SAN/RA 50239-SDG&E-0006

HEBER GEOTHERMAL BINARY DEMONSTRATION PROJECT

QUARTERLY TECHNICAL PROGRESS REPORT FOR THE PERIOD JULY 1, 1981 – SEPTEMBER 30, 1981

San Diego Gas & Electric
Post Office Box 1831
San Diego, California 92112

Prepared for
The Department of Energy
Under Cooperative Agreement No. DE-FC03-80RA50239

DISCLAIMER

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ABSTRACT

The purpose of this quarterly technical progress report is to document work completed on the nominal 65 Megawatt (Mwe gross) Heber Geothermal Binary Demonstration Project, located at Heber, California, during the period of July 1, 1981, through September 30, 1981. The work was performed by San Diego Gas & Electric Company under the support and cooperation of the U. S. Department of Energy, the Electric Power Research Institute, the Imperial Irrigation District, the California Department of Water Resources, and the Southern California Edison Company. Topics covered in this quarterly report include progress made in the areas of Wells and Fluid Production and Injection Systems, Power Plant Design and Construction, Power Plant Demonstration, and Data Acquisition and Dissemination.

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SUMMARY

Recognizing the desirability of demonstrating the operation of the binary cycle process for commercial-scale electric production, San Diego Gas & Electric (SDG&E), the United States Department of Energy (DOE), the Electric Power Research Institute (EPRI), the California Department of Water Resources (DWR), the Imperial Irrigation District (IID), and the Southern California Edison Company (SCE) joined together to carry out the Heber Geothermal Binary Demonstration Project.

The purpose of the Heber Binary Project is to design, construct, and operate a nominal 65 MWe (gross) commercial-scale, binary cycle power plant to demonstrate the technical and economic feasibility of geothermal power generation. The Project will be the first commercial-scale hydrothermal generating facility in the United States utilizing liquid-dominated resources and the binary energy conversion process. It is expected that information developed by this demonstration project will be applicable to a wide range of moderate-temperature, low-salinity hydrothermal reservoirs. Geothermal generation from the Project offers the possibility of displacing 525,000 barrels of oil per year that would otherwise have to be burned in Southern California. Figure 1 shows an artist's rendering of the Project and Figure 2 shows the location.

This report describes the Project's progress for the period of July 1, 1981, through September 30, 1981.

Union Oil Company met with SDG&E several times during September. The pace of the heat sales contract negotiations improved and several major issues were resolved. Union is willing to work with DOE on a separate contract for reservoir data.

Imperial County officials continued to cooperate with SDG&E by extending the Conditional Use Permit (CUP) at Heber. Environmental monitoring equipment now exists on eight groundwater level monitoring wells and on the New River Channel.

The results of the alternate cooling water supply evaluation suggest that the New River be chosen as the source of make-up cooling water to replace the initial Colorado River supply after five years.

Work progressed on the Brine, Hydrocarbon, and Cooling Water System P&ID's. Consideration was given to substantially lowering the turbine generator pedestal height.

Availability studies by the consulting firm of Pickard, Lowe & Garrick are nearing completion. As an additional task, however, PL&G was asked to perform an analysis of a digital control system versus a standard analog control system as they relate to the Project.

With regard to procurement, the revised turbine generator bid package met SDG&E approval and was released for bid.

Dravo Utility Constructors, Inc. (DUCI) was the successful bidder for the Construction Manager contract.

At a joint conference of the House of Representatives and Senate in July, the final authorized amount of $7 million was approved for the Project. Also, the State of Califoria has agreed to contribute $2 million to the Project and share 4.3 percent of the ownership interest.

The final draft of the Health and Safety Management Plan, prepared by SDG&E, was submitted to DOE for approval. After the incorporation of DOE's comments, it is anticipated that the Plan will be released the first week of October.

Substantial progress was made in developing the Data Acquisition System for the Project. Committee work by SDG&E, DOE, EPRI, and Fluor during this quarter has resulted in a nearly complete product.

INTRODUCTION

The scope of the Heber Binary Project is to design, construct, and operate a commercial-size, binary cycle geothermal power plant at the Heber reservoir for a two-year demonstration period. The goal of the Project is to demonstrate the technical and economic feasibility, as well as the environmental acceptability, of geothermal power generation using the binary process. Our work plan for the Project consists of four major tasks, or Work Breakdown Structure (WBS) elements (see Figure 3), that are described below:

WBS 1.1 - WELLS AND FLUID PRODUCTION AND INJECTION SYSTEMS

Primary responsibility for this task has been assigned to the heat supplier. The task consists of well drilling, the construction of surface facilities for geothermal fluid production and injection, including the brine return pipeline, and operation of the field facilities to support plant operation.

WBS 1.2 - POWER PLANT DESIGN AND CONSTRUCTION

This task consists of the work by SDG&E, the architect/engineer, and the construction manager to manage the design, procurement, construction, and start-up of the power plant systems and the associated switchyard and distribution system. The task includes obtaining necessary permits, associated monitoring, design, procurement, construction, start-up, and project management activities.

WBS 1.3 - POWER PLANT DEMONSTRATION

This task consists of the work by SDG&E to operate the power plant for a two-year period to achieve the basic objectives of the Project. The task includes services, repairs, facilities, overhaul, cleaning, consumables, testing, spare parts, and the tools necessary to operate the plant in a safe and reliable manner.

WBS 1.4 - DATA ACQUISITION AND DISSEMINATION

This task consists of the work by SDG&E in gathering, reducing, evaluating, and reporting on reservoir and plant performance data.

The WBS will serve several functions. It divides the work into discrete and manageable work packages which, taken in the aggregate, will constitute Project implementation. To some extent, it will dictate organizational lines, and will be an important management tool. It provides a method of accounting for all work that must be performed, and is the basis for manpower loading and scheduling. In addition, it will be used for cost and schedule control and progress audit.

The following describes each subtask objective and status to date.

WBS 1.1
WELLS AND FLUID PRODUCTION AND INJECTION SYSTEMS

WBS 1.1.1 - DESIGN AND CONSTRUCTION

OBJECTIVE:

This WBS element will be performed and funded entirely by the heat supplier. It will include work to design, build, and test production and injection systems necessary to deliver fluid from the reservoir to the power plant and, after use, return the fluid into the reservoir.

STATUS:

Priority projects in Japan and Indonesia have prevented Union from giving much attention to the heat sales contract. However, the pace of the heat sales contract negotiations picked up in September. The President of Union Geothermal Division met with two SDG&E Vice Presidents early in the month, a session which seems to have convinced Union that SDG&E is serious about this Project. Additional meetings between SDG&E and Union representatives were held on September 9 and 22. Between those meetings, a complete revised draft of the contract was prepared. Several major issues have been resolved.

Union was asked to construct, own, and operate the injection system. They agreed to this for the injection pipeline, but requested that SDG&E include the injection pumps in the plant. (SDG&E has agreed subject to a reasonable injection pressure specification.) SDG&E will not be charged for BTU's used to make electricity to run those pumps.

The reservoir data required by DOE will be acquired in a separate contract with SDG&E. Union is willing to work with DOE. Union will also work with DOE to develop and limit the DOE flowdown clauses for the heat sales contract.

WBS 1.2
POWER PLANT DESIGN AND CONSTRUCTION

WBS 1.2.1 - ENVIRONMENTAL STUDIES AND PERMITS

OBJECTIVE:

The objective of this WBS element is to obtain the necessary permits and provide environmental studies and monitoring to facilitate plant design and ensure compliance with government regulations for plant construction and operation.

STATUS:

MONITORING ACTIVITIES

Four additional groundwater level monitoring wells were installed at the Heber site. Monitoring has begun on these new wells and is continuing on the four existing wells. (The information obtained from these wells will be used by Fluor in the design of the settling ponds.)

The New River Channel was surveyed and mapped. A depth stick and two temperature monitors were installed. New River temperature and flow are now being monitored.

PERMIT ACTIVITIES

Imperial County Planning Director, Dick Mitchell, approved extension of the Project's Conditional Use Permit (CUP) at Heber with the proviso that in the future progress reports be made at six-month intervals to the Board of Supervisors. He also suggested that the first report be due in January 1982, with follow-up reports every six months.

A meeting was held in El Centro on September 9, 1981, with representatives of SDG&E, Fluor, the Imperial County Public Works Department, and the Imperial County Health Department regarding permits which will be required for construction of the power plant. A list of these permits is being compiled, along with a timeframe for their acquisition.

RIGHT OF WAY ACTIVITIES

It has been established that the poles located along the southern boundary of the Heber plant site are owned by IID and Pacific Telephone. IID advised that the road which parallels these poles is used by them for maintenance of the laterals along Willoughby Road and since the height of this road must be maintained for this purpose, it will not be possible to relocate the poles in question. However, neither company has any objection to the Project locating an access road within five feet of the base of the bank on which these poles are located.

In addition, a discussion was held on requirements for leaching field, pipe crossing, etc. During the meeting, Imperial County representatives requested SDG&E to widen the portion of Dogwood Road within the site property lines. However, it was later agreed that the improvement can be postponed until the remainder of the Dogwood Road is widened.

WBS 1.2.2 - POWER PLANT ENGINEERING, DESIGN, AND PROCUREMENT

OBJECTIVE:

The objective of this WBS element is to prepare engineering and design specifications and procure major equipment to build a nominal 65 Mw (gross) electrical geothermal power plant. Special studies also will be accomplished whenever required.

STATUS:

In this and subsequent quarterly reports, the work accomplished in this WBS section will be by discipline (rather than by system).

PROCESS/MECHANICAL ENGINEERING

The alternate cooling water supply evaluation was completed. The final recommendation is that the New River be chosen as the source of makeup water for the forced draft cooling tower system to replace the initial Colorado River supply after five years. As a result, Fluor will be authorized to conduct a study to determine what effects pretreatment of New River water will have on plant design and provide options for SDG&E's consideration.

SDG&E engineers met with Fluor to establish design approaches and criteria to achieve a lower turbine generator elevation. Consideration was given to condenser location, exhaust pipe stress, pressure loss, and liquid removal under start-up and shutdown transients.

A design review meeting was held on September 30, 1981, on the Hydrocarbon, Brine, and Cooling Water System preliminary P&ID's (Process & Instrumentation Diagrams) with Project participants and the DOE Review Panel at Fluor. The major items discussed were:

- The warm-up procedure for the brine side of the brine/hydrocarbon heat exchangers
- The definition of preliminary procedures for warm-up to hot standby on the brine/hydrocarbon heat exchangers
- Loading of the turbine from hot standby to full load
- Unloading of the turbine from full load to hot standby
- Controlled plant shutdown

Hydrocarbon System

Additional computer analysis was performed by Fluor to determine the rating of the hydrocarbon condensers. Comments resulting from the Fluor in-house independent engineering review and from SDG&E were included in

the specification. The results of Fluor's independent engineering review indicated the advisability of developing more refined hydrocarbon mixture property data and additional confirming computer analysis for rating the brine/hydrocarbon heat exchangers. With this additional analysis, the heat exchangers specification was "tightened" so that the suppliers will be requested to quote on the stated design. The specification was modified to reflect comments from the independent engineering review and SDG&E.

A reworking of the hydrocarbon condensate and booster pump specifications to follow API-610 format was started. Also, an evaluation to determine the best alternative for the booster pumps was continued. This included the number of pumps and also potential for reduced voltage starting.

The process system description for the hydrocarbon system was completed in August. The P&ID was revised to incorporate comments from the inter-discipline review. Also, control valve data sheets were started, and additional equipment data sheets were issued.

Brine System

A letter was prepared and issued to Fluor on the brine return system P&ID and process description. A design was developed to provide for a controlled warm-up of the large heat exchangers and brine return pumps, to avoid thermal shock. Provisions to properly vent air and purge gas from the hydrocarbon piping and equipment were also addressed, along with pump operation, process valves, and instrumentation.

Fluor's evaluation of the preferred alternate driver for the brine return pumps was completed. A variable frequency controller and synchronous motor was the evaluated choice. The brine return pump specification was subsequently reviewed by SDG&E and comments transmitted to Fluor. Recommendations concerned the pump testing specification, variable speed pump operation and speed control, materials, sealing and lubrication methods, and pump specification sheets.

Water Treatment and Distribution

Process data sheets for chemical addition packages were prepared. The line and flow summary was completed and the process system description was started. An SDG&E review of the study to re-evaluate the use of settling ponds versus water treatment equipment was held. A critique of the preliminary results indicated that the use of settling ponds was still the preferred approach; design will proceed with settling ponds.

Fuel Gas System

Work has been discontinued on this system. It does not appear fuel gas storage and distribution will be required. Electric heating will be utilized where required.

Plant Instrument and Air System

The air compressors and dryers specification was reviewed and a letter prepared. Recommendations covered lubrication methods, operational requirements, refrigerated air dryer preference over desiccant dryers, and service and capacity.

ELECTRICAL AND I&C ENGINEERING

Fluor issued the Electrical Design Criteria for review. Comments were provided at a meeting held between representatives of Fluor and SDG&E on July 29.

Fluor is continuing work on the preliminary one-line electrical diagram. It will be issued as soon as the sizes and types of large motors are firmly established.

IID has installed voltage recording equipment to monitor terminal voltages on the existing 34.5 kv line, which is to be reconductored and looped into Heber. Voltage fluctuations appear to fall within the design range of ±5%. IID is continuing a review of the tentative motor starting guidelines proposed in the June 22 Project interface meeting.

Fluor has issued to SDG&E, for review, the revised control systems Design Guide sections and the I&C design criteria. These documents will determine many details of the general specifications for control room equipment to be issued for RFQ in January 1982. A high level of detailed, multi-discipline review has begun on the control systems design.

Representatives from Fluor and SDG&E met to discuss use of a digital based I&C system. Fluor documented with a letter, their recommendation of a digital based I&C system also describing their responsibility for design and procurement of the Data Acquisition System (DAS). Multi-discipline review has begun on this recommendation.

Nine engineers from the Project's Engineering Task Force visited Foxboro Company's digital control systems (DCS) demonstration center in El Monte, California, on September 16, 1981, for orientation and "hands-on" operation of a digital control system for application to the Project. As a result of this visit, criteria for operator interface requirements for a DCS system on the Heber plant were outlined.

CIVIL/STRUCTURAL ENGINEERING

A multi-discipline review of the Main Building and Shop and Storage Building arrangements proposed by Fluor was completed. Extensive comments were compiled and transmitted to Fluor for incorporation and/or evaluation. A single-story layout will be used for both buildings.

AVAILABILITY/RELIABILITY ENGINEERING

Pickard, Lowe & Garrick

Pickard, Lowe & Garrick (PL&G) completed their analysis of the conceptual design and alternate system configuration with the issuance of the following reports:

- "Cost-Benefit Analysis of Service and Instrument Air Alternate Configurations"
- "Availability Analysis of Instrumentation and Control Alternate Configurations"
- "Conceptual Design Availability Assessment"
- "Cost-Benefit Analysis of Cooling Tower Alternate Configurations"
- "Cost-Benefit Analysis of Unit/Substation Alternate Configurations"

Having completed the majority of their work on the analysis of the conceptual design and alternate system configurations, PL&G is concentrating on analysis of the actual design (i.e., P&ID's and process flow diagrams) as they become available from Fluor.

Additionally, PL&G issued a report on recommendations for prototypical equipment testing covering the brine/hydrocarbon heat exchangers, the turbine generator, and the downhole well pumps. Comments on the prototypical equipment testing program were forwarded to PL&G redirecting the goal of the task away from testing of fullscale prototypes of major components, and toward confirmation of the availability of subsystems whose reliability and maintainability may be suspect due to the scaling up in size of components or unusual service.

PL&G was asked to put together a report on the advantages and disadvantages of a digital control system versus a standard analog control system as they relate to the Project.

PROCUREMENT

Agreement was reached with Fluor Power Services on the organization of procurement documents. This followed several meetings and the development of the turbine generator bid package format. The turbine generator bid package was completely revised to meet SDG&E requirements, and was released for transmission to the bidders. Westinghouse has elected not to enter the hydrocarbon turbine business; this reduced the number of bidders to three (Elliott, General Electric, and Rotoflow Companies).

WBS 1.2.3 - POWER PLANT CONSTRUCTION

OBJECTIVE:

The objective of this WBS element for Phase I is to provide construction input to the architect/engineer during the design of the power plant to allow construction in an orderly, cost-effective manner. In Phase II, efforts will focus on actual construction of the geothermal binary power plant.

STATUS:

Dravo Utility Constructors, Inc. (DUCI) was the successful bidder for the Construction Manager contract.

SDG&E review of the Construction Manager contract with Dravo Utility Constructors, Inc. (DUCI) was completed, and these comments are being incorporated into a final draft contract. Final SDG&E approval will occur prior to review of the final document by DUCI. Contract negotiations should begin in early October.

WBS 1.2.4 - POWER PLANT START-UP

OBJECTIVE:

The objective of this WBS element is to start-up, check-out, and test the completed power plant. These efforts shall include the necessary personnel training and the correction of equipment or system problem areas identified during plant start-up.

STATUS:

In-house work continued on the Start-up Planning and Procedures Manual.

WBS 1.2.5 - PROJECT MANAGEMENT

OBJECTIVE:

The objective of this WBS element is to provide Project management by establishing interfaces and control between SDG&E, the heat supplier, the architect/engineer, other subcontractors, and the Sponsors; defining schedules and reporting progress based on actual accomplishments; finalizing procedures for management, engineering, start-up and design, construction cost and scheduling, accounting, procurement, and reporting; providing cost control by combining estimating, recording, reporting, analyzing, forecasting, and trending of cost data; monitoring work package budget estimates and reporting progress; negotiating and administering Project agreements and contracts; coordinating legal, public information, geothermal heat supply, and procurement activities; and preparing, reviewing, and publishing information regarding the technical status, cost, and schedules of the Project.

STATUS:

DOE FUNDING AND COOPERATIVE AGREEMENT

At a joint conference of the House of Representatives and Senate in July, the final authorized amount of $7 million was approved for the Project.

Modification A001 to the Cooperative Agreement between DOE and SDG&E to increase DOE's obligation by $1,963,509 to a total of $5,963,509 (which is their estimated share of Phase I costs) was executed in August 1981.

Modification A002 to increase DOE's obligation for their share of the Project costs from $5,963,509 to $7,921,509 was excecuted by both parties in September 1981. This modification obligates all of Fiscal Year 1980 and Fiscal Year 1981 funding for the Project.

A proposed modification to the DOE Cooperative Agreement was submitted to DOE for approval on August 31. This modification involves a change in scope as follows:

1. Extend Phase I to September 30, 1987.
2. Extend environmental studies and permits to end of Project.
3. Extend engineering and design to end of Project.
4. Procure all major equipment.
5. Add construction management.
6. Extend project management to end of Project.

7. Add SDG&E's estimate for data acquisition and dissemination (18 months).

8. Includes a portion of data acquisition and dissemination.

9. Reflect the change in SDG&E's administrative and general rate from 3.28% to 4.27%.

This modification includes only Phase I work. The total Project cost for Phase I has increased $37,834,336 from $10,876,382 to $48,710,718. The increase includes costs through September 30, 1987.

STATE OF CALIFORNIA FUNDING

The agreement between the State of California and SDG&E to assign approximately 4.3 percent of the ownership interest and approximately 1.7 percent of the cost responsibility ($2 million) of the Heber Binary Project to the State was signed by both parties in early September and forwarded to the State control agencies for approval. The agreement was pulled back for modification when the State Legislature put a one-year moratorium on the $2 million appropriation due to budget constraints. This means the money won't be available until the Fiscal Year 1982-1983 (starting July 1, 1982). Since the original appropriation had to be encumbered during the Fiscal Year 1981-1982 to become available and a one-year moratorium was imposed, the Legislature must appropriate the money again in next year's State budget. Therefore, there is no assurance that the Project will ever get the $2 million. The agreement is being modified to have the State's ownership become effective when the appropriation is made and the State encumbers the funds. The modified agreement is expected from the State on October 5, 1981. Consent of all parties to the Heber Participation Agreement for this assignment has now been received.

The cost sharing obligations and ownership interests of the parties will be as follows:

Entity	Cost Sharing Obligation %	Ownership Interest %
SDG&E	31.3	82.5
IID	3.8	10.0
DWR	1.2	3.2
State of California	1.7	4.3
EPRI	10.0	0.0
DOE	50.0	0.0
SCE	2.0	0.0
TOTAL	100.0	100.0

The Imperial Irrigation District (IID) has expressed a desire to reduce its ownership share pro rata to the State's ownership purchase from SDG&E; this amounts to about 0.5%. It has been tentatively agreed to purchase this amount from IID, contingent on the State purchasing 4.3 percent from SDG&E. A draft assignment agreement to accomplish this has been developed.

SPONSORS' TECHNICAL AND MANAGEMENT COMMITTEES

The Sponsors' Technical and Management Committees met on July 14 and 15, respectively. Project Task Force members brought the committee members up to date on the technical and administrative status of the Project. Both STC and SMC members approved SDG&E's proposal to pursue transferring ownership and operation of the injection pipeline and pumps to the heat supplier's scope of work. SMC members were asked to review and approve a proposed modification to the DOE Cooperative Agreement in writing by the end of July. SMC members were also briefed on the principles of the funding agreement whereby the State of California would contribute $2 million to the Project, and Committee members approved proceeding with negotiations for that agreement.

GENERAL

On September 22, 1981, R. G. Lacy presented a briefing for representatives of utilities in the Pacific Northwest for the purpose of advising them on the status of the Project and soliciting their participation in the Project, either as a contributor or as an owner.

On September 24, 1981, R. G. Lacy presented a briefing for key members of the CPUC Staff on the status of the Heber Binary Project. Major areas discussed included technical progress, status of DOE funding, status of the heat sales agreement, and efforts to attract additional participants in the Project.

Work began on the Health and Safety Management Plan in July, which is a deliverable under the DOE Cooperative Agreement. The health and safety objectives and requirements of the Project were defined, as well as identification of those features of the Project that could pose a risk to both Project operating and maintenance personnel and to the general public. After in-house comments were incorporated into the draft Health and Safety Management Plan, a final draft was submitted to DOE for their approval prior to actual distribution. After incorporation of DOE's comments, it is anticipated that the Plan will be released the first week of October.

Work was initiated on an assessment of the risks of a commercial binary power plant at Heber. This study will be used to develop the methodology to make risk assessments for follow-on commercial geothermal power plants. A proposed outline of the scope of work is being prepared.

The third semi-annual Project report was forwarded to the CPUC as required by CPUC Decision #91271. Inquiries from the CPUC regarding the content of the report have been minimal.

WBS 1.3
POWER PLANT DEMONSTRATION

WBS 1.3.1 - DEMONSTRATION, OPERATION, AND MAINTENANCE

OBJECTIVE:

The objective of this WBS element is to demonstrate reliable and economic geothermal power generation.

STATUS:

- No activity on this WBS during the quarter.

WBS 1.4
DATA ACQUISITION AND DISSEMINATION

WBS 1.4.2 - DATA ACQUISITION, ANALYSIS, AND DISSEMINATION

OBJECTIVE:

The overall objective of the data management effort is to acquire, store, evaluate, and report Project data to the energy generation industry and to other parties interested in liquid-dominated geothermal power plant performance. The intended result is to stimulate commercial development of hydrothermal resources in the United States.

STATUS:

SDG&E has assumed the lead role in defining Data Acquisition System (DAS) requirements. A committee (made up of representatives from SDG&E, DOE, EPRI, and Fluor) was formed in July 1981, and responsibilities were assigned. The goal of the committee will be to define DAS requirements and submit them to Fluor for incorporation into the design and procurement of the data acquisition/I&C hardware. SDG&E will be responsible for devising a data points list and a calculations list, and establishing the requirements for a remote terminal interface.

In August, the DOE formally asked Lawrence Berkeley Laboratory (LBL) to provide assistance in defining the DAS software and format requirements. A second DAS Committee meeting was held to review the status of the points and calculations lists and to discuss the role of LBL with the Committee.

In September, with the receipt of the P&IDs from Fluor and the DAS Committee members comments, the points and calculations lists were finalized. The LBL response to DAS system software and format requirements was received, and a third DAS Committee meeting was scheduled for October 1 to finalize such items as output medium, data sampling rate, and data recording frequency.

Battelle, Pacific Northwest Laboratories, issued recommendations for a chemistry and materials monitoring plan to Heber Project Management. The recommendations covered the supply of the instrumentation for detection of gas breakout, corrosion rates, and hydrocarbon leaks. Their proposal also included recommendations for the location of monitoring stations for the brine, hydrocarbon, and cooling water systems and cost estimates to implement these recommendations.

FIGURE 1

HEBER BINARY PROJECT
ARTIST'S RENDERING

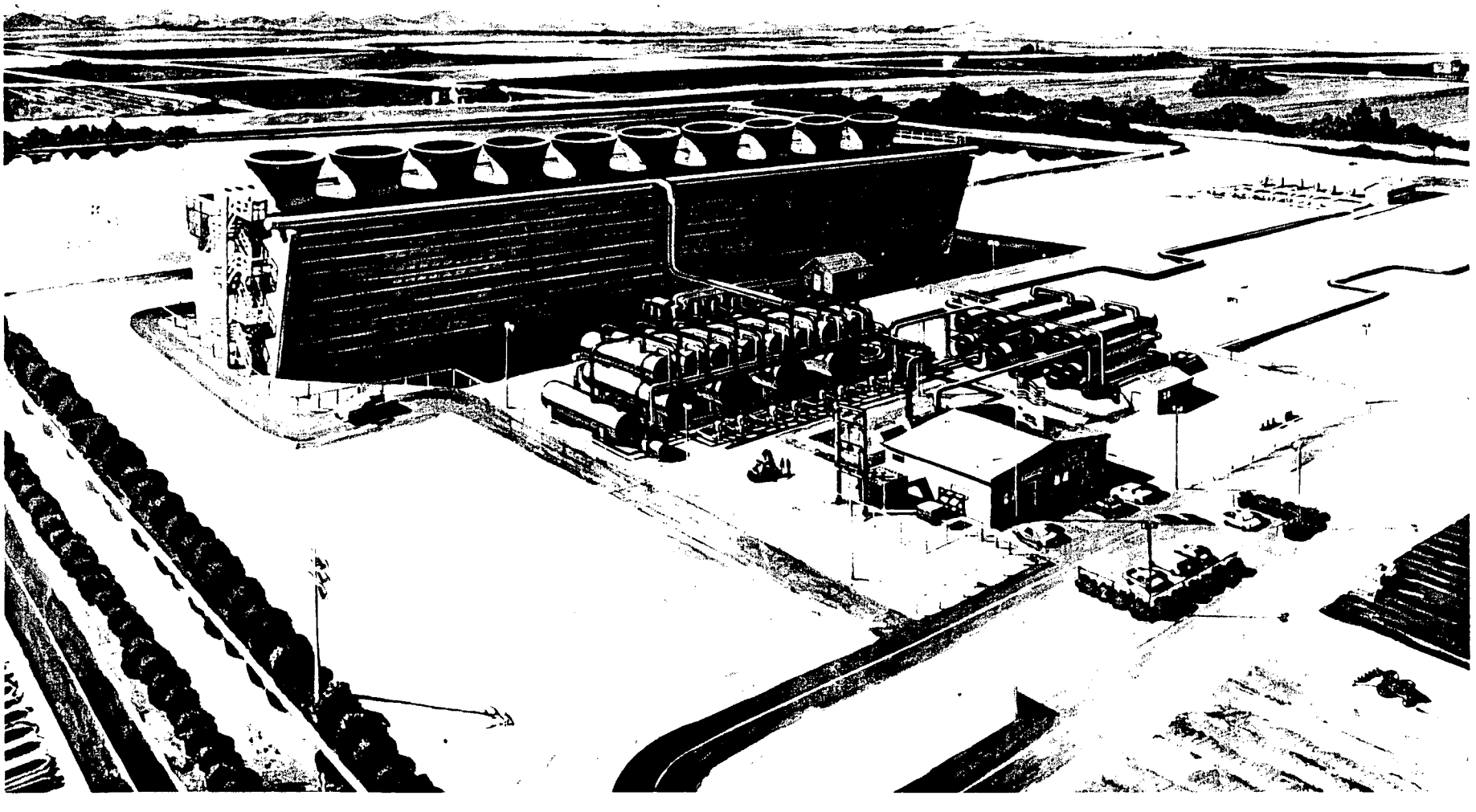

FIGURE 2
HEBER BINARY PROJECT
PLANT LOCATION

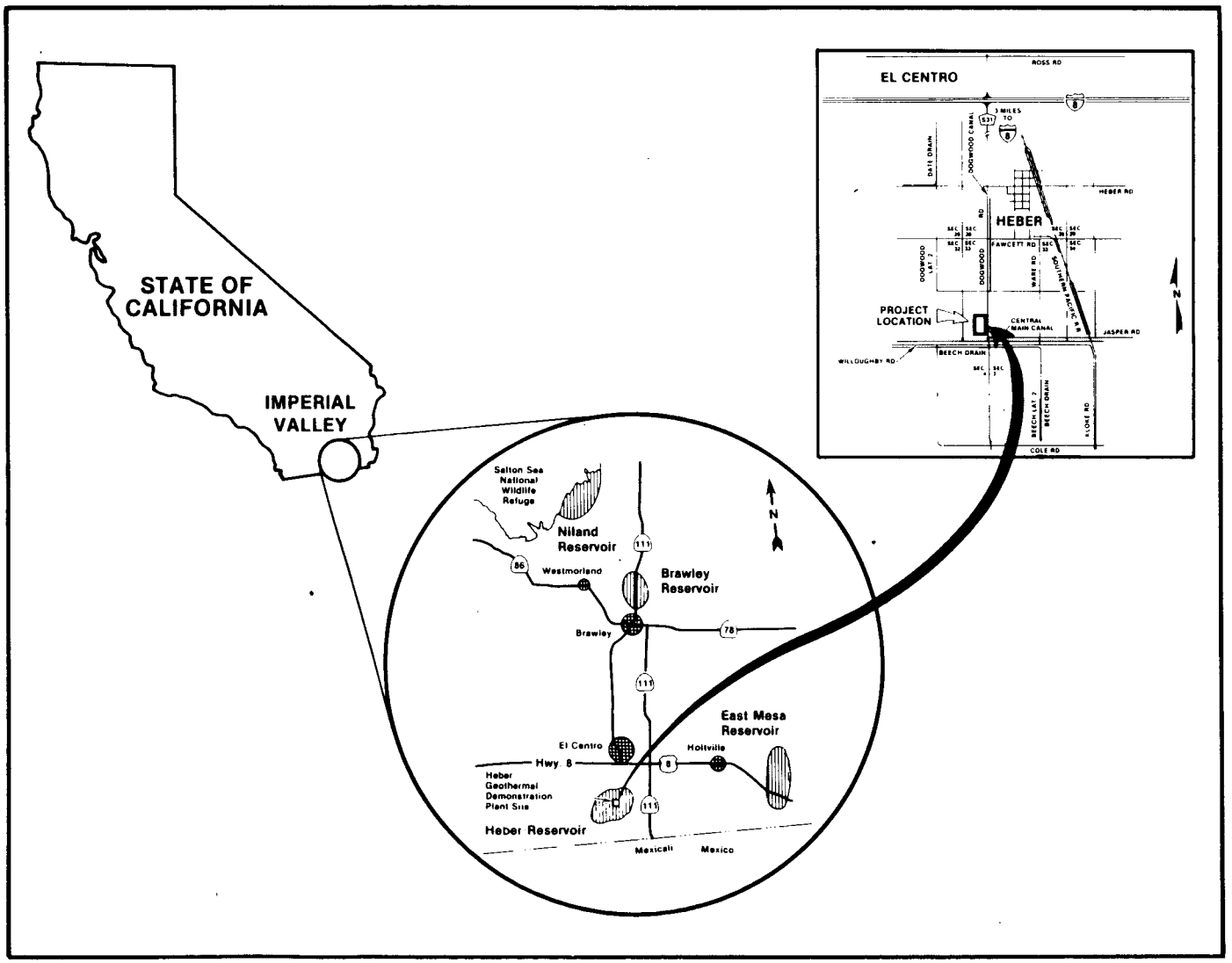

FIGURE 3
HEBER BINARY PROJECT
WORK BREAKDOWN STRUCTURE