CE Obsidian Energy LLC
A Limited Liability Company

Geothermal Resources for Salton Sea Unit 6 Power Plant Development
April 2002

Imperial County is situated in the Salton Trough, a 3,100-square mile structural depression that extends from the Transverse Range on the north and the Gulf of California on the south. The Peninsular Range forms the western boundary, and the Colorado River forms the eastern boundary. The Salton Trough is an active rift valley where sedimentation and natural tectonic subsidence are nearly in equilibrium. The California Division of Mines and Geology recognizes the Salton Trough as an area underlain at shallow depths by thermal water of sufficient temperature for direct heat application. Separate anomalies are distributed throughout the Salton Trough, with hotter fluids suitable for electric generation. *See* Imperial County General Plan, Geothermal/Transmission Element, pp. 4-5.

The Salton Sea field has been known to have significant reserves since oil and gas companies first discovered the field in 1958 during exploration. The Salton Sea Known Geothermal Resource Area (KGRA), as defined by the BLM, includes 161 square miles (102,887 acres). A "known geothermal resource area" is an area in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary of the Interior, engender a belief in those who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose. *See* 30 U.S.C. 1001.

The Salton Sea is a known geothermal resource area as defined by the United States Geological Service. The United States Geological Survey has designated nine KGRAs in Imperial County, including the Salton Sea. *See* Imperial County General Plan, Geothermal/Transmission Element, p. 5. The California Division of Oil, Gas and Geothermal Resources has also designated the Salton Sea as a geothermal field. *Id.* at 7.

Development of the resource was slow in the 1960's and 1970's due to the technical challenges associated with processing of the unusually aggressive hyper-saline brine. Unocal Geothermal, Magma Power Company and various governmental agencies overcame these challenges. Commercial operation of the Salton Sea field began in 1982 at Unocal's Unit 1 power plant and in 1986 at Magma's Vulcan plant. Since then, four additional generating units have been added in the original Unocal development area, and four additional generating units in the original Magma area (*see* Table 1 below). Both of the original development areas and all plants in the field are now operated by CalEnergy and are managed as a single business unit.

Table 1- Salton Sea Development History

Plant	[Net MW]	Start-Up Date
Unit 1	10.0	1982
Vulcan	34.0	1986
Del Ranch (Hoch)	38.0	1989
Elmore	38.0	1989
Unit 3	49.8	1989
Leathers	38.0	1990
Unit 2	20.0	1990
Unit 4	39.6	1996
Unit 5	49.0	2000
Turbo Expander	10.0	2000
Total Existing	326.4	

Only 4,808 acres of the 102,887 acres of the Salton Sea KGRA are currently developed, and that acreage supports the generation of approximately 350 gross (326.4 net) MW. The proposed Salton Sea Unit 6 (SSU6) Power Plant Project will add 3,180 resource acres to development, and will support nearly 200 gross MW of additional electric power generation.

Figure 1 below shows that reservoir temperatures increase to the northwest of the developed field. The SSU6 Project will be developed to the northwest of the current line of development through the field, and should have a hotter than average resource quality. A large part of the Salton Sea geothermal field lies under the waters of the Salton Sea. In fact, the hottest part of the resource is located under the sea. The SSU6 Project would develop the remaining acreage on the shallower western end of the field that is still on land, between the developed part of the field and the hotter part of the field under the sea. However, the inaccessible acreage that is offshore does provide pressure support to the field and additional longevity to the developed part of the field. Without the SSU6 Project, the Salton Sea field would be substantially under-developed.

Figure 2 below shows that the SSU6 Project area is flanked to the southwest by current production from Units 1-5, to the southeast and east by production from the Vulcan and Hoch power plants, and to the northeast from the Elmore power plant. To the northwest, the SSU6 Project area is flanked by the exploration test well IID-8. Successful testing of IID-8 established proven reserves in the field out to the tip of Obsidian Butte. The current production area of Units 1-5 and Vulcan/Hoch define the southern and southeastern boundaries. However, no such limit is apparent northwest and north of the proposed site. The hottest well in the field, IID-14, is drilled north/northwest of the proposed site on Red Island. The Obsidian Butte area developed for the SSU6 Project contains proven reserves. The temperatures are hotter in the direction of development, and the development area is surrounded by production or successful test wells.

CE Obsidian Energy LLC classifies the Salton Sea field as having proven reserves of 680 MW, comprised of 350 MW that are currently proven and producing, and 330 MW that are proven but undeveloped. The SSU6 Project will use only 200 MW of the proven undeveloped reserves. CE Obsidian Energy LLC believes that the Salton Sea field has probable reserves of 1,200 MW, and possible reserves of 2,300 MW. GeothermEx, Inc. (GeothermEx) has performed third-party

reservoir engineering evaluations of the field, and concluded that 1,200 MW of reserves are available within the portion of the Salton Sea field dedicated to the SSU6 Project. The Imperial County General Plan, Geothermal/Transmission Element, identifies the Salton Sea as a KGRA with an estimated capacity of 1,400 MW.

Figure 3 below is a graphical representation of the reserve potential of the field as estimated by Jeff Hulen of The Energy and Geoscience Institute at the University of Utah (EGI), in a recent proposal from the EGI to the U.S. Department of Energy for further study of high-temperature hydrothermal systems in the Salton Trough.

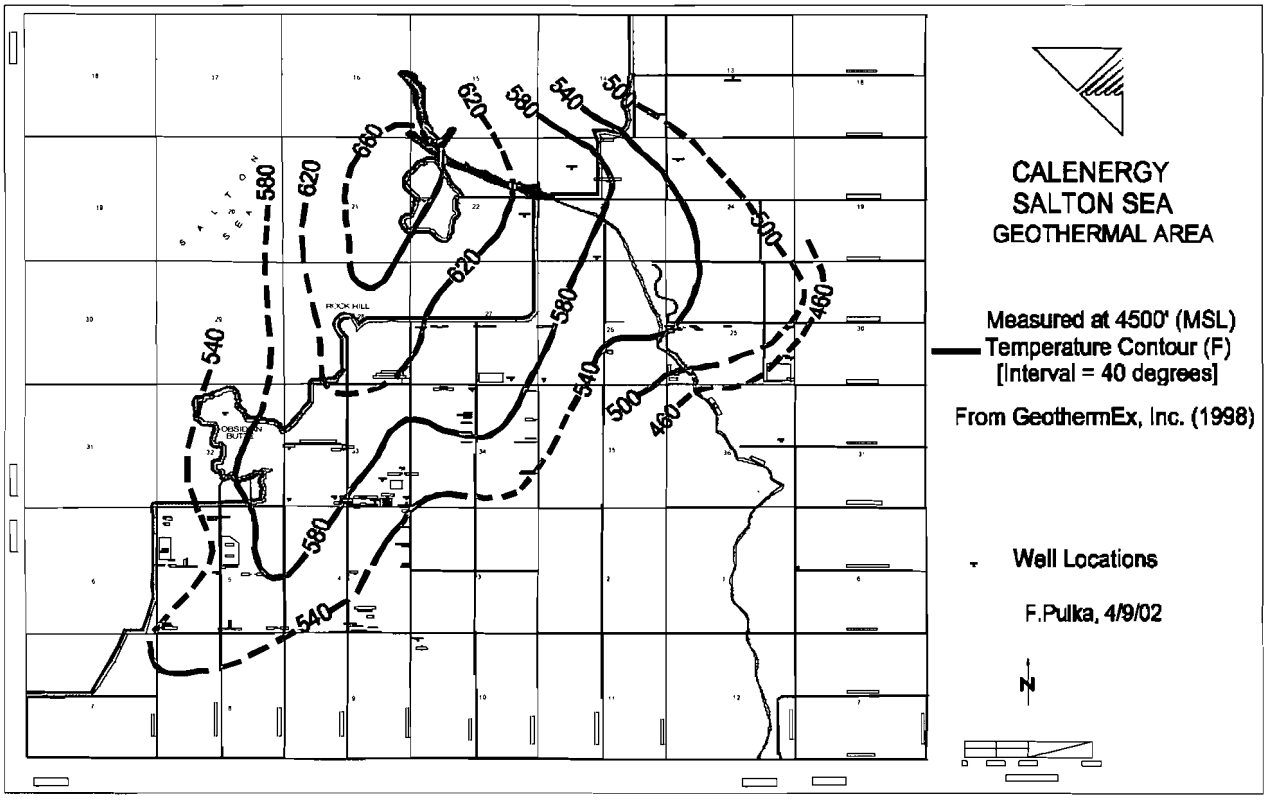

Figure 1: Temperature contours at 4000-foot depth under initial conditions (area of shallow heat anomaly shaded).

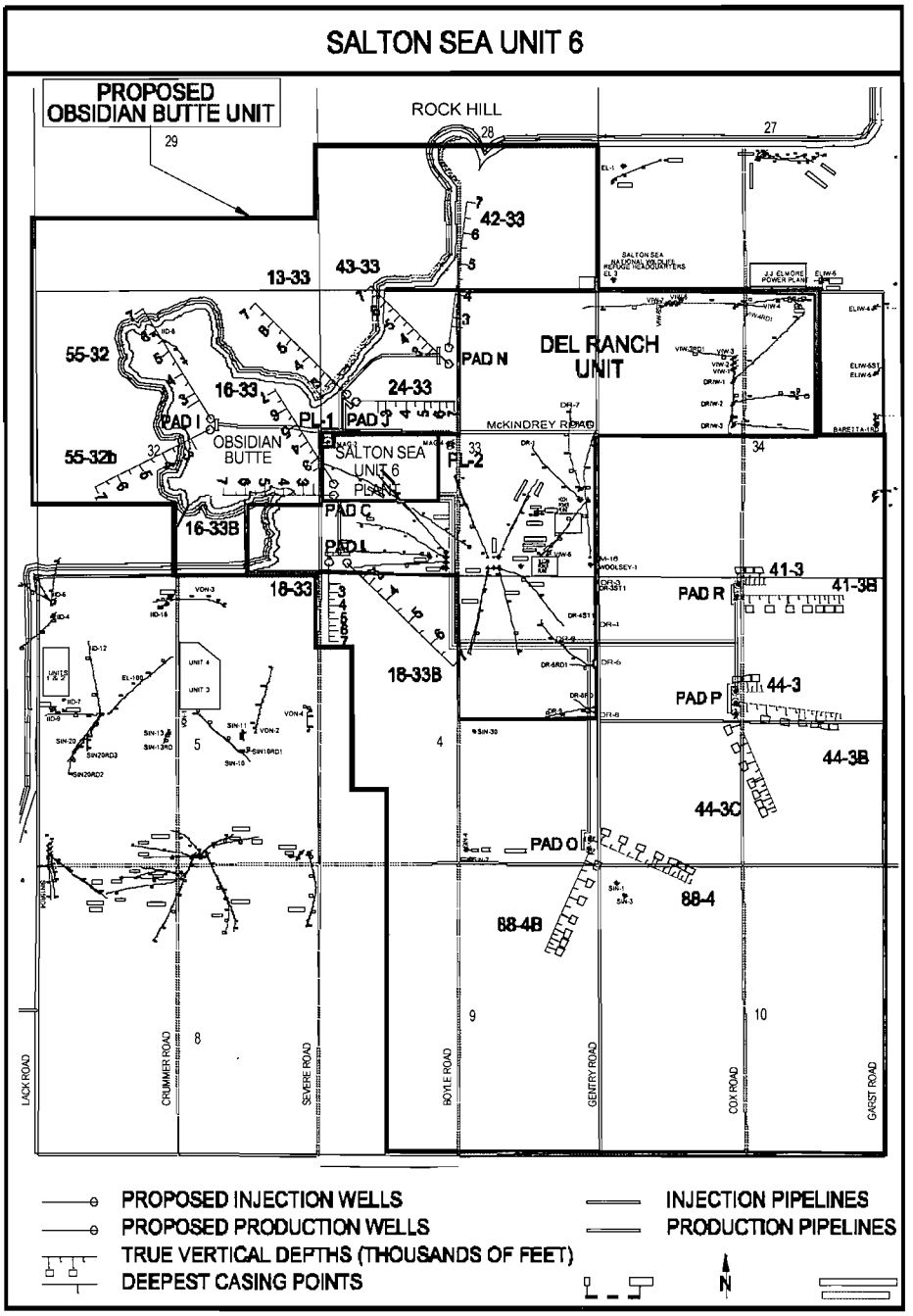

Figure 2: Proposed Unit 6 Wellfield Layout

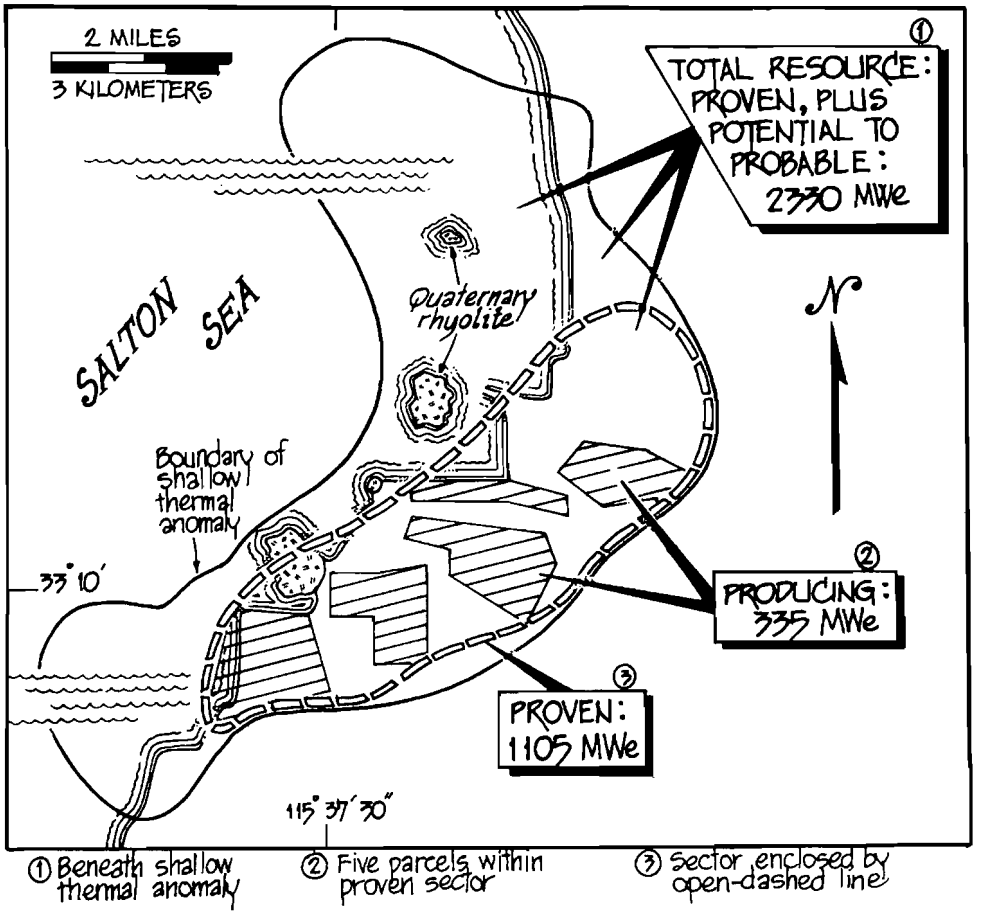

Figure . Resource assessment of the Salton Sea geothermal field. One MWe is considered to satisfy the electric-power needs of 1000 households, or about 4000 people. By this measure, 2325 MWe could support the electric-power needs of 9,300,000 people.

Figure 3: Source: Energy and Geoscience Institute, January 2002.