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Municipal groundwater potential at Lovell, Wyoming

General Geology

The town of Lovell is located at the east edge of the Big-horn Basin along the Shoshone River. The surface formation aside from alluvial river and terrace deposits is the Cody shale. Structurally the town is just east and north of Little Sheep Mountain, one of a series of northwest trending anticlinal structures which expose older rocks at the surface. Faulting is common at the basin margin and generally consists of two types: (1.) thrusting parallel to the NW trending structures and (2.) normal faulting perpendicular to the structures. Normal faulting often is a surface feature and does not offset deeper units. Formations quickly dip off into the basin to the west. Generally, water quality decreases as the depths to a particular aquifer increases. A typical cross section on the east side of the basin is shown in Fig. 1. Recharge to aquifers is from precipitation, stream flows, and infiltration from adjacent formations. Major recharge areas in the Lovell vicinity are, of course, the Pryor-Bighorn Mountains. Potentiometric maps indicate groundwater movement is toward the Big-horn river.

Well Control

Most water wells in the vicinity of Lovell are shallow and produce small quantities from alluvial stream deposits and terrace gravels. A deep well at Frannie produces artesian water from the Madison at 4900'. Mention has been made of a deep well at Cowley (Crosby Well) which produces a large volume of water (a check is being made with State Engineer to verify the details). Substantial information is available from records of

oil and gas wells in the vicinity of Lovell. Figure 2 shows the subsurface well control available.

Production of oil and gas in this area has mostly been from the Tensleep, Madison, Amsden, Phosphoria, and Frontier formations. Subsurface control in the Bighorn Basin is mostly based on the Tensleep Formation. The overlay on Figure 2 shows the structure contours on the Tensleep. Elevations are based on a sea level datum.

Aquifers

A stratigraphic chart of the Bighorn Basin is shown in Figure 3. Bedrock beneath the alluvial cover at Lovell is the Cody shale. Potential aquifers for moderate to large quantities of groundwater include: Frontier sandstones, the Muddy sandstone member of Thermopolis Formation; sandstones in the Morrison Sundance Formations, the Tensleep Formation, Madison Formation, Bighorn Formation and Flathead Formation. The chart also shows the potential aquifers and some properties of the geologic units.

Depth to the Tensleep at the NE end of town (#1 Bischoff) is 2427, and at the SE is 3145 (#1 McArthur et al.). Only a mile south of town (#3 Asay) it has increased to 4272' as shown by the Tensleep contours on Figure 2. Depths to the Madison averages about 300' below the Tensleep. Depths to the Muddy, Cloverly, Morrison, Sundance sands may vary from several hundred to several thousand feet in the vicinity of Lovell depending on the location. The Frontier Formation crops out just west of town so its top would range from surface to about a thousand feet, again depending on the location of the well.

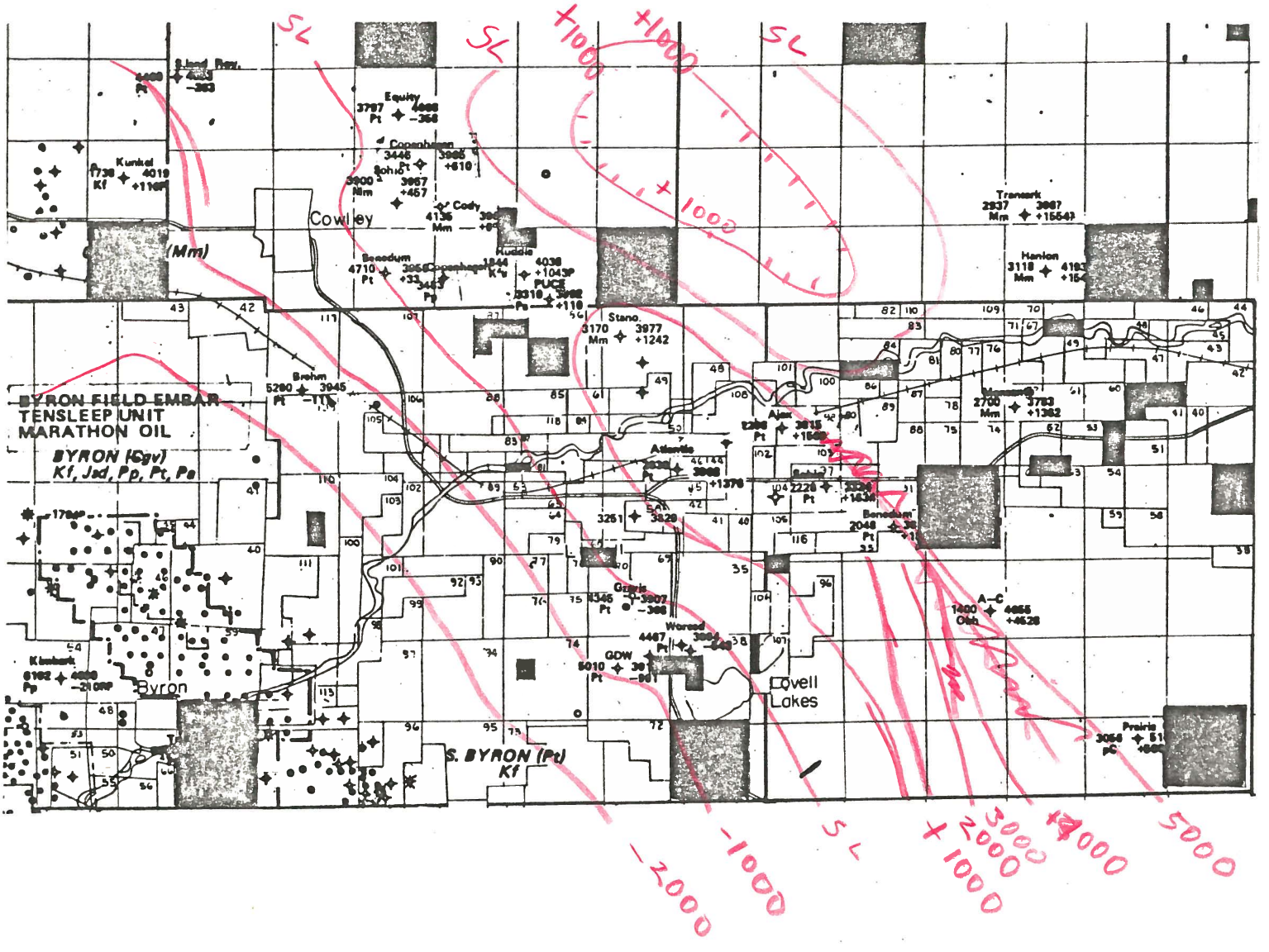
Conclusions

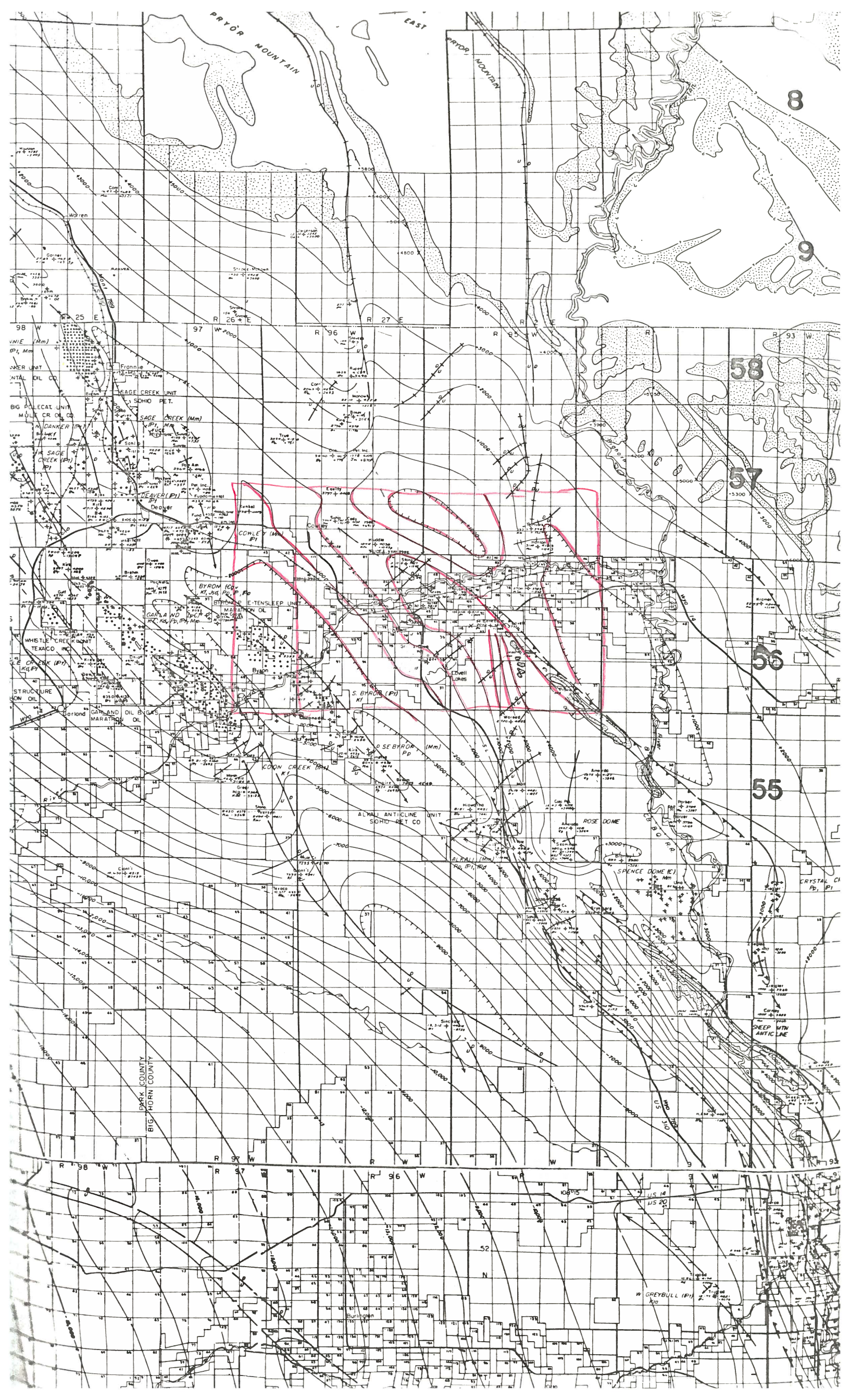
Several potential groundwater sources with moderate to high quantities (several hundred to a thousand gpm) underlie the town of Lovell. The top of the Tensleep Formation is about 2500 feet below the surface in the NE end of town. Depths to groundwater units increase substantially (1500+) from the NE side of town to

SW side. Faulting associated with the nearby Little Sheep Mountain structure may enhance secondary porosity and permeability of the aquifers, however, a large thrust fault on the east side of the structure may be a groundwater barrier to the SW flank of the structure. To the northeast of Lovell several miles, a synclinal structure depresses the units an additional 1000 to 2000 feet. A test well should be carefully located based on the geologic structure in the area and be designed to test several potential producing horizons.

Roy M. Breckenridge
Staff Geologist

May 24, 1977





8

9

58

57

56

55

BYRON MOUNTAIN

BYRON MOUNTAIN

EAST

BIG HORN COUNTY
PARK COUNTY

CRYSTAL CA
Pd, PI

SHEEP MTH
ANTICLINE

ROSE DOME

SPEENCE DOME (C)

ALVALI ANTICLINE UNIT
SOMHO PET CO

ROON CREEK (Mm)

BYRON (Mm)
Pd, PI

WHISTLE CREEK
TEXACO INC

DEAVER (PI)

SAGE CREEK (Mm)

SAGE CREEK UNIT
SOMHO PET.

FRANNIE
SAGE CREEK UNIT

ANTAL OIL CO

W 25 E
W 26 E

R 95 W
R 96 W

T 25 N
T 26 N

W 25 E
W 26 E

R 95 W
R 96 W

T 25 N
T 26 N

W GREYBULL (PI)
Pd, PI

US 14
US 20

52

R 96 W

R 97 W

R 98 W

R 99 W

T 27 N

T 28 N

T 29 N

T 29 N

R 95 W

R 96 W

R 97 W

R 98 W

R 98 W

R 99 W

T 25 N

T 26 N

T 27 N

T 28 N

T 29 N

T 29 N

R 95 W

R 96 W

R 97 W

R 98 W

R 98 W

R 99 W

T 25 N

T 26 N

T 27 N

T 28 N

T 29 N

T 29 N

R 95 W

R 96 W

R 97 W

R 98 W

T 25 N

T 26 N

T 27 N

T 28 N

T 29 N

T 29 N