WESTERN REGION TECHNICAL ATTACHMENT
NO. 88-05
January 26, 1988

THE WEST DESERT POND OR ANOTHER MINI GREAT SALT LAKE

William J. Alder, AM/MIC WSFO Salt Lake City
Gerald Williams, HIC Colorado Basin RFC

The Great Salt Lake through the early to mid portion of the 1980s was on a rampage, but in the recent year it has become more tranquil. During its unprecedented rise of over 12 feet from the fall of 1982 through the historic peak in 1986, damages to lakeshore industries, railroads, highways, and various interests around the lake amounted to 250 million dollars (Alder and Williams, 1985).

The Great Salt Lake reacts dramatically to wet and dry patterns and has shown distinct fluctuations in historic times. The lake reached its historic high the first part of June 1986 and the same elevation the latter part of March 1987, 4211.85 feet above sea level. The lowest level of the Great Salt Lake in modern times was 4191.35 feet in October 1963.

A study by Professor Don Currey (1987) from the University of Utah shows the lake has probably reached or exceeded the 1986 and 1987 highs only about a dozen times in 10,000 years. This indicates that what has happened during the 1980s is an extremely rare event.

The Great Salt Lake is a remnant of Lake Bonneville. At its peak about 15,000 years ago, it was the size of Lake Michigan, stretching from extreme southern Idaho on the north to Cedar City on the south and westward from the Wasatch Front into eastern Nevada. Then, almost overnight, the ice age ended. About that time a "catastrophic" flood occurred out of the lake's northern end due to a natural breach at Red Rock Pass, and water flowed into the Snake River to the Pacific Ocean. During the few weeks of this flood, water poured out of the lake toward the Snake River at more than 30 million CFS, a rate equaling the flow of all rivers on earth into all oceans (Currey, 1987).

The historic Great Salt Lake hydrograph (Figure 1) shows the fluctuations during modern times, since the pioneers arrived in Utah in the mid 1800s.

During the 1985-86 inflow period, the Great Salt Lake continued to rise and was completely out of control. According to State of Utah estimates, a record 7.5 million acre-feet of water entered the lake during this inflow period. A means had to be developed to help control the lake which could be implemented in a short period of time. Some of the alternatives developed were: 1) selected diking of east shore facilities, 2) Antelope Island diking, 3) inter-island diking, 4) Bear River Basin development, 5) west desert pumping, 6) diverting into the Portneuf River of southern Idaho, 7) Utah Lake/Cedar Valley diversion, or 8) doing nothing. The west desert pumping project seemed to have the most "short-term" promise for the least amount of money and was chosen in the spring of 1986. Construction began in July of the same year.

The west desert pumping project was constructed by the State of Utah to help reduce the damage caused by the high water level of the Great Salt Lake. It is a flood control project that expands the normal evaporation process - the only natural means by which water leaves this terminal lake. Water from the Great Salt Lake is pumped into a canal where it flows westward and spreads out, forming a second lake. The new lake is called the West Desert Pond with an unofficial name of "Newfoundland Pond" derived from the range of mountains on the east side of the new lake.

Figure 2 shows the project, which consists of a 10-mile access road along the Southern Pacific Railroad Causeway, the pumping station, canals, trestles, dikes, a 37-mile natural gas pipeline, and a 500-square mile evaporation pond (in black) in the desert west of the Great Salt Lake.

The first pump began operation in April 1987 with the second coming on line in May and the third in June. The pumps have a capacity of pumping 1000-1200 CFS each and were operative 95 percent of the time during the peak evaporation season.

The lake this past season, 1987, fell 2.50 feet or 30 inches, 10 inches of this 30 inches can be attributed to the pumping project. Mother Nature provided reduced inflow and a desirable evaporation season to assist in controlling this overnight monster.

A series of Landsat satellite images (Figures 3, 4, and 5) indicates how the West Desert Pond has grown from late spring to winter. Just recently the return flow to the lake from the pond can be seen using Landsat imagery (Figure 5) and GOES imagery from January 22 (Figure 6).

The idea of the return flow is to maintain fresh water to the West Desert Pond because fresh water evaporates faster than its saline counterpart. The salinity of the north arm water is now 16 percent. The south arm water, which is separated from the north arm water by the Southern Pacific Railroad Causeway, has a salinity of 7 percent. The returning brine has a salinity of about 25 percent according to information received from the Utah State Division of Water Resources.

How will the added water on the west desert affect the Wasatch Front climate? The answer is it will probably have a very small effect. A cold flow over the warmer waters of the pond may locally enhance the snow squalls, especially in the desolate area southeast of the pond under northwest flow. In the past, lake effect snows have been estimated to occur about 6-8 times per year (Carpenter, 1985). It is unlikely that addition of the West Desert Pond will increase the frequency of these events. It will probably increase the areal

coverage of their effects. During stagnant Great Basin high pressure regimes, the tendency for fog to form may be somewhat greater in the winter. Nocturnal thundershowers may occasionally form over the pond, but rainfall from them will be localized. Temperatures near the pond are also likely to be affected with minimums somewhat warmer and maximums somewhat cooler on average.

References:

Alder, W.J., G. Williams, 1985: "The Tale of the Swelling Great Salt Lake", Western Region Technical Attachment, 85-18.

Carpenter, D.M., 1985: "Great Salt Lake Effect Snowfall: Some Notes and an Example", NOAA Technical Memorandum NWS WR-190.

Currey, Don, 1987: "10,000-Year History Shows Lake Won't Inundate Wasatch Front", University of Utah, December.

Fact Sheet, 1987: "West Desert Pumping Sheet", prepared by the Water Resources Division for the State of Utah.

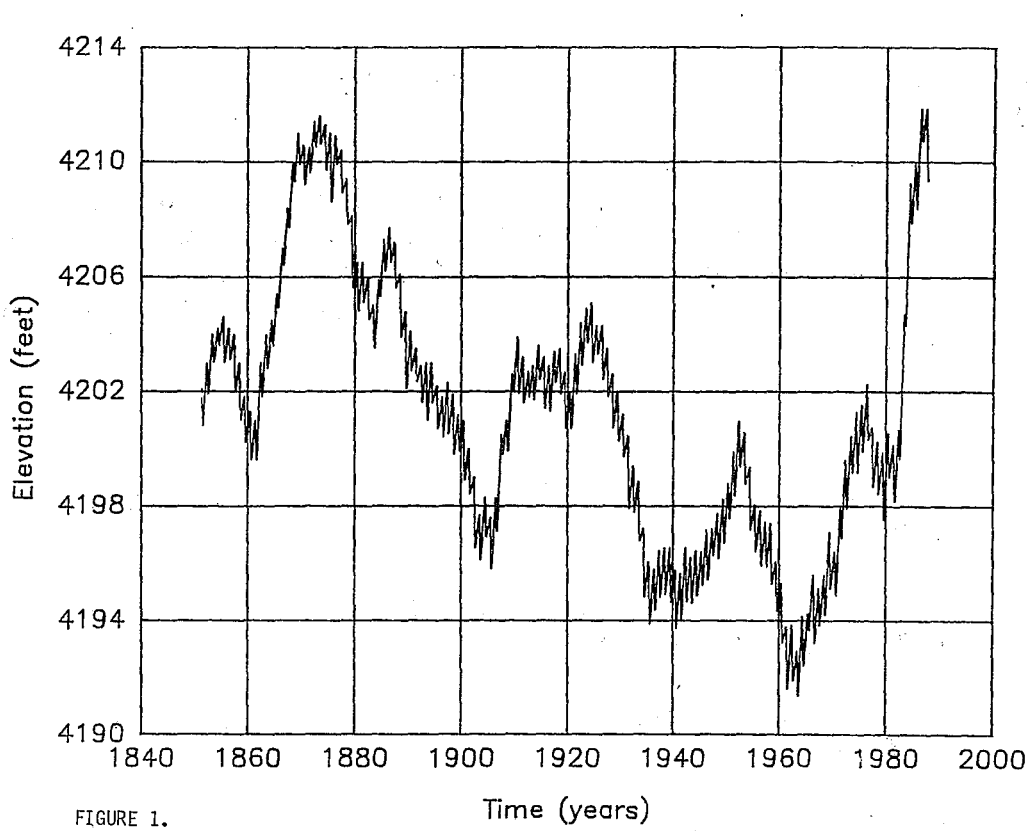

FIGURE 1.

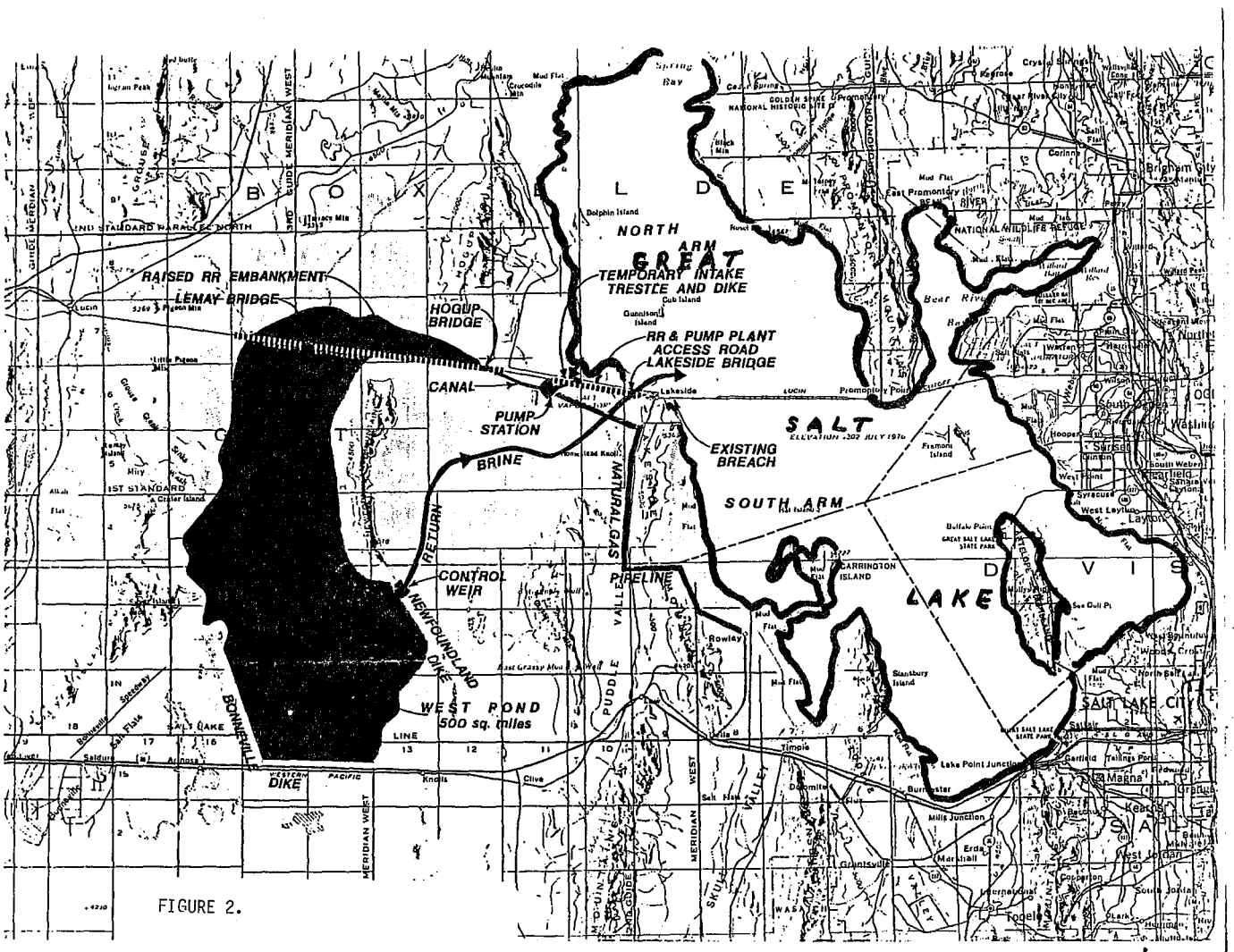

FIGURE 2.

FIGURE 3. Landsat
Visible Satellite Picture
from May 24, 1987.

FIGURE 4. Landsat
Visible Satellite Picture
from September 29, 1987.

FIGURE 5. Landsat
Visible Satellite Picture
from December 18, 1987.

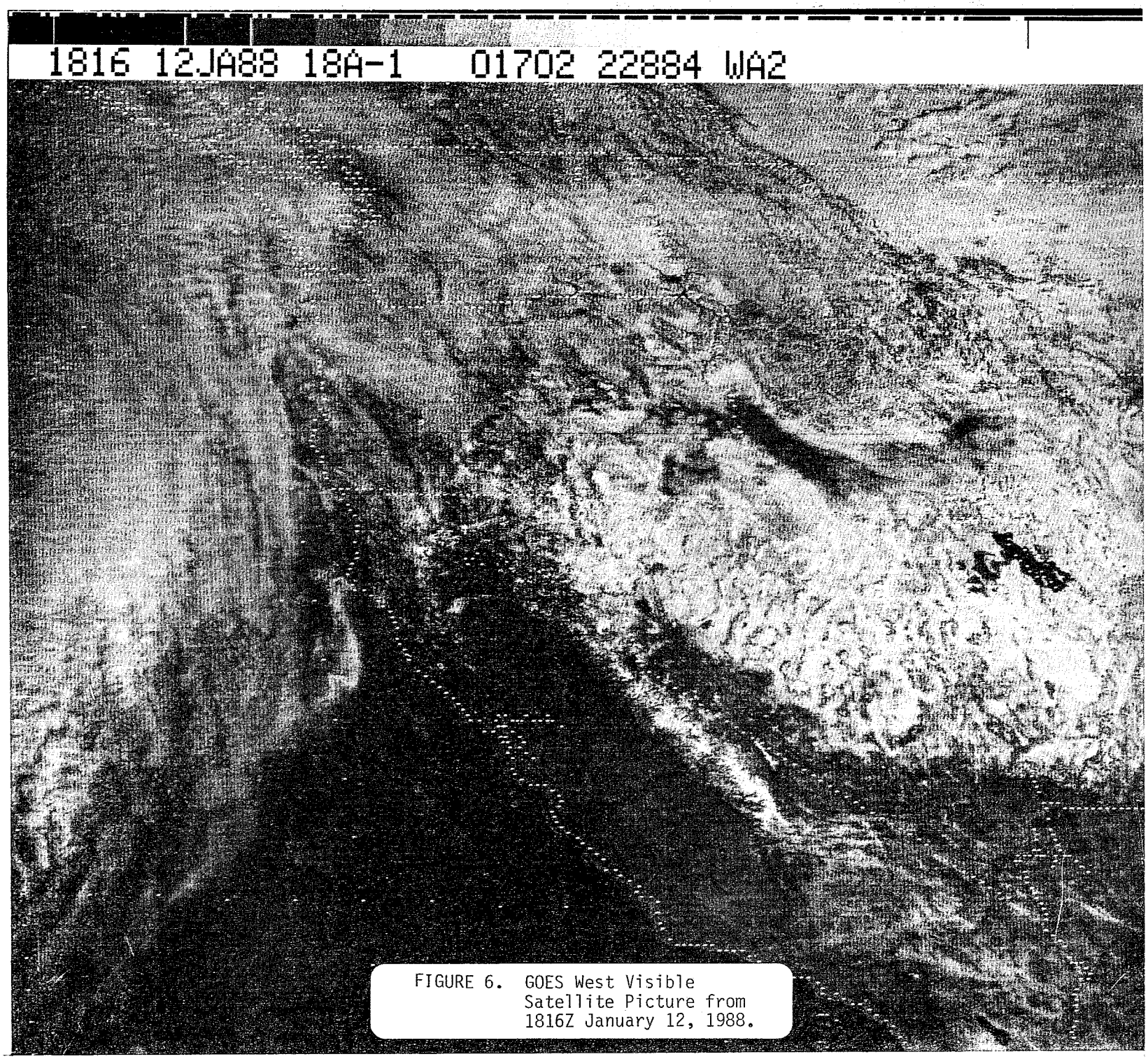

FIGURE 6. GOES West Visible Satellite Picture from 1816Z January 12, 1988.