AREA
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Cassia
Road Log

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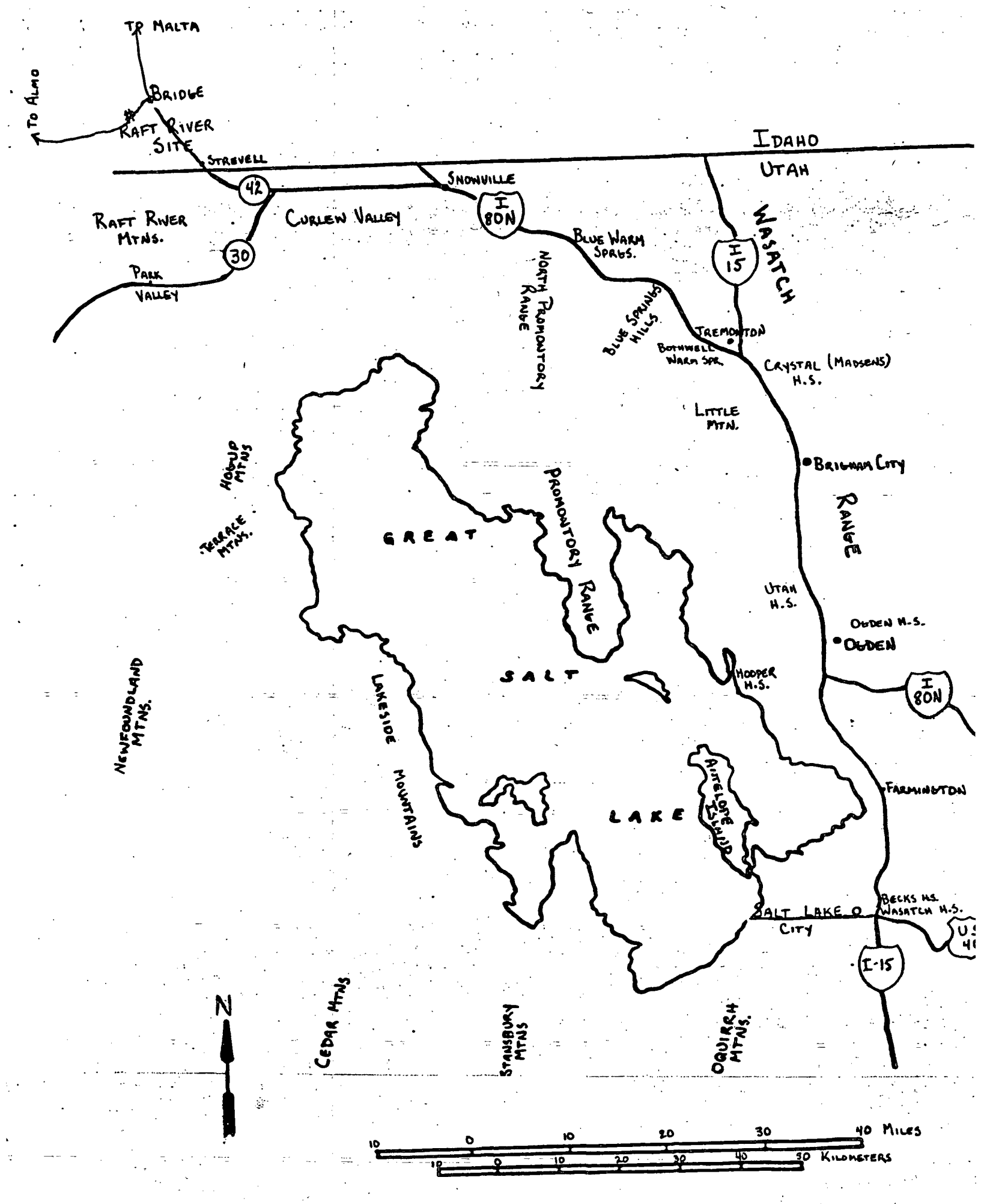
# Field Trip Log

## Salt Lake City, Utah to Raft River, Idaho

with discussion of hydrothermal
and geologic features
en-route

October 4, 1979


TO MALTA
TO ALMO
BRIDGE
RAFT RIVER SITE
IDAHO
UTAH
STREVELL
SNOWVILLE
42
I 80N
RAFT RIVER MTNS.
CURLEW VALLEY
30
PARK VALLEY
BLUE WARM SPRGS.
NORTH PROMONTORY RANGE
BLUE SPRINGS HILLS
H 15
WASATCH
TREMONTON
BOTHWELL WARM SPR.
CRYSTAL (MADSENS) H.S.
LITTLE MTN.
BRIGHAM CITY
HOGUP MTNS
TERRACE MTNS.
PROMONTORY RANGE
GREAT
SALT
LAKE
RANGE
UTAH H.S.
OGDEN H.S.
OGDEN
HOOPER H.S.
I 80N
NEWFOUNDLAND MTNS.
LAKESIDE MOUNTAINS
ANTELOPE ISLAND
FARMINGTON
BECKS HS.
WASATCH H.S.
SALT LAKE CITY
I-15
N
CEDAR MTNS
STANSBURY MTNS
OQUIRRH MTNS.
10 0 10 20 30 40 MILES
10 0 10 20 30 40 50 KILOMETERS

| Cumulative Mileage | |
|---|---|
| 0.0 | Leave the Hotel Utah Motor Inn. Head west on N. Temple (U.S. Hwy 40) |
| 0.3 | Turn right onto 300 West, and head north<br>Bench from Lake Bonneville cut into Mesozoic rocks along the Wasatch front |
| 1.4 | Wasatch Springs and defunct Wasatch Springs Plunge<br>Proceed north on Beck Street, along the Warm Springs Fault Zone |

Becks Hot Springs issue from near the contact between valley fill of Quaternary age and limestones of Paleozoic age. The contact zone and apparent conduit for the thermal waters is the Warm Springs fault. Volcanic rocks of Tertiary age are exposed about 2.5 miles southeast of the springs but are not believed to be a source of heat. Circulation of meteoric water to depths of several thousand feet and contact with saline sediments probably result in the temperatures of about 130° F and the dissolved-solids content of about 13,000 ppm. Some mixing of deeply circulated brines and shallow dilute ground water may occur.

Wasatch Hot Springs, (B-1-1)25db-S, are about one mile north-northwest of Temple Square in Salt Lake City, Salt Lake County. The Springs, like Becks Hot Springs, issue along the Warm Springs fault at the contact between rocks of Quaternary and Paleozoic age. During the past 45 years, several short tunnels have been constructed in an effort to increase spring discharge; other construction in the immediate vicinity of the springs has affected spring discharge.

The temperature of Wasatch Hot Springs was 105° F on July 26, 1967. Dissolved solids were 6,000 ppm. The water is of the sodium chloride type. Although a small area of volcanic rocks is about one mile east of the Wasatch Hot Springs, the source of the heat is believed to be the geothermal gradient.[1]

| | |
|---|---|
| 3.5 | Join I-15 North.<br>Vista across lake to the west (if clear) |

[1]This and subsequent descriptions are from: Mundorff, J.C., 1970, Major Thermal Springs of Utah: Utah Geological and Mineral Survey, Water Resources Bulletin 13, 60 p.

7.0 Contact of Precambrian with Paleozoic (Cambrian) rocks along the Wasatch Front

8.5 Good exposure of faceted spurs and Lake Bonneville bench along the the Wasatch Front

14.0 Farmington

18.0 Antelope Island (Precambrian rocks) to the west and the Promentory Range (Precambrian and Paleozoic rocks) to the northwest.

25.0 Hooper Hot Springs to the west
Hill AFB to the east (potential direct heating site)

Hooper Hot Springs are about 10 miles southwest of Ogden, on the east shore of Great Salt Lake. The springs issue from valley fill of Quaternary age. The springs are about a quarter of a mile west of an inferred fault in the fill and are at the east edge of mudflats of Great Salt Lake. In additon to the main Hooper Hot Springs, several small springs and seeps are in the immediate vicinity and some extend northwestward through the mudflats.

On September 15, 1953, chemical data were obtained at Hooper Hot Springs and at Southwest Hooper Warm Springs, (B-5-3)28d-S, which are about three-eights of a mile west of the main spring. Temperature of Hooper Hot Springs was 140° F and dissolved-solids content was 27,800 ppm. The water was of the sodium chloride type at both springs.

Infrequent observations of temperature between 1951 and 1966 show a temperature range of 118°-140° F at Hooper Hot Springs. The cause of the heat probably is the geothermal gradient; no intrusive or volcanic rocks of late Tertiary or Quaternary age are known to occur within many miles of the springs.

If the source of heat and the dissolved-solids content of the deeply circulated waters are assumed to be the same for both Hooper Hot Springs and Southwest Hooper Warm Springs, the data obtained on September 15, 1953, can be used as the basis for some rough approximations. If the water from Hooper Hot Springs were mixed with an equal amount of water having a temperature of 55° F and having a dissolved-solids content of about 50,000 ppm (about one-fifth that of Great Salt Lake), then the resultant water would have a temperature of 90° F and a dissolved-solids content of 27,800 ppm, such as was observed at Southwest Hooper Warm Springs in 1953.

30.0 Ogden Hot Spring to the east

Ogden Hot Springs are at the mouth of Ogden Canyon, about a quarter of a mile east of the east boundary of the city of Ogden, Weber County. The springs rise in the Wasatch fault zone in rocks of Precambrian age. The immediate vicinity of the springs is mantled with talus or thin valley fill.

A temperature of 150° F was reported for the spring once but nearly all temperature observations have been about 135° F. As for nearly all thermal springs in Utah, the cause of heat probably is the geothermal gradient. Most records show that the spring discharge is about 35 gpm.

The dissolved-solids content of Ogden Hot Springs ranged from 8,650 to 8,820 ppm during 1943-67; the water is of the sodium chloride type

36.0 Utah Hot Spring

Utah (Bear River) Hot Springs are in the extreme southeast corner of Box Elder County, about eight miles northwest of Ogden. The springs issue in an area of complex faulting in rocks of Cambrian age. Gilbert stated that these springs rise along the outer base of Pleasant View spur, one of the several fault-block spurs that are associated with the Wasatch Range. The relation between these springs and the main Wasatch fault zone, however, is not known in detail.

The temperature of Utah Hot Springs has remained constant during the past 125 years. The temperature was 136° in 1843, 136° F in 1871, and 135°-137° F in 1966-67. The source of the heat probably is the geothermal gradient, which results in the heating of deeply circulating meteroic waters.

Most observations indicate that the discharge of Utah Hot Springs is fairly constant at about 500 gpm, although discharges ranging from 250 to 700 gpm have been reported. The water was used as a bathing resort many years ago but is no longer used for that purpose. During recent years, the water has been used for heating of buildings near the springs.

Observed dissolved-solids content of the springs ranged from 18,900 to 25,200 ppm. The water is strongly sodium chloride in type.

46.5 The Great Salt Lake to the west; Promontory Range across the lake

52.0 Little Mountain to the northwest. Site of Utah Geological and Mineral Survey thermal gradient hole. An 800 ft test well will be drilled in the northern portion of Little Mountain. Little Mountain Hot Spring and Stinking Springs are on the southern end of Little Mountain. Brigham City is to the east.

Stinking Hot Springs are about six miles southwest of Bear River City, Box Elder County. The springs discharge from limestones of Mississippian age at the base of the south end of Little Mountain. The water rises along one of the faults in these limestones. The springs derive their name from the presence of hydrogen sulfide gas.

Measured spring temperatures during the period 1951-67 ranged from 113° to 124° F. The absence of evidence of igneous activity of late Tertiary or Quaternary age indicates that the probable cause of heat is the geothermal gradient. Estimated discharges of the springs have ranged from 4 to 45 gpm.

Stinking Hot Springs are some of the most mineralized thermal springs in Utah. Dissolved-solids content in 1911 was 30,400 ppm and in 1967 was 29,000 ppm; observations during the intervening period show concentrations in the same general range but as high as 36,600 ppm. The water is of the sodium chloride type. Lithium and bromide concentrations are fairly high.

55.0 Bear River Migratory Bird Refuge

60.0 Crystal (Madsens) Hot Spring to the east

Crystal (Madsens) Hot Springs are in Box Elder County, about 10 miles north of Brigham City. The springs issue from rocks of Paleozoic age along the Wasatch fault zone. The temperature of the springs has remained fairly constant during the past 125 years. Fremont reported the temperature of these springs as 134° F in 1843, and Gilbert reported temperatures varying from 121° to 132° in 1872. As for most other thermal springs in Utah, the location of these hot spring is along a major fault zone. The absence of evidence of nearby igneous activity of late Tertiary or Quaternary age, and the moderate temperature of the water suggest that the geothermal gradient is the cause of the high temperature of the water. Estimates of spring discharge have ranged from about 500 to about 1,800 gpm during a period of many years.

The dissolved-solids content of Crystal Hot Springs is higher than that for any other hot spring in Utah. The water

is of the sodium chloride type; approximately 95 percent of the dissolved solids, by weight, are sodium and chloride.

65.5 Continue west on I-80N.

70.5 Temporary end to the freeway

72.0 Bothwell and Bothwell Warm Springs to the west

78.0 Blue Springs Hills

80.4 Divided highway begins again

90.0 Blue Springs to the northwest

Blue Warm Springs, are about 17 miles northwest of Tremonton, Box Elder County. The springs apparently issue from rocks of Paleozoic age. Weathered limestone was observed in an excavation at the springs and faulted rocks of Palezoic age crop out about one mile southeast of the springs. Volcanic rocks of late Tertiary age crop out about five miles northwest of the springs. The springs are at the head of Blue Creek Reservoir and are submerged when the reservoir is filled to maximum storage capacity.

The temperature of the water ranges from about 80° to 86° F. Deep circulation of meteoric water and emergence of the water from a fault beneath the valley fill may explain the location and temperature of the springs; the source of heat probably is the geothermal gradient.

The dissolved-solids content probably ranges from about 1,800 to 2,000 ppm; the water is of the sodium chloride type.

92 Road cut in Tertiary volcanic rocks

92.5 Summit of pass in northern portion of the Northern Promontory Range

104.1 Take Exit 5 onto Highway 30, towards Park Valley and Elko

104.7 Turn left towards Strevell, Idaho

120.0 Follow Highway 42 towards Strevell

127.2 Idaho/Utah line (enter Cassia, County, Idaho)

128.0 Strevell, Idaho and the Raft River Valley

138.2 Raft River Geothermal Site Sign and short cut road to the test facility. Do not take this road if wet and muddy

140.7 Turn left onto dirt road. (The west side of this road has a white, blank signboard).

145.2 Turn left towards cooling tower and steam plume

145.7 Enter The Raft River Geothermal test facility. Don Mabey (USGS) will discuss the geology of the Raft River site. Roy Mink (DOE/DGE/ID) will discuss drilling. There will also be speakers from EG&G on space conditioning, fluidized bed experiments, heat dissipation experiments, aquaculture, environmental programs, and the 60 KW experimental loop.