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PRELIMINARY ASSESSMENT OF THE IMPACTS OF THE
HEBER DEVELOPMENT PROJECTS

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SPECIAL REPORT

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INTRODUCTION

Although the Heber area was one of the first geothermal areas of Imperial County to be thoroughly explored, development of the resource for electricity generation is just beginning. Exploration work began in the early 1970's and resulted in the drilling of 15 wells to an average depth of 5,500 feet. Analysis of drilling logs and results of well tests confirmed the feasibility of development for electricity generation. Ultimate capacity of the reservoir was estimated to be approximately 400 to 500 megawatts for 30 years.

Following the exploratory work, two proposals for development of the resource were made. In September 1977, San Diego Gas & Electric (S.D.G.&E.) and Chevron Resources Company submitted an application for a 49 megawatt binary power plant and geothermal overlay zoning for the Heber project area. The County designated the geothermal zone and issued a power plant permit in 1978. In January 1979, Southern California Edison (Edison) and Chevron Resources Company (Chevron) applied for a 49 megawatt flash power plant. The County approved that project in January 1980. Most recently, Chevron applied for certain minor modifications to their brine processing facility permits for the projects. The County used this opportunity to update both permits and then approved the requested changes.

Although these projects have received considerable support from decision-makers and the public in Imperial County, construction of the projects has been delayed due to the need for project approvals from other agencies. Decisions by the California Public Utilities Commission (CPUC) have been particularly important.

Final discretionary approvals will allow S.D.G.&E. to proceed with the Heber Binary Project. A May 1983 decision by the CPUC found that this "Research, Development, and Demonstration Project" would provide benefits to the State of California and the nation as a whole. The decision allows S.D.G.&E. to recover its share of capital and heat costs from ratepayers, but the CPUC placed a ceiling on cost recovery in order to protect ratepayers and to create an incentive for cost-effective operation. The decision limits the demonstration period to a maximum of four years, unless an extension is received, and specifies that cost recovery during the commercial phase of the project shall be limited to reasonable operating and maintenance costs.

In contrast to the CPUC support for the Binary Project, CPUC decisions regarding the Edison/Chevron flash power plant were not encouraging. The October, 1982, decision concluded that the cost-competitiveness of the project was uncertain when compared with other generation options. The decision limited Edison's cost recovery on the project to "avoided costs". Following that CPUC decision, Edison withdrew from the project.

Edison's withdrawal left Chevron without a partner in the project. Well field development for the project, which had been initiated in July 1982, was terminated. Following an extended negotiation, Chevron signed an agreement with Dravo Constructors for project development. Dravo will be responsible for the turbine/generator and associated systems. Chevron will be responsible for brine production and injection facilities. This arrangement will allow the facility to operate under PURPA regulations, thus eliminating the need for CPUC approval. (PURPA, the Public Utility

Regulatory Policies Act of 1978, provides for sales of electricity from small power producers to utilities and exempts small power producers from certain other regulations).

Both projects were under construction by November 1983. For the Binary Project, foundation work and site grading is underway, and well drilling has been initiated by Chevron. For the Flash Project, well development and testing has resumed, and other site work will begin in the near future.

These two projects are very important to Imperial County geothermal development and to development of similar resources elsewhere. Construction and operation of these facilities - of the same size, in the same anomaly, at the same time, and with geothermal resources supplied by the same developer - offer an opportunity to compare the "Dual Flash" and "Binary" technologies. The comparative evaluation of project operations and impacts is therefore of great interest and importance. This report describes initial impacts of the Heber development projects on Imperial County.

INITIAL PROJECT IMPACTS

The Heber projects will have four types of effects on Imperial County: economic, environmental, public service, and public awareness. Since construction of the two facilities began only recently, project-related impacts can only be estimated.

Except for those impacts resulting from use of one technology rather than another (certain environmental impacts of a flash power plant will differ from those of a binary power plant), most impacts of the projects are similar. For the purpose of this report, therefore, most impacts of the projects are assumed to be equal. This report draws estimates of initial impacts from various published and unpublished sources.

Economic Impacts

Anticipated economic effects of the Heber projects include employment, tax revenues, and secondary or induced impacts arising from increased demand for goods and services. The two projects are expected to have similar economic effects on the County.

An analysis of the external benefits of the Heber Binary Project prepared by Regional Economic Research (RER) for S.D.G.&E. indicates that the initial employment-related benefits to Imperial County residents will be substantial. The analysis estimates that 74% of expenditures for labor and fringe benefits, 5% of material purchases, and 80% of construction subcontracts will go to Imperial County residents and businesses.

Assuming that a similar proportion of project expenditures from the Heber Flash Facility go to County residents and businesses, over \$16 million in additional labor income (direct, indirect, and induced) will result from the two projects in the first 2 years of construction. The RER analysis concludes that employment due to the binary project will lead to a net increase in employment in Imperial County and a measurable decrease in the local unemployment rate; this benefit is even more pronounced when both projects are considered.

Tax revenues resulting from the two projects will be relatively minor

in 1984, but by 1985 the projects will make a substantial contribution to the County tax base. The Heber projects will pay local property taxes in 1984 based on the assessed value of existing on-site installations as of March 1984. Sales tax revenues from purchases of taxable materials in Imperial County are estimated to total over \$90,000 per year during the early years of the Heber projects, based on extrapolation of the RER analysis to both projects.

According to the RER Report, only a small proportion of total project-related revenue will be required to meet project-related demand for public services. RER predicts that net revenue will exceed 60% of gross revenue in the early years of the project and will increase to over 90% during the operational phase of the binary project. Economic impacts of the flash project are expected to be similar. Based on this assumption, net revenue from the two projects could exceed \$550,000 per year in 1984 and 1985, approach \$1,000,000 in 1986, and rise thereafter as both projects begin commercial operation.

Environmental Impacts

Environmental impacts from the construction and operation of the two Heber projects have been discussed and evaluated in detail in the environmental impact reports prepared for the projects. Primary impacts included:

1. A potential for induced seismicity (damaging seismicity was not anticipated);
2. A potential for land surface subsidence and/or uplift;
3. Hydrologic impacts;
4. Air quality impacts; and
5. Increases in noise levels.

Preparation for the two projects has included collection of baseline environmental data, establishment of long term monitoring systems, and imposition of appropriate mitigation measures. Seismicity and subsidence impacts, if any, would be similar. Hydrologic and air quality impacts of the projects will differ due to the differences in production technologies.

The Imperial Valley Environmental Project (IVEP), funded by the U.S. Department of Energy and performed by Lawrence Livermore Laboratory, measured the baseline environmental conditions in geothermal areas of Imperial County, including the Heber project area. Subsequent environmental monitoring efforts have focused on the need to maintain the usefulness of the IVEP data base by keeping data current. Regular monitoring of seismicity, subsidence, and water quality has been continued. An area station for monitoring air quality is planned for the Heber area. Regular monitoring of noise levels is not considered necessary, as standard noise mitigation measures will be used by project developers.

A seismic monitoring system for the Heber area has been established by Chevron. The system provides continuous monitoring of seismic activity from a 12 element seismic field network. The network was installed in

1981 and operation and maintenance of the network have continued since that time. Chevron submits annual reports to the County. Reports describe network operation and maintenance, data collection and analysis, and summarize the micro-earthquake studies of the project area. The network will measure the baseline micro-earthquake activity in the project area for comparison with any seismic activity measured following initiation of production and injection operations.

Imperial County has established an extensive Geothermal Subsidence Detection Network which surrounds areas of geothermal development potential. This Network is periodically surveyed in order to determine the pattern of natural subsidence and provide baseline information for detection of possible subsidence induced by geothermal development. Surveys were completed in 1971, 1973, 1975, and 1980.

A survey of the Network is in progress. In the current survey, the County is utilizing a phased approach, wherein the total resurvey will be accomplished in four phases. Phase 1, the main north/south segment of the Network, was surveyed in winter 1982. Phase 2, the main east/west segment of the Network, is being surveyed in winter 1983. The final two phases would survey the remaining portions of the Network to complete the project.

Chevron has installed a subsidence monitoring network in the Heber geothermal field which augments the main subsidence monitoring Network. The Chevron network has been surveyed periodically since 1972 to produce detailed monitoring data on the geothermal project area for the measurement of future impacts.

A repetitive precise gravity survey network was installed at Heber in 1980-81 as part of a project funded by the U.S. Department of Energy. A second repetition of the survey has been completed and resulting data are undergoing analysis. Any changes detected will provide baseline data on non-geothermal gravity changes.

These two monitoring systems are expected to provide reliable data on natural subsidence against which future changes can be evaluated to detect subsidence due to the Heber development projects.

The Regional Water Quality Control Board has continued the water quality monitoring program initiated as part of the IVEP. This monitoring provides baseline water quality data for detection of water quality changes following geothermal development. Data will identify any changes in water quality and will be useful in the design of necessary mitigation measures. Site specific water quality monitoring will be performed by the project developers.

Chevron had intended to use treated New River water as the external water supply for the Heber Flash Power Plant. Due to the cost of water treatment facilities, Chevron requested and received authorization from the County and the Imperial Irrigation District for use of canal water for the first 5 to 10 years of project operations. The Binary Project will also use canal water for at least five years.

In the interim, Chevron is performing studies to determine the effects of the proposed water treatment facilities on the New River and the Salton Sea. Initial findings indicate that impacts on the New River and the Salton Sea will be minimal. Upon completion of the studies, a report

will be submitted to the Water Resources Control Board as part of the information required under Chevron's water appropriation. Chevron is designing water intake facilities to minimize impacts on wildlife.

Air quality monitoring was not continued following the completion of the IVEP. Since the Heber projects are now under construction, the County Air Pollution Control District (APCD) staff believes that ambient air quality monitoring should be resumed in the project area. The APCD is planning to establish an air quality monitoring station in the area. If sufficient funding and monitoring equipment can be obtained, a station will be established in 1984.

The APCD states that long term air quality impacts from operation of the binary project are expected to be relatively minor. Air quality impacts of the flash plant could be greater, so requirements for monitoring of that facility will be more stringent.

Both Heber projects have received "Authority to Construct" permits from the APCD. The APCD staff states that the temporary emissions from construction related sources are not a major concern. Standard mitigations, such as those for dust control, are sufficiently effective for controlling impacts to air quality caused by construction projects.

Public Service Impacts

Public service impacts are impacts associated with increased demand for government provided services and facilities due to the construction and operation of the Heber projects. Impacts will be due to the cost of providing services to new County residents, and costs associated with processing necessary project related permits, performing inspections, and coordinating activities with other agencies. Public service impacts of the two projects are expected to be similar.

Population increase due to the Heber development is expected to be minor, and the resulting impact on utility demand, schools, and community services is expected to be slight. The Master Environmental Impact Report for the Heber area concluded that impacts on community services and facilities would be negligible.

Project construction requires coordination of public services among local agencies, between County and State agencies, and between public agencies and the geothermal developers. Developers must obtain numerous discretionary and ministerial permits from local and state agencies. Agencies requiring permits include the Air Pollution Control District, various County departments, the Imperial Irrigation District, the Regional Water Quality Control Board, and the State Division of Oil and Gas.

To date, geothermal development in Imperial County has been characterized by cooperation among County agencies, geothermal developers, and other involved agencies. Coordination requirements due to the Heber projects will utilize existing communication links and thus will not create new coordination demands.

County staff works with the geothermal industry and other agencies to develop environmental monitoring programs. If detrimental impacts are identified, necessary mitigation programs will be designed and implemented.

Development of both monitoring and mitigation programs will require continued coordination and cooperative efforts by the County, the geothermal industry, and other concerned agencies.

In most cases, the necessary environmental monitoring programs have been designed and implemented. Federal and State funding of these programs has been utilized as much as possible since the major monitoring programs must, of necessity, cover a large portion of the County. County staff believes that full industry support of these programs is not feasible until a greater geothermal industrial base has been achieved.

Public Awareness Impacts

Construction of the Heber projects has led to increased visibility of geothermal development in Imperial County. County staff, geothermal developers, and others have received numerous requests for information, project tours, and formal presentations.

To date, increased public awareness of geothermal development appears to be equivalent to increased public support of development. Local officials and residents anticipate that development will help to resolve the County's serious unemployment and budgetary problems. The employment opportunities resulting from the projects have received wide-spread attention.

Over the long term, the overall impact on Imperial County of the Heber development projects is expected to be beneficial. In addition to the direct and indirect economic effects, the projects will serve to further stimulate support for development of geothermal resources in the County. As the resources and the technologies are proven, development of other projects, both for electricity generation and direct heat utilization will be encouraged.

CONCLUSION

A review of information on initial impacts of the Heber projects indicates that most impacts will be beneficial. Economic effects, including employment and tax revenues, will aid the local economy. Over the life of the projects, economic effects are expected to have the greatest local impact. Project-related employment will be the primary initial benefit, but over the next few years tax revenues will be of increasing importance.

Implementation of necessary monitoring programs is in progress. Public service requirements due to the projects are not expected to place a burden on local agencies. Overall, project development is expected to increase local support for development as the benefits become obvious and adverse impacts are controlled.

The County will continue to collect information on the projects and the impacts of the projects as development progresses. As appropriate, periodic reports on the status of development and local impacts will be issued.