           W         54	100	184 1950/04/28 1971/12/29 105 1974/02/18 20 1953/05/11 1949/00/00 84 1967/10/08	SCOTT AND BARKER, 1962 WHITE, D., USGS, MENLO PARK EVERETT AND RUSH, 1967 VANDENBURGH AND GLANCY, 1970 MARINER AND OTHERS, 1974, 1975 TREXLER AND OTHERS, 1979	MINERAL EXTRAC
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# NAME	со т	RS	C QSEC	NLAT	WLONG	T TEM		DEPTH CDATE	REFERENCE	USE
341 HOT CREEK RANCH SPRING	NY DEN			38.5200	116.3600	S 62		1957/05/13	SANDERS AND MILES, 1974	056
342 HOT CREEK VALLEY SPRING	NY 07N			38.4367	116.2767	S 61			WARING, 1965	
343 WARM SPRING	NY OON	17E 3	B NE NW	38.3383	116.6600	5 26	.1 19	1948/01/28	FIERO, 1968	
344 SALISBURY SPRING	NY 05N 4	16E 2	B SW SE	38.2533	116.8267	5 3	10	1950/01/05	GARSIDE AND SCHILLING, 1979	
345 SPRING		46E 3		38.2389	116.8306		21	1967/07/30	WATSTORE	
346 UPPER? MUD SPRING		16E 2		38.1722	116.7917	S 25		1967/07/30	WATSTORE	
347 SPRING	NY 04N 4	_		38.1722	116.7361		5	1967/07/27	WATSTORE	
348 SPRING 349 WARM SPRINGS	NY 02N 4			38.0278	116.6806		29	1967/07/28	WATSTORE	
350 SPRING	NY 04N 0	50E 2 51E 0	· · · · · · · · · · · · · · · · · · ·	38.1867 38.0472	<u>116.3717</u> 116.1944		13 170 12	1087/08/03	WHITE, D., USGS, MENLO PARK	
351 SPRING		SOE 2		37.9944	116.3861			1967/08/03	WATSTORE	
52.1 DUCKWATER AREA		X6E 3		38.9508	115.7000	S 33		1950/04/25	GARSIDE AND SCHILLING, 1979	AQUACULTURE
2.2 WILLIAMS HOT SPRINGS		50E 3		38.9533	115.2300	S 51		1976/11/10	*NEVADA BUREAU OF MINES AND GEOLOGY	
353 PRESTON SPRINGS	W 12N 6	51E 0		38.9308	115.0825	S 22	the second s	1954/07/31	NEVADA BUREAU OF MINES AND GEOLOGY	
354 BIG SPRING	NY OBN 5	55E 1	5 AC	38.5528	115.2722	<b>S</b> 3	18	1967/06/07	WATSTORE	
355 BLUE EAGLE SPRINGS	NY OON 5	_		38.5631	115.5275	5 2	9 7030.0	1981/07/17	WATSTORE	
356 MOORMAN SPRING	NY OON 6			38.5947	115.1383	S 3		1981/07/18	WATSTORE	
957 EMIGRANT SPRING		12E 1	and the second	38.6250	115.0478	5 19		1981/07/18	WATSTORE	
358 FLAG SPRING NO 3		32E 3		38.4214	115.0222	<u>\$</u> 22	the second s	1964/01/17	WATSTORE	
59 BUTTERFIELD (FLAG, SUNNYSIDE) SPRINGS		2E 2		38.4450	115.0067	<u>S 23</u>		1960/09/26	WARING, 1965; MAXEY AND EAKIN, 1949; ADAMS, 1944	· · · · · · · · · · · · · · · · · · ·
60 HOT CREEK RANCH SPRINGS		11E 1		38.3817	115.1533	S 28		1960/11/08	EAKIN, 1966	
81 MOON RIVER SPRINGS		0E 2		38.3517		S 32		1982/04/27	WATSTORE	
382 Bacon Flat 24-17 oll well 383 CHIMNEY HOT SPRINGS	NY 07N 5			38.4600		<u>W 11</u>	13 10	1653	Hulen and others, 1994	
363 CHIMMETHOT SPRINGS		5E 1 4E 1		38.4633 38.3889	<u>115.7900</u> 115.8694		15	1967/08/07	WATSTORE WATSTORE	
165 SPRING		4E 2		38.3639	115.8517		15 16	1968/09/12	WATSTORE	····· ·
66 GEYSER RANCH SPRINGS		5E 0		38.6750	114.6233		8 189	1900/04/12	CARPENTER, 1915	
67 LOWER PONY SPRING		6E 0		38.3197			80	1981/07/23	WATSTORE	
68 HAMMOND RANCH AREA		9E 1		38.2967	114.2733	S 28		1967/10/16	CARPENTER, 1915; WARING, 1965	
69 SAND SPRING	ES OIN 3	4E 2	SE SE	37.9053		\$ 23.	.3	1965/07/12	RUSH AND KATZER, 1973	
70 FISH LAKE VALLEY	ES 02N 3	6E 2	SW SW S	37.9931	117.9848	\$ 27	2 4	and the second secon	*NEVADA BUREAU OF MINES AND GEOLOGY	
71 GAP SPRING	ES 02N 3	6E 3	SW SE	37.9797	117.9927	S 2	3 38	1975/08/00	VANDENBURGH AND GLANCY, 1970	
72 EMIGRANT WELL	ES OIN 3	ISE O	S NW	37.9717	117.8067	W 2	వ	1970/10/07	TREXLER AND OTHERS, 1979	
73 FISH LAKE VALLEY WELL	ES 01N 3	KE 2	015	37.9233	118.0058	W 2	5	1965/07/12	RUSH AND KATZER, 1973	
74 R.G. PENNEBAKER WELL		5E 0		37.8640	118.1015	W 23	·	91 1961/12/13	RUSH AND KATZER, 1973	
75 NEVADA OIL AND MINERALS VRS NO. 1 WELL	ES 015 3	_		37.8567		W 158.		2797	GARSIDE AND SCHILLING, 1979	
76 FISH LAKE VALLEY		6E 1		37.8425		W a		1961/07/20	*DESERT RESEARCH INSTITUTE, 1973	
177 FISH SPRING		5E 2		37.7425	118.0457	5 2			RUSH AND KATZER, 1973	
78 Gradient well 42-7		GE O		37.8720		₩ 47.		301	*NEVADA BUREAU OF MINES AND GEOLOGY	
179 SILVER PEAK HOT SPRINGS, WATERWORKS SPRINGS		9E 1		37.7600	117.6367	<u>S 34</u>		1000 0 1/15	WARING, 1985	
BO PEARL HOT SPRINGS		0E 2		37.8222		S 36.		1963/04/15	DESERT RESEARCH INSTITUTE, 1973	
81 ALKALI HOT SPRINGS	ES 015 4			37.8267					*WHITE, D., USGS, MENLO PARK	
82 SARCOBATUS FLAT AREA	NY 075 4			37.2967 37.0162	117.0517	W 22.	5	62	MALMBERG AND EAKIN, 1962 DESERT RESEARCH INSTITUTE, 1973	
84 FISHLAKE LIVESTOCK Co. WELL	ES 015 3			37.8767		W h		50.3	RUSH AND SCHROER, 1970	
85 CEDAR SPRING	NY 025 5			37.7508	116.2600		5 9		VANDENBURGH AND RUSH, 1974	
66 CLIMAX SEEP	NY		<u> </u>	37.2244		W 41		1978/03/07	WATSTORE	
87 TIPPIPAH SPRING NO 2	NY			37.0433	116.2072		2	1979/06/19	WATSTORE	
88 YUCCA FLAT TEST WELL 84-69, (TEST WELL E)	NY			37.0550		W 42		572 1957/09/02	SCHOF F AND MOORE, 1964	
89 YUCCA FLAT WELL 79-69A, TESTWELL C	NY			36.9950		W 37		519 1916/10/10	SCHOFF AND MOORE, 1964	
0 SARCOBATUS FLAT-BEATTY AREA	NY 095 4	6E 3	NE NE	37.1142		W 22			MALMBERG AND EAKIN, 1982	
D1 SPRING	NY OIN 5		DD	37.8988	115.6453	S 2	21	1968/09/14	WATSTORE	
92 SAND SPRING	LI 025 5			37.7400	115.7517		0 1	the second s	VANDENBURGH AND RUSH, 1974	
93 N. J. GUNDERSON WELL	LI 035 5			37.6692		W 28.	.3		VANDENBURGH AND RUSH, 1974	
94 G.C. ENGLEMAN WELL	LI 045 5	5E 0	)	37.6188	115.8217	W wan	m	76.3	VAN DENBURGH AND RUSH, 1974	
5 HIKKO SPRING AREA	LI 045 6	0E 1-		37.5975	115.2117	S 26.	7 11167	1950/04/28		
CRYSTAL SPRINGS AREA	LI 055 6	IOE 1	)	37.5300	115.2333	S 27.	.2	1954/09/04		
7 ASH (ALAMO) SPRINGS AREA	LI 065 6	1E 0	NW NW N	37.4600		\$ 31.		1945/07/30	EAKIN, 19638	(SPA)
De LIME SPRING	U			37.9144	114.5403	8 2		1985/04/07	WATSTORE	
99 FLATNOSE SPRING	LI OIN O			37.8961	114.2258		వ	1985/04/08	WATSTORE	
DO DELMUE'S SPRINGS AREA, TWO SPRINGS.	LI 015 6			37.8558	the second s	5 21.			HARDMAN AND MILLER, 1934	
01 PANACA WARM SPRINGS AREA	U 025 6			37.8083		<u>S 29</u>		1949/06/00	RUSH, 1964	
02 BENNETT SPRING	L 025 6			37.7842		_	<u>14</u>	1985/04/10		(SPACE HEATING)
03 CALIENTE MINERAL SPRING, CALIENTE HOT SPRINGS 04 AQUA CALIENTE WELL NO. 3	LI 045 6			37.6217		<u>8 47.</u>	.8 17 5299	1962/07/29 27 1970/10/07	SAND ERSAND MILES, 1974 TREXLER AND OTHERS, 1979	SPACE HEATING
	NY 11\$ 3	_		37.6283 36.9667	114.5100		18 19	1976/08/18	*WHITE, D., USGS, MENLO PARK	<u></u>
		· L Z		30.000/	110.7233		· · · · · · · · · · · · · · · · · · ·	1910/00/18		
		7E 🗠	SW	36 0 147	118 7500	S 24	4 270		SCOLLAND BARKEN: 1962	
05 HICKS (BURRELL) HOT SPRINGS 06 BEATTY MINERAL SPRINGS 07 T <del>W-F WELL</del>	NY 125 4		SW	36.9167	116.7500	S 24. W 6	4 379	1036.0 1960/03/12	SCOTT AND BARKER, 1962 WATSTORE	

# NAME	<u> </u>		\$C	OSEC	NLAT	WLONG		TEMP	FLOW	DEPTH CDAT		REFERENCE	USE
09 COOKS EAST WELL	NY 165	_	07	CABB	36.5744	116.3964	Ŵ	32		91.4 1990/		WATSTORE	
10 FAIRBANKS SPRING	NY 175	50E	09	SE NE	35.4933	118.3433	S	27.2				NAFF, 1973	
11 RODGERS SPRINGS	NY 175	50E	15	NW NE	36.4783	118.3233	S	27.6		1959/	/10/19	NAFF, 1973	
12 LONGSTREET SPRING	NY 175	50E	22	NE NW NE	36.4667	116.3250	5	27.8		1980/	/06/01	DUDLEY AND LARSON, 1976	
113 UNNAMED SPRING	NY 175	50E	26	SW NE NW	36.4483	116.3133	S	27		1958/	/06/12	NAFF, 1973	
14 SCRUGGS SPRING	NY 175	50E	35	SE SW NE	36.4317	116.3067	S	30		1950/	/06/03	NAFF, 1973	
15 DEVIL'S HOLE	NY 175	50E	36	SW SE	36.4267	116.2663	S	33		1965/	/06/17	NAFF, 1973	
16 POINT OF ROCK (KING) SPRING	NY 185	51E	07	NW SE	38.4017	116.2717	Ś	32	4399	1964/	/04/13	HUGHES, 1966; MIFFLIN, 1968	
417 JACK RABBIT SPRING	NY 185	51E	18	SE NW SE	36.3867	116.2717	\$	28		1962/	/06/28	NAFF, 1973	
418 BIG SPRING; ASH MEADOWS SPRING; DEEP SPRING	NY 185	51E	19	SW NE	36.3767	118.2717	S	28		1971/	/02/00	DUDLEY AND LARSON, 1976	
19 CRYSTAL SPRING	NY 185	50E	03	NE SE NW	36.4183	116.3300	S	30		1979/	/12/15	NAFF, 1973	
20 USGS TRACER WELL 2	NY 185	51E	27	NE NE NW	36.5363	116.2317	W	30.6		1968/	/06/25	DUDLEY AND LARSON, 1976	
21 CHERRY PATCH WELL	NY 175	52E	06	CDB	36.4914	118,1492	W	27.5		65.5 1990/	/08/24	WATSTORE	
122 INDIAN SPRING	CL 165	56E			36.5617	115.6683		26.1	5875			CARPENTER, 1915	
123 MANSE RANCH SPRINGS	NY 215	54E	03	SE NE	36.1557	115.6686		25	4542			HARDMAN AND MILLER, 1934	
124 PAHRUMP SPRINGS	NY 205		14	SE SE	36.2075	115.9783	_	25	1840			HARDMAN AND MILLER, 1934	<u> </u>
125 PAHRUMP COMMUNITY CHURCH WELL	NY				36.2117	115,9883	_	27				WATSTORE	
126 WHITE ROCK SPRING	CL 205	SAF		· · · · ·	38.1742	115.4786		25				WATSTORE	
27 PAGO PAGO BAR WELL	CL				38.2361	115.0531	_	28				WATSTORE	
128 Las Vegas Springs	CL 205	AIF	31	·····,	38.1645	115.1899	_	26.1	5015	01.0 1002		Scott and Barker, 1962	
129 H. NICKERSON WELL	CL 225		03	NE NE SW	36.0633	115.1458		29	644	120 1072/		MAXEY AND JAMESON, 1948	
130 GLADSTONE CORPORATION WELL	CL 225	_	10	NE SE NW	36.0600	115.1483		33.3	1609	99 1973/		MAXEY AND JAMESON, 1948	
431 T.A. WELLS WELL	CL 225	_	01	SW NW S	36.0608	115.0043	_	32.8	1000	346		MAXEY AND JAMESON, 1948	
432 VF-2 WELL	LI 128		29	DABB	36.8750	114.9456		32.0				WATSTORE	
433 FUGRO COYOTE V DEEP WELL	CL 135		23	DD	36.8750	114.8922	_	35.5		203.9 1981/		WATSTORE	
433 FUGHO COTOTE V DEEF WELL 434 USGS-MX CE-DT-8	CL 135 CL 135		35	ACAA								WATSTORE	
135 CSV-3	CL 135 CL 145		26	ACDC	36.7678	114.7669	_	33.5		284.7 1986/		WATSTORE	
136 WARM SPRING			16						40050				
130 TRAIN SPRING	CL 145		_	NW SW NE		114.7152		32.2	12250			EAKIN, 1964; MIFFLIN, 1968	· · · · · · · · · · · · · · · · · · ·
	CL 145		21	NW NE NE		114.7142	_	31.6	3840			EAKIN, 1964	
438 JUANITA SPRING	CL 155	_		BAA	36.6369	114.2475		26				WATSTORE	
439 DRY LAKE	CL 175	_	21	CB	36.4550	114.8439		29				WATSTORE	
440 WATER FOUNTAIN VALLEY OF FIRE, NEV.	CL 175		30	NW SW	36.4233	114.5483		35.1				SWANBERG AND OTHERS, 1977	
441 BLUE POINT SPRING	CL 185		06	DCC	36.3897	114.4328		29	4075.0			WATSTORE	
42 ROGERS SPRING	CL 185		12	DDA	36.3775	114.4433		30				WATSTORE	
143 G.P. APEX WELL	CL 18\$	_	33	DB8	36.3411	114.9267		31				WATSTORE	
144 NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELI			09	NW SE	36.1442	114.7220		28.9	114	61		RUSH, 1968B	
45 HOOVER DAM HOT SPRING	CL 225		29	SW	36.0100	114.7450	_	42.2				SWANBERG AND OTHERS, 1977	
146 BLACK CANYON AREA	CL 235	_	05	SE NW SW	35.9800	114.7467	_	30	848			*WATSTORE	
147 BLACK CANYON AREA SPRING	CL 235		21	NE SW NW	35.9467	114.7333		25.6	19			*WATSTORE	
148 MONITOR WELL 116	CL 325		14	DBDB	35.1583	114.5884		29		91.4 1991/			
49 SUNDANCE SHORES WELL	CL 325	66E	24	BBA	35.1497	114.5803	w	32		146.3 1974/	/08/14	WATSTORE	

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						-			APPE	NDIX 2					•		•		•
#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	HCO3		SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
· 1									5.8							;			
2	8.90	58	3.9	5.8	0.34		41			106		23	23			207	1.03		
3																			
4		21	4	3.2	0.3		53	0.08	0.01	50	0	11	5.9	0.6		124	0.96		
5		29	0.4	3.7	0.1		32	0.08	0.03	64	0	12	4.7	1.8		115	0.96		
6		31	2.8	2.1	0.1		57	0.07	0.02	74	0	9	5	0.9		144	0.97		
7	9.1	110	1	4	0		51	1	0	63		119	39	4.6	362	393	1.03	-127	-15.4
8	· · · · ·																		
9	7.70	32	6.3	1.4	0.1		67		0.46	68		13	7			160	1.03		
10													<u></u>	<u></u>					
11									<u> </u>		<u> </u>								
12	8.40	78	0.6	0.4			51	0.66		113	6	41	15	2	262	250	1.00		
13		180	8.6	14	0.2	<u></u>	130	2	0.2	163	0	220	48	6.6		690	0.98		
14	8.60	74	1	3.5	1.1		63	0.6	0.667	90	3	35	18	12	275	255	1.02	<u> </u>	
15	8.60	74	1.1	3.1	<0.1	< 0.02	63	0.64	0.001	92	3	41	18	12		261	0.94	-129.9	-16.56
16	7.60	76	1.3	2.6	1.4		65	1		96	<u>N</u>	39	21	10	272	265	1.02	-123.5	-10.00
17	8.5	74	1.0	4	1.4		<u> </u>	0.6		90	3	35	18	12		256	1.02		
18	8.20	55	0.6	6.4	0.2		34	0.32		120	<u>3</u>	15	11	0.3	186	182	1.02		
19	7.65	320	25	4.6	0.2	0.06	160	6.9	0.45	436	2	130	160	14	100	1038	0.98	-128.2	-14.13
20	7.20	325	25	<u>4.0</u> 19	0.1	0.00	155	<u> </u>	0.45	500	<u> </u>	130	160	14		1030	0.98	-120.2	-14.13
20	1.20	525	20	19	0.3		155	/		500		120	100			1073	0.99		
											· · · · ·	<u>.</u>							
22		74	10		0.4		74		<del></del>	107					256		1 70		
23	7.00		10	23	8.4		74	0		107		22	32	0.1	250	296	1.70		
24	7.80	78		9.6	2.8	<u></u>	79			165			28	1.8		319	1.05		
25	7.1	230	5	17	0.1	<del></del> .	130	2.1		280	0	120	110	10		762	1.03		
26	7.60	230	4.5	17	0.1		130	2.1		280	<u>N</u>	120	110	10		761	1.02		
27	8.86	150	8.7	2.7	0.2	0.01	80	0.64	0.03	224	8	49	52	2.3		464	1.05	-123	-15.8
28	8.8	210	4.4	1.5	0.04	0.01	64		0.032	280	9	120	76	0.1		623	0.98	-131	-16.1
29																			<u></u>
32		210	6.2	3.2	1.5		125	2.9		358	7	67	54	14	660	667	0.98		
33		146	3.7	3.2	0		83	0.41		218	16	76	6	8.9	470	450	1.04		
34	8.10	455	9.9	30	6.3		51	1.3	0.5	948	<u>N</u>	204	69	9.8	1290	1303	0.99		
35		416	11	32	5.2	0.04	39	1.7	0.36	885	N	184	59	0.9	1180	1184	1.02		
36		34	4.8	18	2.4		65	0.11	<u> </u>	104		25	15	0.6	244	216	1.01		
37	9.30	91	2	2.4	0.5		84	0.26		52	39	64	14	7.9	324	331	0.97		
38	7.30	28	6.3	14	2.8		53		0.03	94		14	15			179	1.02		
39		27	6.3	25			54	0.1		117		20	22	0.1		212	0.87		
40		146	12	46	9.7		63	0.87		204		94	157	0.3	640	629	1.00		
41	9.00	197	18	2.2	0.8		4.8	_	1.5	211	36	70	106	1.4	541	540	1.00		
42	7.30	123	3.5	6.4	0.5		65	0.78		182	N	61	27	10	387	387	1.05		
43		89	3.4	7.8	1.8		56	0.35		178		49	19	5.3		319	0.95		
44		58	12	5.8	0.2	N	110	0.37	0.4	119		26	14	2.6	322	288			
45	<u></u>	334		26	8.5			2.5		920	· · · · · ·	34	26		930	884	1.00		
		004			0.0			£		920			20		000	00-1			

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	#	рН	Na	к	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
4		<u> </u>	450				<u></u>				4000	·				<u></u>	4000	4.00	<u></u>	
	8 9		452	26	26	11			1.4		1230		71	16			1209	1.02		
	_	9.20	620	3.5	2	N	N	34	4.6		1080	143	98 ·	46	16	1500	1498	1.02		·····
5	1								· · · · · · · · · · · · · · · · · · ·			· · ·								<u> </u>
	2																			
5																				
	4 5		<u></u>						····		· · · · · · · · · · · · · · · · · · ·				<u> </u>		·····			
	6						· · · · · · · · · · · · · · · · · · ·			<0.2								· · · · · · · · · · · ·	·····	
5									·					· · · · · ·				<u> </u>		
5	8	8.10	157	16	13	0.2	N	166	0.81	· · · · · · · · · · · · · · · · · · ·	338	N	75	9	9.4	631	613	1.01		
		7.00	390	41	49	13		84	0.77		1180		18	40	7.2		1224	1.01	-134.9	-16.78
6		7.40	110	8.3	29	7.7		23	0.22		380		36	4.4	3.4		409	0.97	-140.8	-18.21
6		7.20	130	22	48	12		40	0.67		482		40	14	5.2		549	1.02	-140.2	-17.85
6		7.60	134	4	8.4	N	0.04	96	0.41	N	260	N	46	11	14	442	442	1.01		
6			·····			<u> </u>						<u></u>		, · · .		··				<u></u>
6	_	8.00	450	36	3.1	0.45		151			1149	· ··· _··· ·	2	31	21		1260	0.99		
6	6	7.70	358	33	6.5	0.8		132			959		2	25			1029	1.02		
6		6.70	236	43	41	14		38			867		10	20			829	0.97		
6																				
		7 20	300	31	76			105			1135		20	27	7.2		1173	1.01		
7		7.30 6.6	370	46	<u>75</u> 48	<u> </u>	0.02	86	0.73	0.72	1135		<u>32</u> 12	37	7.4		1179	1.01	-136.6	-16.95
7:	3	8.40			49	17		<u> </u>			426	18	69	30			393	0.39		
74																				
7	_	8.20			74	27			<u>.</u>		278	<u>N</u>	103	117			458	0.59		
						. <u> </u>		<u></u>			<u></u>	<u></u>	<u></u> .	<u> </u>						
	and the second se	8.8	78	2.4	2.4	0.6		75	0.53	0.16	78	17	49	11	8.8		283	1.00		<del></del>
		9.10	75	2.2	1.6	< 0.01	<u> </u>	83	0.47		108		45	15	8.9	·	284	0.94	-139	-17.61
80	the second s	8.10	13	3.9	25	8.6	N	18	N		132	N	11	3.9	0.5	149	149	1.04		
		9.1	75	2.2	1.6	0.01		83	0.47	0.2	108		45	15	8.9		285	0.94	-139	-17.61
8		7.90	17	8.4	37	8.6		20	<u>N</u>	0.205	184	<u>N</u>	20	1.8	0.7	205	204	1.00		
8		7.3	18	8.9	38	9.2		20	0.03	0.06	180	0	22	2.5	0.7		208	1.04		<del></del>
84		7.8 8.00	<u>8</u> 19	4.8	<u>34</u> 35	<u> </u>		<u>20</u> 21	0	0.02	<u>160</u> 190	0	<u>23</u> 19	2.1 2	0.4		<u>181</u> 207	0.94		
86											150		13	<u> </u>				1,94		<u> </u>
87		8.30	24	5.6	16	5.7	0.18	21			118	1	22	2	0.6	157	156	0.98		
88		7.20	9.6	4.6	29	8.1		23			144	N	13	3.3	0.4	162	162	0.97		
89	_	7.90	8.5	5.4	30	. 8	0.06	27			142	N	13	3.5	0.4	166	166	0.98	400.4	40.01
9	0	7.20	10	<u>5.6</u>	40	11.5		31	< 0.02		149		37	8.7	0.4		218	1.01	-139.1	-18.24

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_	#	рН	Na	ĸ	Ca	Mg	Fe	SiO2	B	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
	92	7.80	25	7	32			86		5.7		N		28			178	3.63		
	93	7.8	25	7	32	0.2	<u></u>	86	•	0.1	240	0	15	28	- <u></u>		311	0.57		· · · · · · · · · · · · · · · · · · ·
	94	8.4	113	N	2						98	24	49	60			296	0.98		
	95																			
_	96			_																
	97	8.00			37	2.3					155	N	528	849	····,-·		1493	0.05		
_	98.1	8.00			3	3			·	<u>N</u>	179			18			112	0.12		
	98.2 99	<u>9</u> 8.50	<u>83</u> 1050	<u>N</u> 29	<u>3</u> 245	1 N	0.004	25 97	7.2		<u>170</u> 11	<u>48</u> 6	18 293	0.01		3870	262 3563	0.81	, <u></u>	
_	100	8.40	1100	160	245	0.1	< 0.02	110	6.1	0.04	26	0	340	1900	3	3670	3892	1.01	-106.5	-6.33
	101	0.40	1100		32	7	10.02	110	0.1	0.04	200		21	1900			177	0.51	-100.0	-0.00
	102			<u> </u>	6	3					206		18	16	· · · · ·	<del></del>	144	0.13		
	103			-	56	22					277		70	34			318	0.66		······
	104	·			86	28				· · · · · · · · · · · · · · · · · · ·	286		132	126			513	0.60		
	105.1		1400	120	148	0.17	0.34	208	5.85		49	3	220	2320	5.2		4455	1.00		
	105.2	· _ ·	1298	110	140	0.17	0.01	203	5.85		22	17	211	2225	5.2		4226	0.97		
·	106	6.70	1400	110	140	1.5	0.13	240	6.3		92	·····	230	2300	5		4478	0.99	-105.3	-11.54
	107	7.20	1400	130	68	1.2	0.02	165	9.9		83	<1	400	2200	4.5		4419	0.94	-100.5	-10.83
	108	7.60	1400 1400	<u>86</u>	<u>58</u> 70	1.1	<0.02	<u>145</u> 210	7.1	1.7	<u>68</u> 96		<u> </u>	2050 2100	<u>4.8</u> 5.1		4135 4343	0.99	<u>-106.5</u> -105	-11.65 -10.4
-	110	9.1	152	21	1	4	0,04	45	1.8	1./	230	0	52	192	5.1		582	0.98	-105	-10.4
	111	7.5	18	3.5	19	3.8		18	0.1		284	0	9	21	0.1		232	0.39	<u></u>	
	112		272	8.4	13	0.6		94			93	0	156	278	2.8		871	1.00	·······	
	113	7.90	430	8.6	11	0.2	< 0.02	79	5		162		180	500	4.1		1298	0.94	-127.6	-14.87
_	114	7.90	340	17	31	4.2	0.13	82	1.9		464		45	240	7		997	1.09	-120.7	-14.72
	115	7.2	405	17	22	0.2		90	0.5		455	0	205	250			1214	1.02		
_	116	7.90	486	13	18	1.9		62	2.8		902	<u>N</u>	130	155	8.9	1330	1321	1.01		
<del></del>	117		27	9.8	46	4.1		70	0.1		99		61	38	0.3		305	1.02		
	<u>118</u> 119	7.56	1450	120	<u>24</u> 110	<u>11</u> 6.5	< 0.02	85	8.7		<u>110</u> 197	<1	<u>26</u> 120	<u>38</u> 2400	4.6		<u>153</u> 4402	0.62	-125.5	-14.01
_	120	7.40	33	1.3	50	9.3	0.05	20	0.18		210		23	2400	0.1	271	269	1.00	-120.0	-14.01
	121					0.0			0.10											
	122	6.80	390	20	41	10	< 0.02	63	4.1				120	45	8.6		702	4.82		
	123	8.10	165	26	110	22		65		0.08	312		370	75	· · ·		987	1.01	-130	-16.24
_	124																			
	125	8.10	143	12	31	15		42		1.2	456		63	29			559	0.97		
	126				. <del>.</del>					0.0574										
	127	7.10	180	20	36	4.4	0.08	110	1.9	1.3	375		150	40	7.8		735	0.97	-129.5	-15.58
	128	7.90	101	6.4	46	19	0.04	39	0.3		205	N	69	124	0.5	503	506	1.01	<u></u>	
	<u>129</u> 130	7.00	<u>182</u> 518	<u>11</u> 80	<u>79</u> 97	<u> </u>	0.02	<u>58</u> 155	1.1		<u>407</u> 544	N	<u>154</u> 48	<u>    127    </u> 775	<u> </u>	<u> </u>	<u>831</u> 1967	<u> </u>		
	130	6.9	540	82	<u>97</u> 95	20	0.02	155			490	0	66	790	5.7	1000	1952	1.00		
	132	6.97	130		<del>33</del>	17		40	0.63	0.22	480		65	70	1.4	551	642	0.97		

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#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	СОЗ	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
133		277	27	28		< 0.25	81						26			439	19.27		
134	7.50	304	33	7.6	20		74	3		818		93	20	5.5		963	0.99		
135	8.1	180	12	13	2.1		8.3	0.54	0.24	457	3	26	23	4.3		497	0.99		
136	7.64	110	4.7	91	32		26	0.36	0.06	180	0	190	180	0.7	734	723	1.00	-124.4	-15.15
137	7.40	160	13	8.8	0.5	< 0.02	135	1.2		368		53	29	7.8		589	0.93	-128.6	-15.7
138	8.6	270	14	8.5	2		17	1.8	0.81	365	8	110	140	6.2		758	0.99	-134	-16.4
139	8.30	920	94	17	40	0.01	50	15		1940	41	121	381	12	2650	2645	0.99		
140								·											
141																			
142		1350	240	120	4		340			202		18	2250	6	4530	4427	1.05		
143.1										<u></u>									
143.2																			
144	7.90	60	6.5	56	19	<u>N</u>	51	0.4		260	<u> </u>	72	58	0.3	452	451	0.96		
145	7.70	74	2	179	58	<u>N</u>	25	0.4		211	N	390	191	0.3	1040	1024	1.00		
146	8.00	42	3.5	102	30	0.04	10	0.1		166	N	85	178	0.3	536	533	0.99		
147	6.50	130	22	33	6.8	0.22	66	1.1	0.08	429	1	56	18	1.8	· · · · · · · · · · · · · · · · · · ·	547	0.95	-125.5	-15.65
148																			
149	8.40	200	18	16	0.9	0.18	125	2.6	a .	385		140	41			733	0.97	-131.4	-15.74
150		····																	
151	7.00	157	15	58	16		44			533		84	34	1.7	<u> </u>	672	0.99		<u> </u>
152	8.00	288	33	29	5		80	· · · · · · · · · · · · · · · · · · ·		823		60	28			928	0.98		<u> </u>
153	7.10	105	28	70	27		40	2	5	507	N	94	17	2.5		635	1.01		
154	8	118	21	20	9		40			333		64	21			457	1.00	-127.8	-16.28
155	7.10	38	5.6	33	4.1		51			136		36	25	1.9		262	1.00		
156	6.4		22	100	25	0.18	34		0.33	537		64	14	1.1	582	602	<u> </u>		
157	<u> </u>	<u>80</u> 10	23	96	22	0.37	<u>41</u> 26		0.35	548		<u>67</u> 5.7	<u> </u>	<u> </u>	<u>589</u> 96	615 84	1.01		
<u>158</u> 159	7.4	39	<u>2.3</u> 11	<u> </u>	<u> </u>	0.12	28		0.004	<u>51</u> 318	0	<u> </u>	<u> </u>	0.1	90	378	0.98	-128	-16.9
160	6.90	231	27	15	5.9	0.009	<u>- 20</u> 52		0.19	690		25	14	0.0		705	0.99	-120	-10.3
161	7.60	45	16	60	15		70			335		52	10		·····	435	0.95	-132.7	-16.64
162	7.51	27	7.6	43	8.8	0.004	67		0.028	180		38	17	0.5		297	1.00	102.1	10.01
163	7.01		1.0		0.0	0.004			0.020	100				0.0		201			
164	7.3	47	13	56	11	0.009	51		0.088	234		84	19	0.5	379	397	0.99		
165						0.000			0.000	204				0.0			0.00		
166																			
167	8.00	50	8	26	5.8	N	85			164	N	37	22	0.4	318	315	1.01	••••	
168	9.50	230	16	0.8	<u> </u>	0.04	373	2		116	149	89	30	15	1000	962	1.01		
169	8.90	230	16	1	<0.1	< 0.02	320	2.1		321	32	130	69	17		975	0.88	-130	-14.76
170	7.00	136	17	22	5.8		58	0.81		378	N	62	27	5	526	520	0.93		
171	6.60	230	58	53	35	< 0.02	67	2.1		915	<1	7	1	6.6		910	1.10	-136.1	-15.97
172	6.90	285	56	46	40		70	2.9		949		116	48	7		1138	0.99		
173			······																
174																			
175	7.30	10		46	23.5		20	0.03	0.8	226	1	27	4.6	0.1		246	1.06		
						·····		<u></u>											

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#	рН	Na	к	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO1
176	7.00	39	8.7	52	16		0.58	0.25		287	N	27	14	0.7	380	299	1.02		
177									0.75										
178	6.6	110	35	63	12.3		65	0.9	0.3	493		70	15	2	582	867	0.98	-149	-18.
179	7.20	120	39	60	15.5	< 0.02	65	0.7		488	1	72	16	1.9		631	1.04	-144.7	-15.3
180																			
181	8.50	135	8.9	1	0.03	< 0.02	210	0.2		224	15	40	23	17.7		561	0.93	-130.1	-16.0
182	8.00	58	14	45	12		50		1.8	377		24	6.5			395	0.89	-132.8	-16.2
183	7.90			54	18					396	N	95	18			380	0.47		
184	8.00	118	21	20	9	< 0.02	40		0.113	333		64	21	<u>.</u>		457	1.00	-127.8	-16.2
185	7.00	114	22	41	22.4		39	2.4	0.08	443		68	20	4.5		551	0.99		
186	7.80		<u> </u>	141	61	·				540	N	315	332			1115	0.49		
187				52	20		35	0.8		334		39	23	1	398	335	0.61		
188											·								
189	······						<u></u>												
190	7.74	8.4	4	49	17		24		t	226		20	5.1	0.334		239	1.01		- <u>,</u>
191				· · • =		•••••			0.1										
192										· · · ·					·······				
193						· · · · · · · · · · · · · · · · · · ·													
194	8.90			16	1					56	8	168	114	3	788	338	0.11		
195																			
196																			
197	8.01	780	42	56	2.6	0.037	110	4.3	2	170	1	67	1100	2.9		2251	1.07	-126	-14.
198	7.2	694	53	35	0.2		210	4.4	1.5	112	<u> </u>	323	872	5.5	2120	2311	1.00	-127	-14.
199	7.10	730	62	22	N	N	226	4.7		67	N	315	910	7.3	2360	2310	1.02		
200				32	2		259			31	19	334	955		2495	1616	0.05		
201	7.10	620	38	70	1.5	0.02	150	5.6		100		400	820	4.2		2159	0.95	-121.5	-13.
202	7.6	656	52	52	0.6		198	6.1	1.7	93		405	829	4.7	2100	2298	0.97	-121	-12.
203	7.00									· · · ·			5			5	0.00		
204	9.00	117	5.4	6.2	0.1	N	46	193		12	20	144	57	2.5	361	597	0.99		
205	8.10	139	4.7	5.2	0.3		85	0.76		136		171	20	0.81	567	494	1.01		
206	8.1	277	8	27	0		126	2	0.2	93		528	55	4.1	950	1120	0.95	-126	-15.
207	7.50	248	7.1	20	0.3		104	1.7		95		419	53	4.9	959	905	1.00		
208	6.3	611	58	15	0.3		278	41.8	6.9	369		120	790	2	2056	2292	0.93	-121	-12.
209	7.70	679	<u> </u>	32	8				· <u> </u>	361		234	750	1.2	2056	1882	0.99		-
210	7.20	680	66	16	0.7	< 0.02	270	47		368		73	837	2.1		2173	1.03	-116.7	-12.1
211	8.00	19		24	9					151	N	3	5		211	134	1.03		
212	7.9			37	19					212		47	13	0.1	281	220	0.71		
213	9.30	49	0.4	2.8	1		44	0.2	0.667	34	26	35	5.4			181	1.03		
214	8.40			13		0.27			1.4	120	6		7	7	253	92	0.24		
215											<u> </u>		••••						
216	7.7	• • • • • • • • • •		47	14					232		5	7	0.1	249	187	0.85		
217	7.60	67	4.6	267	53	3.3	34	0.03		312	N	732	8.2	0.6	1320	1323	1.01		
218	7.70			102	1	0.13			8.4	149	N	192	21		583	389	0.74		
	8.21		1.4	17	0.9	0.003	33	0.04	0.011	107	0	8.6	3	0.3	· · · · ·	142	1.01	-109	-14.

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	#	рH	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
-	220	8.06	28	0.9	15	1.1	0.11	27	0.06	0.004	93	0	16	4.7	0.6		139	1.03	-112	-14.9
_	221	7.26	173	5.9	270	0.14	0.116	44	1.4			26	843	34	4.1		1402	1.08	-130	-16.2
_	222	8.84	99	1.6	2.2	< 0.05	0.03	60	1.5		57	13	89	27	7.5		329	1.02	-127	-14.9
-	223	8.55	161	5	166	0.1		33	1.4		4.5	11	617	. 39	3.3		1039	1.06	-130	-16.2
-	224	7.3	170	3.9	66	0.74	5.6	35	1		39	0	470	38	5.1	798	815	0.94	····	
-	225	8.90	125	1.7	6	0.7	0.03	47	1.5		51	17	109	74	7.1	408	414	0.95		
	226	8	58	4.4	9.5	2.9	0.006	78	0.16		140	0	36	9.5	1.6	271	269	0.99		
-	227	8.50	69	3.4	2	0.2	0.03	36		0.309	146	4	23	6.2	1	244	217	0.99		
-	228	8.80	82	2	<u> </u>	0.33		33			48		148	21	5.8		330	0.91		
-	229 230	8.20 8.50	277	15	38	<u> </u>		115		7.1	<u>159</u> 70		<u>128</u> 580	29			244	0.08	101 5	16.01
-	230	8.60	313	13	40	<u> </u>	0.06	109	1		52	10	642	<u>46</u> 49	8.2	1210	<u>1106</u> 1214	0.99	-131.5	-16.01
-	232	4.83	1200	13	55	0.07	0.015	109	9.4		52	12	042	2000	0.2	1210	3455	0.98		
-	233			249	87	0.07	0.015	319	15.6	3	36		70	3740	4.3	7570	6754	1.00	-114	-,2.1
-	234		2230	273	0/	0.2		519	15.0			· · · · ·		3740	4.5	1570	0754	1.00	-114	-,2.1
-	235							· · · · ·												
-	236									··· •					····					
-	237	8.60	190	6.5	3.6	0.02	< 0.02	115	0.89	0.04	111	11	111	126	16		635	0.97	-126.1	-15.89
-	238	7.41	1900	120	80	23		83	0.58	1.7	348	0	240	3000	1.3		5621	0.96	-101	-11.5
-	239	8.1	680	25	11	4.2		49	7.2	0.44	388	2	110	820	0.5		1900	0.98	-110	-13.9
-	240	7.86	1000	48	82	2.1	0.05	160	5.7	1.5	144		360	1500	0.6		3229	0.94	-109.3	-13.46
-	241	5.7	2000	232	109	0.4		284	13.4	3.8	108		48	3400	1	6140	6200	1.00	-105	-10.8
-	242		750	60	18	5		70	5.1	1.1	312	3	39	1300	1.1		2406	0.83	-110.6	-13.3
_	243	7.34	42	2.8	63	15	0.007	40	0.41	0.055	243	0	65	14	0.5		362	1.09	-95	-11.7
	244	9.27	220	7.6	1.7	0.79	0.022	28	1.1	0.012	230	38	89	100	0.8		600	1.02	-111	-14.1
	245	7.57	1480	42	108	1.7		170	15		90	<1	190	2200	5		4256	1.05	-110.2	-12.36
_	246	8.5	1600	57	71	1.1		80	17	2	120	15	180	2300	3.3		4385	1.05		
_	247	8.2	1700	48	75	0.9		120	17	2.1	140	0	210	2400	5.5		4647	1.06		
-	248	7.86	3100	45	27	32	0.18	63	13	0.32	839	0	6.8	4700	0.7	8490	8401	0.96	-97	-10.5
_	249	7.65	370	0.9	33	5.8	0.0055	53	1.5		788		250	15	1.9		1119	0.98		
_	250	6.56	1400	32	70	2.9	0.054	120	14				62	2200	0.5	_	3901	1.03	-107	-11.7
_	251			·····								<u></u>								
	252																		· <del>-</del> · · · ·	
_	253	7.40	450				.0.00	100									1017	0.00	105.0	10.01
-	254	7.40	450	262	44	0.6	< 0.02	<u>180</u> 54	2.4	0.1	114	<u>&lt;1</u>	<u>470</u> 80	<u>380</u> 26	7.9	297	<u>1617</u> 298	0.99	-125.8	-13.21
-	255 256	8.20	<u>68</u> 72	3	<u>    16    </u> 12	<u> </u>	0.01	<u></u> 63	0.3		<u> </u>	<u>N</u>	60	20	<u>6</u> 6.9	297	290	0.97		
-	250	9.9	4400	87	5.7	6.2	0.04	24	4.8	0.3	575	<u> </u>	1700	4843	7.8	11919	11618	1.01		<u> </u>
-	257	<u> </u>	363	34.6	3	<u> </u>	0.25	342	<u>    4.6</u> 7.4	0.3	279	13.5	118	321	5.8	11919	1347	1.02		
	259	0.3				5		42	1.4		768	<u>10.0</u> N	77	34		863	600	0.24		
-	260			· · · · · · ·		¥								<u> </u>						
-	261								· · · · · · · · · · · · · · · · · · ·								·····		······	··· ·
-	262	8.40			42	20					180	8	74	19			252	0.71		
	263	7.70	- 170		4.8	0.06	< 0.02	110	0.66	0.04	256	5	102	22	8.9		558	1.04	-130.4	-16.68
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#	рН	Na	ĸ	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
264.1					· · · ·													<u>,</u>	
264.2	8.59	525	38	10	2.5	0.14	107	3.5		1380	40	65	48	12		1530	0.90	-132	-17.7
265.1	7.7	156	8	6.2	0.14		116	_		243	. <u> </u>	108	24	8.8		547	0.99		
265.2																			
<u> </u>	6.50		14		10	-0.00	60	0.10		064	- 4	64	10	0.5		400	0.00	100.8	16.07
267	7.20	<u>44</u>	14	56	12	< 0.02	68	0.12		264	<1	64	12	2.5	046	403	0.99	-129.8	-16.87
269.1	8.00	<u>29</u> 15	<u>5.9</u> 3.4	<u>57</u> 51	21 20	0.01 N	<u>40</u> 25	0.26	0.5	279 255	<u>N</u>	<u>35</u> 25	<u>21</u> 10	0.2	<u>346</u> 276	<u>347</u> 275	<u> </u>		
269.2	0.00	15	3.4	51	20	<u> </u>	20	<u>N</u>	0.5	200	IN	20	10	0.4	270	215	0.99		<u> </u>
270	7.47	37	12	69	17		37		-	334	·····	25	9	0.889		371	1.07		<u> </u>
271						<u></u>			<u> </u>	001						011	1.01		
272									<u></u>				<u>.</u> /. <u>.</u>						
273									1.2		<u></u>	· · · · ·		· · · · · · · · · · · · · · · · · · ·					
274	8.70	36		24	7.8					135	12	28	7			181	1.00		
275	9.30	64	0.7	1	<0.1		85	<u></u>	N	144		18	6.3			246	0.98	-127.9	-16.28
276												<u> </u>							
277	7.80	36		62	12				0.76	160	N	88	43			320	1.00		
278	6.50	200	36	43	9.4	0.06	77	2.6		673		51	22	4.7		777	0.97	-135.8	-16.01
279																			
280	6.60	47	13	52	11	< 0.02	36	0.17		249	<1	57	10	2		230	3.58	-127.5	-16.28
281	7.10	55	15	50	11	<0.02	46	0.21		278		59	8	2.8		384	1.00	-124.9	-16.24
282	6.72	27	7.5	65	28	0.01	24	0.1	0.063	370		31	8.3	0.5		374	0.99	-120.5	-15.6
283	6.85	21	4.6	69	22	0.01	21	0.07	0.083	320		53	6.9	0.4		356	0.96	-122	-15.9
284	8.65	18	6.7	42	20		20		0.527	217	6.5	35	6.7	0.319		262	1.00	107	-16.6
<u>285</u>	7.2	19	6.5	60	23	0.006	26		0.083	286		52	6.7			335	0.98	-127	-10.0
287	7.8	150	4.8	12	0.3	0.02	105	0.35	0.65				16	1.2		291	13.58	-127.8	-16.2
288	7.0				0.5	0.02	105	0.55	0.05			•					10.00	121.0	10.2
289										·									<u> </u>
290	7.8	4.8	1	49	21	0.01	11			180	0	17	4	0.1		196	1.29		
291	8.29	4.3	1.4	56	17		23	<b></b>		232		19	3.6	0.265		239	1.02		
292	<u> </u>								0.008										
293	8	20	9.5	26	8.7	0.007	71		0.019	130		9	21	0.4		230	1.07	-126	-16.5
294		162		13	1.1	0.12	100			375	7.7	17	17	0.75	518	503	1.07		
295																			
296	7.3	9.3	3.4	51	21	0.01	19			250	0	18	4.4	0.4		250	1.03		
297				54	21	0.1	32			267	N	21	4.3		266	264	0.90		
298	6.8	8.2	2.3	51	16	0.01	21	0.03	0.017	220		19	3.2	0.2		229	1.04	-121.5	-16.2
299	8.00			32	25					148	<u>N</u>	83	10			223	0.82		
300				51	23	0.22	37		<u> </u>	222	<u>N</u>	68	7.5	0.67	314	297	0.84		
301	8.70	145	3.6	10	0.01	< 0.02	58	1.2		50	9	235	44	4.9		535	0.92	-119.5	-15.55
302	9.10	137	2.9	9.6	0.5	0.01	61			12	24	200	46	5	499	492	0.98		
303													1.2			1	0.00	-116	-15.6
304		<del></del>																	

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#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	СОЗ	SO4	Cł	F	TDSm	TDSc	ChgBal	delD	delO18
305	8.7	102	2.5	4.5	0.01	0.06	52	0.19	0.07	54	7	169	17	3.1		384	0.90	-123.2	-16.01
306	8.50	69	3.4	2	0.2	0.03	36	·	7.1	146	4	23	6.2	1		217	0.99		
307							62	1	·····	41	22	157	28	3.5		294	0.00		
308																			
309																			
310	8.5	200	2.2	26	0.1	0.02	34			38	0	380	49	8.4		718	0.97		
311																			
312		70		48	13					88	10	190	43			417	0.94		
U.S. 313		262		16	N			1.6		210		315	78		1	776	1.00		
314																			<u>.</u>
315																			<u>_</u>
316																			
317	7.40	148	6.4	82	14	0.01	25	••••••	75	82	<u>N</u>	403	79	0.7	810	798	0.99		<u> </u>
318	8.00	245	10	32	6.1	0.66	54	2.3		118		374	102	6.8	891	891	1.01		
319				6	0.9		37		0.22	47	9	109	64	4.8	370	254	0.07		
320	7.70			26	8				6.1	144	N	23	11			139	0.62		
321	7.60	305	16	40	3.3	0.07	46	2.3		112	<1	597	87	7.4	<u> </u>	1159	0.93	-130.3	-16.13
322	8.70	160	2.7	7	< 0.25	<u></u>	63	<u></u>		68		238	33	11		548	0.97		
323			<u> </u>	····					0.8		<u> </u>								<u> </u>
324									5										
325	7.50	74	13	23	0.95		94		0.18	202		38	12	4		358	1.03	404	
326	<u>8.77</u> 8.72	99	3.3	1.1	< 0.05	0.03	122	0.7	<u> </u>	<u>119</u> 126	21	47	<u>12</u> 12	14		<u> </u>	0.95	<u>-131</u> -130	<u>-8.4</u> -6.7
<u>327</u> 328	0.72	94	2.7	1.4	< 0.05	0.04	112	0.575		120	17	53	12	14		309	0,00	-130	-0,7
328	7.60	55	4.8	26	13		28			239		41	1	0.31		287	1.01		
330	7.00		4.0	20	13		20			239		41		0.31		201	1.01		<u> </u>
330						<u> </u>				<u> </u>	····								
332										<u>_</u>									
333	8.23	57	13	15	0.924		108			130		44	12	0.738		315	1.06		
334	7.6	43		28	4.2	0.02	76	0.18	0.04	147	0	34	21	0.7	300	288	1.03		<u></u>
335.1						0.02					<b>`</b>								
335.2		80	5	20	4.4	3	68			51	36	106	35		367	382	0.97	·	
336	9.12	43	1.9	7.2	0.512		68			83	9.3	18	7.7	0.889		197	1.00		
337	7.9	13	4.2	37	12	0.008	28	0.01	0.01	168	0.0	36	3.7	0.6	221	217	0.96		<u> </u>
338	7.8	17	5.8	45	11	0.15	31	0.045	0.02	158	0	64	4.8	0.4	269	257	0.99		
339	7.6	38	0.8	4.7	0.1	0.01	46	0.1	0	80	0	19	7	0.4	148	155	1.00		
340	7.70	49	6.8	70	22	0.007	32	0.33	2.1	358	N	55	19	1	444	431	1.00		
341	8.00	197	13	51	15	0.04	135		N	545	N	86	42	8	823	815	1.03		
342									<u>.</u> .										<u> </u>
343									N										
344	8.10	65	2.5	1.6	0.1	0.014	76	0.16	7.6	132	N	26	10	1.2	229	248	0.98		
345	7.8	66	3.5	25	3.4	0.01	70	0.3	0.03	184	0	42	18	1.2	313	320	1.01		
346	7.4	46	4.4	17	2	0.027	46	0.2	0.04	124	0	27	15	0.5	208	219	1.03		
347	7.4	41-	<del>7.9</del>	-25	2.6	0.009	72	0.34	0.05	156	0	21	12	0.8	261	259	1.02		

#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
348	7.8	276	27	58	18	0.015	25	0.61	0.95	702	0	222	36	6.2	945	1015	0.98		
349	7.20	194	24	76	22		53	0.44		702	N	99	31	3	833	848	1.00		
350	7.7	45	1.1	68	6	0.005	42	0.19	0.03	284	0	31	22	0.2	376	355	0.99		<u></u>
351	7.7	36	0.3	5.8	1	0.002	40	0.01	0.04	94	0	9.5	6.3	0.3	143	146	1.01		••••••••••
352.1	8.00	28	6.5	62	22	0.06	25	0.12		321	N	47	8.6	0.6	380	358	0.97		
352.2	9.98	52	1.5	0.723	0.06		70			43	29	14	10	4.8		203	0.94		
353	8.06	12	3.3	40	18		22		1.5	185		38	16	0.22		241	0.95		
354	8.1	54	12	57	17	0.008	32	0.44	0.25	368	0	17	14	2.8	380	388	1.00		
355	6.88	36	5.5	71	23	0.01	24	0.13	0.11	380		29	9.5	0.9	· · · ·	386	1.00	-114	-15
356	7.03	24	5.9	58	19	0.01	27	0.14	0.075	290		47	9.9	1.3		335	0.93	-119	-15.7
357	7.14	5.3	1.6	67	24	0.01	13	0.03	0.018	300		14	2.9	0.2		276	1.05	-108	-14.5
358	7.5	10	3.4	50	21	0.003	26		0.022	270		12	6.6	0.2		262	0.97	-105	-14.3
359				40	23		46		10	178		27	18	<u> </u>	283	242	0.98		
360	7.60	24	5.1	60	24	0.01	28	0.1	0.85	300	• • •	43	9	1	343	342	1.00		
361	7.38	22	4.4	55	22	0.009	25	0.11	0.053	260	0	44	9.3	1.2		311	1.02	-119.5	-15.8
362	9	1680	18	7.1	5.4		20	18.4	0.95	1590	200	425	937	7.68	4920	4101	1.09		<u></u> -
363	7.8	68	17	56	17	0.008	51	0.4	0.24	350	0	47	26	2	405	457	1.00		
364	8	123	25	91	31	0.1	37	0.8	0.33	698	0	59	9.8	2.4	700	723	1.00		······································
365	7.6	120	22	100	26	0.002	27	0.62	0.3	673	0	51	15	2.7	732	696	1.02		·····
366				44	37	0.1	11		0.324	124	N	11	2		132	166	2.26		
367																		-101	-13.2
368										·					<u> </u>		<u> </u>		<u>.</u>
369	7.20	· · · ·		1.1	0.6	<del></del>		0.02		50	N	22	2	0.2		51	0.08		
370													578			578	0.00		
371	7.90	792	60	38	38	0.8	23	9.8		720	N	323	860	3.2	2500	2502	0.96		
372	8.40	875	2.5	71	2		48	······································		56		1120	625	5.6		2777	0.99		
373	7.10			48	7.4			1.7		60	N	98	70	4.2		259	0.58		
374	7.90			17	2.7			0.06		128	N	12	3	0.2		98	0.44		
375																			
376	7.00			49	9.6	0.17				614	N	120	74	4.3	940	559	0.22		
377	8.30			13	4			0.42		158	1	38	7	1.5		143	0.26		
378	8.3	430	45	37	4		140	9.4		224	0	80	460	3.1	1494	1319	1.19		
379																			
380				_															
381	7.10	334	16	47	2.7	0.12	62	1.4		328	N	487		7	1180	1119	1.10		
382	7.90			48	4.9	N				266		106	54	2.7	560	346	0.34		
383		·		9.6	2.4				0.65				47			59	0.51		
384																-			
385	7.70	47	2.5	62	5.9	0.03	38	0.18		240	N	48	23	0.8	346	345	1.01		
386	7.75	240	0.4	220	0.4		17		0.25	110	0	890	49	0.8	1600	1472	0.99		
387	7.05	49	0.9	21	1.3	0.06	55		0.02	160	0	21	7.8	0.3	229	235	1.00		
388	9.00	81	2.6	1.6	N		61		N	187	N	16	6	0.6	287	261	1.02		
389	7.00	142	15	74	.27	1	30			577	N	71	34	0.9	624	679	1.05		
390	8.20			11	5.8	N				155	N	24	55	4.5	427	177	0.21		

#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
391	7.7	45	2.8	57	7.7	• • • •	37		0.05	231	0	48	23	0.6	396	335	1.01		
392	8.00			36	22				<u> </u>	357	N	25	5		<u></u>	264	0.55		
393																			
394							· · · · · ·			<u>,</u>									
395	8.00	29	7.2	44	23		33	0.1		260	N	36	11	0.5		312	1.03		
396	8.40	23	5.2	45	23	N	28	0.2	N	272	N	27	8	0.5	295	294	1.00		
397	8.10	32	6.8	39	18		31	0.1	5.6	231	N	34	9.7	0.5	286	285	1.04		
398	8.3	3.8	0.9	55	31	0.006	14		0.013	289		8.9	4.1	0.1		260	1.09	-97	-12.9
399	8	34	5.6	26	3.5	0.009	55		0.057	146		18	10	1.3		225	1.03	-101	-13.4
400																			
401	8.10	38	6.8	31	9.8	N	51	0.1		189		29	15	1.6	271	275	0.99		
402	7.5	6.5	1.5	56	26	0.042	14		0.016			6.9	7.9	0.1		119	14.14	-103	-13.7
403	8.20	46	15	43	6.2	< 0.01	91			239	N	42	12	1.4	380	374	0.97		
404	7.20	39	14	34	4.8		106		· .· .	200		30	8	1.4		336	0.99		
405	7.90	169	3	18	1.5		69	0.4		254		127	45	5	564	563	1.01		
406	8.20	106	5.8	14	1.9	0.12	68			194	N	69	27	4	368	391	1.01		
407	7.35	64	9.7	44	16	0.023	38		0.11			75	20	3	372	270	2.87		
408	8	50	2.2	22	1	0.05	22		0.05	147	0	40	7.6	0.9	210	218	0.97		
409	7.6	120	11	44	16	0.006	28			270		150	27	3.8	537	533	1.06		
410	7.30	71	8	51	18	N	20	0.51		300	N	80	22	2.2	552	420	1.00		
411		69	7.8	47	21		23	0.31	0.11	302	N	78	21	1.5	547	417	1.00		
412		69	7.8	48	19		22	0.26	0.0958	300	N	75	17	1.7	419	407	1.02		
413	7.90	69	6.8	45	20		29		0.6	285	N	81	21	1.3	528	413	1.01		
414	7.60	71	7.8	46	19		28		0.0419	283	N	80	22	1.2	529	414	1.02		
415		65	7.6	50	24	N	22	0.32		310	N	76	20	1.6	555	419	1.02		
416	7.20	69	7.7	49	21	0.02	23	0.1		310		80	21	1.4	425	425	0.99		
417		68	7.8	45	21		22	0.38		300		78	20	1.5	541	411	0.99		
418		97	8.6	44	19		28	0.44		318	N	105	25	1.3	480	485	1.00		
419	7.40	80	8.8	48	20		26		0.0463	311	N	92	32	1.4	593	461	0.97		
420		62	7.8	45	18		22	0.27		284	N	64	21	2.1	400	382	0.99		
421	7.3	300	9.5	76	39	0.006	26			346		500	130	1.7	1260	1252	1.02		
422		21	9.7	48	15	0.16	17			239	N	28	5		330	261	1.03		
423				55	29		18			239	N	42	4.9		268	266	1.04		
424		8.2		50.3	22.2					243.8	N	32.9	0.7		358.1	234	1.00		
425		5.7	1.2	47	23	0.02	13			235		35	4.5	0.2		245	0.96		
426	7.03	8.4	1.8	94	29	0.007	13		0.013	201		180	16	0.2		441	1.00	-91	-12.5
427	7.35	29	3.7	26.7	44.2	0.01	29.1	0.2		280		91	27	0.44	409	389	0.87		
428	7.4	8.1	3.6	48	25	0.05	14			222	0	51	6.5	0.2	266	266	1.00	<u> </u>	
429			· · · ·	150	44		21	· · · · ·		171	N	453	22		863	774	0.86		
430				155	50		30		1.2	205	N	405	35		857	776	0.93		
431				106	20	<u> </u>				84	N	1027	112		1785	1306	0.27		
432	7.4	81	11	47	21	0.006	34		0.11	303		90	34	1.7		469	1.00	-101	-12.95
								0.04	0.40			400		10	· · · · · · · · · · · ·	(70	0.05	400	10.0

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#	pН	Na	к	Ca	Mg	Fe	SiO2	В	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
435	7.35	38	10	51	25	0.01	24		0.11	239		54	26	1.2		347	1.12	-75	-10.35
436		99	10	65	28		31	0.3		288	N	174	60	2.4	614	611	0.99		
437		101	11	70	26		29	0.3	0.6	274	N	179	64	2.3	620	617	1.02		
438	7.3	25	5.3	130	43	0.08	29		0.039			370	15	1		618	1.38	-87	-11.65
439	7.27	120	13	110	48	0.043	21		0.19	210		360	170	2.1		948	0.95	-97.5	-13.3
440	9.60	36	2.7	5	0.7	<0.15	0.64	0.57		37	N	64	8.1	0.1	160	136	0.89		
441	8.1	340	26	500	170	0.01	17	1.3	0.66	160	0	1900	380	1.5		3415	1.03		
442	7.9	300	20	450	140	0.03	17	1.1	0.6	160	0	1600	340	1.4		2949	1.04		
443	6.96	130	13	120	47	0.004	23		0.21	226		380	200	1.4		1026	0.91	-94	-13.45
444	7.00			298	113	N	38			98		1200	1190	1.5	3720	2889	0.40		
445	8.12	271	7.4	62.7	2.7	<0.15	38.94	0.58		113.8	N	431.3	143.6	4.05	1040	1018	1.01		
446	7.90	680	17	290	4.8	0.01	40	1.4		41	N	730	1000	3.9	2790	2787	1.01		
447	7.60	160	3.1	37	6.9	0.01	25	0.7		79	N	180	180	1.4		633	0.93		
448	7.3	350	8.3	220	75	0.02	28	0.82	**************************************	203		570	600	1	2090	1953	1.01		
449	7.9	160	4	58	16		27			156	0	190	180	•		712	0.97		
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# Nevada Geothermal Resource Use — 1993 Update

by Larry J. Garside and Ronald H. Hess Nevada Bureau of Mines and Geology University of Nevada, Reno

### Geology

Nevada is well-endowed with both high- and low-temperature geothermal resources. Over 40 percent of the state is believed to have potential for the discovery of high-temperature (>90°C) geothermal resources, and another 50 percent has potential for low- to moderate-temperature (<°90C) resources (see Figure 1). Surface and subsurface indications of these resources are the more than 1,000 thermal springs and wells in the state. Realistically, this number of individual springs and wells represents several hundred resource areas.

Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of groundwater along faults to deep levels in a region of higher-than-average heat flow. In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (for example, warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for dozens to hundreds of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

#### **Exploration and Development**

Two hundred and eighteen geothermal well permits were issued from 1988 through 1993 by the Nevada Division of Minerals. They include 58 industrial-class production wells, 30 domestic class, 88 observation or gradient wells, 10 commercial-class, and 25 injection wells. During this same period 109 geothermal wells are reported to have been drilled, with a total amount drilled of approximately 86,500 m. Forty-five of the wells drilled were production wells, with a total amount drilled of approximately 44,800 m. Figure 2 and Table 1 illustrate the number of power generating wells and pace of drilling since 1980.

From 1989 through 1992 noncompetitive and competitive federal geothermal leases in Nevada generated \$1,699,282 in

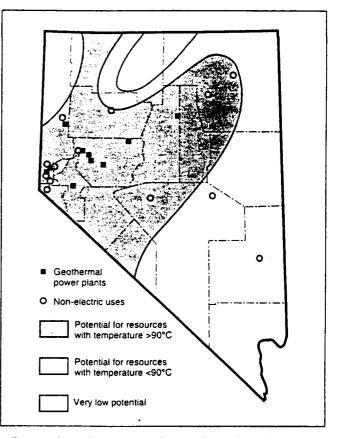


Figure 1. Generalized locations for Nevada's geothermal resources.

rental fees, \$849,641 of which was returned to the State of Nevada. Federal production royalties during the same period generated \$7,485,000, of which \$3,742,500 was returned to the State. Geothermal lease returns (\$849,641) and royalty returns (\$3,742,500) to Nevada totaled \$4,592,141. By regulation, half of all funds collected by the Bureau of Land Management from federal geothermal leases and production royalties is returned to the state.

# **Geothermal Electric Power Generation**

Electric power is generated using geothermal resources at 10 plants in northern Nevada (Table 2, Figure 1). The state's

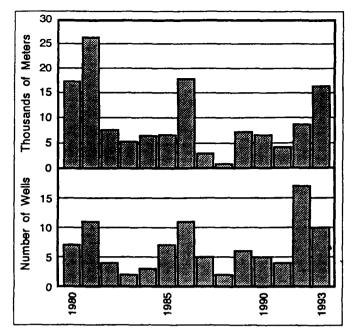


Figure 2. Industrial-class (power generating) wells drilled in Nevada, 1980-1993.

total installed geothermal generating capacity is second only to California.

In 1993 the state-wide peak power demand was 3,755 MW; the total installed generating capacity of Nevada's two major utilities (which supply most of the state's customers) is nearly 2,600 MW (Public Service Commission of Nevada). Thus, geothermal energy provides about 7 percent of the total electricity generated within Nevada (although only about 3 percent of the peak load). Over 40 percent of Nevada's geothermal electric power is exported to California.

From 1989 to 1992, total Nevada geothermal electrical production was 4,076,616 megawatt-hours with an approximate sales value of \$307,410,000. Production capacity in 1988 from eight geothermal power plants was 115.8 MW (gross) while current power production from 10 existing geothermal power plants in Nevada is 191.7 MW gross (Table 1). These values represent a 17 percent increase in sales value of the power sold from 1988 to 1992 and an increase in installed gross power production capacity of 60 percent over 1988.

It is important to note that in 1988 Nevada had nearly a threefold increase over 1987 in the amount of online geothermal generating capacity (Figure 3). The primary reason for this increase was the Dixie Valley 60 MW Oxbow Geothermal plant being put online. The OESI plants at Empire (4.8 MW) and Soda Lake No. 1 (3.6 MW) were also brought online during this period.

According to a 1991 Department of Energy estimate, under stable market conditions and with continuing technologic advancements in the geothermal industry, Nevada's projected electrical production capacity from known geothermal resources by the year 2010 should be at least 600 MW (Energy Information Administration, 1991). It is esti-

Table 1. 1992 directory of Nevada geothermal power plants.

Year	Total # drilled	Total depth(m)	No. industrial wells drilled	Total depth(m	
1988	11	4,268	3	1,098	
1989	15	14.817	6	7,317	
1990	12	11.280	5	6,707	
1991	14	12,561	4	4,268	
1992	36	17,988	17	8,841	
1993	21	25,596	10	16,686	
TOTAL	109	86,510	45	44,917	

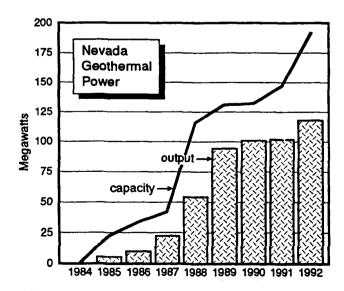
mated that, for the Basin and Range province as a whole, aggressive exploration activity and continued rapid geothermal technologic advancements could add up to 2,000 MW of production capacity from known resources and new discoveries over the next 10 to 20 years (Wright, 1992). These relatively optimistic future scenarios should be tempered by today's reality of low-priced natural gas, increases in efficiency of fossil fuel generating equipment, and anticipated changes in power sales contracts. The future is bright for Nevada's high-temperature resources, but the pace of development will depend on many factors not related to the viability of the geothermal resource.

#### Beowawe

The Oxbow/Beowawe Geothermal Power Co., Beowawe plant came online in 1988. It is a 16 MW (gross), dual-flash plant, which uses geothermal fluids from three wells with a resource temperature of 221°C.

#### **Brady Hot Springs**

The **Brady Hot Springs** geothermal power plant (Figure 4) came online in July 1992. Plant operation and maintenance is being performed by **Oxbow Power Services**, Inc.



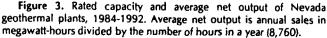




Figure 4. Steam separators and power house at Brady Hot Springs plant (Brady Power Partners), Churchill County, NV. Larry Green photo.

Plant name	Production	1992 Prod	luction (MWh)	1 1	Operator	
(year on line)	capacity <sup>1</sup> (MW)	Gross	Net (sales)	Location		
Beowawe (1985)	16.0	138,196	104,415	\$13,T31N,R47E	Oxbow/Beowawe Geothermal Power Co. P.O. Box 6 Beowawe, NV 89821	
Bradys Hot Springs (1992)	21.1	69,999	54,563	S12,T22N,R26E	Oxbow Power Services, Inc. P.O. Box 649 Femley, NV 89408	
Desert Peak (1985)	8.7	85,364	76,906	S21,T22N,R27E	Western States Geothermal Co. P.O. Box 2627 Sparks, NV 89432-2627	
Dixie Valley <sup>2</sup> (1988)	66.0	535,220	483,307	S7,T24N,R37E S33,T25N,R37E	Oxbow Geothermal Corp. 5250 South Virginia St. Suite 304 Reno, NV 89502	
Empire (1987)	3.6	17,783	12,752	S21,T29N,R23E	OESI/AMOR II P.O. Box 1650 Failon, NV 89407	
Soda Lake No. 1 (1987) and Soda Lake No. 2 (1991)	16.6	107,315	84,419	S33,T20N,R28E	OESI/AMOR III P.O. Box 1650 Fallon, NV 89407	
Steamboat I, I-A (1986) and Steamboat II, III (1992)	31.1	104,574	79,790	S29,T18N,R20E	S.B. Geo, Inc. P.O. Box 18087 Reno, NV 89511	
Stillwater (1989)	13.0	72,707	59,692	S1,T19N,R30E S6,T19N,R31E	OESI/AMOR IV P.O. Box 1650 Failon, NV 89407	
Wabuska (1984)	1.2	6,262	3.860	S15,16,T15N, R25E	Tad's 10 Julian Lane Yerington, NV 89447	
Yankee Caithness (1988)	14.4	82,280	76,096	S5,6,T17N,R20E	Yankee Caithness J.V.L.P. P.O. Box 18160 Reno, NV 89511	
TOTAL	191.7	1,219,700	1,035,800			

 Table 2. Total number of all classes of geothermal wells drilled and number of industrial-class geothermal wells drilled by year, 1988 through 1993. Source: Hess, 1993; Nevada Division of Minerals, 1993.

<sup>1</sup>Production capacity from currently developed geothermal resources. <sup>2</sup>Gross output of the Dixie Valley plant occasionally exceeds 66 MW. *Source*: Hess (1993). The plant uses 5.4 million pounds of brine per hour produced from six of eight production wells. The production zone is 300 to 425 m deep with a resource temperature of between 172 and 182°C. The wells supply two high pressure turbines and one low pressure turbine in a two stage system that produces 21.1 MW gross output. Geothermal fluids are injected into three of five available injection wells (Ettinger and Brugman, 1992; GRC BULLETIN, v. 21, no.1).

#### **Desert Peak**

The Western States Geothermal Co., Desert Peak plant went online in 1985. It was designed by Phillips Petroleum Co. and uses a biphase turbine built by TransAmerica Corp. Production capacity from the currently developed resource is 8.7 MW. The resource temperature is approximately 205°C and wellhead temperature is 165°C.

#### **Dixie Valley**

The largest single geothermal power plant in Nevada, Oxbow Geothermal Corp. Dixie Valley plant, came online in 1988 producing 55-59 MW (net). (Gross output sometimes exceeds 66 MW, as listed on Table 2.) The power is produced in a double-flash turbine generator and purchased by Southern California Edison Co. Oxbow estimates a geothermal energy reserve in Dixie Valley sufficient to supply 200 MW for 30 to 60 years (GRC BULLETIN, June 1987; Reno Gazette-Journal, August 6, 1988).

#### Empire/San Emidio Desert

The OESI/AMOR II Empire plant came online in 1987 and consists of four Ormat Energy Converter Modules with a gross output of 3.6 MW from currently developed geothermal resources. Production is from a liquid-dominated geothermal source at 129 to 137°C. San Emidio Resources continued their geothermal program in the San Emidio Desert near Gerlach, Nevada. Early in 1991 San Emidio Resources signed a 5 MW, 30-year geothermal power supply contract, effective 1992, and a 20 MW, 30-year geothermal power supply contract, effective 1995, both with Sierra Pacific Power Co. (GRC BULLETIN, February 1991). The initial price paid for produced electricity under the long-term contracts is reported to be approximately 5 cents per kWh. At that time plans called for construction of a 6.5 MW binary plant to be online by November 1992. Since then San Emidio Resources requested and was granted a suspension of the 5 MW project in order for Sierra Pacific Power Co. and San Emidio Resources to determine the feasibility of combining the 5 and 20 MW projects into one project. In July 1993, Sierra Pacific Power Co. executed an amendment to the long-term power purchase agreement with San Emidio Resources. The agreement now calls for a 30 MW geothermal power plant to be online by November 1, 1995 (Public Service Commission of Nevada).

### Fallon

In early 1992 the U.S. Navy issued a request for proposal to construct an 80 to 90 MW geothermal power plant at the Fallon Naval Air Station. If this plant is constructed, it will be Phase I of the Navy's geothermal program. Phase II will consist of a second 80 to 90 MW facility to be constructed within 10 years of completion of the Phase I project. The Navy estimates that the potential geothermal resource in the area will be able to produce 300 to 500 MW. The exploration drilling and reservoir testing performed during the initial phase of this project will be used to better define the geothermal potential of this area. Based on previous exploration information it is expected that the resource will be in the 175 to 205°C range.

#### Fish Lake Valley

Fish Lake Power Co. continued their extensive drilling efforts to develop a geothermal resource in the Fish Lake Valley area of Esmeralda County. If a geothermal generating facility is built, the electricity would be delivered to California under a Standard Offer No. 4 Contract.

#### Hot Sulfur Springs

Earth Power Energy and Minerals has requested an avoided-cost purchase contract agreement with Idaho Power Co. If a contract were obtained, a 9.9 MW geothermal power plant could be constructed at Hot Sulfur Springs, Elko County, Nevada (*Reno Gazette-Journal*, October 10, 1993).

#### Rye Patch

The **Rye Patch Limited Partnership** (OESI) is currently nearing completion of a 12.5 MW binary generating plant at their site near **Rye Patch** reservoir. The company has a signed purchase agreement with Sierra Pacific Power Company with an anticipated plant online date of November 30, 1993. This has been delayed while the company continues to develop sufficient and continuous geothermal resources to fuel the plant.

#### Soda Lake

On August 19, 1991, the 13 MW OESI/AMOR III Soda Lake No. 2 geothermal power plant completed commercial operations testing and went online. This plant is adjacent to the 3.6 MW OESI Soda Lake No. 1 plant that came online during 1987 (GRC BULLETIN, October 1991). Both plants are producing from a liquid-dominated geothermal source at 160°C.

#### Steamboat Springs

Two 12 MW, air-cooled, binary geothermal power plants, Steamboat II and III, operated by S.B. Geo, Inc., were brought online in December 1992, adding 24 MW of production to the existing 7.1 MW S.B. Geo Steamboat plant, for a combined gross production capacity of 31.1 MW.

The geothermal fluid cycle at the new plants is completely contained and the fluids are injected back into the ground (closed binary-cycle system). The existing resource is expected to last 30 years or more and can support an additional 36 MW of production capacity. Based on this, plans are currently being formulated to determine the feasibility of installing an additional 24 MW facility in the near future. In December 1993, S.B.Geo, Inc. received a \$7.2 million grant from the U.S. Department of Energy to develop a pilot project known as the Kalina Pilot Plant. The purpose of the project is to increase the efficiency of extracting heat from hot geothermal fluids.

Yankee Caithness J.V.L.P. operates a 14.4 MW (gross) flash turbine system producing from a 170°C resource. The Yankee Caithness Steamboat plant came online in 1988, and the produced power is purchased by Sierra Pacific Power Co. on a 30 year contract.

#### Stillwater

OESI/AMOR IV, Stillwater Geothermal plant came online in April 1989. Total project cost was \$36 million. The aircooled plant consists of 14 Ormat Energy Converters that have a combined gross generating capacity of 13 MW. The plant uses a liquid-dominated geothermal source ranging in temperature from 155 to 170°C. The plant operates on a closed system; all geothermal liquids are injected (Ormat Fact Sheet, 1989; Geo-Heat Center, Fall 1989).

#### Wabuska

Tad's Wabuska plant came online in 1984. Current production capacity is 1.2 MW produced from two Ormat Energy Converter modules. The plant operates on fluids at 107°C. produced from a depth of 107 m (GRC BULLETIN, July, 1987).

# Non-Electric Low- and Moderate-Temperature Applications

The majority of Nevada's population is concentrated in two areas, Reno-Carson City and Las Vegas. Many of the state's geothermal resources are remote from any population centers, thus limiting some potential applications. Although 50 or more small-to-large communities are located within 8 km of geothermal resources, only a few of these areas have been able to use these resources effectively. The reasons for this under-utilization are varied. Although some reasons relate to technical and engineering problems (resource size and temperature, heat loss during transport, etc.), many more are economic (high capital outlays, long payout, under-capitalization of projects) and perceptual (unconventional vs. conventional technology, short vs. long-term cost evaluations, uncertainties about long-term economic risks). There have been attempts to use Nevada's low- and moderate-temperature geothermal resources in more than 20 areas, mainly in the past 5-10 years. Additionally, economic and/or technical appraisals of more areas have been conducted, but for a variety of reasons projects were not completed.

#### Moana Geothermal Area

Moana Hot Springs, located in the southwestern part of Reno, have not flowed at the surface for at least 15 years. The springs were the discharge point for an area of thermal groundwater that has been used for a spa, swimming pool, and home heating for nearly 100 years. Recent use for home space heating began in the 1960s. The area today is predominantly residential. We estimate that the area of thermal groundwater encompasses at least 9 km<sup>2</sup>. In this area there are more than 300 homes that use geothermal fluids for space heating. One hundred and thirty of these homes are part of a district heating system, while most of the rest use downhole heat exchangers in individual wells. A smaller district heating system has retrofitted 12 homes for geothermal heat, and plans to add another four in the spring of 1994. A large hotel, a motel, about three apartment or townhouse complexes, five churches, and a county swimming pool also use the resource. The Veterans Administration Hospital, located about 2 km northeast of the geothermal area, drilled a deep well several years ago and encountered approximately 43°C water. The well was plugged and abandoned.

#### Steamboat Hot Springs

The Steamboat geothermal area consists of a deep, hightemperature (215 to 240°C) geothermal system, a shallower, moderate-temperature (160 to180°C) system, and a number of shallow, low-temperature (30 to 80°C) subsystems (Goranson and others, 1991). The higher temperature systems are used for electric-power generation (see the preceding section). A number of low-temperature thermal groundwater anomalies are in an area of approximately 30 km<sup>2</sup> centered on the hot spring area (Goranson and others, 1991), but these thermal areas are not well known and are little used. A few homes in the Steamboat area have used lowtemperature fluids for over 40 years, and one or more spas have been active in the springs area since the 1860s. Presently probably less than a dozen homes use the low-temperature geothermal fluids for space heating or domestic hot water (including swimming pools). About one domestic geothermal well permit has been issued per year over the last 5 to 7 years.

#### Bower's Hot Springs

A large outdoor swimming pool and smaller children's pool at the Washoe County Park at Bower's Mansion (located between Reno and Carson City), are supplied with warm water from a geothermal well located near the spring.

#### Carson City Area

Water from a well at the site of Carson Hot Springs in northern Carson City is used directly in a swimming pool. In southeast Carson City, thermal groundwater is found in the State Prison/Pinyon Hills area. In the past, there have been a few attempts to use the thermal groundwater from domestic wells in that area for space heating. Geothermal space heating has been considered, but not implemented, for at least two schools in the area.

#### Saratoga Hot Springs

A California company, Lobsters West, has proposed raising lobsters near the warm springs located about 15 km southeast of Carson City. The geothermal fluids would be used to heat tanks in which the lobsters would grow to full size. The experimental study is proposed to last 4 years; live lobsters would be shipped twice a month to local markets (*Reno Gazette-Journal*, November 4, 1993).

#### Hobo Hot Springs

These hot springs, located about 15 km south of Carson City, were used to raise tropical fish and Malaysian prawns in the late 1980s. Lobster raising was also considered. The water temperature is slightly over 40°C. The site is presently inactive.

#### Walley's Hot Springs

Walley's Hot Springs, located near Genoa, about 20 km south of Carson City, was the site of a large spa in the late 1800s and early 1900s (Garside and Schilling, 1979). A modern spa was built on the site in the early 1980s. In addition to use of the geothermal, fluids for bathing and domestic hot water, the buildings are heated with geothermal energy (Lienau and others, 1988).

#### Gerlach

Hot springs located just west of the town of Gerlach (Great Boiling Springs) have been used for bathing for many years. The Gerlach General Improvement District built a bath house using geothermal fluids in 1989. The facility was planned for use by tourists and local residents. The facility has been unable to obtain a permit from the health department because sediment from the well plugged water filters. Future plans are for a geothermal heat exchanger system to heat city water for the spa. Geothermal groundwater apparently extends under at least part of the town, as at least two Gerlach homes use geothermal wells for space heating. The water in one well is reported to be 35 to 36°C (unpublished data, Nevada Division of Minerals).

### San Emidio Desert

A vegetable dehydration plant is under construction in the San Emidio Desert area southwest of Gerlach (Figure 5). The plant is a few kilometers north of the Empire (OESI/AMOR II) Electric-Power plant. Integrated Ingredients (Spice Islands, Fleischmann's, and other brands), part of international food manufacturer Burns Philp, is contracting for the construction of the facility, which will employ about 25 persons when completed in early 1994. The number of employees may increase to about 65 after 18 months. Onions and garlic will be dehydrated and stored at the plant (*Reno Gazette-Journal*, August 31 1993). The plant will use approximately 150°C geothermal fluid.

#### **Brady Hot Springs**

A geothermal vegetable dehydration plant has been operated at this site, about 80 km northeast of Reno, since 1978. The facility uses a moderate-temperature (132°C) geothermal well on site. Since 1993, additional geothermal fluid has been supplied by the nearby Brady Power Partners electric power generation plant, operated by Oxbow Power Services, Inc.

#### Wabuska Hot Springs

In addition to the rather low-temperature electric-power generation plant operated at Wabuska by Tad's Enterprises, several non-electric applications have been located in the area, but none are active today. A hydroponic geothermal greenhouse operation (tomatoes, cucumbers, etc.) was built on the site in the early 1970s, but few vegetables were grown. Tad's Enterprises has in the past operated a geothermal ethanol facility, a plant to grow algae (*Spirulina*) for human consumption, and facilities to raise Malaysian prawns, catfish, and tropical aquarium fish. Some of these were pilot facilities, rather than actual production facilities.

#### Rye Patch Geothermal Area

Florida Canyon Mining Co. operates a large open-pit gold mine and heap-leach gold recovery facility about 50 km northeast of Lovelock, and 7 km north of the area presently under development by Rye Patch Limited Partnership for geothermal electric power production. A 180 m well produces fluids at approximately 100°C; these fluids provide makeup water for the cyanide extraction solutions. Heat from heat exchangers is also extracted to heat the solutions. The heating of cyanide solutions aids extraction during cold weather, and may somewhat enhance total gold recovery.

#### Darrough's Hot Springs Area

Round Mountain Gold Corp. operates a large open-pit gold mine and heap-leach gold recovery facility near the Darrough's Hot Springs geothermal area in Nye County. Geothermal fluids from shallow (approximately 300 m)



Figure 5. Vegetable-dehydration plant under construction in the San Emidio Desert. Larry Green photo.

wells are used in a heat exchanger to transfer heat to cyanide heap-leach solutions (Trexler and others, 1990).

#### Carlin

Carlin Hot Springs, located near the Humboldt River southwest of the town, have a reported temperature of 80°C (Trexler and others, 1982). The Carlin High School used 31°C geothermal fluid from 280 m well from 1986 to 1992 in a closed-loop space heating system. The well was abandoned in 1992, apparently in part because of scaling problems with iron and manganese.

#### Elko Area

Hot springs south of the town of Elko were first used in a bath house in the 1860s (Garside and Schilling, 1979). Thermal groundwater was known to exist to the north of the springs under a part of the town, but no use was made of it until the Elko Heat Company began supplying geothermal fluid for space heating to several downtown buildings in 1982 (Rafferty, 1988). The company has continued to grow; in 1993 it served 16 commercial customers and two residential customers (Mike Lattin, oral commun., 1994).

The Elko County School District, in conjunction with the Elko General Hospital, developed a district geothermal heating system in 1986. The system supplies heat to eight buildings (two schools, a municipal swimming pool complex, a gym, a convention center, a hospital, a city hall, and a school administration building). In 1988 the estimated combined savings to all users was \$300,000 per year (Rafferty, 1988; Richard Harris, oral communication, 1994).

#### Jackpot Area

Two wells drilled in 1988 at the Y3 Ranch about 7 km southeast of Jackpot, were used for raising catfish. The maxi-

mum reported well temperature was 40°C (Lund and others, 1990). The catfish-raising operation was not active in late 1993, reportedly due to insufficient geothermal fluid.

#### Wells Area

Warm springs about 1.5 km north of the present town of Wells were referred to by travelers on the emigrant trail in the 1850s as Humboldt Wells (from which the town name is derived). Thermal (32 to 34°C) groundwater is used by an elementary school and the Wells Rural Electric Co. in heat pump applications for space heating.

#### Duckwater (Big Warm) Springs

A geothermal catfish-growing facility has been operated at this site since 1982. The facility was purchased in 1992 by Robert and Jeff King (Valley Fish) of Preston, Idaho. The facility, located about 110 km west of Ely, produces over 300,000 pounds of prime 8-ounce catfish filets per year that are shipped to Idaho for sale (*Geo-Heat Center Quarterly Bulletin*, December 1992).

#### Caliente Hot Springs

The town of Caliente in Lincoln County derives its name from the local hot springs. A number of wells in the area have reported temperatures from 40 to 80°C (Garside and Schilling, 1979; Lienau and others, 1988). A motel supplies geothermal well water to bathing pools and individual room whirlpool baths, and a trailer park supplies hot water to individual mobile homes. The Lincoln County Hospital (20 beds) was heated using 39°C water from a well on the site, but reduced temperatures (to 28°C) forced reliance on electric resistance heating. The hospital plans to use the lowertemperature fluids from its well for heating and cooling using heat-pump technology. The city swimming pool used geothermal heat in the past, but was damaged during the winter of 1992 and will probably be replaced. The City of Caliente has a grant from the Rural Development Administration to use the local geothermal resources. A nearby perlite processing plant may be the first user of plant process heat. If more funding is found, the city plans to provide heat to the hospital, swimming pool, and eventually an elementary school and youth training facility (Glen Van Roekel, oral communication, 1994).

#### Ash Springs

Thermal waters (31 to 36°C) at Ash Springs, located about 10 km north of Alamo, in Lincoln County, have been used in the past at a spa on the site. The facility is presently closed.

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# NEVADA LOW-TEMPERATURE GEOTHERMAL RESOURCE ASSESSMENT: 1994

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FINAL REPORT

Prepared for

The Oregon Institute of Technology GeoHeat Center

Prepared as part of a study of low- to -moderate temperature geothermal resources of Nevada under the U.S. Department of Energy Low-Temperature Geothermal Resources and Technology Transfer Program

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Plate 1. Million-scale map of geothermal resource occurrences

#### INTRODUCTION

#### Previous Geothermal Assessments

A statewide inventory of the geology and geochemistry of Nevada's geothermal resources was begun at the Nevada Bureau of Mines and Geology (NBMG) in the late 1970s. NBMG had previously published a 1:1,000,000-scale map of hot springs, sinters, and volcanic cinder cones (Horton, 1964b) and several brief summaries of Nevada's geothermal resources (Horton, 1964a; Garside and Schilling, 1972; Garside, 1974). This inventory, published as NBMG Bulletin 91 (Garside and Schilling, 1979), followed a format used in a number of NBMG publications on mineral commodities of Nevada. The bulletin contained descriptions, by county and hot spring area, of the better known geothermal areas. These descriptions included, where available, maps and other data on the geology, and descriptions of historical and present use. Temperature and water chemistry data were presented in an appendix having about 1,400 individual entries (records). These records commonly included multiple entries for the same or adjacent springs as well as numerous well records from geothermal areas which have a larger areal extent than individual spring sites. A 1:1,000,000-scale map was included in the pocket of NBMG Bulletin 91; nearly 400 geothermal sites (springs, spring groups, well groups, etc.) were included on that map. The lower temperature cut-off for inclusion of data in Bulletin 91 was 70°F (21.1°C).

The location, chemical data, and references for the geothermal springs and wells listed in Bulletin 91 were collected by an extensive and relatively complete search of the available literature. These data were entered by hand on data-collection forms, and these forms were used to typeset the listing of data in the bulletin (Appendix 1). A source of unpublished data was a computer database of water-quality data maintained by the Desert Research Institute at Reno.

GEOTHERM is an acronym for a U.S. Geological Survey (USGS) computerized information system designed to maintain data on the geology, geochemistry, and hydrology of geothermal sites primarily within the United States (Teshin and others, 1979; Bliss, 1983). The system was first proposed in 1974, and was active until 1983. The system utilized a mainframe computer, and most of the data were entered by use of key-punch cards. Key punching was done from a rather extensive data-entry form. When the GEOTHERM database was taken off line, a number of products were published or made available to preserve the data. These include basic data for thermal springs and wells on a state-bystate basis (for Nevada, see Bliss, 1983a) and a listing of each record on a state-by state basis, as microfiche (for Nevada, see Bliss, 1983b). The GEOTHERM database was also filed with the National Technical Information Service (NTIS) as digital data. A 9-track one-half inch reel-to-reel tape in ASCII format of this GEOTHERM database was provided to NBMG after the start of this project by Howard Ross at the University of Utah Research Institute (UURI). This tape, containing 8,082 records, was originally from NTIS.

GEOTHERM contained 1367 records for Nevada when it was taken off line in 1983; the is the number of Nevada records on the NTIS tape as well. The great majority of these records are from the published sources used to compile Appendix 1 of Bulletin 91. Unpublished site data and analyses from the files of D.E. White (USGS) make up a significant section of the database also. About 75% of this GEOTHERM data was added to the original database during 1978 and 1979 by personnel at NBMG as part of the U.S. Department of Energy State Coupled Program (see Trexler and others, 1979a). In addition to the entry of new data and the editing and verifying of existing data in GEOTHERM, the longitude and latitude locations of springs and wells were determined by plotting them on 1:250,000-scale maps and hand digitization (Trexler and others, 1979a). New analyses were done during this period, and these data were added to GEOTHERM.

The database available in GEOTHERM during the early 1980s was used, along with other data developed from specific geothermal site studies funded by the U.S. Department of Energy (see numerous reports by Trexler and co-workers, 1980-83) to produce two 1:500,000-scale maps illustrating Nevada's geothermal resources (Trexler and others, 1979, 1983). No statewide resource studies were done after the publication of the 1938 NOAA map (Trexler and others, 1983). A nationwide assessment of lowtemperature geothermal resources (USGS Circular 892) included data for Nevada, and an open-file report (Reed and others, 1983) included about 350 records for Nevada that were used in that assessment. These records were selected from the GEOTHERM database by use of charge balance determinations and other screening methods (Marshall Reed, written commun., 1993). During this period of time, an increase in exploration for geothermal resources by private industry (mainly for electric-power generation) resulted in the drilling of thousands of gradient and slim holes, and several hundred larger diameter wells for industrial and commercial use (space heating, electric power generation, etc.). Developments in Nevada's geothermal industry are documented in yearly summaries of the Nevada mineral industry, published yearly by NBMG since 1979 (e.g, Hess, 1993). Information that is available on geothermal drilling in Nevada has been summarized by Barton and Purkey (1993).

#### Need for a New Assessment

Low- and moderate-temperature geothermal resources are widely distributed in the western United States. Although there has been

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a substantial increase over the last decade in utilization of these resources in direct-heat applications, the large resource base is greatly underutilized (Ross and others, 1994). Previous studies have demonstrated that Nevada is well endowed with geothermal resources, and much of the state must be considered as having potential for direct use. As Ross and others (1994) describe, the expanded use of low- and moderate-temperature geothermal resources requires, as a start, a current inventory of the resources. Such an inventory, combined with collocation studies (the study of resource location near population centers or areas of potential industrial users), will provide some of the basic information that the potential developers of the geothermal resources need to make sound economic decisions. Collocation factors are of particular significance in Nevada, as well as a number of other western states, because people and most industries are concentrated in a few areas; geothermal resources, on the other hand, are rather widely distributed.

There are many factors that can affect the viability of directuse geothermal applications. These include not only the suitability of the fluid and the resource for the application (water temperature, chemistry, amount of available heat, etc.) but also the information available to the developer on the technology of the proposed application, and contractual and other economic factors less closely related to the geothermal resource. The collection of data on these geothermal resources and their present uses is only one factor in encouraging their increased use. Other components of the 1992-1993 low-temperature program include development of better techniques to discover and evaluate the resources, and technical assistance to potential developers (Ross and others, 1994).

#### Nevada Assessment Program

Data compilation for the low-temperature program is being done by State Teams in ten western states. The Nevada program, under the direction of Larry J. Garside at the Nevada Bureau of Mines and Geology at the University of Nevada began data collection in early 1993 (the contract for the research between the University of Nevada and the Oregon Institute of Technology was signed on March 23, 1993). The original contract was to end on December 31, 1993, but was later extended to June 30, 1994. The Technical Project Managers for the agreement were Howard P. Ross (University of Utah Research Institute) and Paul J. Lienau (Oregon Institute of Technology - GeoHeat Center).

The final products of the study include the following: 1) a geothermal database, in hardcopy and as digital data (diskette) listing information on all known low- and moderate-temperature springs and wells in Nevada; 2) a 1:1,000,000-scale map displaying these geothermal localities, and; 3) a bibliography of references on Nevada geothermal resources. The format for presentation of these data was worked out through discussions among State Teams and the Project Managers during the first half of the contract period; the model for this database has been described by Blackett (1993).

#### DATA SOURCES

Information on Nevada's geothermal resources is widely distributed in published reports, in unpublished and limiteddistribution sources (commonly referred to as "gray literature"), and as digital information in databases such as GEOTHERM and WATSTORE. The sources of data and methods of data manipulation are discussed below, followed by a description of the bibliography.

Preliminary Data Compilation

The Nevada geothermal database (Appendices 1 and 2) includes "records" (that is, single reports of chemistry, temperature, location, etc. that are represented by a single spreadsheet row) for all known (reported or suspected) geothermal sites in the state. A number of preliminary databases and spreadsheets were compiled before selection of records for the final listing (Appendices to this report). To get the data from various sources into a common format for comparison required months of work using a variety of computer hardware and software available at NBMG. In the following paragraphs I have summarized the major sources of information, the techniques used to modify and utilize them effectively, and some of the sources of error and other problems that were encountered.

#### GEOTHERM

The history of the GEOTHERM database is summarized above under the description of previous assessments. Because the database was taken off line in 1983, it does not contain data collected after that date. A tape GEOTHERM records that was obtained from UURI was read on to a large magnetic disk at NBMG. Information supplied by NTIS with this tape gave the field lengths of each field in the database. With this information, computer database specialists at NBMG were able to design a database having fixedlength fields and read the GEOTHERM ASCII file into that database. The database on tape contained over 8000 records, with approximately 120 fields for each record. The database software used for this database was INFO, a subset of the ARC/INFO software utilized in many GIS (Geographic Information Systems) applications; hardware was a UNIX-based SUN SPARC II workstaion. The database in INFO was nearly 19 MB (megabytes). From this database, the 1367 Nevada records could be exported, by use of PC

ARC/INFO, in a format compatible with modern database-management software (such as dBASE). We used PC-File (a product of ButtonWare, Inc.) as the PC-based database software. The Nevada GEOTHERM database in PC-File is about 3.2 MB, and has a number of problems that make it difficult to use. One of the most notable problem is that in the PC-File format (essentially a dBASE format), most of the numerical data (temperature, water chemistry, etc.) are preceded by a five sided graphic figure which resembles the outline of a small house (or a baseball field "home plate"). This non-ASCII character was apparently a pad character or "punch" symbol in the original database that acted as a space. It can not be searched for, and was only eliminated after a short version of the database was retrieved into spreadsheet software (Quattro Pro, a product of Borland International, Inc.). In addition, some records had data reported in different units from other records (for example ppm or epm); the units used were reported in a separate database field. Fortunately, these problems were overcome in the shortened (spreadsheet) version.

Additionally, a number of other operations were done on a short database of GEOTHERM data that contained only the fields required for this study (Appendix 1). These include: 1) replacing the county name with a two-letter code (abbreviation) for each county, 2) conversion of numerical data from labels to values and insertion by hand of certain qualifiers on some analyses (N for not detected, t for trace, < for less than), 3) addition of calculated columns for ion balance, total calculated dissolved solids, and a major constituents test (is Na>K and Ca>Mg and Cl>F?), 4) rearrangement of columns into final format. Before final column rearrangement, formulas were converted to values, and a fixed number of decimal places was selected for display. About 455 records were finally selected from this spreadsheet to be included in the final tables listed in the Appendix.

#### WATSTORE

The acronym WATSTORE stands for the National <u>WAT</u>er Data <u>STO</u>rage and <u>REtrieval</u> System, a large-scale computerized system developed for the storage and retrieval of water data collected as part of the activities of the USGS, particularly the Water Resources Division (from a 1981 pamphlet, U.S. Government Printing Office: 1981 - 341-618:52). The system was begun in 1971, and contains a very large set of data on surface and groundwater in the U.S. The water-quality file alone is reported to have (in 1991) 34 million observations from over 200,000 stations; 5,000 parameters (major and trace elements, pesticides, organics, etc.) are included. The database contains information on the analyzing and collecting agency, but does not report whether the data has been published or list references. The WATSTORE database can be searched through arrangements with USGS Water Resources district offices or through a national system of water data exchange (NAWDEX); assistance centers for NAWDEX are also commonly located at USGS Water Resources District Offices. The NAWDEX database also has access to other Federal agency water data, for example the Environmental Protection Agency (EPA), in addition to WATSTORE.

Water quality and other WATSTORE database file information is also available through a commercial outlet, EarthInfo, Inc. of Boulder, Colorado. EarthInfo makes certain data from WATSTORE available on CD-ROMs along with a software retrieval system that can be used by IBM-compatible personal computers. NBMG obtained a CD-ROM that included all Nevada data (current to early 1993) from EarthInfo. Personnel at NBMG (particularly Ron Hess) were able to search the CD-ROM and extract the parameters required for this study (water quality, location, site name, etc.) for all springs and wells having a measured temperature of 18°C or greater. To avoid the combination of parameters (e.g., water chemistry analyses) from different collection dates for the same site, a combination number was created (consisting of the site and collection date numbers) so that a later relational combination of the data would produce records that represent one site visit. These geothermal data were converted to a dBASE format and PC-File was used to eliminate records having temperatures less than 20°C for the area of Nevada south of 38° latitude. At this point, the database consisted of 1,708 records. These records were imported into a spreadsheet format using Quattro Pro software, and a multitude of operations were performed on the data to make it similar to the planned format for the final tables (Appendices 1 and 2). These operations include: 1) conversion of longitude and latitude to decimal degrees, 2) addition of calculated fields for ion balance, total calculated dissolved solids, major constituents test (is Na>K and Ca>Mg and Cl>F?), 3) conversion of depth in feet to meters and flow from cubic feet per second to liters per minute, 4) addition of a reference column for listing of WATSTORE as the reference, 5) convert GW (groundwater) to W (well) and SP to S (spring), 6) conversion of the state-county FIPS code to a two-letter abbreviation (see listing below), 7) conversion of the collection date format to the year/month/ day format, 8) re-arrangement of columns, and 9) a sort of rows (records) by longitude and latitude.

A number of additional operations were later performed on about 140 WATSTORE records selected for the final tables. These include: 1) conversion of Fe, and B from micrograms per liter to milligrams per liter (essentially equivalent to parts per million - ppm), and 2) separation of the site name column into two columns (one for name and one for the legal land location, if reported). Following this, Li, oxygen and hydrogen isotope data, and  $HCO_3-CO_3$  concentrations were added to the short spreadsheet of WATSTORE records. Li, and the <sup>2</sup>H and <sup>18</sup>O were inadvertently left out of the first search of the EarthInfo CD-ROM. The search for  $HCO_3-CO_3$  data in WATSTORE presented a more complicated problem, as these constituents are reported as several different parameters (fields) in the database. A number of the records generated by the first search were lacking data for these constituents; a second search was done for data in all possible related parameters (about eight of them, including bicarbonate and carbonate field results, laboratory results, dissolved, incremental titration, titration to pH 4.5 and pH 8.3, and alkalinity (field and laboratory). The data were entered by hand into the intermediate spreadsheet of WATSTORE records destined for the final tables.

Table 1. County names for Nevada, FIPS (Federal Information Processing Standard) code (32 is Nevada), and abbreviations used in this report.

County Name	FIPS Code	<u>Abbreviation</u>
Churchill	32001	СН
Clark	32003	CL
Douglas	32005	DG
Elko	32007	EL
Esmeralda	32009	ES
Eureka	32011	EU
Humboldt	32013	Hu
Lander	32015	LA
Lincoln	32017	LI
Lyon	32019	LY
Mineral	32021	MN
Nye	32023	NY
Pershing	32027	PE
Story	32029	ST
Washoe	32031	WA
White Pine	32033	WP
Carson City	32510	CC

# Topographic Map Digital Data

A complete examination was made by David Davis at NBMG of the approximately 1,900 7.5-minute topographic maps for Nevada. The entire state has this coverage, and a visual examination was made of each map for any mention of hot or warm springs, geothermal wells, etc. In addition, a 1981 version of GEOTHERM was available in paper copy (Jim Bliss, written commun., 1981) and this was used to identify other geothermal spring and well locations on these topographic maps. About 2700 individual points were marked on the maps, and the locations were digitized in the NBMG GIS laboratory using ARC/INFO software, a CalComp 9500 digitizer, and digital map coordinate data (TIC file) from the USGS. A database of the location and other data collected for this part of the project was created, and about a dozen records in the final table were from the spreadsheet equivalent of that database. In general, the records from this database were for locations where no data were available in other sources. The references are usually the 7.5-minute quadrangle map that the spring or well appears on. Additionally, when more precise longitude and/or latitude locations were required for records taken from any of the other sources used, the appropriate information from this database was entered in intermediate spreadsheets of selected records.

# Other Data Sources

During the selection of records for the final database, if water quality or other data in WATSTORE or GEOTHERM was lacking, incomplete, or appeared to be of poor quality, other sources of information were checked for possible inclusion in the database. Some of these sources were originally cited in NBMG Bulletin 91, but no record of a particular site was ever entered in GEOTHERM. A number of such records refer to dubious thermal spring locations, but must be included in any database that is purported to be complete. Other sources used for one or two sites include Hulen and others (1994), Trexler and others (1990), and Lawrence Livermore Laboratory (1976). Unpublished information in NBMG files and field notes of L. Garside for this and previous geothermal studies was also used. In particular, a number of good analyses and locations reported by Flynn and Buchannan (1990) were used. Their Table 3.1 was scanned, imported into Quattro Pro, and parsed into a spreadsheet of similar format to others used during this study. Also available in spreadsheet format to be checked during the data selection process were the analyses reported by Reed and others (1983) from the GEOTHERM database, and digital data on water analyses done in some areas of Nevada for the NURE (National Uranium Resource Evaluation) program (Hoffman and others, 1991).

# Selection Criteria

In the early stages of this study, it became apparent that the bulk of the data on Nevada's low- an moderate-temperature geothermal resources was contained in two databases, GEOTHERM and WATSTORE. Usually, for individual thermal springs and wells, the best one or two records available from either WATSTORE or GEOTHERM was selected. If the data in these databases were incomplete or nonexistent, other known sources were checked.

The process of record selection for the final database began with hardcopy printouts of the spreadsheets described above (e.g., GEOTHERM, WATSTORE, and the topographic maps). Digital files of the longitude and latitude information for these three databases were used to plot the geothermal localities on 1:1,000,000-scale maps of Nevada in NBMG's GIS lab, using ARC/INFO software. Each of the points or point groups on these maps was checked in a regular fashion for possible errors of location. The 1:1,000,000scale maps were examined, on 1° by 1° blocks of latitudelongitude (about 34 partial or complete blocks for Nevada). Every 7.5-minute topographic map that was shown to have a geothermal locality was re-examined, and the locations displayed on the million-scale maps were compared to those on the 7.5-minute quadrangles. From the available records for a particular spring, the best one, or in a few cases, two records was selected. For groups of springs that are found over several square kilometers, several records were commonly selected to best represent the geographic range and provide a more varied data set of water chemistry. The records selected were numbered, notes were taken on any problems recognized, and the number was written on a million-scale map and on the hardcopy of the appropriate database. This record selection process proceeded from west to east across the state, beginning in northwest Nevada and ending at its southern tip. The selection of the "best" records was somewhat subjective, but generally proceeded as follows. If a point on the maps was determined to be a valid geothermal site, GEOTHERM and WATSTORE records of that site or site area were examined. Selection from one of these databases was generally based on having an ion balance between 0.90 and 1.10, and a check to see if Na>K and Ca>Mg and Cl>F. The ion balance formula used was

Na\*0.04350+K\*0.02558+Ca\*0.04990+Mg\*0.08229/Cl\*0.02821+F\*0.05264+H CO<sub>3</sub>\*0.01639+CO<sub>3</sub>\*0.03333+SO<sub>4</sub>\*0.02082; resulting in a value in milliequivalents per liter, cations/anions. For those records that met these criteria, selection was based on completeness of the other analytical data (temperature, pH, minor constituents. etc.).

During the record selection process, spring and well records that did not meet certain minimum temperature criteria were eliminated from further consideration. According to the statement of work for this project, the minimum temperature for a low temperature resource is defined to be 10°C above the mean annual air temperature at the surface, and should increase by 25°C/km with depth (for wells). The mean annual air temperature in Nevada varies from somewhat less than 7°C to over 18°C (Houghton and others, 1975, figure 17; see figure 1 below). This variation is an effect of both latitude and elevation; southern Nevada's higher mean annual temperature results from its lower latitude and its lower average elevation (Houghton and others, 1975). Based on this map of mean annual temperature, a lower spring and well temperature limit was set for certain latitude ranges in the state. For springs, the decision whether to include or not was relatively simple - if the spring temperature was at or above the set limit, it was included. For wells, only those were considered for inclusion that fell above a gradient of 25°C per kilometer with a beginning (surface) temperature at or above the minimum selected for that latitude range. The total well depth provided in the database was used to calculate this gradient. The following temperature limits were applied during record selection: 1) north of 39° latitude, 18°C or above; 2) 38° to 39°

latitude, 19°C and above (20°C was used for some sites, mostly wells, in the 38°-38.5° range, 3) 37° to 38° latitude, 20°C or above, and 35° to 37° latitude, 25°C and above. No upper temperature limit was used to restrict inclusion in the final data compilation. The statement of work for this project listed an upper limit of 150°C for occurrences to be included in the compilation. Seven occurrences with temperatures above 150°C were included in the database; mainly for completeness. The only data available for some geothermal occurrences was the analysis and associated location information for the high-temperature fluid. It is obvious that lower temperature geothermal fluids are available at these sites (in peripheral areas or, in the case of electric-power generation areas, as condensed steam or reinjection fluids). Because analyses of these lower temperature fluids were not often available, the high temperature fluid analysis was listed as a substitute.

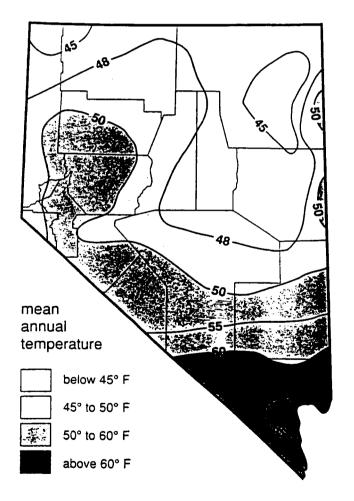


Figure 1. Map of mean annual temperatures in Nevada (from Houghton and others, 1975).

A number of problems were noted for both the GEOTHERM and WATSTORE databases as each plotted point on the million-scale maps was checked to see if it matched a known geothermal site. In quite a number of cases, certain geothermal locations were found to have an incorrect longitude or latitude or both. These were commonly discovered when the 7.5-minute topographic map was compared to the million-scale plot. In some cases, the legal description (section-township-range) was correct, but the longitude or latitude had an error of, for example, one whole degree or one whole minute. These inaccurate site locations were noted, but not corrected in the individual databases unless the record was needed for the final table.

#### DATA FORMAT

Data on Nevada's low- to moderate-temperature geothermal resources are presented in Appendices 1 and 2. The data in these tables are in spreadsheet format, and the digital data used to produce them (and provided separately on diskette) can be searched and otherwise manipulated in a great variety of ways utilizing a number of commercially available spreadsheet and database management software packages. Although there are two Appendices, they were printed from a single spreadsheet. The software and data manipulation methods used at NBMG during this study are further described above, under data sources. The format of the tables and, thus, the spreadsheets, in most respects follows rather closely that of Blackett (1993).

The column headings and data in the columns are generally selfexplanatory, but a few comments should be made. Each column heading is listed below, with a description of the data and a discussion of format and problems.

\* The site number is used to identify the site on the 1:1,000,000-scale map. It was added to the record when that record was selected for inclusion in the final database. The process of record selection was done in 1-degree blocks, proceeding from west to east, beginning in northwestern Nevada. Sites added later may not entirely follow this numbering progression, and to prevent renumbering of many of the sites, some added sites use decimal tenths (e.g., 143.1 and 142.2).

**NAME** The site name is commonly that listed in the source reference. In some cases, corrections, additions, or modifications were made to provide more information.

**CO** The two-letter abbreviation for one of Nevada's 17 counties is listed here. These abbreviations are listed above, under the Data Sources heading, with their FIPS code.

**T, R, SC** The legal land description, Township, Range, and Section are listed under these columns. These were commonly taken from the cited source, but some additions and corrections were made during the data evaluation. Because some of these location data were derived (in the original studies) from maps of varying ages or scales, or by projecting section lines into unsurveyed areas, there is a chance for error. Although some of these errors were noted and corrected, there are certainly many that were not. The best location data for the sites is generally the longitude and latitude; however, if correct, the section-township-range location can be used to confirm a site on topographic maps. Some section locations were determined by use of 1:100,000-scale topographic maps, on which the protracted sections are commonly displayed.

**QSEC** The data in this column, if present, describe the portion of the section in which the geothermal site is located. The quarter-quarter-quarter system (for example: NE SE NW) indicates an approximately 10 acre parcel in the 1 square mile section (640 acres) that is located in the northeast guarter of the southeast quarter of the northwest quarter. For data from the WATSTORE database, letters are used to indicate (from left to right) the quarter section, quarter-quarter section, and so on; the letters A, B, C, and D designate the northeast, northwest, southwest, and southeast quarters, respectively. Thus, for example, ABC would represent the southeast(C) quarter of the northwest quarter(B) of the northeast(A) quarter. The A-B-C-D system thus lists the largest quarter first, followed by progressively smaller quarters; the NE-NW-SW-SE system lists the smallest quarter section first.

**T** This column lists the type of occurrence, either spring (S) or well (W). In a few cases, the original listing did not fall into these two categories, and it was modified. For example, a hot pool was listed as a spring, and mine shafts or mineral exploration drill holes were listed as wells.

**TEMP** The reported temperature of the well or spring is listed, in degrees Celsius, in this column. Many of these reported temperatures were measured and originally reported in degrees Fahrenheit; those converted to 'C were rounded to one decimal place after conversion. If the only information reported on temperature is "warm" or "hot" (for example, from a topographic map), this is listed. The reported temperature is that of the cited reference. It is not necessarily the highest temperature reported in all of the available data for a particular spring or well; a particular record may have been selected because of its complete analysis, rather than because it had the highest reported temperature.

**FLOW** The flow, in liters per minute (L/min) is shown in this column. For wells, this value is commonly the discharge during pumping. Values are reported to one decimal place.

**DEPTH** For wells, the depth in meters is listed, if available

from the original source.

**CDATE** The date of collection is listed here, in the format: year/month/day. For many records that list only the year of collection, this was added during this study, based on other information.

**pH** The reported pH is listed here.

Chemical constituents (Na, Cl, etc.) For most of the chemical constituents, they are listed as reported in the original references or databases. The reporting units are milligrams per liter (mg/L); these are essentially equivalent to parts per million at the concentration levels of the fluids listed in the Appendix. For some analyses, constituent values originally reported in  $\mu$ qm/L (micrograms per liter or parts per billion ppb) were converted to mg/L. If the original source listed a particular constituent as less than a certain value, this was reported using the symbol "<". Similarly, "t" indicates that a trace amount was detected, and "N" indicates the constituent was analyzed for but not detected. The number of decimal places displayed for each element is generally based on that reported in the sources of data. For most of the reported analyses, bicarbonate (HCO<sub>3</sub>) and carbonate (CO<sub>3</sub>) are listed as reported in the sources. Carbonate values are usually only found in waters with a pH of 8.2 or greater. A few sources (e.g., Lawrence Livermore Laboratory, 1976) report total alkalinity; these values were recalculated and reported as bicarbonate, as were the values reported in a  $HCO_3 + CO_3$  column of Table 3.1 of Flynn and Buchannan (1990). Some analyses are noted to be relatively complete, but lack Na and K values. Commonly, the reason for this absence is that the original analysis reported Na + K as a single value, and thus, no data was entered in the Na and K fields in databases such as GEOTHERM.

**TDSm, TDSc** These columns present the total dissolved solids, measured and calculated. The measured value, if present, is from the original data source (presumed to be a residue on evaporation at 105°C). The calculated value was determined by summing the constituents reported. Thus, the TDSc value reported for incomplete analyses only represents a partial sum. A few analyses were summed before Li was added, and may be one to several ppm low. The HCO<sub>3</sub> value was multiplied by 0.492 to make the calculated TSDS values comparable with residue values.

**ChgBal** The electroneutrality of the analysis was evaluated using a charge (ion) balance formula (described further in the section on selection criteria). No value is reported for records which have no or extremely limited analytical data, as such a calculation would be meaningless. The most common reason for a charge balance that varies considerably from 1.00 is a lack of data for  $HCO_3$ . Other missing major ions can also result in a "poor" charge balance.

**delD, delO18** These columns contain isotopic compositions for the stable isotopes <sup>18</sup>O and deuterium (<sup>3</sup>H). Data are reported to zero or one decimal place for <sup>18</sup>O and one or two decimal places for deuterium.

**REFERENCE** The reference citation in this column is that for the source of the data. The records that were taken from the GEOTHERM database include the reference listed therein. The WATSTORE citation is from the database search described above under data sources. An asterisk (\*) precedes some citations; this was used in the GEOTHERM database to indicate unpublished data from individuals or agencies (for example, \*WHITE, D., USGS, MENLO PARK or \*DESERT RESEARCH INSTITUTE, 1973). The \*NEVADA BUREAU OF MINES AND GEOLOGY citation includes unpublished data from that agency's files entered into the original GEOTHERM database as well as some entries made during this study. The \*WATSTORE reference refers to data from GEOTHERM that originated from a WATSTORE search, probably in the late 1970s.

**USE** This data category lists the geothermal application for which the thermal water is presently used, or has been used for in the recent past but is not presently (in parentheses). The source of most of this data is Garside and Hess (1994), with some later additions during the later part of this study. Garside and Hess (1994) is reproduced as Appendix 3. No attempt was made to list uses of only the water but not the contained heat (livestock watering, for example). At least a dozen hot spring areas in Nevada have had hotel spas at them; most were built in the late 19th and early 20th Centuries. These were not listed as a past use, but present spas, swimming pools, etc., were reported.

#### FLUID CHEMISTRY

The geochemistry of thermal water in Nevada (and adjacent areas) has been discussed by a number of authors (e.g., Mariner and others, 1983; Flynn and Buchanan, 1990; Welch and Preissler, 1990; Young and Lewis, 1982). A simplification of the pattern of chemistry exhibited by Nevada thermal water is that eastern Nevada geothermal fluids are calcium bicarbonate dominated, central and northern Nevada has mainly sodium bicarbonate type fluids, and the western part of the state has mostly sodium chloride and sodium sulfate types. The reasons for this pattern are, no doubt, relatively complex; however, water-rock interactions are certainly a significant factor. Thus, eastern Nevada calcium bicarbonate geothermal fluids are strongly influenced by the presence of a regional carbonate aquifer. At least some of the sodium bicarbonate geothermal fluids of the central and north-central parts of the state may result from the exchange of sodium (possibly from volcanic rocks) for calcium in

fluids that were originally calcium bicarbonate in character. Western Nevada sodium chloride and sodium sulfate waters may reflect increased water-rock interaction (and thus generally higher temperatures) as well as possible evaporative concentration of fluids prior to deep circulation and/or extraction of salts from Quaternary playa lake deposits.

#### DISCUSSION

Nevada is well endowed with both high- and low-temperature geothermal resources. Based on a generalized map of known and potential geothermal resource areas of the United States (e.g., Lienau, 1988) over 40% of the state is believed to have potential for the discovery of high-temperature geothermal resources, and another 50% has potential for low -to moderate-temperature resources. This potential is well illustrated by the 1:1,000,000scale map of geothermal occurrences produced during this study (Plate 1). The database for this study consists of 455 individual records, representing more than 300 resource areas. The geothermal springs and wells are distributed over the entire state, with an increased concentration in the northwestern part of the state (Figure 3). Maximum spring and well temperatures are higher in the north and northwest parts of the state. Geothermal occurrence temperatures greater than 75°C are confined to the northwestern half of the state, a pattern that closely follows that of heat flow (see Sass and others, 1981). The distribution of reported temperature vs. number of occurrences is shown below (Figure 2). About 400 springs and wells plot in 11 temperature ranges; additionally 30 sites are listed as "warm" and 23 as "hot".

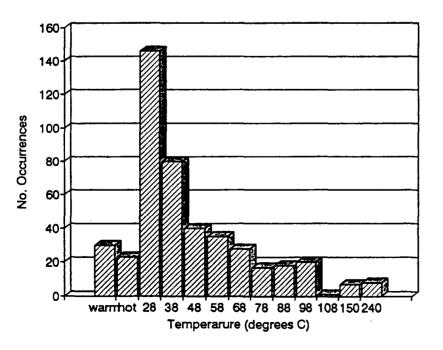
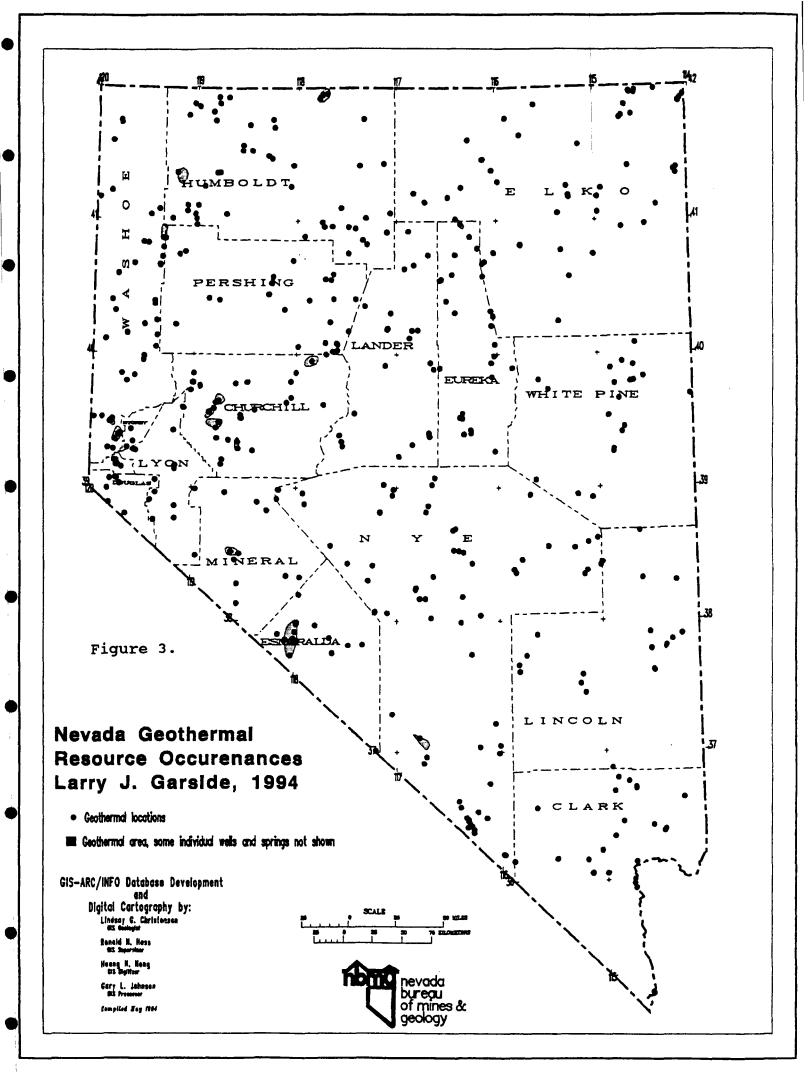


Figure 2. Bar graph of temperature vs. number of geothermal occurrences.



Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of ground water to deep levels along faults in a region of higher-than-average heat flow (the Battle Mountain heat flow high). In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (like warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for hundreds to thousands of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

The Eureka heat flow low, a region of less than 1.5 HFU (heat flow units; 41.8 milliWatts per square meter, mWm<sup>-2</sup>) located in eastern Nye and northwestern Lincoln Counties, is centered on the Nevada portion of a large area of Middle Cambrian to Lower Triassic carbonate rocks (the carbonate rock province). This carbonate rock province underlies southern and eastern Nevada and northeastern Utah (Plume and Carlton, 1988). The Eureka Low is most likely a regional-scale hydrologic feature, representing colder groundwater recharge to regional aquifers.

#### SUMMARY

Nevada is a large state with sparse but locally concentrated population. It has a wide range in average annual temperature, and thus a wide range in the lower limit of temperatures considered anomalous for geothermal fluids. The state's complex pattern of geology and heat flow results in geothermal resource areas of diverse character located throughout the state.

There have been many studies, both general and specific, on Nevada's geothermal resources (see Bibliography). Considerable data are available on specific geothermal spring and well sites but some remote areas are still poorly understood and information on their geothermal resources are incomplete or possibly inaccurate. There are many accurate and complete water analyses and associated location information for well-studied geothermal areas. However, many remote individual springs and wells throughout the state lack complete analyses, and some lack good location information; in some cases, there is uncertainty about the existence of certain springs. For example, Appendix 1 lists over 50 sites for which the only temperature information is "warm" or "hot."

In Nevada, as in many arid areas of the west, most water (whether thermal or nonthermal) has been put to use. Some nonthermal applications actually require cooling before use. Present and recent past uses of the contained heat of Nevada thermal waters are quite varied (see Appendix 3). However, more such use is feasible if potential developers are well informed and encouraged to be conservative in their use of fossil fuels.

#### RECOMMENDATIONS

There are many remote geothermal sites for which no complete data set could be found in the sources examined. For completeness, some of these should be visited and sampled but most of them are unlikely to be put to any low-temperature use because of their remoteness. Having a more complete data set would, however, be useful in regional studies, and might result in the discovery of previously unknown higher temperature resources.

No attempt was made during this study to combine trace-element water chemistry data from more than one analysis into a single record. For example, analyses of B, Li, and F may have been reported in a analysis with poor ion balance while the best analysis in terms of major constituents may have been lacking some of the trace-element data. Some of this type of traceelement data could be added to the final database, but it seemed like a poor practice for this original compilation.

Some sources of information on geothermal springs and wells that were not used during this study might be useful to pinpoint previously unknown (especially low-temperature) geothermal sites. However, the mass of data available and its concentration in populated areas (where good information already exists), make searching such data relatively unproductive. Some examples of such available data include the water well records (submitted by well drillers) for the state available from the Nevada Division of Water Resources. These water well records have many errors (especially in location); searching and confirming previously unknown geothermal sites would take considerable effort. Other sources of water data that are likely to have similar potential errors include the analyses of agencies like the Nevada Division of Health, the Nevada Division of Environmental Protection, and the U.S. Environmental Protection Agency. One source of information that might have a higher potential for adding to the geothermal database is the largely confidential files of geothermal exploration companies. Thousands of shallow to moderately deep (100 to 1000 m) geothermal gradient and "slim holes" were drilled in the search for high temperature geothermal resources (for electric power generation) over the last 30 years. This source of geothermal data was suggested by a number of industry representatives at a March 1994 symposium sponsored by the Geothermal Resources Council on the geothermal resources and exploration of the Basin and Range Province. The extent of the data is not presently known.

Finally, increased future use of geothermal energy in low- to moderate-temperature applications will require not only studies that demonstrate the availability of the resource but also dissemination of information (such as case histories) that illustrate the details of these uses. Such case histories should be understandable by the general public, but also make available details of the technical data. Because some uses, such as district heating systems, require considerable front-end investment compared to individual fossil fuel heating units, projects that can bring together several funding sources have a better chance of success.

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One task of the study was the identification of geological, geophysical, geochemical, and hydrologic studies that have been done since the last resource assessment. The bibliography (Appendix 4) is the result of that literature search. There are 907 citations listed in the bibliography; of these, nearly onehalf are from the bibliography in Garside and Schilling (1979). This bibliography was nearly exhaustive, at least for published sources, through about 1978. That bibliography was scanned and converted with text-recognition software to a format useable by word-processing software. The references from this 1979 bulletin included general references to the geology of geothermal areas as well as references specific to geothermal resources. The additional references in Appendix 4 were obtained from a variety of sources; most were entered in the document by hand, rather than taken directly from other digital data sources. Several methods were used to find these additional references. The bibliography for GEOTHERM (Bliss, 1983 a) was checked for references not in Garside and Schilling (1979). Additionally, the geothermal files in the Public Information Office of the Nevada Bureau of Mines and Geology were a good source, especially for unpublished reports. My own library of geothermal references was searched, and the CD-ROM for GeoRef (the bibliographic database of the American Geological Institute) was searched for any Nevada geothermal references. A similar search was done of the WolfPAC NALIS library information system (the Northern Nevada Academic Libraries Information System). The Geothermal Resources Council Bulletin and Transactions, and the GeoHeat Center Quarterly Bulletin were also scanned for any Nevada references.

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# APPENDIX 1

* NAME								<b>5</b> 1 <b>0</b> 111		berenzuot	
1 TWN SPRING, VYA SPRING	<u> </u>		N SC	OSEC	NLAT		T TEMP		DEPTH CDATE	REFERENCE	USE
2 HILL'S WARM SPRING	W 42N	_	04	NW	41.5933	119.8650	<u>\$ 22</u>	715	1952/05/15	WARING, 1965	
3 UNNAMED SPRING	W 44N		18	NE SE SW	*****		<u>\$ 28</u>		1961/08/08	TREXLER AND OTHERS, 1979	
مرد المراجع المراجع المراجع المراجع التي يتوجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع المراجع ا	W 44N	1 19E	12		41.7459	119.7919	<u>\$ 23</u>	19	1946/02/11	SINCLAIR, 1963B	
4 VIRGIN VALLEY RANCH 10	HU				41.7906		W 21	······	1975/08/05	WATSTORE	
5 VIRGIN V CAMP GROUND 1	HU 45N		02		41.8533	119.0008	W 32		1975/08/05	WATSTORE	
6 ROADSIDE REST AREA 3	HU 46N	1 26E	31	C	41.8753		W 18		1975/08/05	WATSTORE	
7 Surprise Valley Hot Spring	WA				41.166	119.975	S 47		1969/	Flynn and Buchanan, 1990	
8 WARM SPRING	W 39N	1 19E	33		41.2160	119.8627	8 warm			WALL CANYON RESERVOIR 7.5' QUAD	
9 WARM SPRINGS	HU 44N	27E	12	NE SW SW	41.7503	118.8367	S 40		1954/07/27	TREXLER AND OTHERS, 1979	
10 McGEE MOUNTAIN	HU 45N	27E			41.8163	118.8597	\$ 42.2		61	WENDELL, 1970	
11 BOG HOT WELL	HU 46N		31		41.8783		W hot			BOG HOT SPRINGS 7.5' QUAD	
12 BOG HOT SPRINGS	HU 46N		18	SW NE NW			S 55.6	3785	1970/09/01	SINCLAIR, 1963B	
13 BALTAZOR HOT SPRING 9	HU 46N	_						3/05			
			18	8	41.9217	the second s	8 63		1975/08/05	WATSTORE	
14 SOLDIER MEADOWS AREA HOT SPRING	HU 40N	the second s	23		41.3597		8 54	66	1974/02/20	GROSE AND KELLER, 1975B	
15 SOLDIERS MEADOW AREA - UNNAMED HOT SPRING	HU 40N		_23_		41.3597		5 54	50	1950/06/13	MARINER AND OTHERS, 1974, 1975	
16 SOLDIER MEADOW AREA HOT SPRING	HU 40N	_	23		41.3597	119.2180	<u>\$ 48</u>			GROSE AND KELLER, 19758	
17 SOLDIER MEADOW 1	HU 40N	24E	23		41.3581	119.2178	8 54		1975/01/01	WATSTORE	
18 CANE SPRING	HU 39N	1 27E	30	NE	41.2580	118.9362	S 23.3	19		SINCLAIR, 1963A	
19 WEST PINTO HOT SPRING	HU				41.3592	118.8136	5 92		1974/01/01	WATSTORE	
20 EAST PINTO HOT SPRING	HU 40N	28E	17	NE SE SE	41.3625		8 94			GROSE AND KELLER, 19758	
21 WARM SPRING		1 22E	35		41.0397	119.4688	S warm	·		LEADVILLE 7.5' QUAD	
22 LEADVILLE SPRINGS	W 37N					_	-		·····	SMITH, 1956	
					41.0827		S warm		4000100100		<u> </u>
23 CANE SPRINGS	HU 36N		16	<u> </u>	41.0133		<u>\$ 21</u>		1961/12/12	WATSTORE	
24 WHEELER RANCH WELL	HU 37N	_	10	SE	41.1150		W 36.1		1965/09/21	SINCLAIR, 1963A	<u> </u>
25 DOUBLE HOT SPRING 2	HU 36N	1 26E	04		41.0492	119.0275	\$ 68.5		1975/01/01	WATSTORE	
26 UNNAMED SPRING (D.H2)	HU 36N	1 26E	16	SE NE	41.0150	119.0155	\$ 68.5		1938/08/24	GROSE AND KELLER, 19758	
27 WW3922T1	HU 37N	24E			41.0733	119.1097	W 24.2	815.0	1979/12/13	WATSTORE	
28 TH SP HARDIN CITY SE OD	HU 37N	_	10	DCA	41.1156	119.0008	S 50.8	101.9	1980/07/09	WATSTORE	
29 MACFARLANE'S BATH HOUSE SPRING	HU 37N		31		41.0507		\$ 76.5	18.9		SINCLAIR, 1963A	
32 SPRING	HU 42N						<u>s 40</u>	10.0	1960/10/06		
33 SPRING			12	<u> </u>	41.5294					WATSTORE	
	HU 43N		25	D	41.5675	118.5658	<u>\$</u> 70		1960/10/06	WATSTORE	······
34 UNNAMED SPRING	HU 42N		10	SW SE	41.4922		<u>\$ 21.1</u>	19	1957/05/16	SINCLAIR, 1962C	
35 U.S.G.\$. TEST WELL NO. 21	HU 42N	the state of the s	32	SE NE	41.4717		W 24.4		27 1972/00/00	MALMBERG AND WORTS, 1968	
36 WELL	HU 42N	1 31E	11	B	41.5266	118.4769	W 24		107.3 1960/10/08	WATSTORE	
37 HOWARD HOT SPRING	HU 44N	31E	04	SE NE NE	41.7200	118.5033	S 57.8	189	1970/05/05	SINCLAIR, 1962C	
38 FIVE MILE SPRING	HU 45N	33E	21	SE NE SW	41.7625	118.2783	S 27		1975/08/21	TREXLER AND OTHERS, 1979	
39 SPRING	HU 44N	33E	10	BB	41.7053	118.2633	5 26		1959/06/22	WATSTORE	·····
40 JACKSON WELL	HU 39N		07	DCDA	41.2614		W 19.5		1961/02/26	WATSTORE	
41 SOD HOUSE RANCH WELL	HU 41N	_	20	NE	41.4200	and the second se	W 27		34 1975/08/20	SINCLAIR, 1962A	
42 CORDERO MERCURY MINE, NORTH LOWER WELL	HU 47N				41.9167		W 53		1967/11/11	WHITE, D., USGS, MENLO PARK	
43 MENTABERRYS WELL 1	HU 47N		24	BAB	41.9478	the second s	W 26.5		61.0 1976/04/23	WATSTORE	
44 NOQUE'S NEVADA WELL	HU 47N				_	and the second se				GARSIDE AND SCHILLING, 1979	
			17	NE NE SE	41.9555				214 1972/00/00		
45 THE HOT SPRINGS	HU 41N		19	NE NE	41.4208		\$ 57.2	227		LOELTZ AND OTHERS, 1949	
46 THE HOT SPRING	HU 41N		19	NE NE	41.4208		<u>S 58</u>			MARINER AND OTHERS, 1974, 1975	
47 SPRING	HU 41N				41.4364	117.1430	S hot			WARING, 1965	
48 WELL	HU 37N		03	DC	41.1047	117.5739	W 69		18.6 1962/04/28	WATSTORE	
49 SPRINGS	HU 45N	41E			41.7737	117.3452	S hot			WARING, 1985	
50 UNNAMED SPRING	HU 36N	41E	02	SW NE NE	41.0300	117.3215	\$ 21.1	95	1950/00/00	COHEN, 1982	
51 SPRINGS	HU 37N		24		41.0654		S warm	> 757		ANCTIL, 1960	
52 WARM SPRING NEAR DEEP CREEK RESERVOIR	EL 43N		19		41.8153		S warm			CORNACOPIA RIDGE 7.5' OUAD	
53 HOT LAKE	EL 30N				41.1480		S hot			SQUAW VALLEY RANCH 7.5' QUAD	
54 SPRING			25		_						
	EL 39N		36		41.2137		S hot			WARING, 1965	
55 SPRING, HEAD OF HOT CREEK	EL 381		11		41.1832		5 7			WILLOW CREEK RESERVOIR 7.5' QUAD	
56 UNNAMED HOT SPRING	EL 39N		18		41.2571		<u>\$ 47.2</u>		1972/00/00	HOSE AND TAYLOR, 1974	
57 PETAINI (NIAGARA?) SPRINGS	EL 40N	53E	06		41.3837	116.0587	S werm	5960		EAKIN, 1962B	
58 ELLISON RANCH SPRING	EL 41N	52E	08	NE	41.4667	118.1533	\$ 93	3.8	1971/12/30	"WHITE, D., USGS, MENLO PARK, CA	
59 HOT SULPHUR SPRINGS	EL 41N		08	NE	41.4677		S 90		1950/05/24	MARINER AND OTHERS, 1974, 1975	
60 UNNAMED HOT SPRING (SSE PATSVILLE)	EL 45N		20		41.7758		<b>S</b> 41			MARINER AND OTHERS, 1974, 1975	
61 WILD HORSE HOT SPRING	EL 43N		04	SE SE	41.6472		8 54			MARINER AND OTHERS, 1974, 1975	
62 ROWLAND HOT SPRINGS	EL 40N			NW SW N	41.8767		<u> </u>	114	1957/05/17	WHITE, D., USGS, MENLO PARK	
63 SPRING		the second s	14	AN 3N N					1831 937 17	MAHALA CREEK WEST 7.6' QUAD	
	EL 39N		03		41.2980		8 warm	· · · · · · · · · · · ·			
64 WARM SPRINGS	EL 37N		26		41.0613		8 warm			MORGAN HILL 7.5' QUAD	
65 UNNAMED SPRING	EL 36N		14		41.1800		<u>S 36</u>		1962/06/26	TREXLER AND OTHERS, 1979	
66 UNNAMED WELL	EL 36N		11	SW NE SW			W 30		1947/05/18	TREXLER AND OTHERS, 1979	
67 DEVIL'S PUNCH BOWL	EL 39N		15	SE SW	41.2650	115.3050	S 52		1972/12/13	TREXLER AND OTHERS, 1979	
68 H.D. RANCH SPRING, HOT CREEK SPRINGS	EL 43N	60E	34	SE SW NW	41.5762	115.1808	S 64.4	2271	1946/04/09	WARING, 1985	
69 RAILROAD SPRING	EL 37N	62	29		41.0681		S warm			OESTERLING, 1900	
70 UNNAMED HOT SPRING NEAR WELLS	EL 38N	the second s	17	SE NW NE	41.1818		S 61			MARINER AND OTHERS, 1974B	HEAT PUMP
21 UNNAMED HOT SPINEAR WELLS	the second s	_	17	A	41.1819	114.9894	the second s		1974/01/01	WATSTORE	
	LL JON	UEC				114.0004			191401/01	······································	

	~ .									5-7750 CN 07	1105
72 METROPOLIS (TWELVEMILE SPRINGS)	CO T EL 39N		R SC 27	OSEC NE NE	NLAT 41.2450		T TEMP S 38.9	FLOW DE 3038	PTH_CDATE 1964/04/14	REFERENCE WARING, 1985	USE
73 WINE CUP RANCH WELL	EL 41N		25	NW SE	41.4092		N 58.9		20.7 1946/03/25	RUSH, 1968A	
74 PAN AMERICAN PETROLEUM-COBRE MINERALS WELL	EL 37N	67E	03	SW SE	41.1135		N 76.7		1403	*NEVADA BUREAU OF MINES AND GEOLOGY	
75 GAMBLE RANCH WELL NO. 4	EL 40N	09E	16	SW	41.3433	114.1717	N 20		64	RUSH, 1968	
76 THOUSAND SPRINGS (GAMBLE RANCH SPRING)	EL 40N	_	08	SE NW NW		114.1917	\$ 20.6	5110		MIFFLIN, 1968	
77 HOT SPRING	EL 40N		04		41.3862		S hot			TWELVEMILE RANCH 7.5' QUAD	
78 WELL	EL 45N	_	20	ACB	41.7731		N 54		1979/04/26	WATSTORE	
79 MINERAL HOT SPRINGS	EL 45N		18		41.7882	114.7293	5 60		1966/10/13	MARINER AND OTHERS, 1974, 1975	
80 SAN JACINTO RANCH SPRING 81 MINERAL HOT SPRING	EL 40N EL 45N		23	NW NW	41.0083	114.6950	<u>S 26</u> S 60		1962/07/28	MOORE AND EAKIN, 1968	<u> </u>
82 W.D. RANCHING CO. FLOWING WELL	EL 47N		18	BBA NW SW	41.7956		N 37.8		1974/01/01 68.4 1979/12/15	WATSTORE MOORE AND EAKIN, 1968	
83 WHEELER (Y3) RANCH WELL	EL 47N	_	17	CBC	41.9565		N 36		82.5 1977/12/07	WATSTORE	
84 WHEELER (Y3) RANCH WELL	EL 47N		15	DCCD	41.9547		N 43.5		1961/04/23	WATSTORE	(AQUACULTURE)
85 SHOSHONE WARM SPRINGS	EL 47N	_	11	NE SW SW			S 35		1962/06/25	TREXLER AND OTHERS, 1979	
86 UNNAMED HOT SPRING	EL 47N	67E	09	SE NW	41.9600	114.3770	8 30		1960/10/07	HOSE AND TAYLOR, 1974	
87 TROUT CREEK RANCH WELL, GOOSE CREEK AREA	EL 46N	09E	15	NW NE	41.8823	114.1188	N 43.3		75 1912/09/23	MOORE AND EAKIN, 1968	
88 GOOSE CREEK AREA SPRING	EL 46N	_	10	SE SW SE	41.8867	114.1200	S 33.9		1960/10/07	*WATSTORE	
89 TROUT CREEK RANCH WELL	EL 40N		02	SW SE	41.9027		N 21		75 1972/02/13	MOORE AND EAKIN, 1968	
90 NILE SPRING	EL 47N		30	SW SW S	41.9263	114.0687	<u>s 43</u>			MARINER AND OTHERS, 1974, 1975	
91 HOT SPRING	HU 35N	_	11		40.9202		S hot			HOT POT 7.5' QUAD	
92 NEW SPRING 93 POODLE SPRING	W 34N W 34N	_	18		40.8317 40.8244		<u>\$29</u> \$29		1952/05/16	GROSE AND KELLER, 1975B	· ·
94 spring	WA WA	642		<u> </u>	40.8244		<u>5 29</u> 5 29.4		1975/01/01	LAWRENCE LIVERMORE LABORATORY, 1976	·····
95 BUFFALO SPRING	W 31N	20F	06		40.5932		5 29.4 5 warm		1913/	WARING, 1965	
96 BUCKBRUSH SPRING	W 29N	_	11		40.3960		S warm			WARING, 1965	
97 JACK BONHAM RANCH WELL	W 26N	_	12	NE	40.3150		8 23		1963/04/16	GLANCY AND RUSH, 1966	
98.1 FISH SPRING	W 26N		19	SE SE	40.1008	119.8850	\$ 23		1952/09/18	RUSH AND GLANCY, 1967	
96.2 Fleh Spring	WÅ				40.1024	119.8838	S 21		1975/	LAWRENCE LIVERMORE LABORATORY, 1976	
99 THE NEEDLES - WESTERN GEOTHERMAL WELL	WA				40.1500		N 115.5			WHITE, D., USGS, MENLO PARK	
100 THE NEEDLES	WA		<u> </u>		40.1460		\$ 56			MARINER AND OTHERS, 1974, 1975	
101 SEVENMILE SPRING	W 25N		10	BCD	40.0483		<u>S 18</u>		1969/07/30	WATSTORE	
102 SPRING 103 SPRING	W 26N W 27N		10	DBA	40.1344		<u>S 18.5</u>		1969/07/30	WATSTORE	
103 SPHING											
	<u></u>		16	ADA	40.2161		<u>\$25</u>		1969/08/22	WATSTORE	<u></u>
104 LOWER STONEHOUSE SPRING	PE 27N	25E	08	DD	40.2178	119.1997	S 28		1969/09/03	WATSTORE	
104 LOWER STONEHOUSE SPRING 105.1 Amor II well 43-21	PE 27N W 29N	25E 23E	08 21		40.2178 40.3692	119.1997 119.4039	8 28 V 135		1969/09/03 85.4	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
104         LOWER STONEHOUSE SPRING           105.1         Amor II well 43-21           105.2         Amor II well 43-21	PE 27N W 29N W 29N	25E 23E 23E	08 21 21	DD	40.2178 40.3892 40.3692	119.1997 119.4039 119.4039	8 28 V 135 V 135		1969/09/03 85.4 85.4	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
104 LOWER STONEHOUSE SPRING 105.1 Amor II well 43-21	PE 27N W 29N W 29N W 29N	25E 23E 23E 23E 23E	08 21	DD	40.2178 40.3692	119.1997 119.4039 119.4039 119.4067	8 28 V 135		1969/09/03 85.4	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY	
104         LOWER STONEHOUSE SPRING           105.1         Amor II well 43-21           105.2         Amor II well 43-21           106         SAN EMIDIO DESERT - UNNAMED HOT SPRING	PE 27N W 29N W 29N W 29N	25E 23E 23E 23E 23E 23E	08 21 21 09,18	DD	40.2178 40.3692 40.3692 40.3917	119.1997 119.4039 119.4039 119.4039 119.4067 119.3633	8 28 V 135 V 135 S 79		1969/09/03 85.4 85.4	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S	PE 27N W 29N W 29N W 29N W 29N W 32N	25E 23E 23E 23E 23E 23E	08 21 21 09,18 15	DD NW	40.2178 40.3692 40.3692 40.3917 40.6600	119.1997 119.4039 119.4039 119.4039 119.4067 119.3633 119.3667	8 28 W 135 W 135 8 79 8 86	30	1969/09/03 85.4 85.4	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SPORIF 46         110       BOWEN	PE 27N W 29N W 29N W 29N W 32N W 32N WA W 33N	25E 23E 23E 23E 23E 23E 23E	08 21 21 09,18 15	DD NW SW NW	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6608 40.7226	119.1997 119.4039 119.4039 119.4067 119.3633 119.3667 119.3650 119.3443	S         28           W         135           W         135           S         79           S         86           S         68           S         68           S         68           S         68           S         68           S         26	30	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GREAK RANCH WELL	PE 27N W 29N W 29N W 29N W 32N W 32N WA W 33N W 34N	25E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,18 15 10 23 34	DD NW SW NW C A	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6608 40.7226 40.7939	119.1997 119.4039 119.4039 119.4039 119.4067 119.3633 119.3667 119.3650 119.3443 119.3342	S         28           V         135           N         135           S         79           S         86           S         86           S         86.6           S         26           V         26	30	1969/09/03 85.4 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SPORING NEAR GREAT BOILING SPRING         109       GREAT BOILING SPORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL	PE 27N W 29N W 29N W 29N W 32N W 32N WA W 33N W 34N PE 33N	25E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,16 15 10 23	DD NW SW NW	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6608 40.7226 40.7939 40.7447	119.1997 119.4039 119.4039 119.4039 119.4067 119.3650 119.3443 119.3342 119.3342	S         28           V         135           N         135           S         79           S         86           S         89.5           S         88.6           S         26           V         26           V         26           V         26	30 100 390.5	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO	PE 27N W 29N W 29N W 29N W 32N W 32N WA W 33N W 34N PE 33N PE	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,16 15 10 23 34 10	DD NW SW NW C A	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6650 40.7228 40.7239 40.7447 40.7667	110.1997 119.4039 119.4039 119.4039 119.4037 119.3037 119.3067 119.3067 119.3067 119.3443 119.3443 119.3121 119.1731 119.1107	S         28           V         135           N         135           S         66           S         66.6           S         66.6           S         26           V         26           V         33.5           S         64.5	30 100 390.5 150	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP OFILF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL	PE 27N W 29N W 29N W 29N W 32N W 32N WA W 33N W 34N PE 33N PE W 34N	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E 23	08 21 21 09,16 15 10 23 34 10 02	DD NW SW NW C A	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6650 40.7228 40.7939 40.7447 40.7667 40.8633	110.1997 110.4039 110.4039 110.4039 110.4067 110.3650 110.3650 110.3443 110.3443 110.31731 110.1167 110.3417	8         28           N         135           S         79           S         86           S         80.5           S         88.6           S         28           V         23.5           S         84.5           V         33.5           S         84.5	30 100 390.5	1969/09/03 85.4 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1968/06/00	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       GREAT BOILING SP ORIF 4         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16	PE 27N W 29N W 29N W 29N W 32N W 32N W 32N W 33N W 34N PE 33N PE W 34N W 34N	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E 23	08 21 21 09,16 15 10 23 34 10 02 01	DD NW SW NW C A B	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6608 40.7228 40.7939 40.7447 40.7667 40.8633 40.8006	110.1997 119.4039 119.4039 119.4039 119.3033 119.3083 119.3087 119.3087 119.3087 119.3087 119.3087 119.3181	8         28           N         135           S         79           S         86           S         84           S         84           Y         80           S         94	30 100 390.5 150 500	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01 1961/06/12 19661/06/12 1966/06/00 1975/01/01	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1978A MARINER AND OTHERS, 1974, 1975 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16	PE         27N           W         20N           W         20N           W         20N           W         20N           W         30N           W         32N           WA         33N           W         34N           PE         33N           W         34N           PE         W           W         34N           HU         36N	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E 23	08 21 21 09,16 15 10 23 34 10 02 01 34	DD NW SW NW C A	40.2178 40.3692 40.3692 40.3917 40.6600 40.6650 40.6650 40.7228 40.7939 40.7447 40.7667 40.8633	110.1997 119.4039 119.4039 119.4037 119.3833 119.3867 119.3850 119.3850 119.3443 119.3342 119.3342 119.317 119.3181 119.0100	S         28           N         135           N         135           S         66           S         66           S         86.6           S         28           V         26           V         26           S         64.5           S         64.5           S         64.5           S         94.5           S         97.8	30 100 390.5 150	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1968/06/00 1975/01/01 1972/03/29	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         110       BLACK ROCK HOT SPRINGS	PE 27N           W 29N           W 29N           W 29N           W 29N           W 32N           W 33N           W 34N           PE 39N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,18 15 10 23 34 10 02 01 34 06	DD NW SW NW C A B NW NW D	40.2178 40.3692 40.3692 40.3917 40.6600 40.6600 40.6600 40.7228 40.7939 40.7447 40.7667 40.7663 40.8603 40.8006 40.9700 40.9700	110.1997           119.4039           119.4039           119.4039           119.4039           119.3067           119.3657           119.3433           119.3443           119.1731           119.3417           119.3417           119.3411           119.3161           119.3061           119.3061	8         20           W         135           S         79           S         86           S         89.5           S         86.6           W         26           W         33.5           S         84.6           S         84.6           S         94.5           S         57.8           V         20.5	30 100 390.5 150 500	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/02/12 1966/06/00 1975/01/01 1975/01/01 1975/01/01	WATSTORE "NEVADA BUREAU OF MINES AND GEOLOGY "NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 MARINER AND OTHERS, 1978A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1978A MARINER AND OTHERS, 1974, 1975 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16	PE         27N           W         20N           W         20N           W         20N           W         20N           W         30N           W         32N           WA         33N           W         34N           PE         33N           W         34N           PE         W           W         34N           HU         36N	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E 23	08 21 21 09,16 15 10 23 34 10 02 01 34	DD NW SW NW C A B NW NW	40.2178 40.3692 40.3692 40.3917 40.6600 40.6600 40.6608 40.7228 40.7939 40.7447 40.7667 40.8633 40.8605 40.9700	110.1997 119.4039 119.4039 119.4037 119.3833 119.3867 119.3850 119.3850 119.3443 119.3342 119.3342 119.317 119.3181 119.0100	8         28           N         135           S         70           S         86           S         80.5           S         86.6           S         26           Y         33.5           S         84.5           Y         30.5           S         94           S         57.8           Y         20.5           S         18	30 100 390.5 150 500	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1968/06/00 1975/01/01 1972/03/29	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY PANCH (WARDS HOT SPRING 16         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRINGS         117       BACH WELL         118       PORTER SPRING	PE 27N           W 29N           W 29N           W 29N           W 29N           W 32N           W 32N           W 32N           W 32N           W 32N           W 34N           PE 33N           PE           W 34N           PE 20N           PE 20N           PE 29N	25E 23E 23E 23E 23E 23E 23E 23E 23E 23E 23	08 21 21 09,18 15 10 23 34 10 02 01 34 06 05	DD NW SW NW C A B B NW NW D B	40.2178 40.3692 40.3692 40.3692 40.3697 40.6600 40.6650 40.6650 40.728 40.7637 40.7647 40.7667 40.8633 40.8609 40.9700 40.9700 40.9705 40.4178	110.1997 119.4039 119.4039 119.4039 119.4037 119.3867 119.3867 119.3443 119.3443 119.3443 119.3442 119.1187 119.1187 119.3181 119.000 118.7675 118.8676	S         28           N         135           N         135           S         06           S         04           S         04           S         04           S         04           S         94           S         7.8           V         20.5           S         18	30 100 390.5 150 500	1969/09/03 85.4 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/00/14 1969/11/20	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY PANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 18         116       BLACK ROCK HOT SPRING 18         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE	PE 27N           W 29N           W 29N           W 29N           W 32N           W 33N           PE 33N           PE           W 34N           PE 20N           PE 20N           PE 20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,16 15 10 23 34 10 02 01 34 06 05 33 34	DD NW SW NW C A B B NW NW D B B SE	40.2178 40.3692 40.3692 40.3692 40.9600 40.6800 40.6800 40.7226 40.7039 40.7447 40.7667 40.8633 40.8605 40.9700 40.9700 40.4178 40.2450	110.1997 110.4039 110.4039 110.4039 110.4037 110.3863 110.3867 110.3867 110.3443 110.3443 110.3443 110.1731 110.1167 110.3161 110.0100 116.7675 116.8678 119.3850 116.1367	S         28           N         135           N         135           S         06           S         06           S         06           S         28           V         28           V         26           V         33.5           S         04.5           S         94           S         57.8           V         20.5           S         18           V         60	30 100 390.5 150 500 715	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/06/14 1966/05/23	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 19775 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       TAILL HOLE         122       HYDER (HYDRA) HOT SPRINGS	PE 27N           W 29N           W 29N           W 29N           W 32N           W 33N           PE 33N           PE           W 34N           PE 33N           PE 20N           PE 20N           PE 25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,18 15 10 23 34 10 02 01 34 06 05 33 34 01 28	DD NW SW NW C A B B NW NW D B B SE	40.2178 40.3692 40.3692 40.3917 40.6000 40.6500 40.6500 40.728 40.728 40.7447 40.7647 40.6633 40.8008 40.4056 40.4178 40.2450 40.3367 40.6033	110.1997 119.4039 119.4039 119.4039 119.4037 119.3667 119.3650 119.3443 119.3443 119.3443 119.3443 119.3442 119.1167 119.3161 119.3161 119.675 118.6678 118.3650 118.367 118.367 118.367 117.7167	S         28           N         135           N         135           S         79           S         86           S         88.6           S         28           V         23.5           S         84.5           V         33.5           S         84.5           V         30.5           S         77.8           V         20.5           S         18           V         60           V         24           V         24	30 100 390.5 150 500 715	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/06/14 1966/05/23	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         109       GREAT BOILING SP ORIF 46         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 10         116       BLACK ROCK HOT SPRING 10         118       BLACK ROCK HOT SPRING 10         119       COLADO WELL         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HOLE         123       SOU HOT SPRINGS (GILBERTS HOT SPRINGS)	PE 27N           W 29N           W 29N           W 29N           W 32N           PE 33N           PE           W 34N           PE 34N           PE 20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,16 15 10 23 34 10 02 01 34 06 05 33 34 01 28 29	DD NW SW NW C A B B NW NW D B SE SE SE SE SE	40.2178 40.3692 40.3692 40.3692 40.5800 40.6800 40.6800 40.728 40.7847 40.7847 40.7867 40.8633 40.8605 40.9700 40.9700 40.9700 40.9700 40.9700 40.9705 40.4178 40.2450 40.337 40.00513 40.0055	110.1997 119.4039 119.4039 119.4039 119.3067 119.3853 119.3867 119.3443 119.3443 119.3442 119.1187 119.3181 119.3181 119.3181 119.3181 119.3850 118.3875 118.3850 118.3850 118.3850 117.7187 117.7247	8         28           N         135           S         70           S         86           S         80.5           S         86.6           S         26           Y         33.5           S         84.5           Y         30.5           S         57.8           Y         20.5           S         18           Y         20.5           S         18           Y         20.5           S         7.8           S         7.8           S         7.8	30 100 390.5 150 500 715 8 102	1969/09/03 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/12 1965/06/00 1975/01/01 1975/01/01 1975/03/29 1961/06/14 1969/11/20 1966/05/23 42 1957/02/05	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1970A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAR, 1903A WATSTORE WATSTORE WATSTORE SINCLAR, 1903A WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1970A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BLACK ROCK HOT SPRING 16         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GLBERTS HOT SPRINGS)         124       UNNAMED SPRING	PE 27N           W 29N           W 29N           W 29N           W 32N           PE 33N           PE           W 34N           PE 33N           PE           W 34N           PE 20N           PE 25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 21 09,16 15 10 23 34 10 02 01 01 02 01 34 06 05 33 34 01 28 29 19	DD NW SW NW C C A B B B B B B B SE SE SE SE SW SE NW	40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7226 40.7939 40.7437 40.7667 40.8633 40.8606 40.4178 40.4076 40.4178 40.4076 40.3387 40.0613 40.0085 40.0287	110.1997 110.4039 119.4039 119.4039 119.3067 119.3067 119.3050 119.3443 119.3443 119.3442 119.1107 119.3417 119.3181 119.0100 118.7675 118.8678 118.8678 118.3850 116.1397 117.7107 117.7107 117.7247 117.6483	8         28           N         135           N         135           S         70           S         86           S         86.6           S         86.6           S         86.6           S         86.6           S         86.7           V         26           V         33.5           S         84.5           V         80           S         94           S         57.8           V         20.5           S         18           W         90           V         24           V         20           V         24           S         76           S         73           S         28	30 100 390.5 150 600 715 8	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1966/06/00 1975/01/01 1972/03/29 1961/06/14 1969/11/20 1966/05/23 42 1957/02/05 1962/07/31	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1983A WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1983A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974A MARINER AND OTHERS, 1974A MARINER AND OTHERS, 1975A MARINER AND OTHERS, 1975 COHEN AND EVERETT, 1983	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP OFILF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 10         116       BLACK ROCK HOT SPRING 10         117       BACH WELL         118       PORTER SPRING 10         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GILBERTS HOT SPRINGS)         124       UNNAMED SPRING (LOWER RANCH)	PE         27N           W         29N           W         29N           W         29N           W         32N           W         32N           W         32N           W         32N           W         32N           W         33N           W         34N           PE         33N           PE         33N           PE         34N           HU         36N           PE         20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 09,16 15 10 10 23 34 01 02 01 34 06 05 33 34 01 28 29 19	DD NW SW NW C C A B B SE SE SE SE SE SE SW SE NW NW	40.2178 40.3692 40.3692 40.3692 40.9600 40.6600 40.6600 40.7226 40.7039 40.7447 40.7647 40.8633 40.8606 40.9700 40.4056 40.4178 40.2450 40.3367 40.0813 40.0813 40.0835	110.1997 110.4039 110.4039 110.4039 110.4037 110.3850 110.3850 110.3443 110.3443 110.3443 110.1731 110.1187 110.3181 110.100 110.775 110.675 110.8678 110.3850 116.1367 117.76977 117.7167 117.7247 117.6033	S         28           N         135           N         135           S         79           S         86           S         86.6           S         28           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         80           S         94           S         77.8           V         20.5           S         18           V         60           V         24           V         hot           8         73           S         28           S         40	30 100 390.5 150 500 715 8 102 189	1969/09/03 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1968/06/00 1975/01/01 1975/01/01 1975/03/29 1961/06/14 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE SINCLAIR, 1963A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1975 GARSIDE AND OTHERS, 1976A MARINER, AND OTHERS, 1979 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977A	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING 16         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GLBERTS HOT SPRINGS)         124       UNNAMED SPRING (LOWER RANCH)         125       SPRING, J.S. RANCH (MCCOY)	PE 27N           W 29N           W 29N           W 29N           W 39N           W 32N           W 34N           HU 36N           PE 28N           PE 28N           PE 28N           PE 28N           PE 28N           PE 28N	235 235 235 235 235 235 235 235 235 235	08 21 21 09,16 15 10 10 23 34 10 01 02 01 34 06 05 33 34 01 28 19 16 33	DD NW SW NW C A B B SE SE SE SE SE NW NW SW	40.2178 40.3692 40.3692 40.3692 40.6850 40.6850 40.6850 40.7228 40.7039 40.7447 40.7647 40.8633 40.8006 40.9700 40.4058 40.4178 40.4178 40.2651 40.03307 40.0033 40.0287 40.0357	110.1997 110.4039 110.4039 110.4039 110.3083 119.3067 119.3050 119.3443 119.3443 119.3443 119.3141 119.1167 119.3161 119.3450 119.3451 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3457 110.4575 110.4575 110.4575 110.4575 110.4575 117.7167 117.7167 117.7463 117.6003 117.6000	S         28           N         135           N         135           S         79           S         86           S         88.6           S         88.6           S         86.5           S         86.5           S         86.5           S         84.5           V         33.5           S         64.5           V         33.5           S         64.5           V         30.5           S         74.5           V         20.5           S         18           V         20.5           S         18           V         20.5           S         78           S         78           S         73           S         28           S         48.3	30 100 390.5 150 500 715 8 102 189 2536	1969/09/03 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/00 1975/01/01 1975/01/01 1975/01/01 1972/03/29 1961/09/14 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1960/06/04	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAIR, 1963A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND SCHILLING, 1979 MARINER AND OTHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNINAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNINAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED SPRING (GUBERTS HOT SPRINGS)         125       UNNAMED TSPRING (LOWER RANCH)         128       SPRING, J.S. RANCH (MECOY)         129       JERSEY VALLEY AREA - UNNAMED HOT SPRING	PE 27N           W 29N           W 29N           W 29N           W 32N           W 34N           PE 33N           PE           W 34N           PE 20N           PE 20N           PE 20N           PE 20N           PE 25N	235 235 235 235 235 235 235 235 235 235	08 21 21 15 15 10 23 34 10 02 01 34 00 01 34 06 05 33 34 01 28 29 10 16 16 33 28	DD NW SW NW C A B B B SE SE SE SE SE SW SE SW SW SW	40.2178 40.3692 40.3692 40.3917 40.6000 40.6000 40.6550 40.728 40.728 40.7939 40.7447 40.7647 40.8633 40.8603 40.8603 40.8054 40.8450 40.4178 40.0337 40.0033 40.0037 40.0377 40.1790	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.343 119.343 119.343 119.343 119.343 119.343 119.3417 119.3161 119.3161 119.678 118.678 118.678 118.3850 116.387 117.7167 117.7167 117.7247 117.7483 117.6033 117.6000 117.4900	8         20           N         135           S         79           S         86           S         80.5           S         86.6           S         80.5           S         86.6           N         33.5           S         84.5           V         26           V         33.5           S         84.5           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         24           V         hot           S         78           S         28           S         40.3           S         48.3           S         29	30 100 390.5 150 500 715 8 102 189 2536 20	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/02/12 1966/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1962/07/31 1962/07/13	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE COHEN AND OTHERS, 1974, 1975 COHEN AND OTHERS, 1974B COHEN AND OTHERS, 1974, 1975	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         110       BLACK ROCK HOT SPRING 16         111       BACH WELL         112       DRUMEST DREDGING CO. WELL         113       DONTER SPRING         114       DUPER 4/10DA) HOT SPRINGS         115       BLACK ROCK HOT SPRINGS         116       BLACK ROCK HOT SPRING         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HYDER 4/17DRA)	PE 27N           W 29N           W 29N           W 29N           W 29N           W 32N           PE 33N           PE           W 34N           PE 20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 15 15 10 10 23 34 10 00 01 02 01 04 05 33 34 00 05 33 34 01 28 29 19 16 16 20 20 20 20 20 20 20 20 20 20 20 20 20	DD NW SW NW C A B B B SE SE SE SE SE SE SE SE SE SE SE SE SE	40.2178 40.3692 40.3692 40.3692 40.3692 40.5600 40.5650 40.728 40.7637 40.7637 40.7637 40.8633 40.7647 40.8633 40.9700 40.4178 40.2450 40.0247 40.0350 40.2450	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.343 119.3442 119.3442 119.342 119.3417 119.3417 119.3417 119.3417 119.3181 119.3181 119.3850 118.8678 119.3850 118.8678 119.3850 117.7977 117.747 117.7445 117.6033 117.6000 117.6783	S         28           N         135           N         135           S         79           S         86           S         80.5           S         86.6           S         26           V         28           V         33.5           S         64.5           V         30           S         94           S         57.8           V         20.5           S         18           V         90           V         224           V         holt           S         78           S         28           S         48.3           S         48.3           S         29           V         22	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1952/09/18 1965/05/13 115 1963/01/07	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1975 GARSIDE AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (LOWER RANCH)         125       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PANIS WELL         129       J.S. RANCH WELL <td>PE 27N           W 29N           W 29N           W 29N           W 32N           W 33N           PE 33N           PE           W 34N           PE 33N           PE           W 34N           PE 20N           PE 20N</td> <td>23E 23E 23E 23E 22E 22E 23E 23E 23E 23E</td> <td>08 21 21 15 15 10 10 23 34 10 00 01 00 01 00 01 00 01 00 03 34 00 05 33 34 00 05 28 29 19 16 02 29</td> <td>DD NW SW NW C A B B B B SE SE SE SE SE SE SE SE SE NW NW SW SW SW D</td> <td>40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6850 40.7286 40.7939 40.7439 40.7437 40.7667 40.8633 40.8606 40.4176 40.4178 40.4178 40.00813 40.0085 40.0287 40.0287 40.2150 40.21</td> <td>110.1997 110.4039 119.4039 119.4039 119.4037 119.3867 119.3850 119.3443 119.3442 119.3442 119.3442 119.3447 119.3417 119.3417 119.3417 119.3181 119.000 118.7675 118.8678 118.3850 118.3850 117.7197 117.7247 117.6483 117.6003 117.6009</td> <td>S         28           N         135           N         135           S         70           S         86           S         86.6           S         86.6           S         86.6           S         86.6           S         86.6           S         86.7           V         26           V         33.5           S         84.5           V         80           S         94           S         57.8           V         20.5           S         18           W         60           V         24           V         hol           S         78           S         28           S         48.3           S         29           V         22           V         21</td> <td>30 100 390.5 150 500 715 8 102 189 2536 20 38</td> <td>1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/02/12 1966/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1962/07/31 1962/07/13</td> <td>WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WA</td> <td>ELECTRIC POWER VEGETABLE DRYING</td>	PE 27N           W 29N           W 29N           W 29N           W 32N           W 33N           PE 33N           PE           W 34N           PE 33N           PE           W 34N           PE 20N	23E 23E 23E 23E 22E 22E 23E 23E 23E 23E	08 21 21 15 15 10 10 23 34 10 00 01 00 01 00 01 00 01 00 03 34 00 05 33 34 00 05 28 29 19 16 02 29	DD NW SW NW C A B B B B SE SE SE SE SE SE SE SE SE NW NW SW SW SW D	40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6850 40.7286 40.7939 40.7439 40.7437 40.7667 40.8633 40.8606 40.4176 40.4178 40.4178 40.00813 40.0085 40.0287 40.0287 40.2150 40.21	110.1997 110.4039 119.4039 119.4039 119.4037 119.3867 119.3850 119.3443 119.3442 119.3442 119.3442 119.3447 119.3417 119.3417 119.3417 119.3181 119.000 118.7675 118.8678 118.3850 118.3850 117.7197 117.7247 117.6483 117.6003 117.6009	S         28           N         135           N         135           S         70           S         86           S         86.6           S         86.6           S         86.6           S         86.6           S         86.6           S         86.7           V         26           V         33.5           S         84.5           V         80           S         94           S         57.8           V         20.5           S         18           W         60           V         24           V         hol           S         78           S         28           S         48.3           S         29           V         22           V         21	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/02/12 1966/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1962/07/31 1962/07/13	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1977, 1975 MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WA	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP OFILF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACK MOCK HOT SPRING 16         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (LOWER RANCH)         128       SPRING, J.S. RANCH (MACOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         129       J.S. RANCH WELL	PE 27N           W 29N           W 29N           W 29N           W 32N           PE 20N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 109,16 15 10 10 23 34 10 02 01 34 06 05 33 34 01 28 29 19 16 33 28 29 19 16 22 29 12	DD NW SW NW SW NW C A B B SE SE SE SE SE SE SE SE SE SE SE SE SE	40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7226 40.7939 40.7447 40.7667 40.8633 40.8006 40.7070 40.8033 40.8006 40.4178 40.2450 40.3367 40.0813 40.0287 40.0287 40.0287 40.0285 40.028	110.1997 110.4039 119.4039 119.4039 119.3067 119.3067 119.3050 119.3443 119.3443 119.3443 119.3443 119.3141 119.1167 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3250 117.7107 117.7107 117.7107 117.6003 117.6783 117.6099 117.6850	S         28           N         135           N         135           S         70           S         86           S         86.6           S         26           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         20           S         94           S         57.8           V         20.5           S         18           V         60           V         24           V         hot           5         73           S         28           S         48.3           B         29           V         22           V         21           S         95.6	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1966/06/00 1975/01/01 1975/01/01 1972/03/29 1661/06/14 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1963/01/07 32.6 1963/01/07 32.6 1963/07/23	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1974A MARINER AND OTHERS, 1974A WATSTORE SINCLAIR, 1983A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, ND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING 16         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GRIBERTS HOT SPRINGS)         124       UNNAMED SPRING (GRIBERTS HOT SPRINGS)         125       SOU HOT SPRING (GRIBERTS HOT SPRINGS)         126       UNNAMED HOT SPRING (LOWER RANCH)         128       SPRING, J.S. RANCH (MCCOY)         129       J.S. RANCH	PE 27N           W 29N           W 29N           W 29N           W 39N           W 32N           W 33N           PE 33N           PE 20N           PE 20N           PE 20N           PE 25N           PE 26N           PE 29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08         21           21         21           20,16         15           15         10           10         10           02         01           34         06           05         33           34         01           28         19           16         33           26         02           29         12           01         29	DD NW SW NW SW NW C A B B SE SE SE SE SE SE SW SE NW NW SW SW SW SW NW NW C	40.2178 40.3692 40.3692 40.3692 40.6850 40.6850 40.7228 40.7039 40.7437 40.7647 40.7647 40.8633 40.8006 40.9700 40.4076 40.4178 40.4178 40.0613 40.0613 40.0257 40.0350 40.0767 40.0350 40.4759	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3867 119.3850 119.3443 119.3443 119.3443 119.3443 119.3443 119.3447 119.3161 119.3161 119.3161 119.3161 119.3850 117.6009 117.6033 117.6009 117.6031 117.6031 117.6031 117.6050 117.8831	8         20           W         135           N         135           S         66           S         68           V         26           V         33.5           S         64           S         94           S         57.8           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         24           V         hot           S         28           S         40           S         48.3           S         21           S         95.6           S         66	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1958/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1975/01/01 1975/01/01 1975/01/01 1975/01/01 1975/03/29 1961/09/14 1966/05/23 42 1957/02/05 1962/07/31 1952/09/16 1960/06/04 1957/05/13 115 1963/01/07 32.6 1963/07/23 1977/05/08	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WARNER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GOHEN AND OTHERS, 1974, 1975 COHEN AND CHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (LOWER RANCH)         128       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         129       J.S. RANCH WELL         <	PE 27N           W 29N           W 29N           W 29N           W 29N           W 32N           W 33N           PE 33N           PE 20N           PE 20N           PE 20N           PE 20N           PE 25N           PE 25N           PE 25N           PE 25N           PE 25N           PE 27N           PE 27N           PE 27N           PE 27N           PE 28N           PE 27N           PE 28N           PE 27N           PE 28N           PE 28N </td <td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td> <td>08 21 21 15 15 10 23 34 10 02 01 01 02 01 03 4 06 05 33 34 06 05 33 34 01 28 29 16 16 16 33 32 29 12 01 20 01 20 01 00 15 15 15 10 00 15 15 15 15 15 15 15 15 15 15 15 10 10 15 15 15 15 15 15 15 15 15 15 15 15 15</td> <td>DD NW SW NW C A B B SE SE SE SE SW SE SW SE SW SE SW SE SW SE NW NW NW NW C C DDD</td> <td>40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7226 40.7939 40.7447 40.7667 40.8633 40.8006 40.7070 40.8033 40.8006 40.4178 40.2450 40.03367 40.0813 40.0267 40.0350 40.0767 40.2450 40.0265 40.0267</td> <td>110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.107 119.3161 119.3161 119.3161 119.417 117.767 117.767 117.7167 117.7247 117.7483 117.6033 117.6050 117.6850 117.6837</td> <td>S         28           N         135           N         135           S         70           S         86           S         86.6           S         26           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         20           S         94           S         57.8           V         20.5           S         18           V         60           V         24           V         hot           5         73           S         28           S         48.3           B         29           V         22           V         21           S         95.6</td> <td>30 100 390.5 150 500 715 8 102 189 2536 20 38</td> <td>1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/00/12 1965/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1952/09/16 1963/01/07 32.6 1963/07/23 1977/05/08</td> <td>WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1974A MARINER AND OTHERS, 1974A WATSTORE SINCLAIR, 1983A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, ND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963</td> <td>ELECTRIC POWER VEGETABLE DRYING</td>	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 15 15 10 23 34 10 02 01 01 02 01 03 4 06 05 33 34 06 05 33 34 01 28 29 16 16 16 33 32 29 12 01 20 01 20 01 00 15 15 15 10 00 15 15 15 15 15 15 15 15 15 15 15 10 10 15 15 15 15 15 15 15 15 15 15 15 15 15	DD NW SW NW C A B B SE SE SE SE SW SE SW SE SW SE SW SE SW SE NW NW NW NW C C DDD	40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7226 40.7939 40.7447 40.7667 40.8633 40.8006 40.7070 40.8033 40.8006 40.4178 40.2450 40.03367 40.0813 40.0267 40.0350 40.0767 40.2450 40.0265 40.0267	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.107 119.3161 119.3161 119.3161 119.417 117.767 117.767 117.7167 117.7247 117.7483 117.6033 117.6050 117.6850 117.6837	S         28           N         135           N         135           S         70           S         86           S         86.6           S         26           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         20           S         94           S         57.8           V         20.5           S         18           V         60           V         24           V         hot           5         73           S         28           S         48.3           B         29           V         22           V         21           S         95.6	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/00/12 1965/06/00 1975/01/01 1975/01/01 1975/01/01 1975/02/05 1962/07/31 1952/09/16 1963/01/07 32.6 1963/07/23 1977/05/08	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1974A MARINER AND OTHERS, 1974A WATSTORE SINCLAIR, 1983A WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, ND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER, AND OTHERS, 1976A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1977A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       GREAT BOILING SP ORIF 46         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (GUBERTS HOT SPRINGS)         125       UNNAMED HOT SPRING (GUBERTS HOT SPRINGS)         126       SPRING, J.S. RANCH (MECOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       SPRING J.S. RANCH MEL	PE 27N           W 29N           W 29N           W 29N           W 39N           W 32N           W 33N           PE 33N           PE 20N           PE 20N           PE 20N           PE 25N           PE 26N           PE 29N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08         21           21         21           15         15           10         15           23         34           10         02           01         03           34         06           05         33           34         01           28         29           19         16           16         22           17         28           29         19           16         02           29         12           01         30	DD NW SW NW C A B B SE SE SE SE SW SE SW SE NW NW NW NW C C DDD	40.2178 40.3692 40.3692 40.3917 40.6000 40.6000 40.728 40.7939 40.7447 40.7039 40.7447 40.7037 40.8033 40.8009 40.4056 40.4178 40.9700 40.4056 40.3307 40.0337 40.0337 40.0033 40.0613 40.0287 40.1790 40.2450 40.4181	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.343 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.3417 119.3417 119.3417 119.3417 119.3181 119.3181 119.3850 118.8678 119.3850 117.7187 117.7187 117.7483 117.6000 117.6831 117.6831 117.6831 117.6831 117.6831 117.6831 117.6831 117.6831 117.4158	8         20           N         135           S         79           S         86           S         80.5           S         86.6           S         28           V         28           V         33.5           S         84.5           V         80           S         94           S         57.8           V         20.5           S         18           V         24           V         hot           S         28           S         40.3           S         24.3           V         22           V         22           V         22           V         22           V         22 </td <td>30 100 390.5 150 500 715 8 102 189 2536 20 38</td> <td>1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/02/12 1966/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 1962/07/31 1962/07/31 1952/09/16 1963/01/07 32.6 1963/07/23 1977/05/08 1977/05/08</td> <td>WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GOHEN AND CHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975 COHEN AND CHERST, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE</td> <td>ELECTRIC POWER VEGETABLE DRYING</td>	30 100 390.5 150 500 715 8 102 189 2536 20 38	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/02/12 1966/06/00 1975/01/01 1972/03/29 1961/09/14 1969/11/20 1966/05/23 1962/07/31 1962/07/31 1952/09/16 1963/01/07 32.6 1963/07/23 1977/05/08 1977/05/08	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GOHEN AND CHERS, 1974, 1975 COHEN AND OTHERS, 1974, 1975 COHEN AND CHERST, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       SAN EMIDIO DESERT - UNNAMED HOT SPRING (GERLACH HOT S         109       GREAT BOILING SP ORIF 46         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (MARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 10         116       BLACK ROCK HOT SPRING 10         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRILL HOLE         122       HYDER 9HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GLBERTS HOT SPRINGS)         124       UNNAMED SPRING         125       SPRING, J.S. RANCH (McCOY)         126       JERSEY VALLEY AREA - UNNAMED HOT SPRING         127       JERSEY VALLEY AREA - UNNAMED HOT S	PE 27N           W 29N           W 29N           W 29N           W 29N           W 32N           W 34N           PE 30N           PE 20N           PE 20N     <	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08         21           21         21           15         15           10         15           23         34           10         02           01         03           34         06           05         33           34         01           28         29           19         16           16         22           17         28           29         19           16         02           29         12           01         30	DD NW SW NW C A B B SE SE SE SE SE SE SE SE SE SE SE SW SE NW NW SW SW SW SW NW SW SW SW SW SW SW SW SW SW NW	40.2178 40.3692 40.3692 40.3692 40.3692 40.6600 40.6600 40.728 40.7639 40.7639 40.7647 40.7667 40.8633 40.8609 40.7647 40.8633 40.8609 40.4078 40.4078 40.4058 40.0033 40.0085 40.0287 40.0287 40.0287 40.0287 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0281 40.0285 40.0281 40.0285 40.0281 40.0285 40.0281 40.0285 40.0281 40.0285 40.0281 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287 40.0285 40.0287	110.1997 110.4039 119.4039 119.4039 119.4037 119.3853 119.3867 119.3855 119.3443 119.3442 119.3442 119.1187 119.3417 119.3417 119.3417 119.3417 119.3417 119.3181 119.000 118.7675 118.8678 118.3850 116.1387 117.7187 117.7247 117.6483 117.6099 117.6897 117.6897 117.6897 117.6897 117.6897 117.6897 117.6897 117.4831 117.6997 117.6897 117.6897 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.6997 117.4831 117.4831 117.4837 117.4831 117.4837 117.4831 117.3255	S         22           N         135           S         70           S         86           S         80.5           S         86.6           S         26           Y         33.5           S         84.5           Y         30.5           S         64.5           Y         30.5           S         7.8           S         57.8           V         20.5           S         18           V         20.5           S         24           V         holt           S         28           S         48.3           S         29.5           S         22           V         21           S         95.6           S         92.2           S	30 100 390.5 150 500 715 8 102 189 2536 20 38 38 7.6	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/00 1975/01/01 1975/01/01 1975/02/05 1961/00/14 1969/13/20 1962/07/31 1952/09/16 1963/01/07 32.6 1975/05/08 1977/05/08	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WOLLENBERG AND OTHERS, 1977	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105       Amor II well 43-21         106       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANTE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 16         116       BLACK ROCK HOT SPRING 16         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (LOWER RANCH)         125       UNNAMED MOT SPRING (LOWER RANCH)         126       SPRING, J.S. RANCH (MECOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       SPRING SS </td <td>PE 27N           W 29N           W 29N           W 29N           W 32N           W 34N           PE 33N           PE           W 34N           PE 33N           PE 29N           PE 29N           PE 28N           PE 29N           PE 29N           PE 30N           PE 31N</td> <td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td> <td>08 21 21 15 15 10 02 23 34 10 02 01 34 06 05 33 34 06 05 33 34 06 05 33 34 01 28 29 19 16 16 16 16 20 29 12 01 00 12 29 12 01 00 12 10 00 15 15 15 15 10 00 15 15 15 15 15 15 10 00 15 15 15 15 15 15 15 10 00 15 15 15 15 15 10 00 15 15 15 15 15 15 10 00 15 15 15 10 00 15 15 10 00 15 15 10 00 15 15 10 00 10 10 10 10 10 10 10 10 10 10 10</td> <td>DD NW SW NW C A B B SE SE SE SE SE SW SE SE NW SW SW SW SW SW SW SW SW SW SW SW SW SW</td> <td>40.2178 40.3692 40.3692 40.3697 40.6600 40.6500 40.728 40.7939 40.7447 40.7647 40.7647 40.8633 40.8009 40.4056 40.4178 40.9700 40.4056 40.4178 40.0613 40.0033 40.0633 40.0287 40.1790 40.2455 40.2450 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.25555 40.2555 40.25555 40.25555 40.255555 40.25555555 40.255</td> <td>110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.343 119.343 119.342 119.342 119.342 119.167 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3850 117.7167 117.7167 117.7167 117.7167 117.7633 117.6033 117.6050 117.4900 117.4950 117.4550 117.7256</td> <td>8         20           N         135           S         79           S         86           S         80.5           S         86.6           S         80.5           S         86.6           N         33.5           S         84.5           V         26           V         33.5           S         84.5           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         24           V         hot           S         78           S         48.3           S         40.5           S         46.3           S         95.6           S         95.6           S         65.5           S         65.5           S         65.5           S         55.5</td> <td>30 100 390.5 150 500 715 8 102 189 2538 20 38 7.6 4</td> <td>1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/06/12 1961/06/12 1966/06/00 1975/01/01 1975/01/01 1977/02/05 1962/07/31 1952/09/16 1962/07/31 1952/09/16 1963/01/07 32.6 1963/01/07 1963/1 1963/1 1963/10</td> <td>WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE WATSTO</td> <td>ELECTRIC POWER VEGETABLE DRYING</td>	PE 27N           W 29N           W 29N           W 29N           W 32N           W 34N           PE 33N           PE           W 34N           PE 33N           PE 29N           PE 29N           PE 28N           PE 29N           PE 29N           PE 30N           PE 31N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 15 15 10 02 23 34 10 02 01 34 06 05 33 34 06 05 33 34 06 05 33 34 01 28 29 19 16 16 16 16 20 29 12 01 00 12 29 12 01 00 12 10 00 15 15 15 15 10 00 15 15 15 15 15 15 10 00 15 15 15 15 15 15 15 10 00 15 15 15 15 15 10 00 15 15 15 15 15 15 10 00 15 15 15 10 00 15 15 10 00 15 15 10 00 15 15 10 00 10 10 10 10 10 10 10 10 10 10 10	DD NW SW NW C A B B SE SE SE SE SE SW SE SE NW SW SW SW SW SW SW SW SW SW SW SW SW SW	40.2178 40.3692 40.3692 40.3697 40.6600 40.6500 40.728 40.7939 40.7447 40.7647 40.7647 40.8633 40.8009 40.4056 40.4178 40.9700 40.4056 40.4178 40.0613 40.0033 40.0633 40.0287 40.1790 40.2455 40.2450 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.2450 40.2455 40.25555 40.2555 40.25555 40.25555 40.255555 40.25555555 40.255	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.343 119.343 119.342 119.342 119.342 119.167 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3161 119.3850 117.7167 117.7167 117.7167 117.7167 117.7633 117.6033 117.6050 117.4900 117.4950 117.4550 117.7256	8         20           N         135           S         79           S         86           S         80.5           S         86.6           S         80.5           S         86.6           N         33.5           S         84.5           V         26           V         33.5           S         84.5           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         20.5           S         18           V         24           V         hot           S         78           S         48.3           S         40.5           S         46.3           S         95.6           S         95.6           S         65.5           S         65.5           S         65.5           S         55.5	30 100 390.5 150 500 715 8 102 189 2538 20 38 7.6 4	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/06/12 1961/06/12 1966/06/00 1975/01/01 1975/01/01 1977/02/05 1962/07/31 1952/09/16 1962/07/31 1952/09/16 1963/01/07 32.6 1963/01/07 1963/1 1963/1 1963/10	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE WATSTO	ELECTRIC POWER VEGETABLE DRYING
104       LOWER STONEHOUSE SPRING         105.1       Amor II well 43-21         105.2       Amor II well 43-21         105       SAN EMIDIO DESERT - UNNAMED HOT SPRING         107       GERLACH AREA - GREAT BOILING SPRING (GERLACH HOT S         108       UNNAMED HOT SPRING NEAR GREAT BOILING SPRING         109       GREAT BOILING SP ORIF 46         110       BOWEN         111       GRANITE CREEK RANCH WELL         112       WELL         113       UNNAMED HOT SPRING NEAR TREGO         114       FLY RANCH (WARDS HOT SPRING) - WELL         115       HUALAPAI FLAT SPRING 10         116       BLACK ROCK HOT SPRING 10         117       BACH WELL         118       PORTER SPRING         119       COLADO WELL NO. 1         120       SOUTHWEST DREDGING CO. WELL         121       DRIL HOLE         122       HYDER (HYDRA) HOT SPRINGS         123       SOU HOT SPRING (GRUBERTS HOT SPRINGS)         124       UNNAMED HOT SPRING (LOWER RANCH)         128       SPRING, J.S. RANCH (MCCOY)         127       JERSEY VALLEY AREA - UNNAMED HOT SPRING         128       PARIS WELL         130       KYLE HOT SPRINGS <tr< td=""><td>PE 27N           W 29N           W 29N           W 29N           W 32N           PE           W 34N           PE 20N           PE 20N           PE 25N           PE 25N</td><td>23E 23E 23E 23E 23E 23E 23E 23E 23E 23E</td><td>08 21 21 15 15 10 01 23 34 10 00 01 02 01 01 34 06 05 33 34 01 28 29 19 16 16 02 29 19 16 23 33 34 01 00 5 33 34 10 00 10 00 10 00 10 10 10 10 10 10 10</td><td>DD NW SW NW C C A B B SE SE SE SE SE SE SE SE SE SE SE SE SE</td><td>40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7228 40.7939 40.7447 40.7667 40.8633 40.8606 40.7727 40.8633 40.8006 40.4178 40.2450 40.0357 40.0287 40.0085 40.008</td><td>110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.342 119.343 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.345 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.605 117.663 117.663 117.255 117.663 117.255 117.663 117.6457 117.6457</td><td>S         28           N         135           N         135           S         70           S         86           S         86.6           S         26           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         20           S         94           S         94           S         57.8           V         20.5           S         18           V         24           V         hot           S         73           S         28           S         48.3           S         95.6           S         65.5           V         58.1  </td><td>30 100 390.5 150 500 715 8 102 189 2536 20 38 7.6 4 200</td><td>1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/00 1975/01/01 1975/01/01 1975/02/29 1961/00/14 1969/10/14 1969/10/14 1969/17/01/01 1952/09/18 1977/05/08 1977/05/0</td><td>WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE SANDERG AND OTHERS, 1977 WOLLENBERG AND OTHERS, 1977</td><td>ELECTRIC POWER VEGETABLE DRYING</td></tr<>	PE 27N           W 29N           W 29N           W 29N           W 32N           PE           W 34N           PE 20N           PE 20N           PE 25N	23E 23E 23E 23E 23E 23E 23E 23E 23E 23E	08 21 21 15 15 10 01 23 34 10 00 01 02 01 01 34 06 05 33 34 01 28 29 19 16 16 02 29 19 16 23 33 34 01 00 5 33 34 10 00 10 00 10 00 10 10 10 10 10 10 10	DD NW SW NW C C A B B SE SE SE SE SE SE SE SE SE SE SE SE SE	40.2178 40.3692 40.3692 40.3692 40.3692 40.6800 40.6800 40.7228 40.7939 40.7447 40.7667 40.8633 40.8606 40.7727 40.8633 40.8006 40.4178 40.2450 40.0357 40.0287 40.0085 40.008	110.1997 119.4039 119.4039 119.4039 119.4037 119.3850 119.3850 119.342 119.343 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.342 119.345 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.603 117.605 117.663 117.663 117.255 117.663 117.255 117.663 117.6457 117.6457	S         28           N         135           N         135           S         70           S         86           S         86.6           S         26           V         23.5           S         84.5           V         26           V         33.5           S         84.5           V         20           S         94           S         94           S         57.8           V         20.5           S         18           V         24           V         hot           S         73           S         28           S         48.3           S         95.6           S         65.5           V         58.1	30 100 390.5 150 500 715 8 102 189 2536 20 38 7.6 4 200	1969/09/03 85.4 1956/02/22 1960/01/28 1975/01/01 1961/12/13 1961/06/12 1965/06/00 1975/01/01 1975/01/01 1975/02/29 1961/00/14 1969/10/14 1969/10/14 1969/17/01/01 1952/09/18 1977/05/08 1977/05/0	WATSTORE NEVADA BUREAU OF MINES AND GEOLOGY NEVADA BUREAU OF MINES AND GEOLOGY MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974, 1975 WATSTORE SINCLAR, 1963A WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE WATSTORE MARINER, R., USGS, MENLO PARK LOELTZ AND PHOENIX, 1955 GARSIDE AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1976A MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974 MARINER AND OTHERS, 1974B COHEN AND EVERETT, 1963 MARINER AND OTHERS, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE SANDERS AND MILES, 1974 WATSTORE SANDERG AND OTHERS, 1977 WOLLENBERG AND OTHERS, 1977	ELECTRIC POWER VEGETABLE DRYING

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* NAME	со т	R SC	OSEC	NLAT	WLONG	T TEMP	FLOW	DEPTH CDATE	REFERENCE	USE
139 NORTHERN EAST RANGE AREA	HU 35N 36E	28	NE NW NE	40.8850	117.9383	S 27.8			COHEN, 1963	
140 SPRING	PE 30N 33E	_	·	40.4508	118.2934	S warm			CROFUTT, 1872	
141 HUMBOLDT (RYE PATCH) AREA - PHILLIPS PETROL. CAMPB	PE 31N 33E	The second s	SE	40.5350		W 162.8		565 1970/09/01	GARSIDE AND SCHILLING, 1979	
142 Florida Canyon Mine well 143.1 SPRINGS	PE 31N 33E	_		40.5833		W 114.4			Trexter and others, 1990	HEAP LEACHING
143.1 SPRINGS 143.2 BLUE MOUNTAIN DRILL HOLE	PE 33N 35E HU 36N 34E		С	40.7050		S warm	227.1	117 1044/	WARING, 1965	
144 CALIFORNIA PACIFIC UTILITIES CO. WELL	HU 36N 36E		NE SW SE	40.9600		W 87.8 W 22.8	221.1	<u>137 1966/</u> 151 1970/10/07	PARR AND PERCIVAL, 1991 COHEN, 1962	
145 UNNAMED SPRING	HU 36N 37E		SE NE SW	40.9926	117.7620	S 33.9		1954/10/05	COHEN, 1962	
140 BLM WELL	HU 36N 38E		SW NE SE	40.9642		W 22.8		16.5	COHEN, 1962	·····
147 UNNAMED HOT SPRING NEAR GOLCONDA	HU 36N 40E	_	SW SW SE	40.9610		\$ 74	750		MARINER AND OTHERS, 1974, 1975	
148 GOLCONDA TUNGSTEN MINE DRILL HOLE 302	HU 36N 40E	36	SW	40.9497	117.4238	W 61.7		78.6	GARSIDE AND SCHILLING, 1979	<u> </u>
149 UNNAMED HOT SPRING	HU 33N 40E	05	SE	40.7617	117.4922	S 65	100		MARINER AND OTHERS, 1974, 1975	
150 SULPHUR SPRING	PE 35N 41E	34		40.6643	117.3491	S hot	_		KERR, 1940	
151 BROOKS SPRING	HU 34N 41E		NE NW NE	40.8317		S 34		1982/07/15	TREXLER AND OTHERS, 1979	
152 HOT POT SPRING	HU 35N 43E	the second s	NE NE SE	40.9228		<u>S 58</u>		1912/11/16	MARINER AND OTHERS, 1974, 1975	
153 MOUND SPRING	LA 20N 44E	_		40.3125		\$ 32		1950/01/05	"WHITE, D., USGS, MENLO PARK	
154 UNN HOT SP VLLY OF MOON	LA 27N 43E		BCC	40.1911		\$ 53		1974/01/01	WATSTORE	
155 IZZENHOOD RANCH SPRING	LA 35N 45E		SW NE NW			<u>S 31</u>		1962/07/05	TREXLER AND OTHERS, 1979	
158 DEE 3 WELL	EL 36N 49E		CDD	41.0194		<u>W 45</u>		1990/08/27	WATSTORE	
157 BW2 WELL	EU 36N 50E		BCC	40.9831		W 51.5		402.3 1990/08/29	WATSTORE	
158 BRAHMA SPRING 159 NEWMONT WELL MC2	EU 35N 51E		DOCB	40.8872		<u>S 18.5</u>		1990/06/30	WATSTORE	
	EU 34N 51E		DOD	40.7981		<u>W 31.5</u>		1989/04/11	WATSTORE	
160 UNNAMED SPRING 161 UNNAMED SPRINGS NEAR CARLIN	EL 33N 53E EL 33N 52E		NW SE SW	40.7642		<u>S 64</u>		1970/10/07	TREXLER AND OTHERS, 1979	(COACE HEATING)
162 TYROL SPRING	EL 33N 52E		CDBA	40.6972		<u>\$ 79</u> \$ 22		1950/05/24	MARINER AND OTHERS, 1974, 1975 WATSTORE	(SPACE HEATING)
163 SPRING	EU 31N 52E		CUBA	40.5892	the second s	<u>s 22</u> S werm		1990/06/13	BRADBURY AND ASSOCIATES, 1964	
184 MACK CREEK FARM WELL	EU 33N 49E	_	ACDD	40.7494		<u>5 warm</u> W 26		172.2 1990/08/24	WATSTORE	
185 WHITE ROCK SPRINGS	LA 33N 47E			40.7493		S warm		172.2 1000100124	WARING, 1965	
166 HOT SPRING	LA 32N 46E			40.8745		S hot			STONY POINT	
167 BATTLE MOUNTAIN CITY WELL	LA 32N 45E	17	SW SW	40.6463		W 23.3	946	221 1970/09/01	SCOTT AND BARKER, 1962	
168 BEOWAWE - SPRING 51	EU 31N 48E	17	N 1/2	40.5583	116.5833	S 96	283.9		"WHITE, DONALD, U.S.G.S.	ELECTRIC POWER
169 BEOWAWE HOT SPRING	EU 31N 48E	08	SE	40.5667	116.5667	S 96	100		MARINER AND OTHERS, 1974B, 1975	
170 HORSESHOE RANCH HOT SPRINGS	EU 32N 49E	33	SW	40.6017	116.4600	S 58	3.8	1967/11/10	ROBERTS AND OTHERS, 1967	
171 HOT SPRINGS POINT	EU 29N 48E	11	NE NE	40.4035	116.5167	\$ 54	125	1948/10/21	MARINER AND OTHERS, 1974, 1975	
172 HOT SPRINGS POINT	EU 29N 48E		NE NE	40.4033		S 60		1974/08/05	"WHITE, DONALD, U.S.G.S.	
173 SPAING	EU 28N 49E	*****	NW NW N	40.3150		S 85.5	9.5	1968/00/00	GARSIDE AND SCHILLING, 1979	
174 CARLOTTI RANCH SPRING, SULFUR SPRING	EL 26N 52E		SE	40.2900		<u>S 39</u>	378.5		WARING, 1965	
175 HOT CREEK SPRINGS AREA	EU 28N 52E		NW	40.3283		5 26.1	6000	1972/00/00	MARINER AND OTHERS, 1974B	
176 BRUFFEY'S HOT SPRINGS	EU 27N 52E EU 25N 53E		NE SE	40.2192		<u>\$ 65.5</u> \$ 26	189 38	1964/07/16	ROBERTS AND OTHERS, 1967 WARING, 1965	
178 Elko Heat Company Well	EU 234 532			40.825		<u>8 20</u> N 80	36	1989/	Flynn and Buchanan, 1990	SPACE HEATING
179 HOT HOLE (ELKO HOT SPRINGS)	EL 34N 55E	21	NĒ	40.8185		\$ 56	75	1950/05/24	MARINER AND OTHERS, 1974, 1975	
160 WARM SPRING	EL 34N 59E			40.7624		S warm			SOLDIER PEAK 7.5' QUAD	
181 SULPHUR HOT SPRINGS (HOT SULPHUR SPRINGS)	EL 31N 59E		NE NW	40 5867		S 93	75	19747	MARINER AND OTHERS, 1974, 1975	
182 UNNAMED HOT SPRING NEAR RUBY MARSH	EL 27N 58E	02	NW	40.2500		S 65		1949/09/08	MARINER AND OTHERS, 1974, 1975	
183 UNNAMED SPRING	LA 26N 45E	15	NE	40.1275	116.8853	S 22.2			EVERETT AND RUSH, 1966	
184 UNNAMED HOT SPRING (VALLEY OF THE MOON)	LA 27N 43E	23	NE	40.1987	117.1008	S 53		1960/05/25	MARINER AND OTHERS, 1974, 1975	
185 UNNAMED HOT POOL	LA 27N 45E	25		40.1833	116.8617	S 50		1967/03/10	*WHITE, D., USGS, MENLO PARK	
180 UNNAMED SPRING	LA 27N 46E		NW	40.1867		5 22.2		1975/08/00	EVERETT AND RUSH, 1966	
187 Warm apring at Warm Creek Ranch	EL 33N 81E			40.7505		S werm	7570		Eakin and others, 1951	<u></u>
188 UNNAMED SPRING NEAR WARM SPRINGS RANCH	EL 35N 64E		NW NE N	40.9517		<u>\$ 30</u>	189	1964/10/23	*WILSON, 1980	
189 JOHNSON RANCH (BIG SPRINGS)	EL 36N 86E		SW SW SE	40.9708		<u>6 22.7</u>	113.6	1949/10/12	WARING, 1965	
190 COLLAR AND ELBOW SPRING	W 26N 65E			40.0835	114.6343				*NEVADA BUREAU OF MINES AND GEOLOGY	
191 THE NEEDLE ROCKS - ANAHO ISLAND SPRING 192 THE PYRAMID HOT SPRING	W 24N 22E W 24N 22E	_		39.9483 39.9603	119.5100			19/9/10/15	*GARSIDE, L., NBMG	
193 WARM SPRINGS	W 23N 20E			39.8462	119.5012 119.7161	8 werm 5 68.3			*GARSIDE, L., NBMG	
194 MCCULLOCH CORP. WELL	W 22N 21E		SE NW	39.8462		<u>5 66.3</u> W 43.3		1962/03/21	*DESERT RESEARCH INSTITUTE, 1973	
195 COTTONWOOD SPRING	W 23N 21E			39.8327		\$ warm			WARING, 1965	<u> </u>
196 GEOTHERMAL WELL	CH 23N 26E			39.8575	119.0118				HOT SPRINGS FLAT 7.5' QUAD	······································
197 SPRING	CH 22N 28E		ADA	39.7883		\$ 58	0.0	1981/02/20	WATSTORE	
198 Bredys Hot Springs	СН			39.787	119.012			1969/	Flynn and Buchanan, 1990	VEGETABLE DRYING
199 BRADY HOT SPRINGS	CH 22N 26E	12	NE NE SW	39.7883	1 19.0 167	S 94		1966/00/00	"WHITE, D., USGS, MENLO PARK	
200 Eagle Salt Works Spring	CH 22N 36E			39.7301	119.0387	5			Adams, 1944	
201 HAZEN AREA (PATUA HOT SPRINGS)	LY 20N 26E	18	SW	39.5967	1 19.1033	5 86.1		1966/11/12	MARINER AND OTHERS, 1975	
202 Patua Hot Spring	LY			39.507		S 86		1989/	Flynn and Buchanan, 1990	
203 UNNAMED WELL	W 19N 16E			39.5150	119.9650			10 1978/08/17	DESERT RESEARCH INSTITUTE, 1973	
204 LAWTON HOT SPRINGS	W 19N 18E		SW NE	39.5150		<u>\$ 48.9</u>			COHEN AND LOELTZ, 1964	(SPA)
205 MOANA AREA - PEPPER MILL MOTEL	W 19N 19E	24	NE NW	39.5017	119.7963			1957/05/15	BATEMAN AND SCHEIBACH, 1975	SPACE HEATING
208 Warren Estates #1 Well	WA			39.481	119.825	N 88		1989/	Flynn and Buchanan, 1990	SPACE HEATING

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* NAME	co	r A	sc	OSEC	NLAT	WLONG	T	TEMP	FLOW	DEPTH	CDATE	REFERENCE	USE
207 MOANA AREA - MOORE WELL	W 19N		20	NE SE	39.4817	119.8100	W	80		60		BATEMAN AND SCHEIBACH, 1975	SPACE HEATING, P
206 Steamboat/Ormat Well	WA				39.395	119.715	W	113			1969/	Flynn and Buchanan, 1990	ELECTRIC POWER
209 WELL	W 18N	20E	34		39.3817	119.7233	W	30		36		BATEMAN AND SCHEIBACH, 1975	SPACE HEATING
210 STEAMBOAT SPRINGS - SPRING 25	W 18N	20E	33	NE	39.3833	119.7333	5	94	50		1970/09/01	MARINER AND OTHERS, 1974, 1975	
211 UNNAMED WELL	W 17N	20E	07	SE	39.3500	119.7717	W	24		31		GARSIDE AND SCHILLING, 1979	
212 SPRING 0	ST 18N	21E	15	CABD	39.4258	119.6111	S	19	1.7		1970/10/01	WATSTORE	
213 BOWERS MANSION (FRANKTOWN) HOT SPRING - MAIN SPRIN	W 16N	19E	03	NW	39.2833	119.8367	5	47.2	644		1974/02/04	WHITE AND OTHERS, 1963	SWIMMING POOL
214 UNNAMED WELL	W 16N	20E	06		39.2750	119.7800	W	26		24	1974/00/00	DESTERT RESEARCH INSTITUTE, 1973	
215 COMSTOCK MINING DISTRICT-NEW YELLOW JACKET SHAFT	ST 17N	21E	32	SW SE	39.2900	119.6467	W	76.7		914	1964/06/05	BECKER, 1882	
218 SPRING 8	ST 17N	21E	14	DCBC	39.3342	119.5914	S	21	5.1		1970/09/30	WATSTORE	
217 SUTRO TUNNEL	LY 16N	21E	02	NE NE SE	39.2750	119.5650	S	27.2			1950/04/28	GLANCY AND KATZER, 1975	
218 UNNAMED	LY 16N	22E	07	NW SE NW	39.2583	119.5600	W	26.7		31	1953/05/11	GLANCY AND KATZER, 1975	
219 CARSON CITY WELL NO 7	CC 15N	20E	06	DAAC	39.1925	119.7714	W	28		138.7	1988/05/25	WATSTORE	
220 CARSON CITY WELL NO 4	CC 15N	20E	17	DDDA	39.1592	119.7517	W	27		184.1	1988/09/08	WATSTORE	
221 NOBLE MURRAY WELL	CC 15N	20E	23		39.1433	119.6963	W	41				*NEVADA BUREAU OF MINES AND GEOLOGY	SPACE HEATING
222 CARSON HOT SPRING	CC 15N	20E	05	SE NE	39.1917	119.7517	S	50			1921/11/00	*NEVADA BUREAU OF MINES AND GEOLOGY	SPA, POOL
223 SARATOGA HOT SPRING	CC 14N	20E	21	SW SE	39.0567	119.7400	8	50			1958/01/27	*NEVADA BUREAU OF MINES AND GEOLOGY	
224 WETLANDS, WARM WELL	DG 14N	20E	20	DAA	39.0019	119.7514	W	40		7.9	1983/08/26	WATSTORE	
225 HOBO HOT SPRINGS	DG 14N	19E	23	SE SE	39.0550	119.8083	8	48	473		1929/02/24	GLANCY AND KATZER, 1975	(AQUACULTURE)
228 HASTIE WELL	DG 13N	20E	02	C88	39.0183	119.7119	W	21		53.6	1966/05/20	WATSTORE	
227 UNNAMED WELL	LY 14N	23E	25		39.0500	119.3567	W	27.7	1533	165	1979/11/15	SCOTT AND BARKER, 1962	
228 NEVADA STATE PRISON SPRING	CC 15N	20E	18	SE SE	39.1600	119.7350	8	24			1967/07/25	*NEVADA BUREAU OF MINES AND GEOLOGY	(AQUACULTRUE)
229 WABUŞKA AREA	LY 15N	25E	28	SE NE	39.1367	119.1617	W	30	57	305	1953/05/11	HUXEL, 1969	(ETHANOL PRODUC
230 WABUSKA HOT SPRINGS	LY 15N	25E	16	SE	39.1615	119.1827	\$	97			1958/04/25	MARINER AND OTHERS, 1974, 1975	(AQUACULTURE)
231 WABUSKA HOT SPRINGS - MAGMA POWER CO. NO. CB 1 WEL	LY 15N	25E	15	NW SW	39.1617	119.1767	W	97.2	5731	149	1965/11/02	HUXEL, 1969	ELECTRIC POWER
232 DE WELL	CH 22N	27E	21	AACD	39.7642	118.9476	W	163			1987/07/09	WATSTORE	
233 Desert Peak 86-21 Well	СН				39.758	118.946	W	159			1989/	Flynn and Buchanan, 1990	ELECTRIC POWER
234 CHURCHILL DAILLING CORP. TCID No. 1 WELL	CH 22N	30E	15		39.7791	118.6023	W	hot				GARSIDE AND SCHILLING, 1979	
235 USBM HEAT FLOW HOLE	CH 22N	31E	10		39.7918	118.4905	W	25.0		153		OLMSTED AND OTHERS, 1975	
236 DIXIE COMSTOCK MINE	CH 23N	35E	14		39.8661	118.0165	M	hot				VANDERBURG, 1940	
237 DIXIE HOT SPRINGS	CH 22N	35E	05	SE	39.7977	118.0673	S	72	200			MARINER AND OTHERS, 1974, 1975	·····
238 KENNAMETALS WELL	CH 20N	28E	01	ABB	39.6350	118.7889	W	38		191.1	1976/12/12	WATSTORE	
239 CDDH-48A-USGS	CH 21N	29E	30	DDC	39.6494	118.7603	W	26.3		31.4	1978/11/06	WATSTORE	
240 SHALLOW RESEARCH WELL (SODA LAKE), 4	CH 20N	28E	28	SW	39.5633	118.8533	W	100			1958/05/25	MARINER AND OTHERS, 1975	
241 Soda Lake 33-14 Well	СН				39.564	118.859	W	183			1969/	Flynn and Buchanan, 1990	ELECTRIC POWER
242 CDDH-41A	CH 20N	28E	14	DCC	39.5919	118.8064	W	21		125.0	1976/05/20	WATSTORE	
243 USGS CDR-21	CH 18N	28E	12	ABAC	39.4450	118.7858	W	22.5		4.6	1988/07/12	WATSTORE	
244 INDIAN HEALTH SERVICE WELL	CH 19N	29E	29	BACB	39.4853	118.7603	W	20.5		20.7	1989/03/01	WATSTORE	
245 FLOWING WELL IN STILLWATER	CH 19N	31E	07	SW	39.5215	118.5522	W	98			1967/01/18	MARINER AND OTHERS, 1974, 1975	
246 CDD-117A	CH 19N	31E	07	DCD	39.5211	118.5461	W	67		19.8	1978/04/19	WATSTORE	
247 CDPW-44A	CH 19N	30E	06	BCB	39.5433	118.5547	W	93.7		56.7	1978/04/21	WATSTORE	····
248 USFWS WELL 3 NR EAST CAN	CH 20N		20	CAC	39.5825	118.4183	W	25	271.7	213.4	1989/04/03	WATSTORE	
249 DR-SW-LY-9-L1	CH 17N		06	BCAD	39.3586	118.7767	W	25.5		0.6	1985/08/20	WATSTORE	
250 CARSON LAKE CORRAL	CH 16N		07	BACB	39.3561	118.6642	8	77			1987/07/08	WATSTORE	
251 EIGHTMILE FLAT, BORAX SPRING	CH 17N	30E	14	NE	39.3417	118.5783	S	81.1				WARING, 1965	
252 GEOTEHRMAL WELL	CH 17N	30E	36		39.2935	118.5723	W	160.0		2000		EDMISTON AND BENOIT, 1984	
253 SPRING	CH 16N		06		39.2788	118,4332	\$	hot				WARING, 1985	
254 LEE HOT SPRINGS	CH 16N		34	SWNW	39.2092	118.7232	S	88	126		1966/11/00	MARINER AND OTHERS, 1974, 1975	·········
255 E.H. STARK WELL	CH 21N		36	SW	39.6392	118.1063	W	22.8	3765	61	1973/03/00	COHEN AND EVERETT, 1983	
256 HATTON WELL NO. 1	CH 21N		20	NE	39.6767	118.0617	W	21.7	151	49	1971/08/09	SDESERT AT COLD SPRING	
257 Stinking Spring	CH 15N		10	SW	39.1739	118.7333	6	28				Katzenstein and Danti, 1982	
258 Oxbow Geothermal Corp. No. 52-18	СН				39.9537	117.8597	W	231		3007		"NEVADA BUREAU OF MINES AND GEOLOGY	ELECTRIC POWER
259 JAMES LITSTER WELL	LA 24N	AJE	27	SW	39.9200	117.1250	_	38.9			1918/	WARING, 1918	
260 spring	LY 18N		17	NW SE	39.4234		8	34	4			*GARSIDE, L., NBMG	·····
201 TOM ORMECHEA WELL	CH 20N		08	SE	39.6233	117.7400	w	24.4	109	31	1966/11/21	EVERETT, 1964	
202 SMITH CREEK VALLEY WELL	LA 20N		36	NW	39.5588	117.4278	W	29.4			1971/12/00	EVERETT AND RUSH, 1964	
203 UNNAMED HOT SPRING	LA 17N		_		39.3500	117.5583	5	80	75		1969/04/00	MARINER AND OTHERS, 1974, 1975	
4.1 TWIN SPRING	LA 18N		27		39.3961	117.5791	8	werm				WARING, 1965	
4.2 MCLEOD 88 SPRING	NY 14N		34		39.0263	117.1367	8	87.9				"NEVADA BUREAU OF MINES AND GEOLOGY	······································
5.1 UNNAMED SPRING	LA 17N	_	25	NE NW N	39.3162	117.1367	8	92			1959/03/15	TREXLER AND OTHERS, 1979	
5.2 LITTLE HOT SPRINGS				NE NU N			_				1936103113	LITTLE HOT SPRINGS 7.5' QUAD	
200 HOT SPRINGS	LA 23N		02		39.8937	116.6481	8	hot	<u> </u>				
	LA 24N		15	0.44	39.9420	116.6814	8	hot			1001 100 140	WARING, 1965	
د بر		48F	33	SW	39.9017	118.5870	8	72	300		1961/08/10	MARINER AND OTHERS, 1974, 1975	
287 WALTI HOT SPRINGS	EU 24N					116.0733	8	32.2	25500			EAKIN, 1062A	
287 WALTI HOT SPRINGS 288 SHIPLEY HOT SPRINGS	EU 24N	52E	23	SE	39.9417								
207 WALTI HOT BPRINGS 208 SHIPLEY HOT SPRINGS 9.1 SIRI RANCH SPRING, (WATER WELL)	EU 24N EU 24N	52E 53E	06	SW NE	39.9917	116.0450	W	35			1958/02/11	HARRILL, 1968	· · · · · · · · · · · · · · · · · · ·
207 WALTI HOT SPRINGS 208 SHIPLEY HOT SPRINGS 9.1 SIRI RANCH SPRING, (WATER WELL) 9.2 SULFUR SPRINGS AREA	EU 24N EU 24N EU 23N	52E 53E 52E	06 36	SW NE NW	39.9917 39.8350	116.0450 116.0662	S	23.3	75.7			WARING, 1965	
207 WALTI HOT BPRINGS 208 SHIPLEY HOT SPRINGS 9.1 SIRI RANCH SPRING, (WATER WELL)	EU 24N EU 24N	52E 53E 52E 50E	06	SW NE	39.9917	116.0450			75.7	147.8	1958/02/11 1945/08/24		

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# NAME	со	Ŧ	R SC	OSEC	NLAT	WLONG	T TEMP	FLOW	DEPTH CDATE	REFERENCE	USE
273 BARTHOLOMAE CORP. WATER WELL	EU 18N		18	SW	39.4367		W 23.3	53	204 1972/00/00	RUSH AND EVERETT, 1964	
274 BARTHOLOMAE CORP. WATER WELL	EU 18N	_		NW	39.4133		W 22.2	757	1972/00/00	RUSH AND EVERETT, 1964	
275 BARTHOLOMAE HOT SPRINGS	EU 18N	_		SE	39.4053		S 54		1958/01/27	MARINER AND OTHERS, 1974, 1975	<del></del>
276 UNNAMED WELL	LA 18N		08	SW	39.4126		W 21.7		1975/08/00	RUSH AND EVERETT, 1964	
277 MONITOR VALLEY WELL	LA 18N		_	SE NE	39.3881		W 21.7		1973/10/12	RUSH AND EVERETT, 1964	
278 SPENCER HOT SPRINGS	LA 17N			NENE	39.3209		5 72	50	1962/04/28	MARINER AND OTHERS, 1974, 1975	
279 UNNAMED WELL	LA 16N			NW	39.2375		W 28.9	22.7	36.5 1971/07/10	FIERO, 1968	<u></u>
280 POTT'S RANCH HOT SPRING	NY 14N	_	02	NE	39.0783		S 45	125	1972/00/00	MARINER AND OTHERS, 1974, 1975	<u> </u>
281 DIANA'S PUNCH BOWL	NY 14N	_	22	SE	39.0263		S 59		1972/00/00	MARINER AND OTHERS, 1974, 1975	
262 FISH CREEK SPRINGS	EU 16N		08	BCBB	39.2769		S 19	15129.0	1981/07/17	WATSTORE	
283 THOMPSON RANCH SPRING	EU 23N			080	39,9008		<u>5 21</u>	3600.0	1981/07/14	WATSTORE	
264 WARM SPRINGS RANCH	W 22N		01	NE NE	39.8117		S 22.6	3000.0	1974/02/20	*NEVADA BUREAU OF MINES AND GEOLOGY	
285 WELL AT ALLIGATOR RIDGE	W 22N	_	25		39.7408		<u> </u>		200.9 1984/04/24	WATSTORE	· - · · · · · · · · · · · · · · · · · ·
285 BIG BLUE SPRING	W 14N		_	CCCC					200.0 1004/04/24		••••••••
		_	_ 23		39.0627		S warm		107 4 5 4 5 4	WARING, 1965	
207 UNN HOT SP CHERRY CREEK	W 23N		06		39.8950		<u>S 61</u>		1974/01/01	WATSTORE	
288 SHELL OIL CO. STEPTOE UNIT NO. 1 WELL	<u>W 24N</u>	_	19	NE NE	39.9433		W 151.1		2562	GARSIDE AND SCHILLING, 1979	
269 UNNAMED SPRING	W 24N	1 85Ë	31	NE	39.9168		<u>S 28</u>	1703		SNYDER, 1963	
290 BORCHERT JOHN (WARM) SPRING	WP				39.7778	114.8497	<u>\$ 18</u>		1978/08/25	WATSTORE	
291 SHELLBOURNE SPRINGS	W 22N	1 64E	12		39.7933	114.6883	S 24.0		1972/00/00	*NEVADA BUREAU OF MINES AND GEOLOGY	
292 UPPER SHELLBOURNE SPRING	W 22N	65E	08	SE NW	39.8000	114.6550	\$ 25	1703	1964/06/28	MIFFLIN, 1968	
293 WELL	W 23N	1 66E	31	AB	39.8303	114.5550	W 20.2		1983/07/27	WATSTORE	
294 MELVIN HOT SPRING (MONTE NEVA)	W 21N		24		39.6667		\$ 79			CLARK AND OTHERS, 1920	
295 SPRING, KERN MOUNTAINS	W 21N				39.6691		S warm		·····	WARING, 1965	
296 STEPTOE WARM SPRING	WP	702			39.5386		S 24		1978/08/25	WATSTORE	
297 MCGILL WARM SPRINGS		64E	21	SE NW	39.4150		<u>5 29</u>	17034	1945/08/14	CLARK AND OTHERS, 1920	SWIMMING POOL
	· · · · · · · · · · · · · · · · · · ·	_								WATSTORE	STUMMING FOOL
298 SCHOOLHOUSE SPRING	W 18N	_		DA	39.4537		<u>5 28</u>	17320.0	1981/07/15		
299 ELY-LACKAWANNA ZONE - LACKAWANNA HOT SPRINGS	W 16N	_	03	NE	39.2650		<u>S 35</u>			EAKIN AND OTHERS, 1967	
300 ELY WARM SPRINGS	W 16N		10		39.2683		<u>s 29</u>	83	1975/00/00	CLARK AND OTHERS, 1920	
301 WALLEYS HOT SPRINGS (GENOA HOT SPRINGS)	DG 13N		22	SW NW NE	38.9812		8 61	75		MARINER AND OTHERS, 1974, 1975	SPA
302 WALLEYS HOT SPRING	DG 13N		22	SW NW NE	38.9812		<u>\$ 63</u>	57	1934/02/07	*WHITE, D., USGS, MENLO PARK	
303 BENSON SPRING - SOUTH OR	DG 12N			ACC	38.8747		<u>5 22</u>		1981/06/10	WATSTORE	
304 DOUD SPRING	DG 11N		20	SE SW	38.7950	119.6533	<u>\$ 21.1</u>	681.3	1962/07/23	GLANCY AND KATZER, 1975	····
305 NEVADA HOT SPRINGS	LY 12N	23E	16	SE	38.8995	119.4117	<u>S 61</u>	200	1970/07/01	MARINER AND OTHERS, 1974, 1974	
306 AMBASSADOR WELL, ARTESIA LAKE AREA	LY 13N	23E	25	NW SW	38.9587	119.3617	W 27.8		165 1949/08/09	SCOTT AND BARKER, 1962	
307 WELLINGTON WELL	LY 10N	23E	02	NW SE	38.7533	119.3767	W 47.2		61 1912/09/28	LOELTZ AND EAKIN, 1953	
308 WILSON HOT SPRINGS	LY 11N	25E	34		38.7672	119.1732	S warm	0		GARSIDE AND SCHILLING, 1979	
309 HOT SPRING	LY 12N	25E	34		38.8598	119.1749	S hot			WILSON CANYON 7.5' QUAD	
310 GRANT VIEW HOT SPRINGS	LY		-		38.9900		8 53		1977/05/11	WATSTORE	
311 DOUBLE SPRING	M 13N	29F	25		38.9647		S warm			WARING, 1965	
312 Deadhorse Wells (dry)	M 12N		21		38.6959		W hot			Miller and others, 1953	
313 WEDELL SPRING NO.1	M 12N		07	SW	38.9191		5 62.2	859	1957/05/25	EAKIN, 1962C	
314 hot well	NY	346		311	38.9869		N hot	0.5	1807/03/23	Mount Annie 7.5'	
									· · · · · · · · · · · · · · · · · · ·	the second se	······
315 hot drill hole	MN				38.8333		W hot			*GARSIDE, L., NBMG	
316 UNNAMED	LY 07N	_	04	SW SE	38.4917		<u>s 43.3</u>		1966/10/13	DAVIS, 1954; WARING, 1965	
317 CITY OF HAWTHORNE WELL	M OBN		27	SW	38.5200		N 28.7		184 1950/04/28	SCOTT AND BARKER, 1962	
318 WELL NO. 3	M OSN	_	32		38.5067		N 34	- <u></u>	1971/12/29	*WHITE, D., USGS, MENLO PARK	
319 U. S. BUREAU OF LAND MANAGEMENT WELL	M 05N		19	NE	38.2800		N 43.3		105 1974/02/18	EVERETT AND RUSH, 1967	
320 BUREAU OF LAND MANAGEMENT NO. 2 WELL	<u>M 03N</u>	31E	07	NE SW	38.1317	118.5642			20 1953/05/11	VANDENBURGH AND GLANCY, 1970	
321 SODAVILLE SPRINGS, SODA SPRINGS	M 06N	35E	_ 29	SE	38.3417	118.1017	<u>\$35</u>	100	1949/00/00	MARINER AND OTHERS, 1974, 1975	
322 GENE SAWYER WELL	NY 13N	36E	26	NE SW	38.9617	117.9383	N 54		84 1967/10/06	TREXLER AND OTHERS, 1979	
323 GABBS AREA	NY 12N	36E	27	NW	38.8817	117.9200	N 47.8		66 1958/02/11	EAKIN, 1962B	MINERAL EXTRACTION??
324 CHARNOCK (BIG BLUE) SPRINGS	NY 13N	44E	16		38.9914	117.0415	<u> 6 26.7</u>	1703	1946/01/30	WARING, 1965	
325 BIG BLUE, CHARNOCK SPRING	NY 13N	44E	32	NE	38.9483	117.0500	S 32		1962/08/18	TREXLER AND OTHERS, 1979	
326 DARROUGH'S WELL	NY 11N				38.8200	117.1750	N 90.5		244	*NEVADA BUREAU OF MINES AND GEOLOGY	HEAP LEACHING
327 DARROUGH'S NORTH SPRING	NY 11N				38.8250		8 71.2		1958/01/27	*NEVADA BUREAU OF MINES AND GEOLOGY	
328 WARM SPRING	NY OBN			SW	38.5696		S warm			BLACK SPRINGS 7.5' QUAD	
329 UNNAMED WELL	M OSN	_			38.3333		N 40		1968/06/00	TREXLER AND OTHERS, 1979	
330 hot driff hole	MN			· · · · · · · · · · · · · · · · · · ·	38.2000	117.9700				*GARSIDE, L., NBMG	
331 STANLEY A TANNER WELL		405						-		RUSH AND SCHROER, 1970	
	NY 07N	_			38.4372						
332 INDIAN SPRINGS	NY 07N		34		38.4210		S warm			WARING, 1965	
333 HALL MINE WELL, ANACONDA MOLYBDENUM PROJECT	NY 05N				38.3063		<u>\$ 27.7</u>		1954/09/04	*NEVADA BUREAU OF MINES AND GEOLOGY	
334 WELL	NY 02N			ACB	38.0650		N 28		1967/05/06	WATSTORE	
335.1 WELLS	NY 12N				38.6704	116.7034				MOSQUITO CREEK 7.5' QUAD	
335.2 BELMONT MINE, 1500 FT LEVEL	NY O3N		_		38.0750	117.2217			457 1964/10/23	BASTIN AND LANEY, 1918	
338 MOSQUITO RANCH SPRINGS	NY 11N	47E	06	SE NE	38.8250	118.7267	\$ 31.6		1941/07/03		
337 SPRING	NY 10N	49E	22	CAA	38.6972	116.4361	S 40		1967/05/10	WATSTORE	
338 TEST HOLE UCE-10	NY 10N	49E	22	CAA	38.6878	116.4625	N 48		903.1 1967/06/03	WATSTORE	
339 SPRING	NY OBN	49E	21	CDC	38.5361	118.4556	S 35		1967/07/31	WATSTORE	
340 OLD DUGAN PLACE HOT SPRING	NY OON	49E	25	NW NE	38.5300		5 36.1		1975/08/20	GARSIDE AND SCHILLING, 1979	

# NAME	CO T R SC	OSEC	NLAT	WLONG	T TEMP	FLOW	DEPTH CDATE	REFERENCE	USE
HOT CREEK RANCH SPRING	NY 08N 50E 29	SE SE	38.5200		5 62.8	2666	1957/05/13	SANDERS AND MILES, 1974	· <u> </u>
42 HOT CREEK VALLEY SPRING	NY 07N 51E 30		38.4367		<u>\$ 61.1</u>			WARING, 1965	
143 WARM SPRING 144 SALISBURY SPRING	NY 06N 47E 36	NE NW	38.3383		<u>\$ 26.1</u> <u>\$ 30</u>	19	1948/01/28	FIERO, 1968	··
HAS SPRING	NY 05N 46E 28 NY 05N 46E 33	SW SE CD	38.2533 38.2369		<u>\$ 30</u> <b>\$</b> 21		1950/01/05	GARSIDE AND SCHILLING, 1979 WATSTORE	
46 UPPER? MUD SPRING	NY 04N 46E 26	CA	38.1722		S 25.5		1967/07/30	WATSTORE	
47 SPRING	NY 04N 47E 29		30.1722		8 25.5 8 25		1967/07/27	WATSTORE	
48 SPRING	NY 02N 47E 14	AC	38.0278		\$ 29		1987/07/28	WATSTORE	
49 WARM SPRINGS	NY 04N 50E 20	SW	38.1867		8 63	170		WHITE, D., USGS, MENLO PARK	
50 SPRING	NY 02N 51E 02	D	38.0472		S 22		1967/08/03	WATSTORE	
51 SPRING	NY 02N 50E 28	ACC	37.9944		\$ 25		1967/08/02	WATSTORE	
2.1 DUCKWATER AREA	NY 13N 56E 32	NW SE NW			\$ 33.9		1950/04/26	GARSIDE AND SCHILLING, 1979	AQUACULTURE
2.2 WILLIAMS HOT SPRINGS	W 13N 60E 33	NE	38.9533		\$ 51.6		1976/11/10	*NEVADA BUREAU OF MINES AND GEOLOGY	
53 PRESTON SPRINGS	W 12N 61E 02	SW NE	38.9308	115.0825	\$ 22.7		1954/07/31	*NEVADA BUREAU OF MINES AND GEOLOGY	
54 BIG SPRING	NY 06N 55E 15	AC	38.5528	115.2722	S 38		1967/08/07	WATSTORE	
55 BLUE EAGLE SPRINGS	NY 08N 57E 11	ODB	38.5631	115.5275	8 29	7030.0	1981/07/17	WATSTORE	
56 MOORMAN SPRING	NY 09N 61E 32	DABC	38.5947	115.1383	8 37	1294.0	1981/07/18	WATSTORE	
57 EMIGRANT SPRING	W 09N 62E 19	AC	38.6250	115.0478	8 19.5	5247.0	1981/07/18	WATSTORE	
58 FLAG SPRING NO 3	NY 07N 62E 33	BCCC	38.4214	115.0222	\$ 22.8		1964/01/17	WATSTORE	
59 BUTTERFIELD (FLAG, SUNNYSIDE) SPRINGS	NY 07N 62E 28	NE	38.4450	115.0067	S 23.9	7571	1960/09/26	WARING, 1965; MAXEY AND EAKIN, 1949; ADAMS, 1944	
60 HOT CREEK RANCH SPRINGS	NY 06N 61E 18		38.3817	115.1533	\$ 28.7		1960/11/08	EAKIN, 1966	
61 MOON RIVER SPRINGS	NY 06N 60E 25	BDAD	38.3517	115.1808	5 32.5		1982/04/27	WATSTORE	
62 Bacon Flat 24-17 oil well	NY 07N 57E 17		38.4600	118.5900	W 113		1653	Hulen and others, 1994	
83 CHIMNEY HOT SPRINGS	NY 07N 55E 16	DC	38.4633	115.7900	\$ 60		1967/08/07	WATSTORE	
64 SPRING	NY 06N 54E 11	C	38.3889	115.8694	S 45		1967/08/07	WATSTORE	
55 SPRING	NY 06N 54E 24	CA	38.3639	115.8517	S 46		1968/09/12	WATSTORE	
66 GEYSER RANCH SPRINGS	LI 09N 65E 01		38.6750	114.6233	S 18	189	1979/11/15	CARPENTER, 1915	<u> </u>
B7 LOWER PONY SPRING	LI 05N 66E 05	CBCC	38.3197		S 20		1981/07/23	WATSTORE	
58 HAMMOND RANCH AREA	LI 05N 69E 17		38.2967	114.2733	S 28.9		1967/10/16	CARPENTER, 1915; WARING, 1965	
SAND SPRING	ES 01N 34E 27	SE SE	37.9053		<u>\$ 23.3</u>		1965/07/12	RUSH AND KATZER, 1973	
70 FISH LAKE VALLEY	ES 02N 36E 28	SW SW S	37.9931		\$ 27.2	4	1978/08/03	*NEVADA BUREAU OF MINES AND GEOLOGY	
1 GAP SPRING	ES 02N 36E 32	SW SE	37.9797		<u>5 23</u>	38	1975/08/00	VANDENBURGH AND GLANCY, 1970	
72 EMIGRANT WELL	ES 01N 38E 08	NW	37.9717		W 25		1970/10/07	TREXLER AND OTHERS, 1979	
73 FISH LAKE VALLEY WELL	ES 01N 36E 20	015	37.9233		W 25		1965/07/12	RUSH AND KATZER, 1973	
74 R.G. PENNEBAKER WELL	ES 018 35E 09	SW SW	37.8640		W 23.3		91 1961/12/13	RUSH AND KATZER, 1973	
75 NEVADA OIL AND MINERALS VRS NO. 1 WELL	ES 015 36E 16	SW NE NE			W 158.8	<u></u>	2797	GARSIDE AND SCHILLING, 1979	
76 FISH LAKE VALLEY	ES 015 36E 19	NE	37.8425		W 25		1961/07/20	*DESERT RESEARCH INSTITUTE, 1973	
77 FISH SFRING 78 Gradient well 42-7	ES 025 35E 25 ES 015 36E 07	NW SW	37.7425		<u>S 24</u> W 47.5	757	301	RUSH AND KATZER, 1973 *NEVADA BUREAU OF MINES AND GEOLOGY	
79 SILVER PEAK HOT SPRINGS, WATERWORKS SPRINGS	ES 028 39E 15	SE SE	37.8720		<del>v 47.5</del> S 34.2	1892	301	WARING, 1965	
D PEARL HOT SPRINGS	ES 015 40E 25	SE NW SW			<u>5 34.2</u> S 36.7	1092	1963/04/15	*DESERT RESEARCH INSTITUTE, 1973	
31 ALKALI HOT SPRINGS	ES 015 40E 25	NE NE	37.8287		<u>5 50.7</u> \$ 50.5	95	1903/04/13	"WHITE, D., USGS, MENLO PARK	
2 SARCOBATUS FLAT AREA	NY 075 44E 28	NW SW	37.2967		W 22.2		62	MALMBERG AND EAKIN, 1962	······································
33 NONE GIVEN	ES 115 43E 06	NW	37.0162		8 25		02	*DESERT RESEARCH INSTITUTE, 1973	
A FISHLAKE LIVESTOCK Co. WELL	ES 018 39E 05		37.8767		W hot	<u> </u>	50.3	RUSH AND SCHROER, 1970	
S CEDAR SPRING	NY 025 51E 21	SE	37.7508		S 25			VANDENBURGH AND RUSH, 1974	······
B CLIMAX SEEP	NY NY	<u> </u>	37.2244		<u>5 65</u> W 41.5		1978/03/07	WATSTORE	
7 TIPPIPAH SPRING NO 2	NY		37.0433		S 22		1979/06/19	WATSTORE	
8 YUCCA FLAT TEST WELL 84-69,(TEST WELL E)	NY		37.0433		<u>5 22</u> W 42.2		572 1957/09/02	SCHOF F AND MOORE, 1964	
9 YUCCA FLAT WELL 79-09A, TESTWELL C	NY		37.0550		W 37.2		519 1916/10/10	SCHOFF AND MOORE, 1964	
0 SARCOBATUS FLAT-BEATTY AREA	NY 095 46E 35	NE	37.1142	the second s	W 22.2			MALMBERG AND EAKIN, 1962	
1 SPRING	NY 01N 56E 35	DD	37.8988		<u>\$ 21</u>		1968/09/14	WATSTORE	
2 SAND SPRING	LI 028 55E 28	NE SE SE	37.7400		<u> </u>	1	1927/08/05	VANDENBURGH AND RUSH, 1974	··
3 N. J. GUNDERSON WELL	LI 035 55E 19	SE SE	37.6692	115.8283		<u> </u>	73 1946/10/27	VANDENBURGH AND RUSH, 1974	······································
4 G.C. ENGLEMAN WELL	LI 045 55E 06	UL	37.6188		W warm		76.3	VAN DENBURGH AND RUSH, 1974	
5 HIKKO SPRING AREA	LI 045 60E 14		37.5975		\$ 26.7	11167	1950/04/28	EAKIN, 1963B	
6 CRYSTAL SPRINGS AREA	LI 055 60E 10		37.5300		<u> </u>		1954/09/04	COHEN, 1966	
7 ASH (ALAMO) SPRINGS AREA	LI 065 61E 06	NW NW N	37.4800		<u> </u>	32894	1945/07/30	EAKIN, 19638	(SPA)
6 LIME SPRING	<u> </u>		37.9144		<u> </u>		1965/04/07	WATSTORE	
9 FLATNOSE SPRING	LI 01N 69E 35	cc	37.8961		<u> </u>		1985/04/08	WATSTORE	
0 DELMUE'S SPRINGS AREA, TWO SPRINGS.	LI 018 66E 13	NE NW SE			<u>5 25</u> 5 21.1	757	00100100	HARDMAN AND MILLER, 1934	·····
1 PANACA WARM SPRINGS AREA	LI 025 66E 04	116 MIT 3E	37.8083		<u>s 29.5</u>	18472	1949/06/00	RUSH, 1964	
2 BENNETT SPRING	LI 025 67E 07	CD	37.7842		<u>s 28.5</u> S 24		1985/04/10	WATSTORE	
3 CALIENTE MINERAL SPRING, CALIENTE HOT SPRINGS	LI 04\$ 67E 06	NE	37.6217		<u>5 24</u> 8 47.8	<del></del>	1962/07/29	SAND ERSAND MILES, 1974	(SPACE HEATIN
4 AQUA CALIENTE WELL NO. 3	U 045 87E 08	NW NW	37.6283		W 67	5299	27 1970/10/07	TREXLER AND OTHERS, 1979	SPA
5 HICKS (BURRELL) HOT SPRINGS	NY 115 37E 21		36.9667		5 38	19	1978/08/18	"WHITE, D., USGS, MENLO PARK	
	NY 125 47E 05	SW	36.9167		<u>\$ 36</u> \$ 24.4	379		SCOTT AND BARKER, 1962	· ·=
IG BEATTEMINERAL SPHINGS									
6 BEATTY MINERAL SPRINGS 7 TW- F WELL	NY 145 52E		36.7594	the second s	W 64	883.0	1036.0 1960/03/12	WATSTORE	

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# NAME	co	T F	a sc	OSEC	NLAT	WLONG	т	TEMP	FLOW	DEPTH CDATE	REFERENCE USE	
409 COOKS EAST WELL	NY 165	50E	07	CABB	36.5744	116.3964	W	32		91.4 1990/08/25	WATSTORE	
410 FAIRBANKS SPRING	NY 175	50E	09	SE NE	36.4933	118.3433	S	27.2		1934/02/18	NAFF, 1973	
411 RODGERS SPRINGS	NY 175	50E	15	NW NE	36.4783	118.3233	S	27.8		1959/10/19	NAFF, 1973	
412 LONGSTREET SPRING	NY 175	50E	22	NE NW NE	36.4667	116.3250	S	27.8		1980/08/01	DUDLEY AND LARSON, 1976	
413 UNNAMED SPRING	NY 175	50E	28	SW NE NW	36.4483	118.3133	S	27		1958/06/12	NAFF, 1973	
414 SCRUGGS SPRING	NY 175	50E	35	SE SW NE	36.4317	116.3067	S	30		1980/05/03	NAFF, 1973	
415 DEVIL'S HOLE	NY 175	50E	36	SW SE	36.4267	116.2683	Ŝ	33		1965/06/17	NAFF, 1973	
416 POINT OF ROCK (KING) SPRING	NY 185	51E	07	NW SE	36.4017	116.2717	S	32	4399	1964/04/13	HUGHES, 1966; MIFFLIN, 1968	
417 JACK RABBIT SPRING	NY 185	51E	18	SE NW SE	36.3867	116.2717	S	28		1962/06/28	NAFF, 1973	
418 BIG SPRING; ASH MEADOWS SPRING; DEEP SPRING	NY 185	51E	19	SW NE	36.3767	118.2717	S	28		1971/02/00	DUDLEY AND LARSON, 1976	
419 CRYSTAL SPRING	NY 185	50E	03	NE SE NW	36.4183	116.3300	S	30		1979/12/15	NAFF, 1973	
420 USGS TRACER WELL 2	NY 165	51E	27	NE NE NW	38.5383	116.2317	W	30.6		1968/06/25	DUDLEY AND LARSON, 1976	-
421 CHERRY PATCH WELL	NY 175	52E	06	CDB	36.4914	116.1492	W	27.5		85.5 1990/08/24	WATSTORE	
422 INDIAN SPRING	CL 165	56E			36.5617	115.6683	S	26.1	5875	1548 1967/11/10	CARPENTER, 1915	
423 MANSE RANCH SPRINGS	NY 215	54E	03	SE NE	38.1557	115.8886	S	25	4542	1978/08/18	HARDMAN AND MILLER, 1934	
424 PAHRUMP SPRINGS	NY 205	53E	14	SE SE	36.2075	115.9783	S	25	1840	1960/06/31	HARDMAN AND MILLER, 1934	
425 PAHRUMP COMMUNITY CHURCH WELL	NY				36.2117	115.9883	W	27	. <u>.</u>	1976/01/09	WATSTORE	
426 WHITE ROCK SPRING	CL 205	58E			36.1742	115.4786	S	25		1965/06/26	WATSTORE	
427 PAGO PAGO BAR WELL	CL				36.2361	115.0531	W	28		61.0 1982/05/18	WATSTORE	
428 Las Vegas Springs	CL 205	61E	31		38.1845	115.1899	S	26.1	5015		Scott and Barker, 1962	
429 H. NICKERSON WELL	CL 225		03	NE NE SW	36.0633	115,1458	w	29	644	120 1972/02/13	MAXEY AND JAMESON, 1948	
430 GLADSTONE CORPORATION WELL	CL 225		10	NE SE NW	36.0600	115,1483	W	33.3	1609	99 1973/00/00	MAXEY AND JAMESON, 1948	
431 T.A. WELLS WELL	CL 225		01	SW NW S	36.0608	115.0043		32.8		346	MAXEY AND JAMESON, 1948	
432 VF-2 WELL	LI 125		29	DABB	38.8750	114.9458	W	34		1986/02/05	WATSTORE	
433 FUGRO COYOTE V DEEP WELL	CL 135		23	DD	36.7956	114.8922	W	35.5		203.9 1981/07/22	WATSTORE	
434 USGS-MX CE-DT-6	CL 135		35	ACAA	36.7678	114.7869	w	33.5		264.7 1986/09/26	WATSTORE	
435 CSV-3	CL 145		28	ACDC	36.6908	114.9250		41		237.7 1987/10/07	WATSTORE	
436 WARM SPRING	CL 145	_	18	NW SW NE		114.7152	s	32.2	12250	1950/08/27	EAKIN, 1964; MIFFLIN, 1968	
437 IVERSON SPRING	CL 145		21		36,7097	114.7142		31.6	3840	1958/05/19	EAKIN, 1964	
438 JUANITA SPRING	CL 155		14	BAA	30.6369	114.2475	_	26		1986/01/25	WATSTORE	
439 DRY LAKE	CL 175		21	CB	36,4550	114.8439	ŝ	29		1985/07/01	WATSTORE	
440 WATER FOUNTAIN VALLEY OF FIRE, NEV.	CL 175		30	NW SW	36.4233	114.5483	s	35.1		1971/03/15		
441 BLUE POINT SPRING	CL 185		06	DCC	36.3897	114.4328	ŝ	29	4075.0	1977/05/04	WATSTORE	
442 ROGERS SPRING	CL 185		12	DDA	36.3775	114.4433	s	30	4073.0	1977/05/04	WATSTORE	
443 G.P. APEX WELL	CL 185		33	088	36.3411	114.9267	w	31		1966/09/30	WATSTORE	
444 NAT'L PARK SERVICE, CALLVILLE BAY CAMPGROUND WELL	CL 103		09	NW SE	36.1442	114.7220	w	28.9	114	61	RUSH, 1968B	
445 HOOVER DAM HOT SPRING	CL 223		- 29	SW	36.0100	114.7450	<u></u>	42.2		1966/07/27	SWANBERG AND OTHERS, 1977	
446 BLACK CANYON AREA	CL 235		05	SE NW SW	35.9800	114.7467	5	30	848	1960/00/00	*WATSTORE	
447 BLACK CANYON AREA SPRING	CL 233	65E	21	NE SW NW	35.9467	114.7333		25.6	19	1978/08/18	*WATSTORE	
448 MONITOR WELL 116	CL 328		14	OBOB	35.1583	114.7333		23.6		91.4 1991/08/08	WATSTORE	·······
449 SUNDANCE SHORES WELL	CL 323		24	BBA	35.1363	114.5803		32		146.3 1974/06/14		
	02 020		<b>*</b> -4	200		114.0000	**	~~		1.4.4 101.400114		

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#	рН	Na	ĸ	Ca	Mg	Fe	SiO2	В		HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
<u>· 1</u>									5.8			·					••••••		
2	8.90	58	3.9	5.8	0.34		41			106		23	23			207	1.03		
3					·····											<u></u>			<del></del>
4		21	4	3.2	0.3		53	0.08	0.01	50	0	11	5.9	0.6		124	0.96		<u>_</u>
5	·····	29	0.4	3.7	0.1		32	0.08	0.03	64	0	12	4.7	1.8		115	0.96		
6		31	2.8	2.1	0.1		57	0.07	0.02	74	0	9	5	0.9		144	0.97		
7	9.1	110	1	4	0		51	1	0	63		119	39	4.6	362	393_	1.03	-127	-15.4
8	7 70															1.00	4.00		
9	7.70	32	6.3	1.4	0.1		67		0.46	68		13	77			160	1.03		
<u>11</u> 12	0.40	70	0.6	0.4			<b>F4</b>	0.66					45		000	050	1.00		
descent of the second s	8.40	78	0.6	0.4	0.0		51	0.66		113	6	41	15	2	262	250	1.00		
<u>13</u> 14	9 60	<u>180</u> 74	8.6	<u> </u>	0.2		130	2	0.2	163	0	220	48	6.6	075	690	0.98		
14	<u>8.60</u> 8.60	74	1	3.5	<u> </u>	-0.00	<u>63</u> 63	0.6	0.667	<u>90</u> 92	3	35	<u>18</u> 18	<u>12</u> 12	275	<u>255</u> 261	<u> </u>	-129.9	10.50
16	7.60	74	1.1	2.6	1.4	< 0.02	65	0.04		<u>92</u> 96	 N	<u>41</u> 39	21	10	272	265	1.02	-129.9	-16.56
17	8.5	70	1.3	4	1.4		63	0.6		<u> </u>	3	39	18	12	212	205	1.02		
18	8.20	55	0.6	6.4	0.2		34	0.32		120	<u></u> N	15	10	0.3	186	182	1.02		
19	7.65	320	25	4.6	0.2	0.06	160	6.9	0.45	436	2	130	160	<u> </u>	100	1038	0.98	-128.2	-14.13
20	7.20	325	26	19	0.3	0.00	155	7	0.45	500	1	120	160	14		1073	0.99	-120.2	-14.10
21	1.20				0.0		155				······	120	100			10/0	0.00		
22																		·····	
23		74	10	23	8.4		74	0		107		22	32	0.1	256	296	1.70		
24	7.80	78	11	9.6	2.8		79			165		28	28	1.8		319	1.05		
25	7.1	230	5	17	0.1		130	2.1		280	0	120	110	10		762	1.03		<u> </u>
26	7.60	230	4.5	17	0.1		130	2.1		280	N	120	110	10		761	1.02		
27	8.86	150	8.7	2.7	0.2	0.01	80	0.64	0.03	224	8	49	52	2.3		464	1.05	-123	-15.8
28	8.8	210	4.4	1.5	0.04	0.01	64		0.032	280	9	120	76	0.1		623	0.98	-131	-16.1
29																			
32		210	6.2	3.2	1.5		125	2.9		358	7	67	54	14	660	667	0.98		
33		146	3.7	3.2	0		83	0.41		218	16	76	6	8.9	470	450	1.04		
34	8.10	455	9.9	30	6.3		51	1.3	0.5	948	N	204	69	9.8	1290	1303	0.99		
35		416	11	32	5.2	0.04	39	1.7	0.36	885	N	184	59	0.9	1180	1184	1.02		
36		34	4.8	18	2.4		65	0.11		104		25	15	0.6	244	216	1.01		
37	9.30	91	2	2.4	0.5		84	0.26		52	39	64	14	7.9	324	331	0.97		
38	7.30	28	6.3	14	2.8	_	53		0.03	94		14	15			179	1.02		
39		27	6.3	25			54	0.1		117		20	22	0.1		212	0.87		
40		146	12	46	9.7		63	0.87		204		94	157	0.3	640	629	1.00		
41	9.00	197	18	2.2	0.8		4.8		1.5	211	36	70	106	1.4	541	540	1.00		
42	7.30	123	3.5	6.4	0.5		65	0.78		182	N	61	27	10	387	387	1.05		
43		89	3.4	7.8	1.8		56	0.35		178		49	19	5.3		319	0.95		
44		58	12	5.8	0.2	N	110	0.37	0.4	119		26	14	2.6	322	288	1.04		
45		334		26	8.5	-		2.5		920		34	26		930	884	1.00		
48	8.00-	-296		10	8		55			881		36	26			900	0.94	-134.6	-16.44

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#	рН	Na	<u> </u>	Са	Mg	Fe	SiO2	В	Li	НСОЗ	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
47																			
48		452	26	26	11			1.4		1230		71	16			1209	1.02		
49																			
<u>50</u> 51	9.20	620	3.5	2	N	<u>N</u>	34	4.6		1080	143	98 -	46	16	1500	1498	1.02		
52								···.											<u> </u>
53														··· · ··· ·					
54				-										<u>_</u>				<u></u>	
55								· · · · · · · · · · · · · · · · · · ·								<u> </u>			- <u></u>
56									<0.2										
57																			
58	8.10	157	16	13	0.2	N	166	0.81		338	N	75	9	9.4	631	613	1.01		
59	7.00	390	41	49	13		84	0.77		1180		18	40	7.2		1224	1.01	-134.9	-16.78
60	7.40	110	8.3	29	7.7		23	0.22		380		36	4.4	3.4		409	0.97	-140.8	-18.21
61	7.20	130	22	48	12		40	0.67		482		40	14	5.2		549	1.02	-140.2	-17.85
62	7.60	134	4	8.4	N	0.04	96	0.41	N	260	<u>N</u>	46	11	14	442	442	1.01		<del></del>
63		<u> </u>									· · · · · · ·								<u></u>
<u>64</u> 65	8.00	450	36	3.1	0.45		151			1140		2	31	21		1260	0.99		······
66	7.70	358	33	<u> </u>	0.45		132	· · · · · · · · · · · · · · · · · · ·	·	<u>1149</u> 959		2	25	21		1029	1.02		<b>_</b>
67	6.70	236	43	41	14		38			867		10	25			829	0.97		<u> </u>
68	0.70	200						·		007		10	20			029	0.37		
69	· · · · · · · · · · · · · · · · · · ·			<u></u>	<u>-</u> -		<del> </del>					· ·		· · · ·					<u> </u>
70	7.30	300	31	75	37		105			1135	<u></u>	32	27	7.2		1173	1.01		
71	6.6	370	46	48	13	0.02	86	0.73	0.72	1135	· · ·	12	37	7.4		1179	1.02	-136.6	-16.95
72																			
73	8.40			49	17					426	18	69	30			393	0.39		÷
74	· · ·															·			
75	8.20			74	27					278	<u>N</u>	103	117			458	0.59		
76					· · · · · · · · · · · · · · · · · · ·										<u> </u>				
		70						0 50									4 00		
78	8.8	78	2.4	2.4	0.6		75	0.53	0.16	78	17	49	11	8.8		283	1.00	400	47.64
<u>79</u> 80	<u>9.10</u> 8.10	<u>75</u> 13	2.2	1.6	< 0.01	N	83	0.47	·	108		45	15	8.9	140	284	0.94	-139	-17.61
81	9.1	75	<u>3.9</u> 2.2	<u> </u>	<u>8.6</u> 0.01	N	<u>18</u> 83	<u>N</u> 0.47	0.2	<u>132</u> 108	N	<u>11</u> 45	<u>3.9</u> 15	0.5	149	149 285	<u> </u>	-139	-17.61
82	7.90	17	<u> </u>	37	8.6		20	N	0.205	184	N	20	1.8	0.5	205	203	1.00	-109	-17.01
83	7.3	18	8.9	38	9.2	<u> </u>	20	0.03	0.06	180	0	22	2.5	0.7		208	1.04		
84	7.8	8	4.8	34	10		20	0.00	0.02	160	0	23	2.1	0.4		181	0.94		
.85		19	6.6	35	11		21			190		19	2			207	1.02		
86				···															······································
87		24	5.6	16	5.7	0.18	21			118	1	22	2	0.6	157	156	0.98		
88	7.20	9.6	4.6	29	8.1		23			144	N	13	3.3	0.4	162	162	0.97		
89	7.90	8.5	5.4	30	8	0.06	27			142	N	13	3.5	0.4	166	166	0.98		
90	7.20	10	5.6	40	11.5		31	<0.02		149		37	8.7	0.4		218	1.01	-139.1	-18.24

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i	#рН	Na	ĸ	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
9	1		_																
9	2 7.80	25	7	32			86		5.7		Ν		28			178	3.63		
9	3 7.8	25	7	32	0.2		86			240	0	15	28			311	0.57		
9	4 8.4	113	N	2						98	24	49	60			296	0.98		
9	5																	-	
9	6																		
9	7 8.00		-	37	2.3					155	N	528	849			1493	0.05		
<b>98</b> .	1 8.00			3	3		· · · ·		N	179			18			112	0.12		
98.	2 9	83	N	3	1	0.004	25			170	48	18	0.01			262	0.81		,
	9 8.50	1050	29	245	N		97	7.2		11	6	293	1830	,	3870	3563	1.01		,
10	0 8.40	1100	160	260	0.1	< 0.02	110	6.1	0.04	26		340	1900	3		3892	1.06	-106.5	-6.33
10	1	**************************************		32	7					200		21	19			177	0.51		
10				6	3					206		18	16		······	144	0.13	<u></u>	
10				56	22					277		70	34			318	0.66		<u></u>
10				86	28	• • •			······································	286		132	126	<u> </u>		513	0.60		
105.		1400	120	148	0.17	0.34	208	5.85		49	3	220	2320	5.2	<u> </u>	4455	1.00	<u> </u>	
105.		1298	110	140	0.17	0.01	200	5.85	• • •	22	17	220	2320	5.2		4226	0.97		
100.		1400	110	140	1.5	0.01	240	<u> </u>		92	17	230	2300	5.2		4478	0.99	-105.3	-11.54
10		1400	130	68	1.5	0.02	165	9.9		<u>92</u>	<1	400	2300	4.5		4419	0.99	-105.5	-10.83
		1400		58					······		<1			4.5					
			86		1	< 0.02	145	7.1	4 7	68		350	2050	·····	<u>    .                             </u>	4135	0.99	-106.5	-11.65
10		1400	120	70	1.1	0.04	210	8.2	1.7	96		380	2100	5.1		4343	0.98	-105	-10.4
		152	21	1	4		45	1.8		230	0	52	192			582	0.73		
11		18	3.5	<u> </u>	3.8		18	0.1		284	0	9	21	0.1		232	0.39		·····
		272	8.4	13	0.6		94			93	0	156	278	2.8		871	1.00	407.6	44.07
11:		430	8.6	11	0.2	< 0.02	79	5		162		180	500	4.1		1298	0.94	-127.6	-14.87
		340	17	31	4.2	0.13	82	1.9		464		45	240	7		997	1.09	-120.7	-14.72
11		405	17	22	0.2		90	0.5		455	0	205	250			1214	1.02		
		486	13	18	1.9		62	2.8		902	<u>N</u>	130	155	8.9	1330	1321	1.01		
117		27	9.8	46	4.1		70	0.1		99		61	38	0.3		305	1.02		
118				24	11					110		26	38		·····	153	0.62		
		1450	120	110	6.5	< 0.02	85	8.7		197	<1	120	2400	4.6		4402	0.98	-125.5	-14.01
120		33	1.3	50	9.3	0.05	20	0.18		210		23	29	0.1	271	269	1.00		
12*										·····									
123		390	20	41	10	<0.02	63	4.1				120	45	8.6		702	4.82		<u> </u>
123		165	26	110	22		65		0.08	312		370	75			987	1.01	-130	-16.24
124			·																
12		143	12	31	15		42		1.2	456		63	29			559	0.97		
120	3								0.0574										
127	7.10	180	20	36	4.4	0.08	110	1.9	1.3	375		150	40	7.8		735	0.97	-129.5	-15.58
128	3 7.90	101	6.4	46	19	0.04	39	0.3		205	N	69	124	0.5	503	506	1.01		
129	)	182	11	79	17		58	1.1		407		154	127	1.9	826	831	1.00		
130	7.00	518	80	97	20	0.02	155			544	N	48	775	6.3	1968	1967	0.97		
131	6.9	540	82	95	22	0.03	110			490	0	66	790	5.7		1952	1.00		
		130	8.2	73	17		40	0.63	0.22	480		65	70	1.4	551	642	0.97		

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#	рН	Na	к	Ca	Mg	Fe	SiO2	B	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
133		277	27	28		< 0.25	81						26	<u> </u>		439	19.27		
134	7.50	304	33	7.6	20		74	3		818		93	20	5.5		963	0.99		
135	8.1	180	12	13	2.1		8.3	0.54	0.24	457	3	26	23	4.3		497	0.99		
136	7.64	110	4.7	91	32		26	0.36	0.06	180	0	190	180	0.7	734	723	1.00	-124.4	-15.15
137	7.40	160	13	8.8	0.5	< 0.02	135	1.2	0.00	368		53	29	7.8		589	0.93	-128.6	-15.7
138	8.6	270	14	8.5	2		17	1.8	0.81	365	8	110	140	6.2		758	0.99	-134	-16.4
139	8.30	920	94	17	40	0.01	50	15		1940	41	121	381	12	2650	2645	0.99		
140										1010									
141							·								<u> </u>				
142		1350	240	120	4	<u></u>	340			202		18	2250	6	4530	4427	1.05		
143.1					•			· · · · ·											
143.2							· · · ·												
144	7.90	60	6.5	56	19	N	51	0.4		260	N	72	58	0.3	452	451	0.96		
145	7.70	74	2	179	58	<u></u> N	25	0.4		211	N	390	191	0.3	1040	1024	1.00		
146	8.00	42	3.5	102	30	0.04	10	0.1		166	N	85	178	0.3	536	533	0.99		
147	6.50	130	22	33	6.8	0.22	66	1.1	0.08	429	1	56	18	1.8		547	0.95	-125.5	-15.65
148					0.0				0.00	120	·····					011	0.00	120.0	10.00
149	8.40	200	18	16	0.9	0.18	125	2.6		385		140	41			733	0.97	-131.4	-15.74
150						0.10	120	2.0									0.01		
151	7.00	157	15	58	16		44			533		84	34	1.7		672	0.99		
152	8.00	288	33	29	5	· · ·	80			823		<u> </u>	28	1.7		928	0.98		
153	7.10	105	28	70	27		40	2	5	507	N	94	17	2.5		635	1.01	. <u></u>	
150	8	118	21	20	9		40	£	<u>_</u>	333		<u> </u>	21			457	1.00	-127.8	-16.28
155	7.10	38	5.6	33	4.1		51			136		36	25	1.9		262	1.00	121.0	
156	6.4	77	22	100	25	0.18	34		0.33	537		64	14	1.1	582	602	1.04		<u> </u>
157	6.2	80	23	96	22	0.10	41	· <u> </u>	0.35	548		67	14	1.2	589	615	0.99		
158	6.6	10	2.3	8.5	1.9	0.12	26		0.004	51		5.7	3.9	0.1	96	84	1.01		
159	7.4	39	11	59	20	0.069	28		0.19	318	0	50	14	0.6		378	0.98	-128	-16.9
160	6.90	231	27	15	5.9	0.000	52		0,10	690		25	10	0.0		705	0.99		
161	7.60	45	16	60	15		70			335		52	12			435	0.95	-132.7	-16.64
162	7.51	27	7.6	43	8.8	0.004	67		0.028	180		38	17	0.5		297	1.00		
163					0.0	0.001			0.020									<u> </u>	
164	7.3	47	13	56	11	0.009	51		0.088	234		84	19	0.5	379	397	0.99		
165						0.000			0.000					0.0					
166																			
167	8.00	50	8	26	5.8	N	85		• • • • • • • • • • • •	164	N	37	22	0.4	318	315	1.01		<u> </u>
168		230	16	0.8	<u> </u>	0.04	373	2		116	149	89	30	15	1000	962	1.01		
169		230	16	<u> </u>	< 0.1	< 0.04	320	2.1		321	32	130	<u>50</u>	17	1000	975	0.88	-130	-14.76
170		136	17	22	5.8	<u></u>	58	0.81		378	<u> </u>	62	27	5	526	520	0.93	-100	-14.10
170		230	58	53	35	<0.02	<u>56</u>	2.1		915	<1	7	1	6.6	520	910	1.10	-136.1	-15.97
172		285	<u> </u>	<u> </u>	40	~U.UZ	70	2.1		<u>913</u> 949		116	48			1138	0.99	100.1	10.01
172	0.50	200		-10	<u> </u>		10	£.J		573						1100	0.00		<u> </u>
173								<u>.</u>			<u> </u>	<del></del>	· · · · · ·						·
	7.30		-2.1		23.5		20	0.03	0.8	226	1	27	4.6	0.1		246	1.06		
	1.00		£.1					0.00					4.0						

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#	≠ pH	Na	к	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
176	5 7.00	39	8.7	52	16		0.58	0.25		287	N	27	14	0.7	380	299	1.02		
177	7				·····				0.75										
178	and the second		35	63	12.3		65	0.9	0.3	493		70	15	2	582	867	0.98	-149	-18.1
179		120	39	60	15.5	< 0.02	65	0.7		488	1	72	16	1.9		631	1.04	-144.7	-15.31
180																			
181		135	8.9	1	0.03	<0.02	210	0.2		224	15	40	23	17.7		561	0.93	-130.1	-16.09
182		58	14	45	12		50		1.8	377		24	6.5			395	0.89	-132.8	-16.24
183	· · · · · · · · · · · · · · · · · · ·			54	18					396	<u>N</u>	95	18			380	0.47		
		118	21	20	9	<0.02	40		0.113	333		64	21			457	1.00	-127.8	-16.28
185		114	22	41	22.4		39	2.4	0.08	443		68	20	4.5		551	0.99		<u></u>
186					61		05			540	<u>N</u>	315	332			1115	0.49		
				52	20		35	0.8		334	· · · · - ·	39	23	1	398	335	0.61		<u></u>
188 189									<u> </u>		·								
109		8.4	4	49	17		24		•	226		20	5.1	0.334		239	1.01		
190		<u> </u>					<u> </u>		0.1	220		20	<u> </u>	0.004		209	1.01		· · · · · · · · · · · · · · · · · · ·
192								_	0.1	······		<u> </u>							
193		<u></u>													·····				
194				16	1					56	8	168	114	3	788	338	0.11		
195					· · · · ·		<u>_</u>	_										<u></u>	
196																			<u></u>
197		780	42	56	2.6	0.037	110	4.3	2	170	1	67	1100	2.9		2251	1.07	-126	-14.3
198	3 7.2	694	53	35	0.2		210	4.4	1.5	112		323	872	5.5	2120	2311	1.00	-127	-14.2
199	7.10	730	62	22	N	N	226	4.7		67	N	315	910	7.3	2360	2310	1.02		
200	)			32	2		259			31	19	334	955		2495	1616	0.05		
201		620	38	70	1.5	0.02	150	5.6		100		400	820	4.2		2159	0.95	-121.5	-13.3
202		656	52	52	0.6		198	6.1	1.7	93		405	829	4.7	2100	2298	0.97	-121	-12.4
203													5_			5	0.00		
204		117	5.4	6.2	0.1	<u> </u>	46	193		12	20	144	57	2.5	361	597	0.99	<del></del>	
205		139	4.7	5.2	0.3		85	0.76		136		171	20	0.81	567	494	1.01	400	45.0
206	-	277 248	8	27	0		126	2	0.2	93		528	55	4.1	950	1120	0.95	-126	-15.9
207			7.1	20	0.3		104	1.7		95		419	53	4.9	959	905	1.00	101	10.4
208 209		<u>611</u> 679	58	<u>15</u> 32	<u> </u>	*	278	41.8	6.9	<u>369</u> 361		120	790	1.2	2056	2292	0.93	-121	-12.4
209	***	680	66	16	0.7	<0.02	270	47		361		<u>234</u> 73	750 837	2.1	2000	1882 2173	<u> </u>	-116.7	-12.16
210		19		24	9	<u> </u>	210			151	N	- 73	<u> </u>	2.1	211	134	1.03	-110.7	-12.10
	**** · · · · · · · ·			37	19					212	<b>F</b> I	47	13	0.1	281	220	0.71		·····
213		49	0.4	2.8	1	·····	44	0.2	0.667	34	26	35	5.4	0.1	201_	181	1.03		
214	· · · · · · · · · · · · · · · · · · ·			13		0.27		<u></u>	1.4	120	6		<u> </u>	7	253	92	0.24		<u> </u>
215								_			ž		•	•					
216	······			47	14					232		5	7	0.1	249	187	0.85	· ··	
217		67	4.6	267	53	3.3	34	0.03		312	N	732	8.2	0.6	1320	1323	1.01		
218				102	1	0.13			8.4	149	N	192	21		583	389	0.74		
219	8.21	25	1.4	17	0.9	0.003	33	0.04	0.011	107	0	8.6	3	0.3		142	1.01	-109	-14.8

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_	#	рН	Na	к	Ca	Mg	Fe	SiO2	В	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
_	220	8.06	28	0.9	15	1.1	0.11	27	0.06	0.004	93	0	16	4.7	0.6		139	1.03	-112	-14.9
	221	7.26	173	5.9	270	0.14	0.116	44	1.4			26	843	34	4.1		1402	1.08	-130	-16.2
_	222	8.84	99	1.6	2.2	<0.05	0.03	60	1.5		57	13	89	27	7.5		329	1.02	-127	-14.9
_	223	8.55	161	5	166	0.1		33	1.4		4.5	11	617	. 39	3.3		1039	1.06	-130	-16.2
	224	7.3	170	3.9	66	0.74	5.6	35	1		39	0	470	38	5.1	798	815	0.94		
	225	8.90	125	1.7	6	0.7	0.03	47	1.5		51	17	109	74	7.1	408	414	0.95		
	226	8	58	4.4	9.5	2.9	0.006	78	0.16		140	0	36	9.5	1.6	271	269	0.99		
_	227	8.50	<u> </u>	<u>3.4</u> 2	<u>2</u> 14	0.2	0.03	<u>36</u> 33	· · ·	0.309	146	4	23	6.2	1	244	217	0.99		
-	228 229	<u>8.80</u> 8.20	82	2	7.2	1.7				7.1	<u>48</u> 159	-*	<u>148</u> 128	<u>21</u> 29	5.8		<u>330</u> 244	0.91		
	230	8.50	277	15	38	0.2		115		/.1	70		580	46			1106	0.99	-131.5	-16.01
_	231	8.60	313	13	40	1	0.06	109	1		52	12	642	40	8.2	1210	1214	0.98		
	232	4.83	1200		55	0.07	0.015	190	9.4					2000	0.7		3455	0.97		<u> </u>
	233	8	2230	249	87	0.2		319	15.6	3	36		70	3740	4.3	7570	6754	1.00	-114	-,2.1
·	234						<u> </u>													
	235	·								<u> </u>					<u>-u</u> <del>-</del>					
	236																			
	237	8.60	190	6.5	3.6	0.02	<0.02	115	0.89	0.04	111	11	111	126	16		635	0.97	-126.1	-15.89
_	238	7.41	1900	120	80	23		83	0.58	1.7	348	0	240	3000	1.3		5621	0.96	-101	-11.5
	239	8.1	680	25	11	4.2		49	7.2	0.44	388	2	110	820	0.5		1900	0.98	-110	-13.9
_	240	7.86	1000	48	82	2.1	0.05	160	5.7	1.5	144		360	1500	0.6		3229	0.94	-109.3	-13.46
	241	5.7	2000	232	109	0.4		284	13.4	3.8	108	<u> </u>	48	3400	1	6140	6200	1.00	-105	-10.8
	242		750	60	18	5		70	5.1	1.1	312	3	39	1300	1.1		2406	0.83	-110.6	-13.3
_	243	7.34	42	2.8	63	15	0.007	40	0.41	0.055	243	0	65	14	0.5		362	1.09	-95	-11.7
-	244	9.27	220	7.6	1.7	0.79	0.022	28	1.1	0.012	230	38	89	100	0.8		600	1.02	-111	<u>-14.1</u> -12.36
. –	245 246	<u>7.57</u> 8.5	1480 1600	<u>42</u> 57	<u>108</u> 71	<u> </u>		<u>170</u> 80	<u>15</u> 17	2	<u>90</u> 120	<u>&lt;1</u> 15	<u>190</u> 180	<u>2200</u> 2300	<u>5</u>		4256 4385	1.05	-110.2	-12.30
·	240	8.2	1700	<u>57</u>	75	0.9		120	17	2.1	140	0	210	2300	5.5		4305	1.05		
	248	7.86	3100	45	27	32	0.18	63	13	0.32	839	0	6.8	4700	0.7	8490	8401	0.96	-97	-10.5
	249	7.65	370	0.9	33	5.8	0.0055	53	1.5	0.02	788		250	15	1.9		1119	0.98		
	250	6.56	1400	32	70	2.9	0.054	120	1.5				62	2200	0.5		3901	1.03	-107	-11.7
	251															·····				
<del></del>	252							-												<u> </u>
	253																<u> </u>			<u> </u>
_	254	7.40	450	26	44	0.6	<0.02	180	2.4	0.1	114	<1	470	380	7.9		1617	0.99	-125.8	-13.21
_	255	7.60	68	3	16	2.2	0.01	54	0.3		86	N	80	26	6	297	298	0.97		
_	256	8.20	72	2	12	0.9	0.04	63	0.08		98	N	60	21	6.9	287	286	1.01		
	257	9.9	4400	87	5.7	6.2	0.25	24	4.8	0.3	575	256	1700	4843	7.8	11919	11618	1.02		
	258	8,9	363	34.6	3	1.1		342	7.4		279	13.5	118	321	5.8		1347	1.00		
_	259				64	5		42			768	N	77	34		863	600	0.24		
	260																· · · · · · · · · · · · · · · · · · ·			
	261																			
	262	8.40	4-0		42	20		440	0.00		180	8		19			252	0.71	400 /	10.00
	263	7.70	170	8.4	4.8	0.06	< 0.02	110	0.66	0.04	256	5	102	22	8.9		558	1.04	-130.4	-16.68

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<u>#</u> 264.1	рН	Na	К	Ca	Mg	Fe	SiO2	В	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
264.2	8.59	525	38	10	2.5	0.14	107	3.5		1380	40	65	48	12		1530	0.90	-132	-17.7
265.1	7.7	156	8	6.2	0.14		116	0.0		243		108	24	8.8		547	0.99		
265.2																		· · · · ·	
266	· · · · · · ·				•••••••		· · · · · · · · · · · ·					·····		· · ·· · · · · · · · · · · · · · · · ·					
267	6.50	44	14	56	12	< 0.02	68	0.12		264	<1	64	12	2.5		403	0.99	-129.8	-16.87
268	7.20	29	5.9	57	21	0.01	40	0.26		279	N	35	21	0.2	346	347	1.01		
269.1	8.00	15	3.4	51	20	N	25	N	0.5	255	N	25	10	0.4	276	275	0.99		
269.2																			
270	7.47	37	12	69	17		37			334		25	9	0.889		371	1.07		
271																			
272																			
273									1.2				<u> </u>						··
274	8.70	36		24	7.8					135	12	28	7			181	1.00		
<u>275</u> 276	9.30	64	0.7	1	<0.1		85	<u></u>	<u>N</u>	144		18	6.3			246	0.98	-127.9	-16.28
	7.80	36		62	12	<u> </u>			0.76	160	NI.	00	43			320	1.00		
<u> </u>	6.50	200	36	43	9.4	0.06	77	2.6	0.76	673	N	<u>88</u> 51	<u>43</u> 22	4.7		777	0.97	-135.8	-16.01
279	0,50	200		40	9.4	0.00		2.0		073		51		4.7			0.97	-135.0	-10.01
280	6.60	47	13	52	11	<0.02	36	0.17		249	<1	57	10	2		230	3.58	-127.5	-16.28
281	7.10	55	15	50	11	< 0.02	46	0.21		278		59	8	2.8		384	1.00	-124.9	-16.24
282	6.72	27	7.5	65	28	0.01	24	0.1	0.063	370		31	8.3	0.5		374	0.99	-120.5	-15.6
283	6.85	21	4.6	69	22	0.01	21	0.07	0.083	320		53	6.9	0.4		356	0.96	-122	-15.9
284	8.65	18	6.7	42	20		20		0.527	217	6.5	35	6.7	0.319		262	1.00		
285	7.2	19	6.5	60	23	0.006	26		0.083	286		52	6.7	1		335	0.98	-127	-16.6
286																			
287	7.8	150	4.8	12	0.3	0.02	105	0.35	0.65			1	16	1.2		291	13.58	-127.8	-16.2
288															·				
289												<u>مہ م</u>					1.00		<u></u>
	7.8	4.8	1	49		0.01	11			180	0	17	4	0.1		196	1.29		. <u> </u>
<u>291</u> 292	8.29	4.3	1.4	56	17		23	<u> </u>	0.008	232		19	3.6	0.265		239	1.02	· · · · · · · · · · · · · · · · · · ·	
292	8	20	9.5	26	8.7	0.007	71		0.008	130		9	21	0.4		230	1.07	-126	-16.5
294		162	3.5	13	1.1	0.12	100		0.013	375	7.7	17	17	0.75	518	503	1.07	-120	-10.0
295						U.12	100		·····										
296	7.3	9.3	3.4	51	21	0.01	19			250	0	18	4.4	0.4	·	250	1.03		
297				54	21	0.1	32			267	N	21	4.3		266	264	0.90	· · · · · · · · · · · · · · · · · · ·	
298	6.8	8.2	2.3	51	16	0.01	21	0.03	0.017	220		19	3.2	0.2		229	1.04	-121.5	-16.2
299	8.00			32	25					148	N	83	10		· · ·	223	0.82		
300				51	23	0.22	37			222	N	68	7.5	0.67	314	297	0.84		
301	8.70	145	3.6	10	0.01	<0.02	58	1.2		50	9	235	44	4.9		535	0.92	-119.5	-15.55
302	9.10	137	2.9	9.6	0.5	0.01	61			12	24	200	46	5	499	492	0.98		
303													1.2			1	0.00	-116	-15.6
										<u></u>				· ·					

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#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
305	8.7	102	2.5	4.5	0.01	0.06	52	0.19	0.07	54	7	169	17	3.1		384	0.90	-123.2	-16.01
306	8.50	69	3.4	2	0.2	0.03	36		7.1	146	4	23	6.2	1		217	0.99		
307							62	1		41	22	157	28	3.5		294	0.00	· · ·	
308																			
309																			
310	8.5	200	2.2	26	0.1	0.02	34	- <u></u>		38	0	380	49	8.4		718	0.97		
311											-						<del>_</del>		
312		70		48	13					88	10	190	43			417	0.94		
313		262		16	<u>N</u>			1.6		210		315	78			776	1.00		<u> </u>
314										·····								·	<u> </u>
<u>315</u> 316		• • • • • •	· · · · · · · · ·																
	7.40	148	6.4	82	14	0.01	25		75	82	N	403	79	0.7	810	798	0.99	· · · · ·	
	8.00	245	10	32	6.1	0.66	<u></u> 54	2.3	/3	118	1.1	374	102	6.8	891	<u>798</u> 891	1.01		
319	0.00	240	10	<u> </u>	0.1	0.00	37	2.3	0.22	47	9	109	64	4.8	370	254	0.07		
320	7.70			26	<u>0.9</u> 8		- 37		6.1	144	<del></del> N	23	11	4.0		139	0.62		<u> </u>
321	7.60	305	16	40	3.3	0.07	46	2.3		112	<1	597	87	7.4		1159	0.93	-130.3	-16.13
322	8.70	160	2.7		< 0.25	0.07	63			68		238	33	11		548	0.97		
323									0.8					<u>.</u>					
324									5					·			· · · · · · · · · · · · · · · · · · ·		<u> </u>
325	7.50	74	13	23	0.95		94		0.18	202		38	12	4		358	1.03	<u> </u>	
326	8.77	99	3.3	1.1	< 0.05	0.03	122	0.7		119	21	47	12	14		379	0.95	-131	-8.4
327	8.72	94	2.7	1.4	< 0.05	0.04	112	0.575		126	17	53	12	14		369	0.88	-130	-6.7
328																			
329	7.60	55	4.8	26	13		28			239		41	1	0.31		287	1.01		
330																			
331																			
332																			
333	8.23	57	13	15	0.924		108			130		44	12	0.738		315	1.06		<u> </u>
334	7.6	43	9	28	4.2	0.02	76	0.18	0.04	147	0	34	21	0.7	300	288	1.03		
335.1								<u>    .                                </u>				400			0.07	000	0.07		<u> </u>
335.2	0.40	80	5	20	4.4	3	68	·		51	36	106	35	0.000	367	382	0.97		
336	9.12	43	1.9	7.2	0.512	0.000	68	0.01	0.04	83	9.3	18	7.7	0.889	004	197	1.00		<u> </u>
<u>337</u> 338	<u>7.9</u> 7.8	<u>13</u> 17	<u>4.2</u> 5.8	<u> </u>	12	0.008	28	0.01	0.01	<u>168</u> 158	0	36	<u>3.7</u> 4.8	0.6	<u>221</u> 269	217 257	0.960.99		<u></u>
338	7.6	38	<u> </u>	45	<u> </u>	0.15	<u>31</u> 46	0.045	0.02	158 80	0	<u> </u>	4.8	0.4	148	155	1.00		
339	7.70	<u> </u>	6.8	<u>4.7</u> 70	22	0.01	32	0.1	2.1	358	<u>N</u>	55	19	1	444	431	1.00		
340	8.00	197	13	51		0.007	135	0.00	<u> </u>	<u> </u>	<u> </u>	<u>55</u>	42	8	823	815	1.00		<u> </u>
341	0.00	131				0.04	100		11	545	<u></u>	00	76	0	020	013	1.00		
343						· · · · ·		··· .	N										<u> </u>
344	8.10	65	2.5	1.6	0.1	0.014	76	0.16	7.6	132	N	26	10	1.2	229	248	0.98		
345	7.8	66	3.5	25	3.4	0.01	70	0.3	0.03	184	0	42	18	1.2	313	320	1.01	····	<u> </u>
346	7.4	46	4.4	17	2	0.027	46	0.2	0.04	124	0	27	15	0.5	208	219	1.03		<u> </u>
347	7.4	41	7.9	25	2.6	0.009	72	0.34	0.05	156	0	21	12	0.8	261	259	1.02		

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	#	pН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	СОЗ	SO4	Cl	F	TDSm	TDSc	ChgBal	delD	delO18
	348	7.8	276	27	58	18	0.015	25	0.61	0.95	702	0	222	36	6.2	945	1015	0.98		
	349	7.20	194	24	76	22		53	0.44		702	N	99	31	3	833	848	1.00		
	350	7.7	45	1.1	68	6	0.005	42	0.19	0.03	284	0	31	22	0.2	376	355	0.99		
	351	7.7	36	0.3	5.8	1	0.002	40	0.01	0,04	94	0	9.5	6.3	0.3	143	146	1.01		
	52.1	8.00	28	6.5	62	22	0.06	25	0.12		321	N	47	8.6	0.6	380	358	0.97		
	52.2	9.98	52	1.5	0.723	0.06		70			43	29	14	10	4.8		203	0.94	<u> </u>	<u></u>
	353 354	<u>8.06</u> 8.1	<u>12</u> 54	<u>3.3</u> 12	<u>40</u> 57	<u>18</u> 17	0.008	22	0.44	1.5	<u>185</u> 368	0	<u>38</u> 17	16	0.22	380	241 388	0.95		<u> </u>
	354	6.88	<del>54</del> 36	5.5	71	23	0.008	<u>32</u> 24	<u>0.44</u> 0.13	0.25	380	0		<u>    14</u> 9.5	<u>2.8</u> 0.9	380	386	1.00	-114	-15
	356	7.03	24	5.9	58	19	0.01	24	0.13	0.075	290		47	9.9	1.3	······	335	0.93	-119	-15.7
-	357	7.14	5.3	1.6	67	24	0.01	13	0.03	0.013	300	<u> </u>	14	2.9	0.2		276	1.05	-108	-14.5
	358	7.5	10	3.4	50	21	0.003	26	0.00	0.010	270		12	6.6	0.2		262	0.97	-105	-14.3
	359				40	23	0.000	46		10	178		27	18		283	242	0.98		
	360	7.60	24	5.1	60	24	0.01	28	0.1	0.85	300		43	9	1	343	342	1.00		
	361	7.38	22	4.4	55	22	0.009	25	0.11	0.053	260	0	44	9.3	1.2		311	1.02	-119.5	-15.8
	362	9	1680	18	7.1	5.4	<u> </u>	20	18.4	0.95	1590	200	425	937	7.68	4920	4101	1.09		
	363	7.8	68	17	56	17	0.008	51	0.4	0.24	350	0	47	26	2	405	457	1.00		······································
	364	8	123	25	91	31	0.1	37	0.8	0.33	698	0	59	9.8	2.4	700	723	1.00		
	365	7.6	120	22	100	26	0.002	27	0.62	0.3	673	0	51	15	2.7	732	696	1.02		
	366				44	37	0.1	11		0.324	124	N	11	2		132	166	2.26		
	367																		-101	-13.2
	368																			
	369	7.20			1.1	0.6			0.02		50	<u>N</u>	22	2	0.2		51	0.08		
	370													578			578	0.00		<u></u>
	371	7.90	792	60	38	38	0.8	23	9.8	······	720	N	323	860	3.2	2500	2502	0.96		<u></u>
	372	8.40	875	2.5	71	2		48			56		1120	625	5.6		2777	0.99		
	<u>373</u> 374	7.10			48	7.4			1.7		60	<u>N</u> N	<u>98</u> 12	<u></u> 3	4.2		<u>259</u> 98	0.58		
	374	7.90			<u> </u>	2.1			0.06		128	N	12	3	0.2		90	0.44		
	376	7.00	<u> </u>		49	9.6	0.17				614		120	74	4.3	940	559	0.22		
	377	8.30	-		13	4	0.17		0.42		158	1	38	7	1.5		143	0.26		<u></u>
	378	8.3	430	45	37	4	··	140	9.4		224	0	80	460	3.1	1494	1319	1.19		
;	379				<u> </u>													· · · • • • • <u>· · · ·</u>		
	380						·													
	381	7.10	334	16	47	2.7	0.12	62	1.4		328	N	487		7	1180	1119	1.10		
	382	7.90			48	4.9	N				266		106	54	2.7	560	346	0.34		
	383				9.6	2.4				0.65				47			59	0.51		
-	384													<u> </u>						
_	385	7.70	47	2.5	62	5.9	0.03	38	0.18		240	N	48	23	0.8	346	345	1.01		
	386	7.75	240	0.4	220	0.4		17		0.25	110	0	890	49	0.8	1600	1472	0.99		<u> </u>
_	387	7.05	49	0.9	21	<u> </u>	0.06	55		0.02	160	0	21	7.8	0.3	229	235	1.00		<u>-</u> -
	388 389	9.00 7.00	<u>81</u> 142	<u>2.6</u> 15	<u>1.6</u> 74	<u>N</u> 27	1	<u>61</u> 30	<u> </u>	<u>N</u>	<u>187</u> 577	<u>N</u> N	<u>16</u> 71	<u>6</u> 34	0.6	<u>287</u> 624	<u>261</u> 679	1.02		
	390	8.20	- 142	12	11	5.8	N				155	N	24	<u> </u>	4.5	427	177	0.21		
`	0.50	0.20		· • • • •		0.0	N				100				4.0	121		0.21	······	

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	#	рН	Na	к	Ca	Mg	Fe	SiO2	в	Li	нсоз	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
	391	7.7	45	2.8	57	7.7		37		0.05	231	0	48	23	0.6	396	335	1.01		
	392	8.00			36	22					357	N	25	5			264	0.55		
	393												<u> </u>			··				
	394				i															
	395	8.00	29	7.2	44	23		33	0.1		260	<u>N</u>	36		0.5		312	1.03		
	396	8.40	23	5.2	45	23	<u>N</u>	28	0.2	<u>N</u>	272	N	27	8	0.5	295	294	1.00		
	397	8.10	32	6.8	39	18		31	0.1	5.6	231	N	34	9.7	0.5	286	285	1.04		
	398	8.3	3.8	0.9	55	31	0.006	14		0.013	289		8.9	4.1	0.1		260	1.09	-97	-12.9
	399	8	34	5.6	26	3.5	0.009	55		0.057	146		18	10	1.3		225	1.03	-101	-13.4
	400	0.40																		
	401	8.10	38	6.8	31	9.8	<u>N</u>	51	0.1		189		29	15	1.6	271	275	0.99		
	402	7.5	6.5	1.5	56	26	0.042	14		0.016			6.9	7.9	0.1		119	14.14	-103	-13.7
	403	8.20	46	15	43	6.2	<0.01	91			239	N	42	12	1.4	380	374	0.97		<u> </u>
·	404	7.20	39	14	34	4.8		106			200		30	8	1.4		336	0.99		
	<u>405</u> 406	7.90 8.20	169	3	18	1.5	0.10	<u> </u>	0.4		254		127	45	5	564	563	1.01		
	400	7.35	<u>   106   </u> 64	<u>5.8</u> 9.7	<u> </u>	1.9	0.12	<u>68</u> 38	· ···.	0.11	194	<u>N</u>	<u>69</u> 75	<u>27</u> 20	43	<u>368</u> 372	<u> </u>	<u>1.01</u> 2.87	<u> </u>	<u> </u>
	408	<u>7.35</u> 8	50	2.2	22	<u>16</u> 1	0.023	22		0.05	147	0	40	7.6	0.9	210	210	0.97		
	409	7.6	120	<u> </u>	44	16	0.006	28		0.05	270	0	150	27	3.8	537	533	1.06		······
	410	7.30	71	8	51	18	0.000 N	20	0.51		300	N	80	22	2.2	552	420	1.00		
	411		69	7.8	47	21		23	0.31	0.11	302	N	78	21	1.5	547	417	1.00		
	412		69	7.8	48	19		22	0.26	0.0958	300	N	75	17	1.7	419	407	1.02	· · · · · ·	
	413	7.90	69	6.8	45	20		29		0.6	285	N	81	21	1.3	528	413	1.01		
	414	7.60	71	7.8	46	19		28		0.0419	283	N	80	22	1.2	529	414	1.02	<u></u>	
	415		65	7.6	50	24	N	22	0.32		310	N	76	20	1.6	555	419	1.02		
	416	7.20	69	7.7	49	21	0.02	23	0.1		310		80	21	1.4	425	425	0.99		
	417		68	7.8	45	21		22	0.38		300		78	20	1.5	541	411	0.99		
	418		97	8.6	44	19		28	0.44		318	N	105	25	1.3	480	485	1.00		
	419	7.40	80	8.8	48	20		26		0.0463	311	N	92	32	1.4	593	461	0.97		
	420		62	7.8	45	18		22	0.27	_	284	N	64	21	2.1	400	382	0.99		
	421	7.3	300	9.5	76	39	0.006	26			346		500	130	1.7	1260	1252	1.02		
	422		21	9.7	48	15	0.16	17			239	N	28	5		330	261	1.03		
· · · · · · · · · · · · · · · · · · ·	423				55	29		18			239	N	42	4.9		268	266	1.04		
	424		8.2		50.3	22.2					243.8	N	32.9	0.7		358.1	234	1.00		
	425		5.7	1.2	47	23	0.02	13			235		35	4.5	0.2		245	0.96		
tallie Room	426	7.03	8.4	1.8	94	29	0.007	13		0.013	201	_	180	16	0.2		441	1.00	-91	-12.5
	427	7.35	29	3.7	26.7	44.2	0.01	29.1	0.2		280		91	27	0.44	409	389	0.87		
	428	7.4	8.1	3.6	48	25	0.05	14			222	0	51	6.5	0.2	266	266	1.00		
	429			<u> </u>	150	44		21			171	<u>N</u>	453	22		863	774	0.86		
	430				155	50		30		1.2	205	<u>N</u>	405	35		857	776	0.93		
	431	7 4			106	20	0.000			<u> </u>	84	<u>N</u>	1027	112		1785	1306	0.27		10.05
	432	7.4	81	11	47	21	0.006	34	0.04	0.11	303		90	34	1.7		469	1.00	-101	-12.95
	433	7.15	78	11	46		0.01	33	0.31	0.13	300		100		1.9		472	0.95	-100	-12.9
	434	7.16	88	11	58	25	0.006	30		0.14	272		160	53	2.1	<u> </u>	561	0.96	-97	-12.95

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	#	рН	Na	к	Ca	Mg	Fe	SiO2	В	Li	HCO3	CO3	SO4	CI	F	TDSm	TDSc	ChgBal	delD	delO18
	435	7.35	38	10	51	25	0.01	24		0.11	239		54	26	1.2		347	1.12	-75	-10.35
	436		99	10	65	28		31	0.3		288	N	174	60	2.4	614	611	0.99		
	437		101	11	70	26		29	0.3	0.6	274	N	179	64	2.3	620	617	1.02		
	438	7.3	25	5.3	130	43	0.08	29		0.039			370	15	1		618	1.38	-87	-11.65
	439	7.27	120	13	110	48	0.043	21		0.19	210		360	170	2.1		948	0.95	-97.5	-13.3
	440	9.60	36	2.7	5	0.7	<0.15	0.64	0.57		37	N	64	8.1	0.1	160	136	0.89		
	441	8.1	340	26	500	170	0.01	17	1.3	0.66	160	0	1900	380	1.5		3415	1.03		
	442	7.9	300	20	450	140	0.03	17	1.1	0.6	160	0	1600	340	1.4		2949	1.04		
	443	6.96	130	13	120	47	0.004	23		0.21	226		380	200	1.4		1026	0.91	-94	-13.45
	444	7.00			298	113	N	38			98		1200	1190	1.5	3720	2889	0.40		
	445	8.12	271	7.4	62.7	2.7	<0.15	38.94	0.58		113.8	N	431.3	143.6	4.05	1040	1018	1.01		
	446	7.90	680	17	290	4.8	0.01	40	1.4		41	N	730	1000	3.9	2790	2787	1.01		
	447	7.60	160	3.1	37	6.9	0.01	25	0.7		79	N	180	180	1.4		633	0.93		
	448	7.3	350	8.3	220	75	0.02	28	0.82		203	···	570	600	1	2090	1953	1.01		
	449	7.9	160	4	58	16		27			156	0	190	180	· · ·		712	0.97		
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# Nevada Geothermal Resource Use — 1993 Update

by Larry J. Garside and Ronald H. Hess Nevada Bureau of Mines and Geology University of Nevada, Reno

## Geology

Nevada is well-endowed with both high- and low-temperature geothermal resources. Over 40 percent of the state is believed to have potential for the discovery of high-temperature (>90°C) geothermal resources, and another 50 percent has potential for low- to moderate-temperature (<°90C) resources (see Figure 1). Surface and subsurface indications of these resources are the more than 1,000 thermal springs and wells in the state. Realistically, this number of individual springs and wells represents several hundred resource areas.

Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of groundwater along faults to deep levels in a region of higher-than-average heat flow. In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (for example, warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for dozens to hundreds of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

#### **Exploration and Development**

Two hundred and eighteen geothermal well permits were issued from 1988 through 1993 by the Nevada Division of Minerals. They include 58 industrial-class production wells, 30 domestic class, 88 observation or gradient wells, 10 commercial-class, and 25 injection wells. During this same period 109 geothermal wells are reported to have been drilled, with a total amount drilled of approximately 86,500 m. Forty-five of the wells drilled were production wells, with a total amount drilled of approximately 44,800 m. Figure 2 and Table 1 illustrate the number of power generating wells and pace of drilling since 1980.

From 1989 through 1992 noncompetitive and competitive federal geothermal leases in Nevada generated \$1,699,282 in

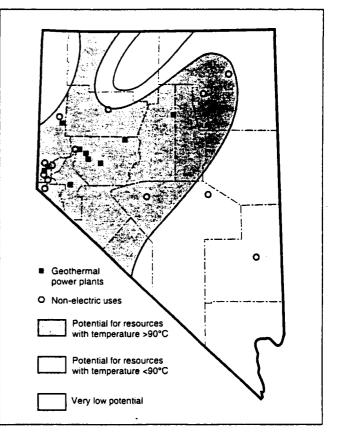


Figure 1. Generalized locations for Nevada's geothermal resources.

rental fees, \$849,641 of which was returned to the State of Nevada. Federal production royalties during the same period generated \$7,485,000, of which \$3,742,500 was returned to the State. Geothermal lease returns (\$849,641) and royalty returns (\$3,742,500) to Nevada totaled \$4,592,141. By regulation, half of all funds collected by the Bureau of Land Management from federal geothermal leases and production royalties is returned to the state.

### **Geothermal Electric Power Generation**

Electric power is generated using geothermal resources at 10 plants in northern Nevada (Table 2, Figure 1). The state's

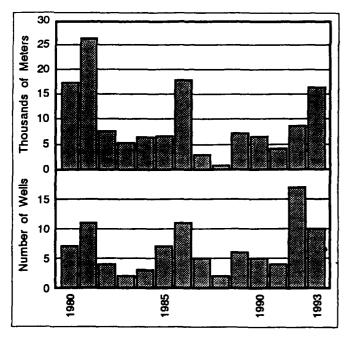


Figure 2. Industrial-class (power generating) wells drilled in Nevada, 1980-1993.

total installed geothermal generating capacity is second only to California.

In 1993 the state-wide peak power demand was 3,755 MW; the total installed generating capacity of Nevada's two major utilities (which supply most of the state's customers) is nearly 2,600 MW (Public Service Commission of Nevada). Thus, geothermal energy provides about 7 percent of the total electricity generated within Nevada (although only about 3 percent of the peak load). Over 40 percent of Nevada's geothermal electric power is exported to California.

From 1989 to 1992, total Nevada geothermal electrical production was 4,076,616 megawatt-hours with an approximate sales value of \$307,410,000. Production capacity in 1988 from eight geothermal power plants was 115.8 MW (gross) while current power production from 10 existing geothermal power plants in Nevada is 191.7 MW gross (Table 1). These values represent a 17 percent increase in sales value of the power sold from 1988 to 1992 and an increase in installed gross power production capacity of 60 percent over 1988.

It is important to note that in 1988 Nevada had nearly a threefold increase over 1987 in the amount of online geothermal generating capacity (Figure 3). The primary reason for this increase was the Dixie Valley 60 MW Oxbow Geothermal plant being put online. The OESI plants at Empire (4.8 MW) and Soda Lake No. 1 (3.6 MW) were also brought online during this period.

According to a 1991 Department of Energy estimate, under stable market conditions and with continuing technologic advancements in the geothermal industry, Nevada's projected electrical production capacity from known geothermal resources by the year 2010 should be at least 600 MW (Energy Information Administration, 1991). It is esti-

Table 1. 1992 directory of Nevada geothermal power plants.

Year	Total # drilled	Totaí depth(m)	No. industrial wells drilled	<i>Total</i> depth(m)
1988	11	4,268	3	1,098
1989	15	14,817	6	7,317
1990	12	11,280	5	6,707
1991	14	12.561	4	4,268
1992	36	17.988	17	8,841
1993	21	25,596	10	16,686
TOTAL	109	86,510	45	44,917

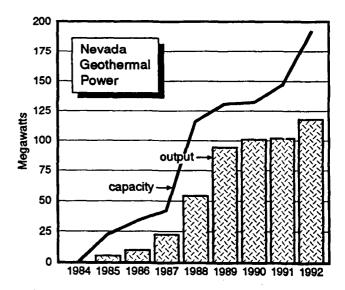
mated that, for the Basin and Range province as a whole, aggressive exploration activity and continued rapid geothermal technologic advancements could add up to 2,000 MW of production capacity from known resources and new discoveries over the next 10 to 20 years (Wright, 1992). These relatively optimistic future scenarios should be tempered by today's reality of low-priced natural gas, increases in efficiency of fossil fuel generating equipment, and anticipated changes in power sales contracts. The future is bright for Nevada's high-temperature resources, but the pace of development will depend on many factors not related to the viability of the geothermal resource.

## Beowawe

The Oxbow/Beowawe Geothermal Power Co., Beowawe plant came online in 1988. It is a 16 MW (gross), dual-flash plant, which uses geothermal fluids from three wells with a resource temperature of 221°C.

### Brady Hot Springs

The Brady Hot Springs geothermal power plant (Figure 4) came online in July 1992. Plant operation and maintenance is being performed by Oxbow Power Services, Inc.



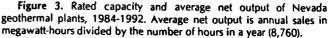




Figure 4. Steam separators and power house at Brady Hot Springs plant (Brady Power Partners), Churchill County, NV. Larry Green photo.

Plant name (year on line)	Production capacity <sup>1</sup> (MW)	1992 Proc	luction (MWh)	Location	Operator
		Gross	Net (sales)		
Beowawe (1985)	16.0	138,196	104,415	S13,T31N,R47E	Oxbow/Beowawe Geothermal Power Co. P.O. Box 6 Beowawe, NV 89821
Bradys Hot Springs (1992)	21.1	69,999	54,563	S12,T22N,R26E	Oxbow Power Services, Inc. P.O. Box 649 Femley, NV 89408
Desert Peak (1985)	8.7	85,364	76,906	S21,T22N,R27E	Western States Geothermal Co. P.O. Box 2627 Sparks, NV 89432-2627
Dixie Valley <sup>2</sup> (1988)	66.0	535,220	483,307	S7,T24N,R37E S33,T25N,R37E	Oxbow Geothermal Corp. 5250 South Virginia St. Suite 304 Reno, NV 89502
Empire (1987)	3.6	17,783	12,752	S21,T29N,R23E	OESI/AMOR II P.O. Box 1650 Fallon, NV 69407
Soda Lake No. 1 (1987) and Soda Lake No. 2 (1991)	16.6	107,315	84,419	S33,T20N,R28E	OESI/AMOR III P.O. Box 1650 Fallon, NV 89407
Steamboat I, I-A (1986) and Steamboat II, III (1992)	31.1	104,574	79,790	S29,T18N,R20E	S.B. Geo, Inc. P.O. Box 18087 Reno, NV 89511
Stillwater (1989)	13.0	72,707	59,692	S1,T19N,R30E S6,T19N,R31E	OESI/AMOR IV P.O. Box 1650 Fallon, NV 89407
Wabuska (1984)	1.2	6,262	3,860	S15,16,T15N, R25E	Tad's 10 Julian Lane Yerington, NV 89447
Yankee Caithness (1988)	14.4	82,280	76,096	\$5,6,T17N,R20E	Yankee Caithness J.V.L.P. P.O. Box 18160 Reno, NV 89511
TOTAL	191.7	1,219,700	1,035,800		

 Table 2. Total number of all classes of geothermal wells drilled and number of industrial-class geothermal wells drilled by year, 1988 through 1993. Source: Hess, 1993; Nevada Division of Minerals, 1993.

<sup>1</sup>Production capacity from currently developed geothermal resources. <sup>2</sup>Gross output of the Dixie Valley plant occasionally exceeds 66 MW. *Source:* Hess (1993). The plant uses 5.4 million pounds of brine per hour produced from six of eight production wells. The production zone is 300 to 425 m deep with a resource temperature of between 172 and 182°C. The wells supply two high pressure turbines and one low pressure turbine in a two stage system that produces 21.1 MW gross output. Geothermal fluids are injected into three of five available injection wells (Ettinger and Brugman, 1992; GRC BULLETIN, v. 21, no.1).

## **Desert Peak**

The Western States Geothermal Co., Desert Peak plant went online in 1985. It was designed by Phillips Petroleum Co. and uses a biphase turbine built by TransAmerica Corp. Production capacity from the currently developed resource is 8.7 MW. The resource temperature is approximately 205°C and wellhead temperature is 165°C.

## **Dixie Valley**

The largest single geothermal power plant in Nevada, Oxbow Geothermal Corp. Dixie Valley plant, came online in 1988 producing 55-59 MW (net). (Gross output sometimes exceeds 66 MW, as listed on Table 2.) The power is produced in a double-flash turbine generator and purchased by Southern California Edison Co. Oxbow estimates a geothermal energy reserve in Dixie Valley sufficient to supply 200 MW for 30 to 60 years (GRC BULLETIN, June 1987; Reno Gazette-Journal, August 6, 1988).

### Empire/San Emidio Desert

The OESI/AMOR II Empire plant came online in 1987 and consists of four Ormat Energy Converter Modules with a gross output of 3.6 MW from currently developed geothermal resources. Production is from a liquid-dominated geothermal source at 129 to 137°C. San Emidio Resources continued their geothermal program in the San Emidio Desert near Gerlach, Nevada. Early in 1991 San Emidio Resources signed a 5 MW, 30-year geothermal power supply contract, effective 1992, and a 20 MW, 30-year geothermal power supply contract, effective 1995, both with Sierra Pacific Power Co. (GRC BULLETIN, February 1991). The initial price paid for produced electricity under the long-term contracts is reported to be approximately 5 cents per kWh. At that time plans called for construction of a 6.5 MW binary plant to be online by November 1992. Since then San Emidio Resources requested and was granted a suspension of the 5 MW project in order for Sierra Pacific Power Co. and San Emidio Resources to determine the feasibility of combining the 5 and 20 MW projects into one project. In July 1993, Sierra Pacific Power Co. executed an amendment to the long-term power purchase agreement with San Emidio Resources. The agreement now calls for a 30 MW geothermal power plant to be online by November 1, 1995 (Public Service Commission of Nevada).

## Fallon

In early 1992 the U.S. Navy issued a request for proposal to construct an 80 to 90 MW geothermal power plant at the Fallon Naval Air Station. If this plant is constructed, it will be Phase I of the Navy's geothermal program. Phase II will consist of a second 80 to 90 MW facility to be constructed within 10 years of completion of the Phase I project. The Navy estimates that the potential geothermal resource in the area will be able to produce 300 to 500 MW. The exploration drilling and reservoir testing performed during the initial phase of this project will be used to better define the geothermal potential of this area. Based on previous exploration information it is expected that the resource will be in the 175 to 205°C range.

### Fish Lake Valley

Fish Lake Power Co. continued their extensive drilling efforts to develop a geothermal resource in the Fish Lake Valley area of Esmeralda County. If a geothermal generating facility is built, the electricity would be delivered to California under a Standard Offer No. 4 Contract.

## Hot Sulfur Springs

Earth Power Energy and Minerals has requested an avoided-cost purchase contract agreement with Idaho Power Co. If a contract were obtained, a 9.9 MW geothermal power plant could be constructed at Hot Sulfur Springs, Elko County, Nevada (*Reno Gazette-Journal*, October 10, 1993).

## Rye Patch

The Rye Patch Limited Partnership (OESI) is currently nearing completion of a 12.5 MW binary generating plant at their site near Rye Patch reservoir. The company has a signed purchase agreement with Sierra Pacific Power Company with an anticipated plant online date of November 30, 1993. This has been delayed while the company continues to develop sufficient and continuous geothermal resources to fuel the plant.

### Soda Lake

On August 19, 1991, the 13 MW OESI/AMOR III Soda Lake No. 2 geothermal power plant completed commercial operations testing and went online. This plant is adjacent to the 3.6 MW OESI Soda Lake No. 1 plant that came online during 1987 (GRC BULLETIN, October 1991). Both plants are producing from a liquid-dominated geothermal source at 160°C.

### Steamboat Springs

Two 12 MW, air-cooled, binary geothermal power plants, Steamboat II and III, operated by S.B. Geo, Inc., were brought online in December 1992, adding 24 MW of production to the existing 7.1 MW S.B. Geo Steamboat plant, for a combined gross production capacity of 31.1 MW.

The geothermal fluid cycle at the new plants is completely contained and the fluids are injected back into the ground (closed binary-cycle system). The existing resource is expected to last 30 years or more and can support an additional 36 MW of production capacity. Based on this, plans are currently being formulated to determine the feasibility of installing an additional 24 MW facility in the near future. In December 1993, S.B.Geo, Inc. received a \$7.2 million grant from the U.S. Department of Energy to develop a pilot project known as the Kalina Pilot Plant. The purpose of the project is to increase the efficiency of extracting heat from hot geothermal fluids.

Yankee Caithness J.V.L.P. operates a 14.4 MW (gross) flash turbine system producing from a 170°C resource. The Yankee Caithness Steamboat plant came online in 1988, and the produced power is purchased by Sierra Pacific Power Co. on a 30 year contract.

### **Stillwater**

OESI/AMOR IV, Stillwater Geothermal plant came online in April 1989. Total project cost was \$36 million. The aircooled plant consists of 14 Ormat Energy Converters that have a combined gross generating capacity of 13 MW. The plant uses a liquid-dominated geothermal source ranging in temperature from 155 to 170°C. The plant operates on a closed system; all geothermal liquids are injected (Ormat Fact Sheet, 1989; Geo-Heat Center, Fall 1989).

### Wabuska

Tad's Wabuska plant came online in 1984. Current production capacity is 1.2 MW produced from two Ormat Energy Converter modules. The plant operates on fluids at 107°C. produced from a depth of 107 m (GRC BULLETIN, July, 1987).

# Non-Electric Low- and Moderate-Temperature Applications

The majority of Nevada's population is concentrated in two areas, Reno-Carson City and Las Vegas. Many of the state's geothermal resources are remote from any population centers, thus limiting some potential applications. Although 50 or more small-to-large communities are located within 8 km of geothermal resources, only a few of these areas have been able to use these resources effectively. The reasons for this under-utilization are varied. Although some reasons relate to technical and engineering problems (resource size and temperature, heat loss during transport, etc.), many more are economic (high capital outlays, long payout, under-capitalization of projects) and perceptual (unconventional vs. conventional technology, short vs. long-term cost evaluations, uncertainties about long-term economic risks). There have been attempts to use Nevada's low- and moderate-temperature geothermal resources in more than 20 areas, mainly in the past 5-10 years. Additionally, economic and/or technical appraisals of more areas have been conducted, but for a variety of reasons projects were not completed.

### Moana Geothermal Area

Moana Hot Springs, located in the southwestern part of Reno, have not flowed at the surface for at least 15 years. The springs were the discharge point for an area of thermal groundwater that has been used for a spa, swimming pool, and home heating for nearly 100 years. Recent use for home space heating began in the 1960s. The area today is predominantly residential. We estimate that the area of thermal groundwater encompasses at least 9 km<sup>2</sup>. In this area there are more than 300 homes that use geothermal fluids for space heating. One hundred and thirty of these homes are part of a district heating system, while most of the rest use downhole heat exchangers in individual wells. A smaller district heating system has retrofitted 12 homes for geothermal heat, and plans to add another four in the spring of 1994. A large hotel, a motel, about three apartment or townhouse complexes, five churches, and a county swimming pool also use the resource. The Veterans Administration Hospital, located about 2 km northeast of the geothermal area, drilled a deep well several years ago and encountered approximately 43°C water. The well was plugged and abandoned.

### Steamboat Hot Springs

The Steamboat geothermal area consists of a deep, hightemperature (215 to 240°C) geothermal system, a shallower, moderate-temperature (160 to180°C) system, and a number of shallow, low-temperature (30 to 80°C) subsystems (Goranson and others, 1991). The higher temperature systems are used for electric-power generation (see the preceding section). A number of low-temperature thermal groundwater anomalies are in an area of approximately 30 km<sup>2</sup> centered on the hot spring area (Goranson and others, 1991), but these thermal areas are not well known and are little used. A few homes in the Steamboat area have used lowtemperature fluids for over 40 years, and one or more spas have been active in the springs area since the 1860s. Presently probably less than a dozen homes use the low-temperature geothermal fluids for space heating or domestic hot water (including swimming pools). About one domestic geothermal well permit has been issued per year over the last 5 to 7 years.

### Bower's Hot Springs

A large outdoor swimming pool and smaller children's pool at the Washoe County Park at Bower's Mansion (located between Reno and Carson City), are supplied with warm water from a geothermal well located near the spring.

## Carson City Area

Water from a well at the site of Carson Hot Springs in northern Carson City is used directly in a swimming pool. In southeast Carson City, thermal groundwater is found in the State Prison/Pinyon Hills area. In the past, there have been a few attempts to use the thermal groundwater from domestic wells in that area for space heating. Geothermal space heating has been considered, but not implemented, for at least two schools in the area.

## Saratoga Hot Springs

A California company, Lobsters West, has proposed raising lobsters near the warm springs located about 15 km southeast of Carson City. The geothermal fluids would be used to heat tanks in which the lobsters would grow to full size. The experimental study is proposed to last 4 years; live lobsters would be shipped twice a month to local markets (*Reno Gazette-Journal*, November 4, 1993).

## **Hobo Hot Springs**

These hot springs, located about 15 km south of Carson City, were used to raise tropical fish and Malaysian prawns in the late 1980s. Lobster raising was also considered. The water temperature is slightly over 40°C. The site is presently inactive.

### Walley's Hot Springs

Walley's Hot Springs, located near Genoa, about 20 km south of Carson City, was the site of a large spa in the late 1800s and early 1900s (Garside and Schilling, 1979). A modern spa was built on the site in the early 1980s. In addition to use of the geothermal, fluids for bathing and domestic hot water, the buildings are heated with geothermal energy (Lienau and others, 1988).

### Gerlach

Hot springs located just west of the town of Gerlach (Great Boiling Springs) have been used for bathing for many years. The Gerlach General Improvement District built a bath house using geothermal fluids in 1989. The facility was planned for use by tourists and local residents. The facility has been unable to obtain a permit from the health department because sediment from the well plugged water filters. Future plans are for a geothermal heat exchanger system to heat city water for the spa. Geothermal groundwater apparently extends under at least part of the town, as at least two Gerlach homes use geothermal wells for space heating. The water in one well is reported to be 35 to 36°C (unpublished data, Nevada Division of Minerals).

# San Emidio Desert

A vegetable dehydration plant is under construction in the San Emidio Desert area southwest of Gerlach (Figure 5). The plant is a few kilometers north of the Empire (OESI/AMOR II) Electric-Power plant. Integrated Ingredients (Spice Islands, Fleischmann's, and other brands), part of international food manufacturer Burns Philp, is contracting for the construction of the facility, which will employ about 25 persons when completed in early 1994. The number of employees may increase to about 65 after 18 months. Onions and garlic will be dehydrated and stored at the plant (*Reno Gazette-Journal*, August 31 1993). The plant will use approximately 150°C geothermal fluid.

## **Brady Hot Springs**

A geothermal vegetable dehydration plant has been operated at this site, about 80 km northeast of Reno, since 1978. The facility uses a moderate-temperature (132°C) geothermal well on site. Since 1993, additional geothermal fluid has been supplied by the nearby Brady Power Partners electric power generation plant, operated by Oxbow Power Services, Inc.

## Wabuska Hot Springs

In addition to the rather low-temperature electric-power generation plant operated at Wabuska by Tad's Enterprises, several non-electric applications have been located in the area, but none are active today. A hydroponic geothermal greenhouse operation (tomatoes, cucumbers, etc.) was built on the site in the early 1970s, but few vegetables were grown. Tad's Enterprises has in the past operated a geothermal ethanol facility, a plant to grow algae (*Spirulina*) for human consumption, and facilities to raise Malaysian prawns, catfish, and tropical aquarium fish. Some of these were pilot facilities, rather than actual production facilities.

## Rye Patch Geothermal Area

Florida Canyon Mining Co. operates a large open-pit gold mine and heap-leach gold recovery facility about 50 km northeast of Lovelock, and 7 km north of the area presently under development by Rye Patch Limited Partnership for geothermal electric power production. A 180 m well produces fluids at approximately 100°C; these fluids provide makeup water for the cyanide extraction solutions. Heat from heat exchangers is also extracted to heat the solutions. The heating of cyanide solutions aids extraction during cold weather, and may somewhat enhance total gold recovery.

### Darrough's Hot Springs Area

Round Mountain Gold Corp. operates a large open-pit gold mine and heap-leach gold recovery facility near the Darrough's Hot Springs geothermal area in Nye County. Geothermal fluids from shallow (approximately 300 m)



Figure 5. Vegetable-dehydration plant under construction in the San Emidio Desert. Larry Green photo.

wells are used in a heat exchanger to transfer heat to cyanide heap-leach solutions (Trexler and others, 1990).

## Carlin

Carlin Hot Springs, located near the Humboldt River southwest of the town, have a reported temperature of 80°C (Trexler and others, 1982). The Carlin High School used 31°C geothermal fluid from 280 m well from 1986 to 1992 in a closed-loop space heating system. The well was abandoned in 1992, apparently in part because of scaling problems with iron and manganese.

### Elko Area

Hot springs south of the town of Elko were first used in a bath house in the 1860s (Garside and Schilling, 1979). Thermal groundwater was known to exist to the north of the springs under a part of the town, but no use was made of it until the Elko Heat Company began supplying geothermal fluid for space heating to several downtown buildings in 1982 (Rafferty, 1988). The company has continued to grow; in 1993 it served 16 commercial customers and two residential customers (Mike Lattin, oral commun., 1994).

The Elko County School District, in conjunction with the Elko General Hospital, developed a district geothermal heating system in 1986. The system supplies heat to eight buildings (two schools, a municipal swimming pool complex, a gym, a convention center, a hospital, a city hall, and a school administration building). In 1988 the estimated combined savings to all users was \$300,000 per year (Rafferty, 1988; Richard Harris, oral communication, 1994).

### Jackpot Area

Two wells drilled in 1988 at the Y3 Ranch about 7 km southeast of Jackpot, were used for raising catfish. The maxi-

mum reported well temperature was 40°C (Lund and others, 1990). The catfish-raising operation was not active in late 1993, reportedly due to insufficient geothermal fluid.

## Wells Area

Warm springs about 1.5 km north of the present town of Wells were referred to by travelers on the emigrant trail in the 1850s as Humboldt Wells (from which the town name is derived). Thermal (32 to 34°C) groundwater is used by an elementary school and the Wells Rural Electric Co. in heat pump applications for space heating.

# Duckwater (Big Warm) Springs

A geothermal catfish-growing facility has been operated at this site since 1982. The facility was purchased in 1992 by Robert and Jeff King (Valley Fish) of Preston, Idaho. The facility, located about 110 km west of Ely, produces over 300,000 pounds of prime 8-ounce catfish filets per year that are shipped to Idaho for sale (*Geo-Heat Center Quarterly Bulletin*, December 1992).

### **Caliente Hot Springs**

The town of Caliente in Lincoln County derives its name from the local hot springs. A number of wells in the area have reported temperatures from 40 to 80°C (Garside and Schilling, 1979; Lienau and others, 1988). A motel supplies geothermal well water to bathing pools and individual room whirlpool baths, and a trailer park supplies hot water to individual mobile homes. The Lincoln County Hospital (20 beds) was heated using 39°C water from a well on the site, but reduced temperatures (to 28°C) forced reliance on electric resistance heating. The hospital plans to use the lowertemperature fluids from its well for heating and cooling using heat-pump technology. The city swimming pool used geothermal heat in the past, but was damaged during the winter of 1992 and will probably be replaced. The City of Caliente has a grant from the Rural Development Administration to use the local geothermal resources. A nearby perlite processing plant may be the first user of plant process heat. If more funding is found, the city plans to provide heat to the hospital, swimming pool, and eventually an elementary school and youth training facility (Glen Van Roekel, oral communication, 1994).

### Ash Springs

Thermal waters (31 to 36°C) at Ash Springs, located about 10 km north of Alamo, in Lincoln County, have been used in the past at a spa on the site. The facility is presently closed.

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# NEVADA LOW-TEMPERATURE GEOTHERMAL RESOURCE ASSESSMENT: 1994

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By

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FINAL REPORT

Prepared for

The Oregon Institute of Technology GeoHeat Center

Prepared as part of a study of low- to -moderate temperature geothermal resources of Nevada under the U.S. Department of Energy Low-Temperature Geothermal Resources and Technology Transfer Program

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1. Million-scale map of geothermal resource occurrences

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### INTRODUCTION

Previous Geothermal Assessments

A statewide inventory of the geology and geochemistry of Nevada's geothermal resources was begun at the Nevada Bureau of Mines and Geology (NBMG) in the late 1970s. NBMG had previously published a 1:1,000,000-scale map of hot springs, sinters, and volcanic cinder cones (Horton, 1964b) and several brief summaries of Nevada's geothermal resources (Horton, 1964a; Garside and Schilling, 1972; Garside, 1974). This inventory, published as NBMG Bulletin 91 (Garside and Schilling, 1979), followed a format used in a number of NBMG publications on mineral commodities of Nevada. The bulletin contained descriptions, by county and hot spring area, of the better known geothermal areas. These descriptions included, where available, maps and other data on the geology, and descriptions of historical and present use. Temperature and water chemistry data were presented in an appendix having about 1,400 individual entries (records). These records commonly included multiple entries for the same or adjacent springs as well as numerous well records from geothermal areas which have a larger areal extent than individual spring sites. A 1:1,000,000-scale map was included in the pocket of NBMG Bulletin 91; nearly 400 geothermal sites (springs, spring groups, well groups, etc.) were included on that map. The lower temperature cut-off for inclusion of data in Bulletin 91 was 70°F (21.1°C).

The location, chemical data, and references for the geothermal springs and wells listed in Bulletin 91 were collected by an extensive and relatively complete search of the available literature. These data were entered by hand on data-collection forms, and these forms were used to typeset the listing of data in the bulletin (Appendix 1). A source of unpublished data was a computer database of water-quality data maintained by the Desert Research Institute at Reno.

GEOTHERM is an acronym for a U.S. Geological Survey (USGS) computerized information system designed to maintain data on the geology, geochemistry, and hydrology of geothermal sites primarily within the United States (Teshin and others, 1979; Bliss, 1983). The system was first proposed in 1974, and was active until 1983. The system utilized a mainframe computer, and most of the data were entered by use of key-punch cards. Key punching was done from a rather extensive data-entry form. When the GEOTHERM database was taken off line, a number of products were published or made available to preserve the data. These include basic data for thermal springs and wells on a state-bystate basis (for Nevada, see Bliss, 1983a) and a listing of each record on a state-by state basis, as microfiche (for Nevada, see Bliss, 1983b). The GEOTHERM database was also filed with the National Technical Information Service (NTIS) as digital data. A 9-track one-half inch reel-to-reel tape in ASCII format of this GEOTHERM database was provided to NBMG after the start of this project by Howard Ross at the University of Utah Research Institute (UURI). This tape, containing 8,082 records, was originally from NTIS.

GEOTHERM contained 1367 records for Nevada when it was taken off line in 1983; the is the number of Nevada records on the NTIS tape as well. The great majority of these records are from the published sources used to compile Appendix 1 of Bulletin 91. Unpublished site data and analyses from the files of D.E. White (USGS) make up a significant section of the database also. About 75% of this GEOTHERM data was added to the original database during 1978 and 1979 by personnel at NBMG as part of the U.S. Department of Energy State Coupled Program (see Trexler and others, 1979a). In addition to the entry of new data and the editing and verifying of existing data in GEOTHERM, the longitude and latitude locations of springs and wells were determined by plotting them on 1:250,000-scale maps and hand digitization (Trexler and others, 1979a). New analyses were done during this period, and these data were added to GEOTHERM.

The database available in GEOTHERM during the early 1980s was used, along with other data developed from specific geothermal site studies funded by the U.S. Department of Energy (see numerous reports by Trexler and co-workers, 1980-83) to produce two 1:500,000-scale maps illustrating Nevada's geothermal resources (Trexler and others, 1979, 1983). No statewide resource studies were done after the publication of the 1988/NOAA map (Trexler and others, 1983). A nationwide assessment of lowtemperature geothermal resources (USGS Circular 892) included data for Nevada, and an open-file report (Reed and others, 1983) included about 350 records for Nevada that were used in that assessment. These records were selected from the GEOTHERM database by use of charge balance determinations and other screening methods (Marshall Reed, written commun., 1993). During this period of time, an increase in exploration for geothermal resources by private industry (mainly for electric-power generation) resulted in the drilling of thousands of gradient and slim holes, and several hundred larger diameter wells for industrial and commercial use (space heating, electric power generation, etc.). Developments in Nevada's geothermal industry are documented in yearly summaries of the Nevada mineral industry, published yearly by NBMG since 1979 (e.g, Hess, 1993). Information that is available on geothermal drilling in Nevada has been summarized by Barton and Purkey (1993).

Need for a New Assessment

these

Low- and moderate-temperature geothermal resources are widely distributed in the western United States. Although there has been

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a substantial increase over the last decade in utilization of these resources in direct-heat applications, the large resource base is greatly underutilized (Ross and others, 1994). Previous studies have demonstrated that Nevada is well endowed with geothermal resources, and much of the state must be considered as having potential for direct use. As Ross and others (1994) describe, the expanded use of low- and moderate-temperature geothermal resources requires, as a start, a current inventory of the resources. Such an inventory, combined with collocation studies (the study of resource location near population centers or areas of potential industrial users), will provide some of the basic information that the potential developers of the geothermal resources need to make sound economic decisions. Collocation factors are of particular significance in Nevada, as well as a number of other western states, because people and most industries are concentrated in a few areas; geothermal resources, on the other hand, are rather widely distributed.

There are many factors that can affect the viability of directuse geothermal applications. These include not only the suitability of the fluid and the resource for the application (water temperature, chemistry, amount of available heat, etc.) but also the information available to the developer on the technology of the proposed application, and contractual and other economic factors less closely related to the geothermal resource. The collection of data on these geothermal resources and their present uses is only one factor in encouraging their increased use. Other components of the 1992-1993 low-temperature program include development of better techniques to discover and evaluate the resources, and technical assistance to potential developers (Ross and others, 1994).

### Nevada Assessment Program

Data compilation for the low-temperature program is being done by State Teams in ten western states. The Nevada program, under the direction of Larry J. Garside at the Nevada Bureau of Mines and Geology, at the University of Nevada, began data collection in early 1993 (the contract for the research between the University of Nevada and the Oregon Institute of Technology was signed on March 23, 1993). The original contract was to end on December 31, 1993, but was later extended to June 30, 1994. The Technical Project Managers for the agreement were Howard P. Ross (University of Utah Research Institute) and Paul J. Lienau (Oregon Institute of Technology - GeoHeat Center).

The final products of the study include the following: 1) a geothermal database, in hardcopy and as digital data (diskette) listing information on all known low- and moderate-temperature springs and wells in Nevada; 2) a 1:1,000,000-scale map displaying these geothermal localities, and; 3) a bibliography of references on Nevada geothermal resources. The format for presentation of these data was worked out through discussions among State Teams and the Project Managers during the first half of the contract period; the model for this database has been described by Blackett (1993).

# DATA SOURCES

Information on Nevada's geothermal resources is widely distributed in published reports, in unpublished and limiteddistribution sources (commonly referred to as "gray literature"), and as digital information in databases such as GEOTHERM and WATSTORE. The sources of data and methods of data manipulation are discussed below, followed by a description of the bibliography.

## Preliminary Data Compilation

The Nevada geothermal database (Appendices 1 and 2) includes "records" (that is, single reports of chemistry, temperature, location, etc. that are represented by a single spreadsheet row) for all known (reported or suspected) geothermal sites in the state. A number of preliminary databases and spreadsheets were compiled before selection of records for the final listing (Appendices to this report). To get the data from various sources into a common format for comparison required months of work using a variety of computer hardware and software available at NBMG. In the following paragraphs I have summarized the major sources of information, the techniques used to modify and utilize them effectively, and some of the sources of error and other problems that were encountered.

### **GEOTHERM**

The history of the GEOTHERM database is summarized above under the description of previous assessments. Because the database was taken off line in 1983, it does not contain data collected after that date. A tape of GEOTHERM records that was obtained from UURI was read on to a large magnetic disk at NBMG. Information supplied by NTIS with this tape gave the field lengths of each field in the database. With this information, computer database specialists at NBMG were able to design a database having fixedlength fields and read the GEOTHERM ASCII file into that database. The database on tape contained over 8000 records, with approximately 120 fields for each record. The database software used for this database was INFO, a subset of the ARC/INFO software utilized in many GIS (Geographic Information Systems) applications; hardware was a UNIX-based SUN SPARC II workstaion. The database in INFO was nearly 19 MB (megabytes). From this database, the 1367 Nevada records could be exported, by use of PC

ARC/INFO, in a format compatible with modern database-management software (such as dBASE). We used PC-File (a product of ButtonWare, Inc.) as the PC-based database software. The Nevada GEOTHERM database in PC-File is about 3.2 MB, and has a number of problems that make it difficult to use. One of the most notable \_ problemgis that in the PC-File format (essentially a dBASE format), most of the numerical data (temperature, water chemistry, etc.) are preceded by a five sided graphic figure which resembles the outline of a small house (or a baseball field "home plate"). This non-ASCII character was apparently a pad character or "punch" symbol in the original database that acted as a space. It can not be searched for, and was only eliminated after a short version of the database was retrieved into spreadsheet software (Quattro Pro, a product of Borland International, Inc.). In addition, some records had data reported in different units from other records (for example ppm or epm); the units used were reported in a separate database field. Fortunately, these problems were overcome in the shortened (spreadsheet) version.

Additionally, a number of other operations were done on a short database of GEOTHERM data that contained only the fields required for this study (Appendix 1). These include: 1) replacing the county name with a two-letter code (abbreviation) for each county, 2) conversion of numerical data from labels to values and insertion by hand of certain qualifiers on some analyses (N for not detected, t for trace, < for less than), 3) addition of calculated columns for ion balance, total calculated dissolved solids, and a major constituents test (is Na>K and Ca>Mg and Cl>F?), 4) rearrangement of columns into final format. Before final column rearrangement, formulas were converted to values, and a fixed number of decimal places was selected for display. About 222455 records were finally selected from this spreadsheet to be included in the final tables listed in the Appendix.

### WATSTORE

The acronym WATSTORE stands for the National <u>WAT</u>er Data <u>STO</u>rage and <u>REtrieval</u> System, a large-scale computerized system developed for the storage and retrieval of water data collected as part of the activities of the USGS, particularly the Water Resources Division (from a 1981 pamphlet, U.S. Government Printing Office: 1981 - 341-618:52). The system was begun in 1971, and contains a very large set of data on surface and groundwater in the U.S. The water-quality file alone is reported to have (in 1991) 34 million observations from over 200,000 stations; 5,000 parameters (major and trace elements, pesticides, organics, etc.) are included. The database contains information on the analyzing and collecting agency, but does not report whether the data has been published or list references. The WATSTORE database can be searched through arrangements with USGS Water Resources district offices or through a national system of water data exchange (NAWDEX); assistance centers for NAWDEX are also commonly located at USGS Water Resources District Offices. The NAWDEX database also has access to other Federal agency water data, for example the Environmental Protection Agency (EPA), in addition to WATSTORE.

Water quality and other WATSTORE database file information is also available through a commercial outlet, EarthInfo, Inc. of Boulder, Colorado. EarthInfo makes certain data from WATSTORE available on CD-ROMs along with a software retrieval system that can be used by IBM-compatible personal computers. NBMG obtained a CD-ROM that included all Nevada data (current to early 1993) from EarthInfo. Personnel at NBMG (particularly Ron Hess) were able to search the CD-ROM and extract the parameters required for this study (water quality, location, site name, etc.) for all springs and wells having a measured temperature of 18°C or greater. To avoid the combination of parameters (e.g., water chemistry analyses) from different collection dates for the same site, a combination number was created (consisting of the site and collection date numbers) so that a later relational combination of the data would produce records that represent one site visit. These geothermal data were converted to a dBASE format and PC-File was used to eliminate records having temperatures less than 20°C for the area of Nevada south of 38° latitude. At this point, the database consisted of 1,708 records. These records were imported into a spreadsheet format using Quattro Pro software, and a multitude of operations were performed on the data to make it similar to the planned format for the final tables (Appendices 1 and 2). These operations include: 1) conversion of longitude and latitude to decimal degrees, 2) addition of calculated fields for ion balance, total calculated dissolved solids, major constituents test (is Na>K and Ca>Mg and Cl>F?), 3) conversion of depth in feet to meters and flow from cubic feet per second to liters per minute, 4) addition of a reference column for listing of WATSTORE as the reference, 5) convert GW (groundwater) to W (well) and SP to S (spring), 6) conversion of the state-county FIPS code to a two-letter abbreviation (see listing below), 7) conversion of the collection date format to the year/month/ day format, 8) re-arrangement of columns, and 9) a sort of rows (records) by longitude and latitude.

A number of additional operations were later performed on about 140 WATSTORE records selected for the final tables. These include: 1) conversion of Fe, and B from micrograms per liter to milligrams per liter (essentially equivalent to parts per million - ppm), and 2) separation of the site name column into two columns (one for name and one for the legal land location, if reported. Following this, Li, oxygen and hydrogen isotope data, and  $HCO_3-CO_3$  concentrations were added to the short spreadsheet of WATSTORE records. Li, and the <sup>2</sup>H and <sup>18</sup>O were inadvertently left out of the first search of the EarthInfo CD-ROM. The search for  $HCO_3-CO_3$  data in WATSTORE presented a more complicated problem, as these constituents are reported as several different parameters (fields) in the database. A number of the records generated by the first search were lacking data for these constituents; a second search was done for data in all possible related parameters (about eight of them, including bicarbonate and carbonate field results, laboratory results, dissolved, incremental titration, titration to pH 4.5 and pH 8.3, and alkalinity (field and laboratory). The data were entered by hand into the intermediate spreadsheet of WATSTORE records destined for the final tables.

Table 1. County names for Nevada, FIPS (Federal Information Processing Standard) code (32 is Nevada), and abbreviations used in this report.

County Name	FIPS Code	<u>Abbreviation</u>
Churchill	32001	СН
Clark	32003	CL
Douglas	32005	DG
Elko	32007	EL
Esmeralda	32009	ES
Eureka	32011	EU
Humboldt	32013	Hu
Lander	32015	LA
Lincoln	32017	LI
Lyon	32019	LY
Mineral	32021	MN
Nye	32023	NY
Pershing	32027	PE
Story	32029	ST
Washoe	32031	WA
White Pine	32033	WP
Carson City	32510	cc

## Topographic Map Digital Data

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A complete examination was made by David Davis at NBMG of the approximately 1,900 7.5-minute topographic maps for Nevada. The entire state has this coverage, and a visual examination was made of each map for any mention of hot or warm springs, geothermal wells, etc. In addition, a 1981 version of GEOTHERM was available in paper copy (Jim Bliss, written commun., 1981) and this was used to identify other geothermal spring and well locations on these topographic maps. About 2700 individual points were marked on the maps, and the locations were digitized in the NBMG GIS laboratory using ARC/INFO software, a CalComp 9500 digitizer, and digital map coordinate data (TIC file) from the USGS. A database of the location and other data collected for this part of the project was created, and about a dozen records in the final table were from the spreadsheet equivalent of that database. In general, the records from this database were for locations where no data were available in other sources. The references are usually the 7.5-minute quadrangle map that the spring or well appears on. Additionally, when more precise longitude and/or latitude locations were required for records taken from any of the other sources used, the appropriate information from this database was entered in intermediate spreadsheets of selected records.

## Other Data Sources

During the selection of records for the final database, if water quality or other data in WATSTORE or GEOTHERM was lacking, incomplete, or appeared to be of poor quality, other sources of information were checked for possible inclusion in the database. Some of these sources were originally cited in NBMG Bulletin 91, but no record of a particular site was ever entered in GEOTHERM. A number of such records refer to dubious thermal spring locations, but must be included in any database that is purported to be complete. Other sources used for one or two sites include Hulen and others (1994), Trexler and others (1990), and Lawrence Livermore Laboratory (1976). Unpublished information in NBMG files and field notes of L. Garside for this and previous geothermal studies was also used. In particular, a number of good analyses and locations reported by Flynn and Buchannan (1990) were used.\_Their Table 3.1 was scanned, imported into Quattro Pro, and (parsed) into a spreadsheet of similar format to others used during this study. Also available in spreadsheet format to be checked during the data selection process were the analyses reported by Reed and others (1983) from the GEOTHERM database, and digital data on water analyses done in some areas of Nevada for the NURE (National Uranium Resource Evaluation) program (Hoffman and others, 1991).

## Selection Criteria

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In the early stages of this study, it became apparent that the bulk of the data on Nevada's low- an moderate-temperature geothermal resources was contained in two databases, GEOTHERM and WATSTORE. Usually, for individual thermal springs and wells, the best one or two records available from either WATSTORE or GEOTHERM was selected. If the data in these databases were incomplete or nonexistent, other known sources were checked.

The process of record selection for the final database began with hardcopy printouts of the spreadsheets described above (e.g., GEOTHERM, WATSTORE, and the topographic maps). Digital files of the longitude and latitude information for these three databases were used to plot the geothermal localities on 1:1,000,000-scale maps of Nevada in NBMG's GIS lab, using ARC/INFO software. Each of the points or point groups on these maps was checked in a regular fashion for possible errors of location. The 1:1,000,000scale maps were examined, on 1° by 1° blocks of latitude-

longitude (about 34 partial or complete blocks for Nevada). Every 7.5-minute topographic map that was shown to have a geothermal locality was re-examined, and the locations displayed on the million-scale maps were compared to those on the 7.5-minute quadrangles. From the available records for a particular spring, the best one, or in a few cases, two records was selected. For groups of springs that are found over several square kilometers, several records were commonly selected to best represent the geographic range and provide a more varied data set of water chemistry. The records selected were numbered, notes were taken on any problems recognized, and the number was written on a million-scale map and on the hardcopy of the appropriate database. This record selection process proceeded from west to east across the state, beginning in northwest Nevada and ending at its southern tip. The selection of the "best" records was somewhat subjective, but generally proceeded as follows. If a point on the maps was determined to be a valid geothermal site, GEOTHERM and WATSTORE records of that site or site area were examined. Selection from one of these databases was generally based on having an ion balance between 0.90 and 1.10, and a check to see if Na>K and Ca>Mg and Cl>F. The ion balance formula used

Na\*0.04350+K\*0.02558+Ca\*0.04990+Mg\*0.08229/Cl\*0.02821+F\*0.05264+H Co3\*0.01639+Co3\*0.03333+S04\*0.02082; resulting in a value in milliequivalents per liter, cations/anions. For those records that met these criteria, selection was based on completeness of the other analytical data (temperature, pH, minor constituents. etc.).

During the record selection process, spring and well records that did not meet certain minimum temperature criteria were eliminated from further consideration. According to the statement of work for this project, the minimum temperature for a low temperature resource is defined to be 10°C above the mean annual air temperature at the surface, and should increase by 25°C/km with depth (for wells). The mean annual air temperature in Nevada varies from somewhat less than 7°C to over 18°C (Houghton and others, 1975, figure 17; see figure 1 below). This variation is an effect of both latitude and elevation; southern Nevada's higher mean annual temperature results from its lower latitude and its lower average elevation (Houghton and others, 1975). Based on this map of mean annual temperature, a lower spring and well temperature limit was set for certain latitude ranges in the state. For springs, the decision whether to include or not was relatively simple - if the spring temperature was at or above the set limit, it was included. For wells, only those were considered for inclusion that fell above a gradient of 25°C per kilometer with a beginning (surface) temperature at or above the minimum selected for that latitude range. The total well depth provided in the database was used to calculate this gradient. The following temperature limits were applied during record selection: 1) north of 39° latitude, 18°C or above; 2) 38° to 39°

latitude, 19°C and above (20°C was used for some sites, mostly wells, in the 38°-38.5° range, 3) 37° to 38° latitude, 20°C or above, and 35° to 37° latitude, 25°C and above. No upper temperature limit was used to restrict inclusion in the final data compilation. The statement of work for this project listed an upper limit of 150°C for occurrences to be included in the compilation. Seven occurrences with temperatures above 150°C were included in the database mainly for completeness. The only data available for some geothermal occurrences was the analysis and associated location information for the high-temperature fluid. It is obvious that lower temperature geothermal fluids are available at these sites (in peripheral areas or, in the case of electric-power generation areas, as condensed steam or reinjection fluids). Because analyses of these lower temperature fluids were not often available, the high temperature fluid analysis was listed as a substitute.

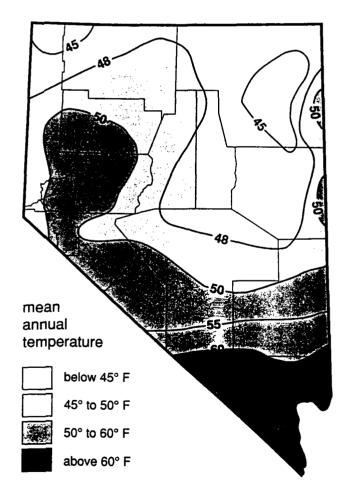


Figure 1. Map of mean annual temperatures in Nevada (from Houghton and others, 1975).

A number of problems were noted for both the GEOTHERM and WATSTORE databases as each plotted point on the million-scale maps was checked to see if it matched a known geothermal site. In quite a number of cases, certain geothermal locations were found to have an incorrect longitude or latitude or both. These were commonly discovered when the 7.5-minute topographic map was compared to the million-scale plot. In some cases, the legal description (section-township-range) was correct, but the longitude or latitude had an error of, for example, one whole degree or one whole minute. These inaccurate site locations were noted, but not corrected in the individual databases unless the record was needed for the final table.

### DATA FORMAT

Data on Nevada's low- to moderate-temperature geothermal resources are presented in Appendices 1 and 2. The data in these tables are in spreadsheet format, and the digital data used to produce them (and provided separately on diskette) can be searched and otherwise manipulated in a great variety of ways utilizing a number of commercially available spreadsheet and database management software packages. Although there are two Appendices, they were printed from a single spreadsheet. The software and data manipulation methods used at NBMG during this study are further described above, under data sources. The format of the tables and, thus, the spreadsheets, in most respects follows rather closely that of Blackett (1993).

The column headings and data in the columns are generally selfexplanatory, but a few comments should be made. Each column heading is listed below, with a description of the data and a discussion of format and problems.

# The site number is used to identify the site on the 1:1,000,000-scale map. It was added to the record when that record was selected for inclusion in the final database. The process of record selection was done in 1-degree blocks, proceeding from west to east, beginning in northwestern Nevada. Sites added later may not entirely follow this numbering progression, and to prevent renumbering of many of the sites, some added sites use decimal tenths (e.g., 143.1 and 142.2).

**NAME** The site name is commonly that listed in the source reference. In some cases, corrections, additions, or modifications were made to provide more information.

**CO** The two-letter abbreviation for one of Nevada's 17 counties is listed here. These abbreviations are listed above, under the Data Sources heading, with their FIPS code.

**T, R, SC** The legal land description, Township, Range, and Section are listed under these columns. These were commonly taken from the cited source, but some additions and corrections were made during the data evaluation. Because some of these location data were derived (in the original studies) from maps of varying ages or scales, or by projecting section lines into unsurveyed areas, there is a chance for error. Although some of these errors were noted and corrected, there are certainly many that were not. The best location data for the sites is generally the longitude and latitude; however, if correct, the section-township-range location can be used to confirm a site on topographic maps. Some section locations were determined by use of 1:100,000-scale topographic maps, on which the protracted sections are commonly displayed.

**QSEC** The data in this column, if present, describe the portion of the section in which the geothermal site is located. The quarter-quarter-quarter system (for example: NE SE NW) indicates an approximately 10 acre parcel in the 1 square mile section (640 acres) that is located in the northeast quarter of the southeast quarter of the northwest quarter. For data from the WATSTORE database, letters are used to indicate (from left to right) the quarter section, quarter-quarter section, and so on; the letters A, B, C, and D designate the northeast, northwest, southwest, and southeast quarters, respectively. Thus, for example, ABC would represent the southeast(C) quarter of the northwest quarter(B) of the northeast(A) quarter. The A-B-C-D system thus lists the largest quarter first, followed by progressively smaller quarters; the NE-NW-SW-SE system lists the smallest quarter section first.

**T** This column lists the type of occurrence, either spring (S) or well (W). In a few cases, the original listing did not fall into these two categories, and it was modified. For example, a hot pool was listed as a spring, and mine shafts or mineral exploration drill holes were listed as wells.

**TEMP** The reported temperature of the well or spring is listed, in degrees Celsius, in this column. Many of these reported temperatures were measured and originally reported in degrees Fahrenheit; those converted to °C were rounded to one decimal place after conversion. If the only information reported on temperature is "warm" or "hot" (for example, from a topographic map), this is listed. The reported temperature is that of the cited reference. It is not necessarily the highest temperature reported in all of the available data for a particular spring or well; a particular record may have been selected because of its complete analysis, rather than because it had the highest reported temperature.

**FLOW** The flow, in liters per minute (L/min) is shown in this column. For wells, this value is commonly the discharge during pumping. Values are reported to one decimal place.

**DEPTH** For wells, the depth in meters is listed, if available

from the original source.

**CDATE** The date of collection is listed here, in the format: year/month/day. For many records that list only the year of collection, this was added during this study, based on other information.

**pH** The reported pH is listed here.

Chemical constituents (Na, Cl, etc.) For most of the chemical constituents, they are listed as reported in the original references or databases. The reporting units are milligrams per liter (mg/L); these are essentially equivalent to parts per million at the concentration levels of the fluids listed in the Appendix. For some analyses, constituent values originally reported in µgm/L (micrograms per liter or parts per billion ppb) were converted to mg/L. If the original source listed a particular constituent as less than a certain value, this was reported using the symbol "<". Similarly, "t" indicates that a trace amount was detected, and "N" indicates the constituent was analyzed for but not detected. The number of decimal places displayed for each element is generally based on that reported in the sources of data. For most of the reported analyses, bicarbonate (HCO<sub>3</sub>) and carbonate (CO<sub>3</sub>) are listed as reported in the sources. Carbonate values are usually only found in waters with a pH of 8.2 or greater. A few sources (e.g., Lawrence Livermore Laboratory, 1976) report total alkalinity; these values were recalculated and reported as bicarbonate, as were the values reported in a HCO<sub>3</sub> + CO<sub>3</sub> column of Table 3.1 of Flynn and Buchannan (1990). Some analyses are noted to be relatively complete, but lack Na and K values. Commonly, the reason for this absence is that the original analysis reported Na + K as a single value, and thus, no data was entered in the Na and K fields in databases such as GEOTHERM.

**TDSm, TDSc** These columns present the total dissolved solids, measured and calculated. The measured value, if present, is from the original data source (presumed to be a residue on evaporation at 105°C). The calculated value was determined by summing the constituents reported. Thus, the TDSc value reported for incomplete analyses only represents a partial sum. A few analyses were summed before Li was added, and may be one to several ppm low. The HCO<sub>3</sub> value was multiplied by 0.492 to make the calculated TSDS values comparable with residue values.

**ChgBal** The electroneutrality of the analysis was evaluated using a charge (ion) balance formula (described further in the section on selection criteria). No value is reported for records which have no or extremely limited analytical data, as such a calculation would be meaningless. The most common reason for a charge balance that varies considerably from 1.00 is a lack of data for HCO<sub>3</sub>. Other missing major ions can also result in a "poor" charge balance.

**delD, delO18** These columns contain isotopic compositions for the stable isotopes <sup>18</sup>O and deuterium ( ${}^{3}$ H). Data are reported to zero or one decimal place for <sup>18</sup>O and one or two decimal places for deuterium.

**REFERENCE** The reference citation in this column is that for the source of the data. The records that were taken from the GEOTHERM database include the reference listed therein. The WATSTORE citation is from the database search described above under data sources. An asterisk (\*) precedes some citations; this was used in the GEOTHERM database to indicate unpublished data from individuals or agencies (for example, \*WHITE, D., USGS, MENIO PARK or \*DESERT RESEARCH INSTITUTE, 1973). The \*NEVADA BUREAU OF MINES AND GEOLOGY citation includes unpublished data from that agency's files entered into the original GEOTHERM database as well as some entries made during this study. The \*WATSTORE reference refers to data from GEOTHERM that originated from a WATSTORE search, probably in the late 1970s.

**USE** This data category lists the geothermal application for which the thermal water is presently used, or has been used for in the recent past but is not presently (in parentheses). The source of most of this data is Garside and Hess (1994), with some later additions during the later part of this study. Garside and Hess (1994) is reproduced as Appendix 3. No attempt was made to list uses of only the water but not the contained heat (livestock watering, for example). At least a dozen hot spring areas in Nevada have had hotel spas at them; most were built in the late 19th and early 20th Centuries. These were not listed as a past use, but present spas, swimming pools, etc., were reported.

# FLUID CHEMISTRY

The geochemistry of thermal water in Nevada (and adjacent areas) has been discussed by a number of authors (e.g., Mariner and others, 1983; Flynn and Buchanan, 1990; Welch and Preissler, 1990; Young and Lewis, 1982). A simplification of the pattern of chemistry exhibited by Nevada thermal water is that eastern Nevada geothermal fluids are calcium bicarbonate dominated, central and northern Nevada has mainly sodium bicarbonate type fluids, and the western part of the state has mostly sodium chloride and sodium sulfate types. The reasons for this pattern are, no doubt, relatively complex; however, water-rock interactions are certainly a significant factor. Thus, eastern Nevada calcium bicarbonate geothermal fluids are strongly influenced by the presence of a regional carbonate aquifer. At least some of the sodium bicarbonate geothermal fluids of the central and north-central parts of the state may result from the exchange of sodium (possibly from volcanic rocks) for calcium in

fluids that were originally calcium bicarbonate in character. Western Nevada sodium chloride and sodium sulfate waters may reflect increased water-rock interaction (and thus generally higher temperatures) as well as possible evaporative concentration of fluids prior to deep circulation and/or extraction of salts from Quaternary playa lake deposits.

# DISCUSSION

Nevada is well endowed with both high- and low-temperature geothermal resources. Based on a generalized map of known and potential geothermal resource areas of the United States (e.g., Lienau, 1988) over 40% of the state is believed to have potential for the discovery of high-temperature geothermal resources, and another 50% has potential for low -to moderate-temperature resources. This potential is well illustrated by the 1:1,000,000scale map of geothermal occurrences produced during this study (Plate 1). The database for this study consists of 455 individual records, representing more than 300 resource areas. The geothermal springs and wells are distributed over the entire state, with an increased concentration in the northwestern part of the state (Figure 3). Maximum spring and well temperatures are higher in the north and northwest parts of the state. Geothermal occurrence temperatures greater than 75°C are confined to the northwestern half of the state, a pattern that closely follows that of heat flow (see Sass and others, 1981). The distribution of reported temperature vs. number of occurrences is shown below (Figure 2). About 400 springs and wells plot in 11 temperature ranges; additionally 30 sites are listed as "warm" and 23 as "hot".

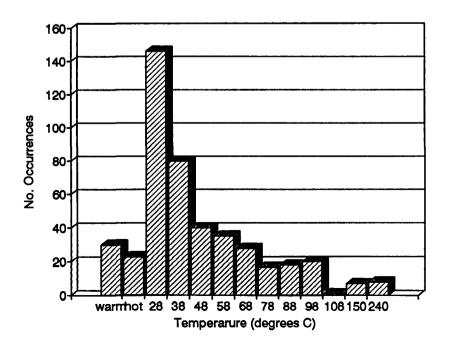
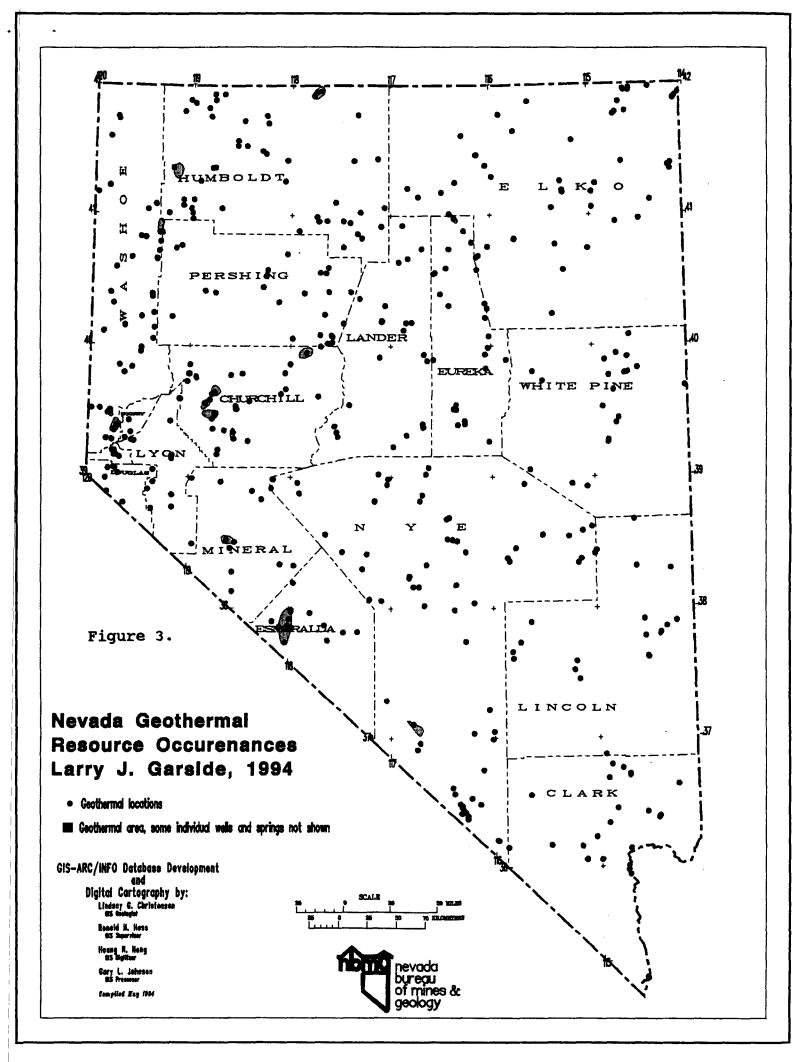


Figure 2. Bar graph of temperature vs. number of geothermal occurrences.



Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of ground water to deep levels along faults in a region of higher-than-average heat flow (the Battle Mountain heat flow high). In east-central and southern Nevada, the low- to moderate-temperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (like warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for hundreds to thousands of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

The Eureka heat flow low, a region of less than 1.5 HFU (heat flow units; 41.8 milliWatts per square meter, mWm<sup>-2</sup>) located in eastern Nye and northwestern Lincoln Counties, is centered on the Nevada portion of a large area of Middle Cambrian to Lower Triassic carbonate rocks (the carbonate rock province). This carbonate rock province underlies southern and eastern Nevada and northeastern Utah (Plume and Carlton, 1988). The Eureka Low is most likely a regional-scale hydrologic feature, representing colder groundwater recharge to regional aquifers.

## SUMMARY

Nevada is a large state with sparse but locally concentrated population. It has a wide range in average annual temperature, and thus a wide range in the lower limit of temperatures considered anomalous for geothermal fluids. The state's complex pattern of geology and heat flow results in geothermal resource areas of diverse character located throughout the state.

There have been many studies, both general and specific, on Nevada's geothermal resources (see Bibliography). Considerable data are available on specific geothermal spring and well sites but some remote areas are still poorly understood and information on their geothermal resources are incomplete or possibly inaccurate. There are many accurate and complete water analyses and associated location information for well-studied geothermal areas. However, many remote individual springs and wells throughout the state lack complete analyses, and some lack good location information; in some cases, there is uncertainty about the existence of certain springs. For example, Appendix 1 lists over 50 sites for which the only temperature information is "warm" or "hot."

In Nevada, as in many arid areas of the west, most water (whether thermal or nonthermal) has been put to use. Some nonthermal applications actually require cooling before use. Present and recent past uses of the contained heat of Nevada thermal waters are quite varied (see Appendix 3). However, more such use is feasible if potential developers are well informed and encouraged to be conservative in their use of fossil fuels.

## RECOMMENDATIONS

There are many remote geothermal sites for which no complete data set could be found in the sources examined. For completeness, some of these should be visited and sampled but most of them are unlikely to be put to any low-temperature use because of their remoteness. Having a more complete data set would, however, be useful in regional studies, and might result in the discovery of previously unknown higher temperature resources.

No attempt was made during this study to combine trace-element water chemistry data from more than one analysis into a single record. For example, analyses of B, Li, and F may have been reported in a analysis with poor ion balance while the best analysis in terms of major constituents may have been lacking some of the trace-element data. Some of this type of traceelement data could be added to the final database, but it seemed like a poor practice for this original compilation.

Some sources of information on geothermal springs and wells that were not used during this study might be useful to pinpoint previously unknown (especially low-temperature) geothermal sites. However, the mass of data available and its concentration in populated areas (where good information already exists), make searching such data relatively unproductive. Some examples of such available data include the water well records (submitted by well drillers) for the state available from the Nevada Division of Water Resources. These water well records have many errors (especially in location); searching and confirming previously unknown geothermal sites would take considerable effort. Other sources of water data that are likely to have similar potential errors include the analyses of agencies like the Nevada Division of Health, the Nevada Division of Environmental Protection, and the U.S. Environmental Protection Agency. One source of information that might have a higher potential for adding to the geothermal database is the largely confidential files of geothermal exploration companies. Thousands of shallow to moderately deep (100 to 1000 m) geothermal gradient and "slim holes" were drilled in the search for high temperature geothermal resources (for electric power generation) over the last 30 years. This source of geothermal data was suggested by a number of industry representatives at a March 1994 symposium sponsored by the Geothermal Resources Council on the geothermal resources and exploration of the Basin and Range Province. The extent of the data is not presently known.

Finally, increased future use of geothermal energy in low- to moderate-temperature applications will require not only studies that demonstrate the availability of the resource but also dissemination of information (such as case histories) that illustrate the details of these uses. Such case histories be understandable by the general public, but make available details of the technical data. Because some uses, such as district heating systems, require considerable front-end investment compared to individual fossil fuel heating units, projects that can bring together several funding sources have a better chance of success.

### BIBLIOGRAPHY

One task of the study was the identification of geological, geophysical, geochemical, and hydrologic studies that have been done since the last resource assessment. The bibliography (Appendix 4) is the result of that literature search. There are 907 citations listed in the bibliography; of these, nearly onehalf are from the bibliography in Garside and Schilling (1979). This bibliography was nearly exhaustive, at least for published sources, through about 1978. That bibliography was scanned and converted with text-recognition software to a format useable by word-processing software. The references from this 1979 bulletin included general references to the geology of geothermal areas as well as references specific to geothermal resources. The additional references in Appendix 4 were obtained from a variety of sources; most were entered in the document by hand, rather than taken directly from other digital data sources. Several methods were used to find these additional references. The bibliography for GEOTHERM (Bliss, 1983 a) was checked for references not in Garside and Schilling (1979). Additionally, the geothermal files in the Public Information Office of the Nevada Bureau of Mines and Geology were a good source, especially for unpublished reports. My own library of geothermal references was searched, and the CD-ROM for GeoRef (the bibliographic database of the American Geological Institute) was searched for any Nevada geothermal references. A similar search was done of the WolfPAC NALIS library information system (the Northern Nevada Academic Libraries Information System). The Geothermal Resources Council Bulletin and Transactions, and the GeoHeat Center Quarterly Bulletin were also scanned for any Nevada references.



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# NEVADA BUREAU OF MINES AND GEOLOGY

### MEMORANDUM

DATE: January 14, 1994

FROM: Larry Garside Law

- TO: Paul Lineau \ Geo-Heat Center Oregon Institute of Technology Klamath Falls, OR 97601
- SUBJECT: Quarterly Progress Report, Nevada Low-Temperature Geothermal Resources

In December the contract between OIT and the University of Nevada, Reno (Nevada Bureau of Mines and Geology) was extended to June 30, 1994. I have briefly summarized the progress for the preceding quarter below; if you have further questions, please contact me. Thank you for your assistance in getting the paperwork signed for the contract extension.

- 1. GEOTHERM The 1368 records from GEOTHERM are in Quatro Pro spreadsheets and include the data in the approximate order and format as Bob Blackett illustrated in his Geo-Heat Center Quarterly Bulletin (November) article. The longitude and latitude are as decimal degrees, and can be plotted by the GIS lab (Arc/Info). Selection of the ones to be used in the final data base is continuing.
- 2. WATSTORE Over 1700 records have been selected from the WATSTORE database. These include any spring or well records with temperatures over 18°C north of 38°N latitude, and only those over 20°C for the area south of 38°. The pertinent data is in a Quatro Pro spreadsheet in a format similar to the GEOTHERM data described above.
- 3. NURE water chemistry data A number of 1° by 2° quadrangles in Nevada were studied for their uranium potential in the 1970s by Bendix Field Engineering for the U.S. Energy Research and Development Administration (now Department of Energy). Water samples of springs and wells were taken and analyzed, including some thermal waters. However, the analyses do not include complete data on major constituents, so the data set is not too useful. However, trace metals

(including arsenic) are reported, and these data may be useful in the future for site specific studies or specific public inquiries. The data is available at NBMG in digital format.

- 5. Bibliography We continue to add new references to the bibliography from the published, unpublished, and gray literature available in our geothermal files in the NBMG public information office and from my own library. The search for other new references is continuing, and will include articles in the GRC Bulletin, the Geo-Heat Center Quarterly Bulletin, the GRC Transactions, etc.
- 6. Geothermal location data The program to identify and digitize every Nevada thermal spring shown on the 1:24,000scale topographic maps is complete. We have over 2800 records (some points have more than one record). We have checked the data base for errors, and made corrections. Correlation with locations listed in other data sets is continuing.
- 7. Use I have just completed a preliminary survey of the lowto moderate-temperature uses in Nevada. I have summarized this data and described the high-temperature uses (electric power generation) with Ron Hess here at NBMG for an article in an upcoming GRC Bulletin. I have enclosed a manuscript copy of that article for your information.
- Other items of interest I have had a couple of contacts in 8. the last several months by individuals interested in lowtemperature applications. One individual was interested in information on geothermal sites for an RV park. Also, I had a question from a National Geographic writer about the Fly Geyser area of Washoe County, and a real estate agent asked about an area of thermal ground water in the Saratoga Springs south of Carson City. Additionally, it appears that a mining company has encountered quite hot (almost certainly >90°C) ground water in a somewhat remote area of northern Mineral County. The company has filed for geothermal leases, and there may be potential for high-temperature applications. The nearest known thermal water is a "hot" water well 7 km to the northwest. This discovery points up again the potential for the discovery of blind geothermal reservoirs in the Basin and Range.

Vcc: Howard Ross, UURI

## NEVADA GEOTHERMAL RESOURCE USE - 1993 UPDATE

by Larry J. Garside and Ronald H. Hess

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## Geology

Nevada is well endowed with both high- and low-temperature geothermal resources. Over 40% of the state is believed to have potential for the discovery of high-temperature (>90°C) geothermal resources, and another 50% has potential for low -to moderate-temperature (<90°C) resources (see Figure 1). Surface and subsurface indications of these resources are the more than 1000 thermal springs and wells in the state. Realistically, this number of individual springs and wells represents several hundred resource areas.

Geothermal reservoirs in the northwestern part of the state have generally higher temperatures; these reservoirs are usually interpreted as being related to circulation of ground water to deep levels along faults in a region of higher-than-average heat flow. In east-central and southern Nevada, the low- to moderatetemperature geothermal resources are generally believed to be related to regional groundwater circulation in fractured carbonate-rock aquifers. Discharge areas (for example, warm springs) may be up to several hundred kilometers from the area of recharge, and the waters may have circulated for dozens to hundreds of years to depths of several kilometers. Maximum temperatures attained during this journey could be 100°C or higher, but spring temperatures at discharge points are generally less than 65°C.

## Exploration and Development

Two hundred and eighteen geothermal well permits were issued from 1988 through 1993 by the Nevada Division of Minerals: they include 58 industrial class production wells, 30 domestic class, 88 observation or gradient wells, 10 commercial class, and 25 injection wells. During this same period 109 geothermal wells are reported to have been drilled with a total amount drilled of approximately 86,500 m. Forty-five of the wells drilled were production wells with a total drilled of approximately 44,800 m. Figure 2 and Table 1 illustrate the number of power generating wells and pace of drilling since 1980.

From 1989 through 1992 noncompetitive and competitive federal geothermal leases in Nevada generated \$1,699,282 in rental fees, \$849,641 of which was returned to the State of Nevada. Federal

production royalties, during the same period, generated \$7,485,000 of which \$3,742,500 was returned to the State. Geothermal lease returns (\$849,641) and royalty returns (\$3,742,500) to Nevada totaled \$4,592,141. By regulation, half of all funds collected by the Bureau of Land Management from federal geothermal leases and production royalties are returned to the State.

## Geothermal Electric Power Generation

Electric power is generated using geothermal resources at 10 plants in northern Nevada (Table 2, Figure 1). The state's total installed geothermal generating capacity is second only to California.

In 1993 the state-wide peak power demand was 3,755 megawatts (MW); the total installed generating capacity of Nevada's two major utilities (who supply most of the state's customers) is nearly 2,600 MW (Public Service Commission of Nevada). Thus, geothermal energy provides about 7% of the total electricity generated within Nevada (although only about 3% of the peak load). Over 40% of Nevada's geothermal electric power is exported to California.

Total Nevada geothermal electrical production 1989-1992 was 4,076,616 megawatt-hours with an approximate sales value of \$307,410,000. Production capacity in 1988 from eight geothermal power plants was 115.8 MW gross while current power production from ten existing geothermal power plants in Nevada is 191.7 MW gross (Table 1). These values represent an 17% increase in sales value of the power sold from 1988 to 1992 and an increase in installed gross power production capacity of 60% over 1988.

It is important to note that in 1988 Nevada had nearly a threefold increase over 1987 in the amount of on-line geothermal generating capacity (Figure 3). The primary reason for this increase was the Dixie Valley 60-MW Oxbow Geothermal plant being put on line. The OESI plants at Empire (4.8 MW) and Soda Lake No. 1 (3.6 MW) were also brought on line during this period.

According to a 1991 Department of Energy estimate, under stable market conditions and with continuing technologic advancements in the geothermal industry, Nevada's projected electrical production capacity from known geothermal resources by the year 2010 should be at least 600 MW (Energy Information Administration, 1991). It is estimated, for the Basin and Range province as a whole, that aggressive exploration activity and continued rapid geothermal technologic advancements could add up to 2,000 MW of production capacity from known resources and new discoveries over the next 10 to 20 years (Wright, 1992). These relatively optimistic future scenarios should be tempered by today's reality of low-priced

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natural gas, increases in efficiency of fossil fuel generating equipment, and anticipated changes in power sales contracts. The future is bright for Nevada's high-temperature resources, but the pace of development will depend on many factors not related to the viability of the geothermal resource.

## Beowawe

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The Oxbow/Beowawe Geothermal Power Co., Beowawe plant came on line in 1988. It is a 16 MW (gross), dual-flash plant, which uses geothermal fluids from three wells with a resource temperature of 221°C.

## Brady's Hot Springs

The Brady Hot Springs geothermal power plant (Figure 4) came on line in July, 1992. Plant operation and maintenance is being performed by Oxbow Power Services, Inc. The plant uses 5.4 million pounds of brine per hour produced from six of eight production wells. The production zone is 300 to 425 m deep with a resource temperature of between 172°C and 182°C. The wells supply two high pressure turbines and one low pressure turbine in a two stage system that produces 21.1 MW gross output. Geothermal fluids are injected into three of five available injection wells. (Ettinger and Brugman, 1992; Geothermal Hot Line, v. 21 no.1)

## Desert Peak

The Western States Geothermal Co., Desert Peak plant went on line in 1985. It was designed by Phillips Petroleum Co. and uses a biphase turbine built by TransAmerica Corp. Production capacity from the currently developed resource is 8.7 MW. The resource temperature is approximately 205°C and well-head temperature is 165°C.

## Dixie Valley

The largest single geothermal power plant in Nevada, Oxbow Geothermal Corp. Dixie Valley plant, came on line in 1988 producing 55-59 MW (net). The power is produced in a double-flash turbine generator and purchased by Southern California Edison Co. Oxbow estimates a geothermal energy reserve in Dixie Valley sufficient to supply 200 MW for 30 to 60 years. (GRC Bulletin, June 1987; Reno Gazette-Journal, August 6, 1988)

#### Empire/San Emidio Desert

The OESI/AMOR II Empire plant came on line in 1987 and consists of four Ormat Energy Converter Modules with a gross output of 3.6 MW from currently developed geothermal resources. Production is from a liquid-dominated geothermal source at 129°C to 137°C.san Emidio Resources continued their geothermal program in the San

Emidio Desert near Gerlach, Nevada. Early in 1991 San Emidio Resources signed a 5-MW, 30-year geothermal power supply contract, effective 1992, and a 20-MW, 30-year geothermal power supply contract, effective 1995, both with Sierra Pacific Power Co. (GRC Bulletin, February 1991) The initial price paid for produced electricity under the long-term contracts is reported to be approximately 5 cents per kWh. At that time plans called for construction of a 6.5 MW binary plant to be on line by November 1992. Since then San Emidio Resources requested and was granted a suspension of the 5-MW project in order for Sierra Pacific Power Co. and San Emidio Resources to determine the feasibility of combining the 5 and 20 MW projects into one project. In July 1993, Sierra Pacific Power Co. executed an amendment to the longterm power purchase agreement with San Emidio Resources. The agreement now calls for a 30-MW geothermal power plant to be on line by November 1, 1995 (Public Service Commission of Nevada).

### Fallon

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In early 1992 the U.S. Navy issued a request for proposal to construct an 80- to 90-MW geothermal power plant at the Fallon Naval Air Station. If this plant is constructed it will be phase I of the Navy's geothermal program. Phase II will consist of a second 80 to 90 MW facility to be constructed within 10 years of completion of the phase I project. The Navy estimates that the potential geothermal resource in the area will be able to produce 300-500 MW. The exploration drilling and reservoir testing performed during the initial phase of this project will be used to better define the geothermal potential of this area. Based on previous exploration information it is expected that the resource will be in the 175°C to 205°C range.

## Fish Lake Valley

Fish Lake Power Co. continued their extensive drilling efforts to develop a geothermal resource in the Fish Lake Valley area of Esmeralda County. If a geothermal generating facility is built, the electricity would be delivered to California under a Standard Offer No. 4 Contract.

## Hot Sulfur Springs

Earth Power Energy and Minerals has requested an avoided-cost purchase contract agreement with Idaho Power Co. If a contract were obtained, a 9.9-MW geothermal power plant could be constructed at Hot Sulfur Springs, Elko County, Nevada. (Reno Gazette-Journal, October 10, 1993)

## Rye Patch

The Rye Patch Limited Partnership (OESI) is currently nearing completion of a 12.5 MW binary generating plant at their site

near **Rye Patch** reservoir. The Company has a signed purchase agreement with Sierra Pacific Power Company which had an anticipated plant on-line date of November 30, 1993. This has been delayed while the Company continues to develop a sufficient and continuous geothermal resource that is required to fuel the plant.

## Soda Lake

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On August 19, 1991 the 13 MW OESI/AMOR III soda Lake No. 2 geothermal power plant completed commercial operations testing and went on line. This plant is adjacent to the 3.6 MW OESI Soda Lake No. 1 plant that came on line during 1987 (GRC Bulletin, October 1991). Both plants are producing from a liquid-dominated geothermal source at 160°C.

## Steamboat Springs

Two 12-MW, air-cooled, binary geothermal power plants, Steamboat II and III, operated by S.B. Geo, Inc., were brought on line in December 1992 adding 24 MW of production to the existing 7.1-MW S.B. Geo Steamboat plant for a combined gross production capacity of 31.1 MW.

The geothermal fluid cycle at the new plants is completely contained and the fluids are injected back into the ground (closed binary-cycle system). The existing resource is expected to last 30 years or more and can support an additional 36 MW of production capacity. Based on this, plans are currently being formulated to determine the feasibility of installing an additional 24-MW facility in the near future. In December 1993 S.B.Geo, Inc. received a \$7.2 million grant from the U.S. Department of Energy to develop a pilot project known as the Kalina pilot plant. The purpose of the project is to increase the efficiency of extracting heat from hot geothermal fluids.

Yankee Caithness J.V.L.P. operates a 14.4-MW (gross) flash turbine system producing from a 170°C. resource. The Yankee Caithness Steamboat plant came on line in 1988 and the produced power is purchased by Sierra Pacific Power Co. on a 30-year contract.

### Stillwater

**OESI/AMOR IV, Stillwater Geothermal** plant came on line in April 1989. Total project cost was \$36 million. The air-cooled plant consists of 14 Ormat Energy Converters that have a combined gross generating capacity of 13 MW. The plant uses a liquid-dominated geothermal source ranging in temperature from 155°C to 170°C. The plant operates on a closed system; all geothermal liquids are reinjected. (Ormat Fact Sheet, 1989; Geo-Heat Center, Fall 1989)

## Wabuska

Tad's Wabuska plant came on line in 1984. Current production capacity is 1.2 MW produced from two Ormat Energy Converter modules. The plant operates on fluids at 107°C. produced from a depth of 107 m. (GRC Bulletin, July, 1987).

## Non-Electric Low- and Moderate-Temperature Applications

The majority of Nevada's population is concentrated in two areas, Reno-Carson City and Las Vegas. Many of the state's geothermal resources are remote from any population centers, thus limiting some potential applications. Although 50 or more small to large communities are located within 8 km of geothermal resources, only a few of these areas have been able to use these resources effectively. The reasons for this under- utilization are varied. Although some reasons relate to technical and engineering problems (resource size and temperature, heat loss during transport, etc.), many more are economic (high capital outlays, long payout, under-capitalization of projects) and perceptual (unconventional vs. conventional technology, short vs. long term cost evaluations, uncertainties about long-term economic risks).

There have been attempts to use Nevada's low- and moderatetemperature geothermal resources at more than 20 areas, mainly in the past 5-10 years. Additionally, economic and/or technical appraisals of a number more areas have been conducted, but for a variety of reasons projects were not completed.

# Moana Geothermal Area

Moana Hot Springs, located in the southwestern part of Reno, have not flowed at the surface for at least 15 years. The springs were the discharge point for an area of thermal groundwater that has been used for a spa, swimming pool, and home heating for nearly 100 years. Recent use for home space heating began in the 1960s. The area today is predominantly residential. We estimate that the area of thermal ground water encompasses at least 9 km<sup>2</sup>. In this area there are more than 300 homes that use geothermal fluids for space heating. One hundred and thirty of these homes are part of a district heating system, while most of the rest use down-hole heat exchangers in individual wells. A smaller district heating system has retrofitted 12 homes for geothermal heat, and plans to add another four in the spring of 1994. A large hotel, a motel, about three apartment or townhouse complexes, five churches, and a county swimming pool also use the resource. The Veterans Administration Hospital, located about 2 km northeast of the geothermal area, drilled a deep well several years ago, but encountered only approximately 43°C water. The well was plugged and abandoned.

## Steamboat Hot Springs

The Steamboat geothermal area consists of a deep, hightemperature (215-240°C) geothermal system, a shallower, moderatetemperature (160-180°C) system, and a number of shallow, lowtemperature (30-80°C) subsystems (Goranson and others, 1991). The higher temperature systems are used for electric-power generation (see the preceding section). A number of low-temperature thermal groundwater anomalies are in an area of approximately 30 km<sup>2</sup> centered on the hot spring area (Goranson and others, 1991), but these thermal areas are not well known and are little used. A few homes in the Steamboat area have used low-temperature fluids for over 40 years, and one or more spas have been active in the springs area since the 1860s. Presently probably less than a dozen homes use the low-temperature geothermal fluids for space heating or domestic hot water (including swimming pools). About one domestic geothermal well permit has been issued per year over the last five to seven years.

## Bower's Hot Springs

A large outdoor swimming pool and smaller children's pool at the Washoe County Park at Bower's Mansion (located between Reno and Carson City) are supplied with warm water from a geothermal well located near the spring.

## Carson City Area

Water from a well at the site of Carson Hot Springs in northern Carson City is used directly in a swimming pool. In southeast Carson City, thermal groundwater is found in the State Prison/Pinyon Hills area. In the past, there have been a few attempts to use the thermal groundwater from domestic wells in that area for space heating. Geothermal space heating has been considered but not implemented in at least two schools in the area.

### Saratoga Hot Springs

A California company, Lobsters West, has proposed to raise lobsters near the warm springs, located about 15 km southeast of Carson City. The geothermal fluids would be used to heat tanks in which the lobsters would grow to full size. The experimental study is proposed to last four years; live lobsters would be shipped twice a month to local markets (Reno Gazette-Journal, November 4, 1993).

## Hobo Hot Springs

These hot springs, located about 15 km south of Carson City, were used to raise tropical fish and Malaysian prawns in the late 1980s. Lobster raising was also considered. The water temperature is slightly over 40°C. The site is presently inactive.

# Walley's Hot Springs

Walley's Hot Springs, located near Genoa, about 20 km south of Carson City, was the site of a large spa in the late 1800s and early 1900s (Garside and Schilling, 1979). A modern spa was built on the site in the early 1980s. In addition to use of the geothermal fluids for bathing and domestic hot water, the buildings are heated with geothermal energy (Lienau and others, 1988).

## Gerlach

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Hot springs located just west of the town of Gerlach (Great Boiling Springs) have been used for bathing for many years. The Gerlach General Improvement District built a bath house using geothermal fluids in 1989. The facility was planned for use by tourists and local residents. The facility has been unable to obtain a permit from the health department because of plugging of water filters by sediment from the well. Future plans are for a geothermal heat exchanger system to heat city water for the spa. Geothermal ground water apparently extends under at least part of the town, as at least two Gerlach homes use geothermal wells for space heating. The water in one well is reported to be 35-36°C (unpubl. data, Nevada Division of Minerals).

## San Emidio Desert

A vegetable dehydration plant is under construction in the San Emidio Desert area southwest of Gerlach. The plant is a few kilometers north of the Empire (OESI/AMOR II) electric-power plant. Integrated Ingredients (Spice Islands, Fleischmann's, and other brands), part of international food manufacturer Burns Philp, is contracting for the construction of the facility, which will employ about 25 persons when completed in early 1994. The number of employees may increase to about 65 after 18 months. Onions and garlic will be dehydrated and stored at the plant (Reno Gazette-Journal, August 31 1993). The plant will use approximately 150°C geothermal fluid.

### Brady's Hot Springs

A geothermal vegetable dehydration plant has been operated at this site, about 80 km northeast of Reno, since 1978. The facility uses a moderate-temperature (132°C) geothermal well on site. Since 1993, additional geothermal fluid has been supplied by the nearby Brady Power Partners electric power generation plant operated by Oxbow Power Services, Inc.

### Wabuska Hot Springs

In addition to the rather low-temperature electric-power generation plant operated at Wabuska by Tad's Enterprises, several non-electric applications have been located at the area, but none are active today. A hydroponic geothermal greenhouse operation (tomatoes, cucumbers, etc.) was built on the site in the early 1970s, but few vegetables were grown. Tad's Enterprises has in the past operated a geothermal ethanol facility, a plant to grow algae (<u>Spirulina</u>) for human consumption, and facilities to raise Malaysian prawns, catfish, and tropical aquarium fish. Some of these were pilot facilities, rather than actual production facilities.

## Rye Patch Geothermal Area

Florida Canyon Mining Co. operates a large open-pit gold mine and heap-leach gold recovery facility located about 50 km northeast of Lovelock, and 7 km north of the area presently under development by Rye Patch Limited Partnership for geothermal electric power production. A 180-m well produces fluids at approximately 100°C; these fluids provide make-up water for the cyanide extraction solutions and heat is also extracted from via heat exchanger to heat the solutions. The heating of cyanide solutions aids extraction during cold weather, and may enhance total gold recovery somewhat.

### Darrough's Hot Springs Area

Round Mountain Gold Corp. operates a large open-pit gold mine and heap-leach gold recovery facility near the Darrough's Hot Springs geothermal area in Nye County. Geothermal fluids from shallow (approx. 300 m) wells are used in a heat exchanger to transfer heat to cyanide heap-leach solutions (Trexler and others, 1990). The heated cyanide solutions increase gold extraction during periods of freezing or near freezing weather; additionally, the heating of solutions may enhance total gold recovery.

### Carlin

Carlin Hot Springs, located near the Humboldt River southwest of the town, have a reported temperature of 80°C (Trexler and others, 1982). The Carlin High School used 31°C geothermal fluid from 280-m well from 1986 to 1992 in a closed-loop space heating system. The well was abandoned in 1992, apparently in part because of scaling problems with iron and manganese.

## Elko Area

Hot springs south of the town of Elko were first used in a bath house in the 1860s (Garside and Schilling, 1979). Thermal groundwater was known to exist to the north of the springs under a part of the town, but no use was made of it until the Elko Heat Company began supplying geothermal fluid for space heating to several downtown buildings in 1982 (Rafferty, 1988). The company has continued to grow; in 1993 it served 16 commercial customers and 2 residential customers (Mike Lattin, oral commun., 1994).

The Elko County School District, in conjunction with the Elko General Hospital, developed a district geothermal heating system in 1986. The system supplies heat to eight buildings (two schools, a municipal swimming pool complex, a gym, a convention center, a hospital, a city hall, and a school administration building). In 1988 the estimated combined savings to all users was \$300,000 per year (Rafferty, 1988; Richard Harris, oral commun., 1994).

## Jackpot Area

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Two wells drilled in 1988 at the Y3 Ranch about 7 km southeast of Jackpot were used for raising of catfish. The maximum reported well temperature was 40°C (Lund and others, 1990). The catfishraising operation was not active in late 1993, reportedly due to insufficient enough geothermal fluid.

## Wells Area

Warm springs about 1.5 km north of the present town of Wells were referred to by travelers on the emigrant trail in the 1850s as Humboldt Wells (from which the town name is derived). Thermal (32-34°C) groundwater is used by an elementary school and the Wells Rural Electric Co. in heat pump applications for space heating.

# Duckwater (Big Warm) Springs

A geothermal catfish-growing facility has been operated at this site since 1982. The facility was purchased in 1992 by Robert and Jeff King (Valley Fish) of Preston, Idaho. The facility, located about 110 km west of Ely, produces over 300,000 pounds of prime 8-ounce catfish filets per year (Geo-Heat Center Quarterly Bulletin, December 1992) that are shipped to Idaho for sale.

# Caliente Hot Springs

The town of Caliente in Lincoln County derives its name from the local hot springs. A number of wells in the area have reported temperatures from 40 to 80°C (Garside and Schilling, 1979; Lienau and others, 1988). A motel supplies geothermal water from a well to bathing pools and individual room whirlpool baths, and a trailer park supplies hot water to individual mobile homes. The Lincoln County Hospital (20 beds) was heated using 39°C water from a well on the site, but reduced temperatures (to 28°C) forced reliance on electric resistance heating. The hospital plans to use the lower-temperature fluids from its well for heating and cooling using heat-pump technology. The city swimming pool used geothermal heat in the past, but was damaged during the winter of 1992 and will probably be replaced. The City of Caliente has a grant from the Rural Development Administration to use the local geothermal resources. A nearby perlite processing plant may be the first user, for plant process heat. If more funding is found, the city plans to provide heat to the hospital, swimming pool, and eventually an elementary school and youth training facility (Glen Van Roekel, oral commun., 1994).

## Ash Springs

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Thermal waters (31-36°C) at Ash Springs, located about 10 km north of Alamo, in Lincoln County, have been used in the past at a spa on the site. The facility was closed during a 1993 visit.

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# Figure/Table captions

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Figure 1. Generalized Nevada geothermal resources.

Figure 2. Industrial-class (power generating) wells drilled in Nevada, 1980-1993.

Figure 3. Rated capacity and average net output of Nevada geothermal plants, 1984-1992. Average net output is annual sales in megawatt-hours divided by the number of hours in a year (8,760).

Figure 4. Steam separators and power house at Brady's Hot Springs plant (Brady Power Partners), Churchill County, NV. <u>Larry Green</u> photo.

Figure 5. Vegetable-dehydration plant under construction in the San Emidio Desert. <u>Larry Green photo.</u>

Table 1. 1992 directory of Nevada geothermal power plants.

Table 2. Total number of all classes of geothermal wells drilled and number of industrial-class geothermal wells drilled by year, 1988 through 1993. Source: Hess, 1993; Nevada Division of Minerals, 1993.