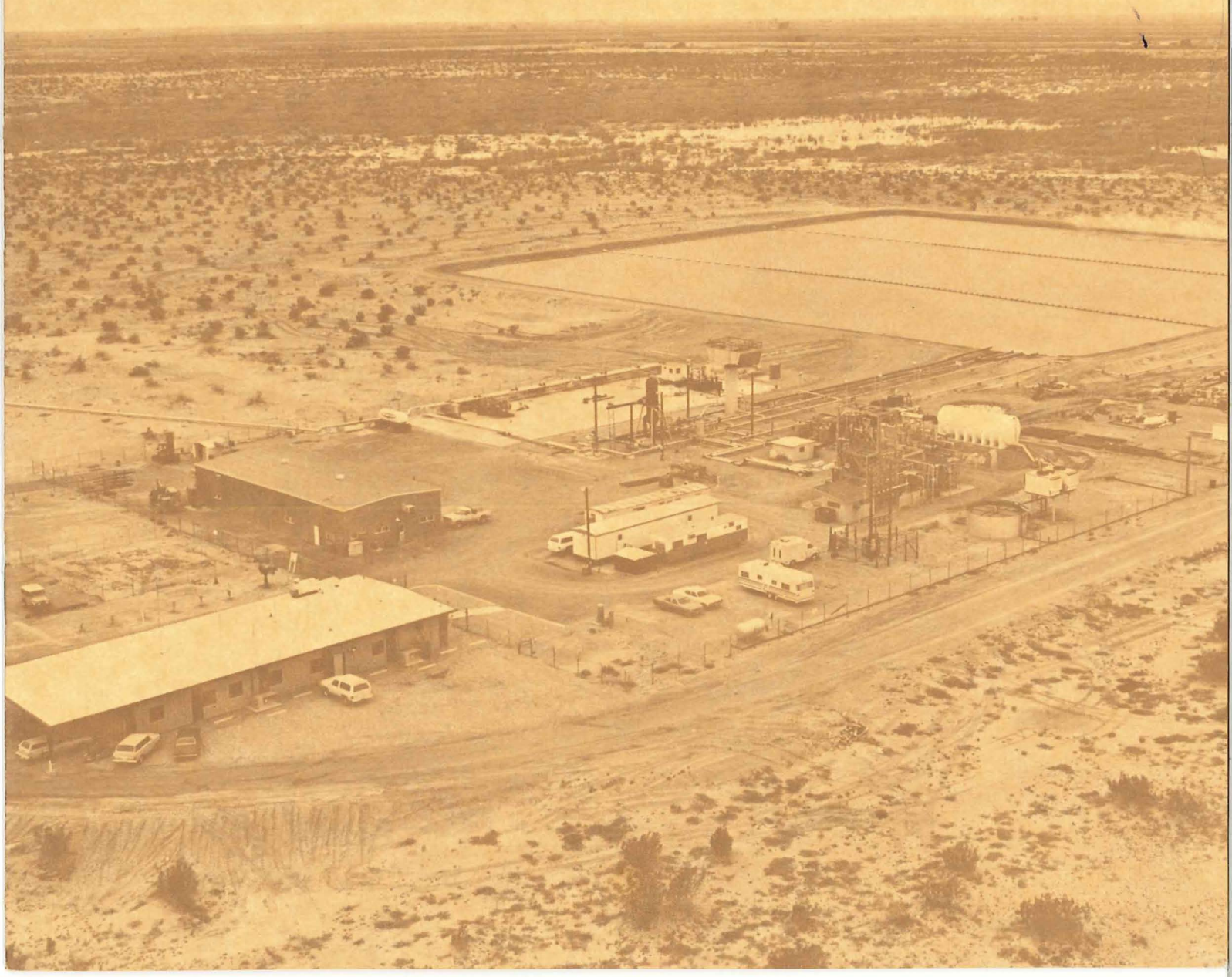
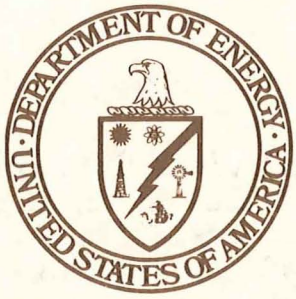
GL03061

U.S. DEPARTMENT OF ENERGY

GEOTHERMAL COMPONENT TEST FACILITY

EAST MESA, CALIFORNIA





UNITED STATES
DEPARTMENT OF ENERGY

GEOTHERMAL COMPONENT TEST FACILITY

A GEOTHERMAL ENERGY PROJECT OF
THE U.S. DEPARTMENT OF ENERGY
IN COOPERATION WITH
THE U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

OPERATED BY

WESTEC Services, Inc.

San Diego, Brawley, Tustin

GEOTHERMAL TEST WELLS, EAST MESA TEST SITE

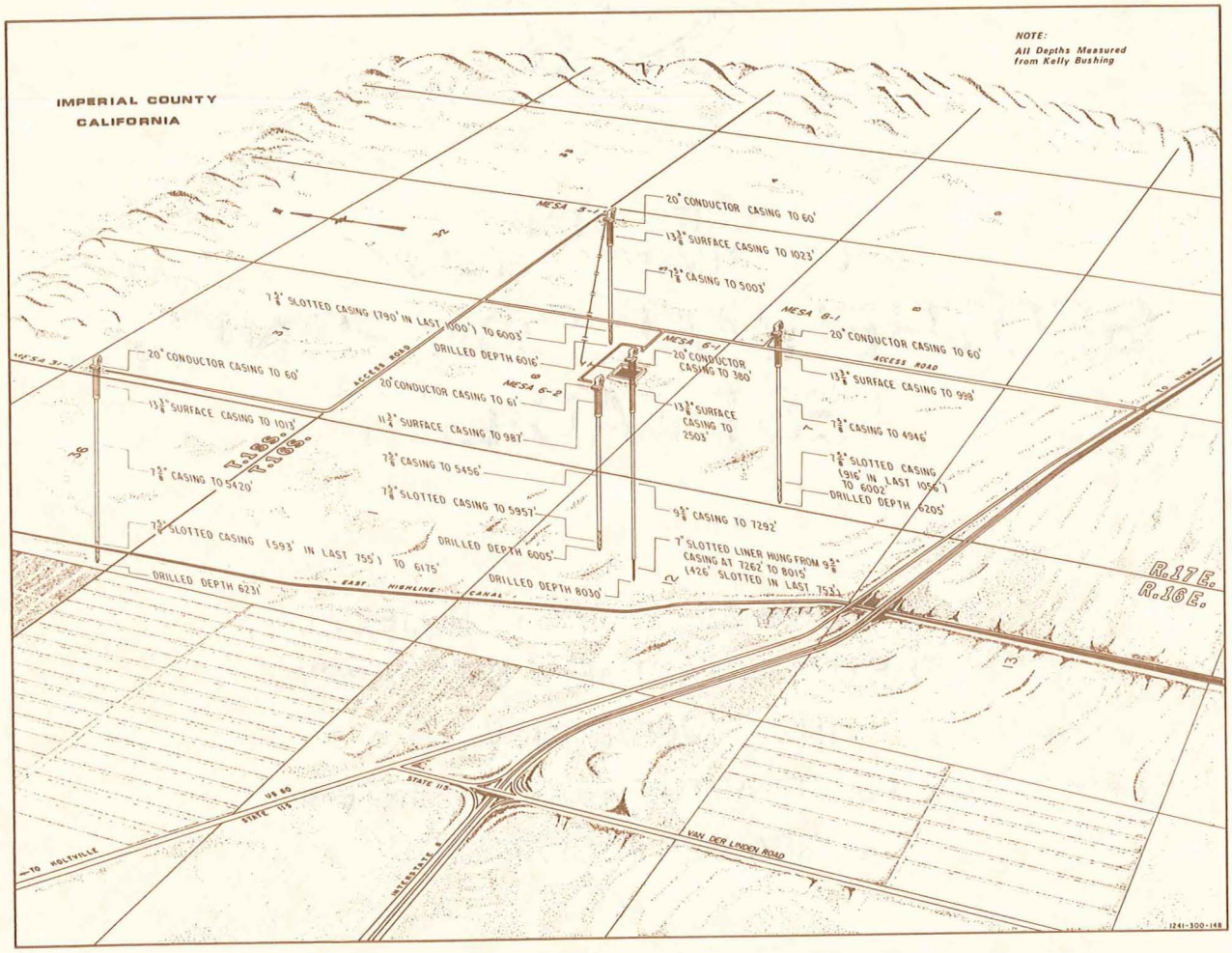


Figure 1. Phantom View of East Mesa Test Wells
(Courtesy of Bureau of Reclamation)

INTRODUCTION

The U.S. Department of Energy Geothermal Component Test Facility (GCTF) has been established by DOE to assist in the rapid commercialization of the geothermal energy potential by providing geothermal fluid and supporting services for tests of heat extraction and energy conversion equipment and materials. The Facility also actively promotes the exchange of reliable information among investigators within the energy community, and with the general public.

The Facility is located in the East Mesa area of California's Imperial Valley, 10 miles east of Holtville, California. It is managed for the U.S. Department of Energy by WESTEC Services, Inc., San Diego, California, and operated by WESTEC Services, Inc. in cooperation with the Bureau of Reclamation, U.S. Department of the Interior. The Bureau of Reclamation operates, on the same site, a continuing geothermal investigations program. Three geothermal fluid wells (Mesa 6-1, Mesa 6-2 and Mesa 8-1) have been piped to the test pad to provide experimenters with a range of chemical characteristics for flexibility in testing. Mesa 5-1 is used for reinjection. The wells, shown in Figure 1, are operated and maintained by the Bureau of Reclamation as part of their reservoir investigations.

Below is a partial list of companies or institutions who have used or plan to use the GCTF at East Mesa:

- Aerojet Energy Conversion Company
- Allied Chemical Corporation
- Austral-Erwin Engineering Company
- Barber-Nichols Engineering
- Battelle Memorial Institute, Pacific Northwest Laboratories
- Brookhaven National Laboratory
- DSS Engineers, Inc.
- General Ener-Tech, Inc.
- Horst Power Systems, Inc.
- Jet Propulsion Lab, California Institute of Technology
- Oak Ridge National Laboratory
- Occidental Research Corporation
- University of Utah, Department of Mechanical and Industrial Engineering

LOCATION

The East Mesa GCTF is located about 20 miles east of El Centro, about 140 miles east of San Diego, and 10 miles north of the Mexican border in the Imperial Valley of California. Its location is pinpointed in Figure 2.

The Imperial Valley is supported mainly by agriculture with some heavy industry. The weather of the area is typified by hot summers and pleasant winters. Average annual rainfall is about 3.5 inches. About half the rain usually precipitates in high intensity summer showers and about half in gentle winter rains.

A four lane freeway, Interstate 8, traverses Imperial Valley from San Diego to Yuma, Arizona. It runs adjacent to El Centro and about 2 miles from the GCTF. To the north, State Highway 111 connects El Centro to Indio and Palm Springs. The Van Der Linden Road exit from Interstate 8 provides access to Evan Hewes Road which parallels the freeway on the north side. East of Van Der Linden Road on Evan Hewes Road is the Test Facility sign located by the access road to the Facility; the Facility is located 1.7 miles north of this sign. All roads to the Facility are paved. The GCTF is also accessible by regularly scheduled airline flights to the airport in El Centro where rental cars are available. Transportation is not ordinarily provided by the GCTF.

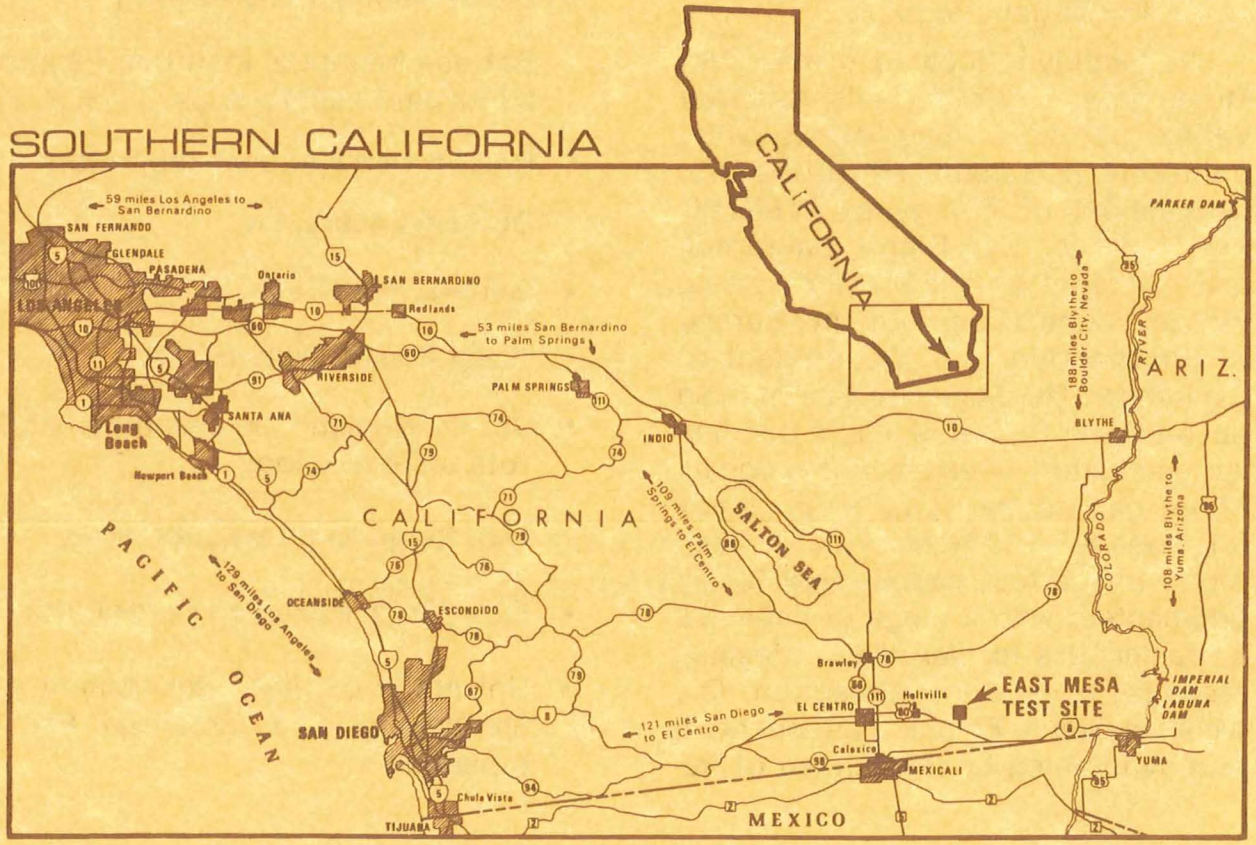


Figure 2. The Geothermal Component Test Facility is located at the Bureau of Reclamation, East Mesa Test Site.

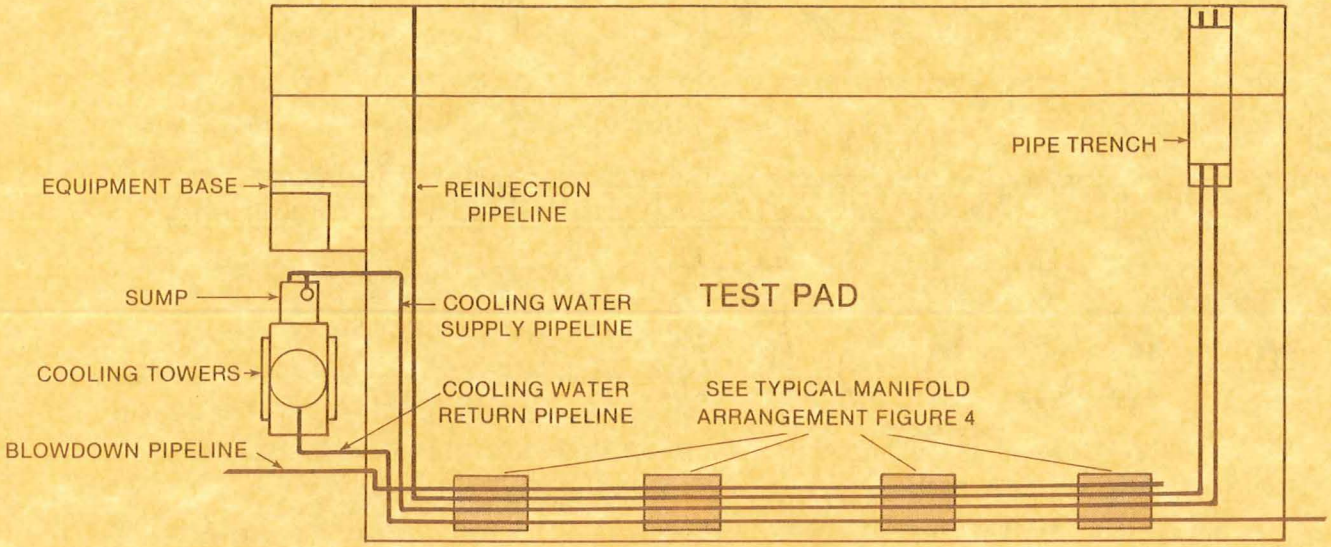
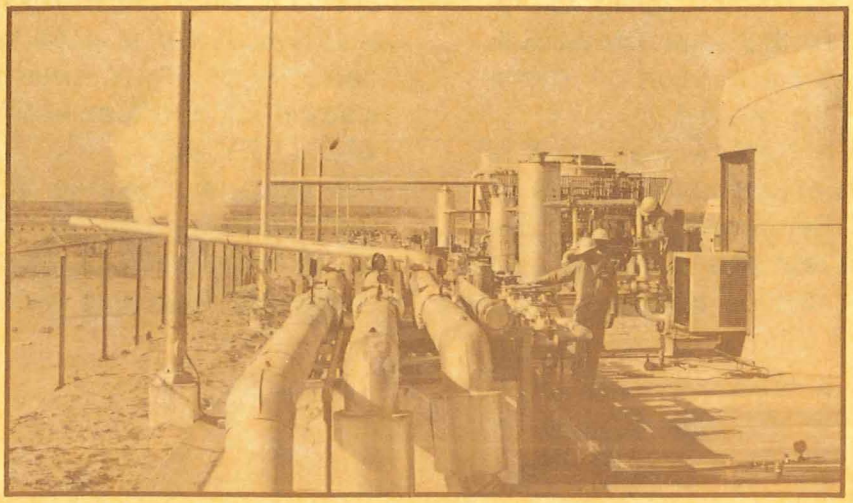


Figure 3. Test Pad Plot Plan

DESCRIPTION OF TEST FACILITY

Test Pad

The usable space on the concrete pad designed for the placement of test equipment is about 80 feet by 160 feet, with a 15 foot wide access strip adjacent to the pad. There are four manifold arrangements for use by investigators, as shown in Figure 3. The number of experiments which could be in progress concurrently is limited only by the physical size of the equipment and the amounts of geothermal fluid, cooling water and electrical power required by each experiment. The manifold arrangement shown in Figure 4 is typical of the four stations on the test pad. As shown, the manifold consists of 9 valves: fluid supplies from each of the three wells, reinjection, blowdown, cooling water supply and return, compressed air and industrial water.



EXPERIMENTAL STATION MANIFOLD CONNECTIONS

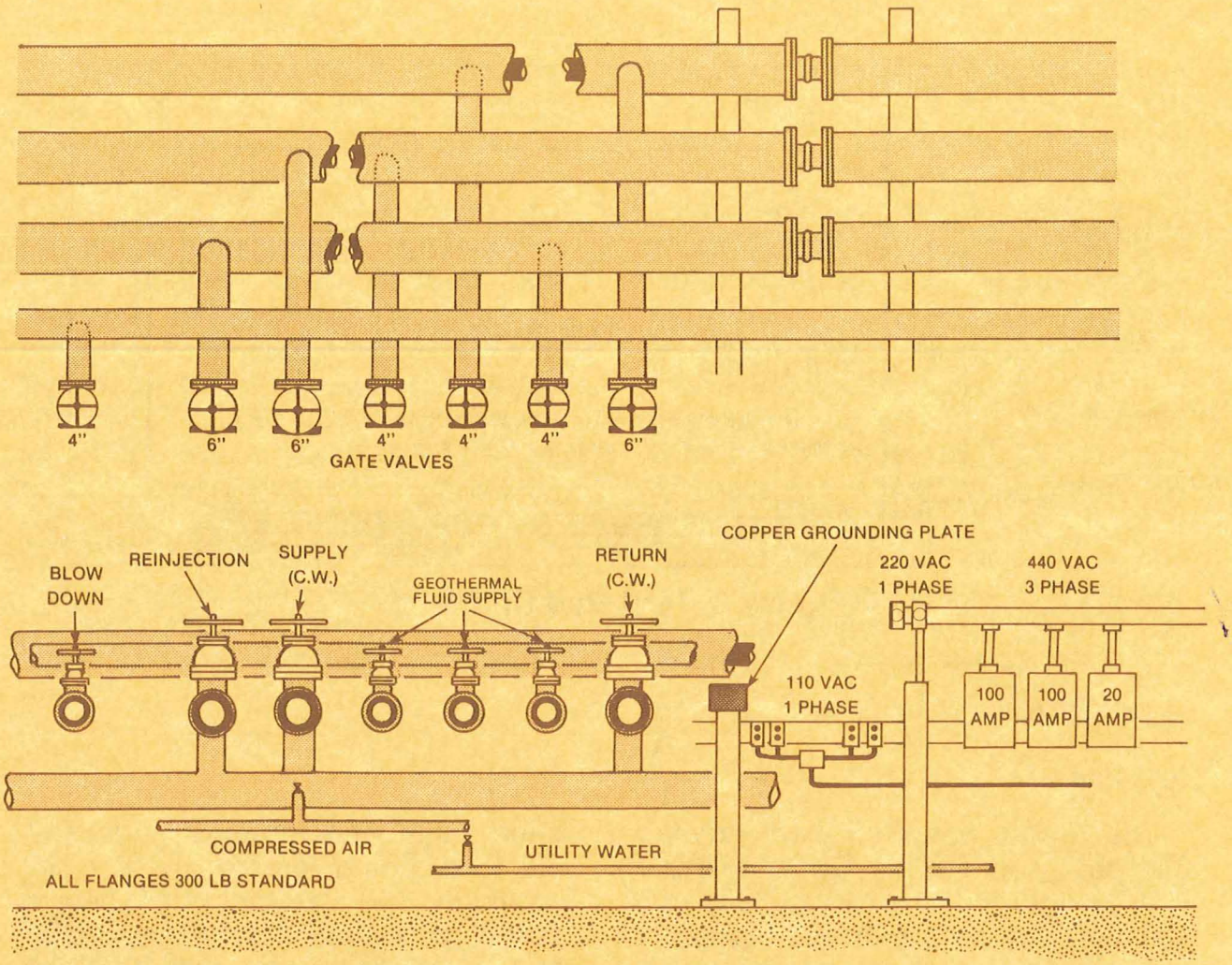


Figure 4. Test Pad Manifold (Typical)

Geothermal Fluid

As previously stated, the geothermal fluid is available from three wells: Mesa 6-1, Mesa 6-2 and Mesa 8-1. The basic data from each of these wells is shown in Table 1.

Reinjection of geothermal fluids is handled on an experimental basis by the Bureau of Reclamation. Fluid disposal from the test pad is to a holding pond adjacent to the Facility.

Cooling

Cooling water is available from a cooling tower located adjacent to the test pad. It has a rated heat rejection capacity of 5 MW (thermal) with provisions for future expansion to 10 MW when needed. A total flow of about 700 gpm is available at a maximum temperature of 90°F. Lower cooling water temperatures may be expected during nighttime and winter operations.

Instrument Air and Utility Water

Instrument air is available at 100 psig and a total flow of 50 scfm. Utility water is available for cleaning the test pad area and equipment. Since the water is not potable, bottled water is provided for drinking.

Electrical Service

The power supply to the Facility has a total capacity of 430 kVA via transmission lines from the local utility. The following services are available at each of the four test manifolds, as shown in Figure 4:

- 440 volts AC, three-phase, two 100 amp switches and one 20 amp switch.
- 220 volts AC, single-phase, two 20 amp receptacles (up to 100 amps available).
- 110 volts AC, single-phase, eight 20 amp receptacles.

Other configurations and receptacle adaptations can be made by onsite personnel.

Table 1

EAST MESA PRODUCTION WELL DATA					
Well	100% Liquid Flow (Not Pumped)				TDS (June, 76) mg/L
	Temp.		Press. psig	Flow gal/min	
	°F	°C			
Mesa 6-1	331	166	95	90	26,300
Mesa 6-2	338	170	145	85	5,000
Mesa 8-1	306	152	100	45	1,600
[1]Mesa 5-1	315	157			2,390
[2]Mesa 31-1	309	154			2,900

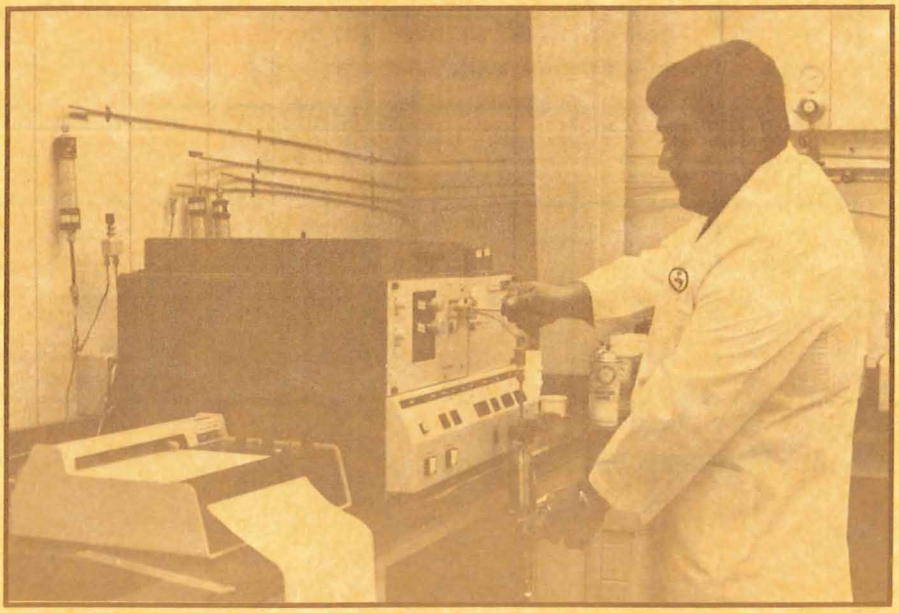
1 — Reinjection Well
2 — Well not currently used for production purposes.

SUPPORTIVE SERVICES

The GCTF is managed, operated and maintained by WESTEC Services, Inc. The Facility is operated 24 hours per day every day of the year to enable experimenters to perform endurance runs on equipment. Onsite personnel will make the appropriate connections to all test equipment to the test pad manifold. The GCTF has equipment to offload and locate the experimenters' equipment on the test pad. If the test equipment is of sufficient size that onsite equipment is unable to handle it, heavier equipment is available from a local independent crane rental firm.

While the experimenter's test system should not require construction other than the connection of components to pad services, onsite craftsmen have the experience and capability to assist in trouble-shooting as well as to make minor modifications to the experimenters' equipment. Onsite maintenance craftsmen have extensive experience in each of their respective fields. Maintenance facilities include a complete machine shop, electrical support equipment, a storehouse for hardware and supplies, and an extensive tool crib. The machine shop has lathes, a milling machine, power saw, radial drill press, automatic pipe threader, welding equipment, and other miscellaneous items. Tools are available for loan to visitors on an individual basis. Private industry and comprehensive agricultural interests in the surrounding community support a variety of services and suppliers which have proven helpful to experimenters.

The experimenters are solely responsible for the operation, maintenance and performance of tests on their respective equipment. However, the onsite personnel are responsible for the supply of fluid, cooling water, electricity, compressed air and utility water, and are available to gather data in the absence of the investigators.



OTHER FACILITIES AVAILABLE

GCTF visitors have access to a limited amount of air conditioned office space with telephones in a mobile office close to the test pad.

A chemical laboratory is located at the GCTF. In addition to the standard laboratory array, it is equipped with the following:

- Atomic absorption spectrophotometer equipped for flame work with air-acetylene and nitrous oxide-acetylene.
- Principal metal analysis with HGA furnace capability for various trace metal analysis.
- Gas chromatograph equipped with hot wire detector for non-condensable gases, i.e., CO_2, air, etc. Equipped also with flame ionization detector capability for various hydrocarbon and trace hydrocarbon analyses, e.g., isobutane.
- Scanning ultraviolet/visible dual beam spectrophotometer for various cation and anion determinations.

All chemical laboratory analyses are performed or supervised by the Facility staff chemist.

The GCTF is a Government installation situated in an area regulated by the Department of the Interior with all the security such a designation provides. Space is available for temporary storage of test equipment before or after use or during extended shutdowns.

Perimeter lighting is provided for the running of experiments beyond daylight hours.

Bottled drinking water is provided by the GCTF. The GCTF also furnishes a dumpster for rubbish disposal by the Facility as well as its guests.

The United Parcel Service (UPS) will deliver packages to the GCTF as a part of its regular service. Another service available is the delivery of bottled gases. However, one week is usually required for the arrival of bottled gases from the Liquid Air Company in Yuma, Arizona. Most other services are available locally.

COSTS

There is normally no cost to the user of the Facility; however, if an experimenter requires manpower to operate or maintain/service his equipment, then man hour and materials charges will be made to the experimenter.

GENERAL

A GCTF representative is available to visit the prospective experimenter's location. The purpose of such a visit would be for an examination of test equipment for compatibility with the GCTF, and the provison of any additional data and information a prospective experimenter may require. The experimental equipment must meet current OSHA standards.

WHOM TO CONTACT

Parties interested in more technical information about the East Mesa GCTF or about how to arrange for use of the Facility may write or call K.L. Newman, GCTF Engineer, WESTEC Services, Inc., 3211 Fifth Street, San Diego, California 92103; Telephone (714) 294-9770.

Formal requests for use of the GCTF should be made to A.J. Adduci, U.S. Department of Energy, San Francisco Operations Office, 1333 Broadway, Oakland, California 94612; Telephone (415) 273-7943, using the format of the attached application.

U.S. DEPARTMENT OF ENERGY
EAST MESA GEOTHERMAL COMPONENT TEST FACILITY
Holtville, California 92250

TEST APPLICATION

GCTF Test No: _____

Organization: Contact:
Address: Phone:

Test Name:

Description of Test:

Technology Under Study:

Test Objective:

Equipment Type, Generic:
Specific:

Resources Required:

1. Elect. Power:
   110V, 1ph_____ amps; _____KW
   220V, 1ph_____ amps; _____KW
   440V, 3ph_____ amps; _____KW
2. Cooling Water:
   Press. _____psig
   Flow _____GPM
   Temp. Rise _____ΔT,°F
3. Geothermal Fluid:
   Flow _____GPM
   Desired Temp. _____°F
   Inlet Press. _____psig
   Specific Well _____
4. Instrument Air Flow: _____SCFM; _____ psig

Schedule (Best Estimate):

1. Arrival Date: _____
2. Test Start Date: _____
3. Test Completion Date: _____
4. Equipment Removal Date: _____

Equipment Size/Weight:

Special Hazards:

Support Equipment Required:

Signed: _____ Date _____
Principal Investigator