

Water for Nevada

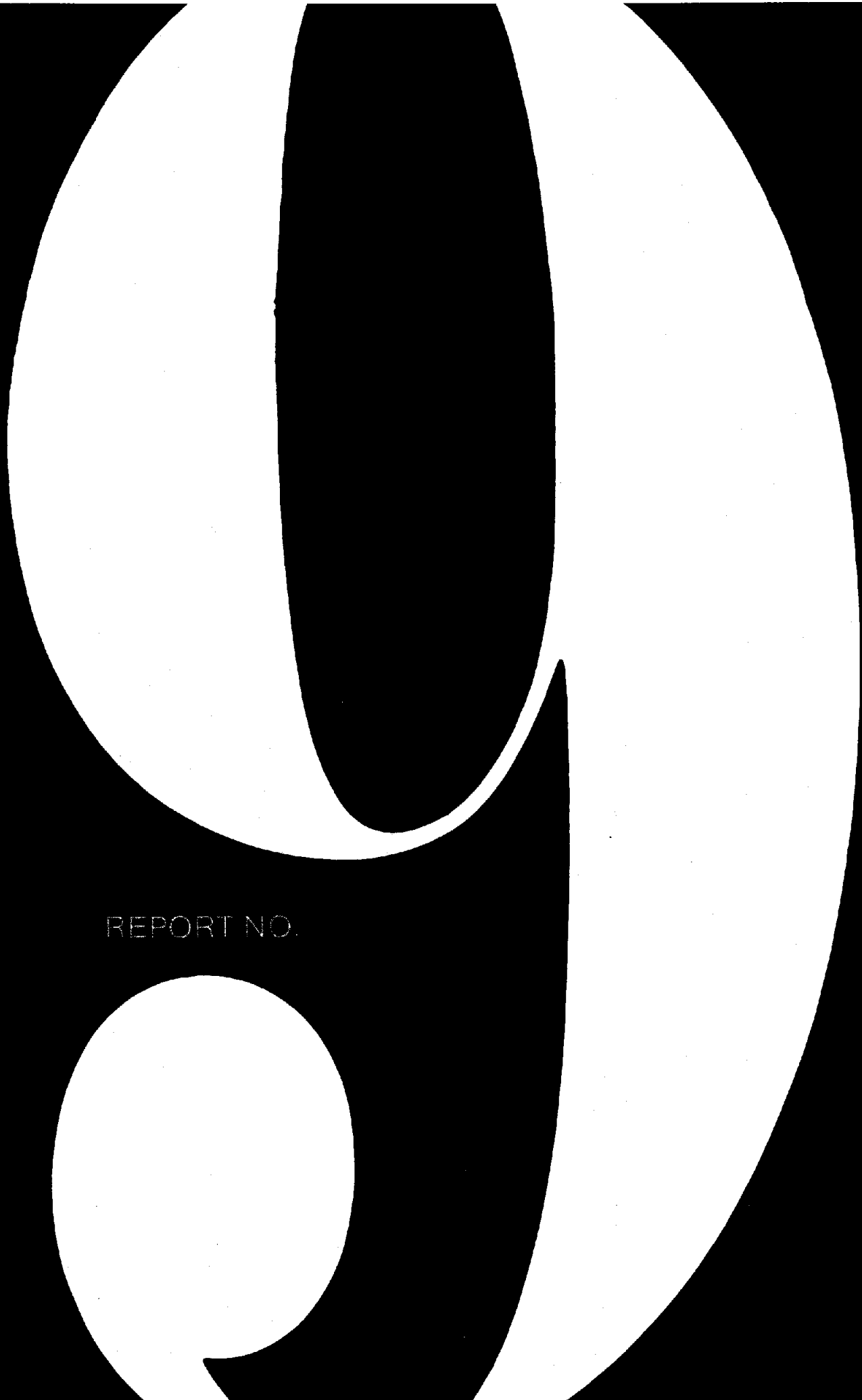


FORECASTS FOR THE FUTURE — ELECTRIC ENERGY

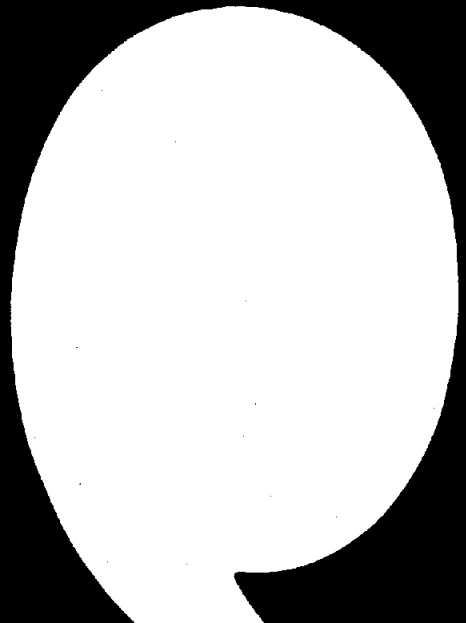
FORECASTS FOR THE FUTURE — ELECTRIC ENERGY

ABSTRACT

Electric energy generation and use as well as use of water and related land resources are considered from a Nevada viewpoint. Factors originating outside of Nevada are considered because Nevada is a part of the West and the Nation. Conservation measures, the subject of the detailed and separate addendum to the report, are summarized.



REPORT NO.



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TO THE CITIZENS OF THE STATE OF NEVADA

This report examines whether Nevada will import, export or be self sufficient with respect to electric energy, together with future water and related land resources questions. The report was edited and prepared by Victor R. Hill, of the Division's planning staff, along with Robert E. Walstrom, Natural Resources Consultant. Many other individuals and agencies provided extensive input for which there is space for only partial acknowledgment herein.

Nevada is currently a net importer of electric energy, and must also import the fuel required for generation within the State. Generation of electric energy in Nevada makes use of scarce water and related land resources. In this regard, generation requires considerable support. Accordingly, a preliminary listing of valleys which might efficiently support electric energy generation has been provided.

There are many things to consider related to Nevada's future electric energy course. Some of the more apparent include pressures building outside of Nevada affecting availability of sites and fuels. Transmission of electric energy is on a regional basis. Therefore, siting of generating facilities cannot escape regional import-export aspects. Inside of Nevada, this report examines methods of efficiently achieving reasonable economic and environmental balance, without a morass of regulations. However, recent and future federal actions may become controlling with respect to regulations.

It should be noted that there is great interest for future development of Nevada's geothermal resources. About 20% of the State is thought to have promise for future geothermal exploration. On a national scale, Nevada is estimated to be second only to California for potential geothermal development.

Additional emphasis in the report has been placed upon factors of efficiency in the use and generation of electric energy. In arid Nevada's future, conservation measures can help to prevent having to face in some areas the hard decision of whether to drink water or use it for coolant in electric energy generating stations.

Respectfully,

Roland D. Westergard
State Engineer

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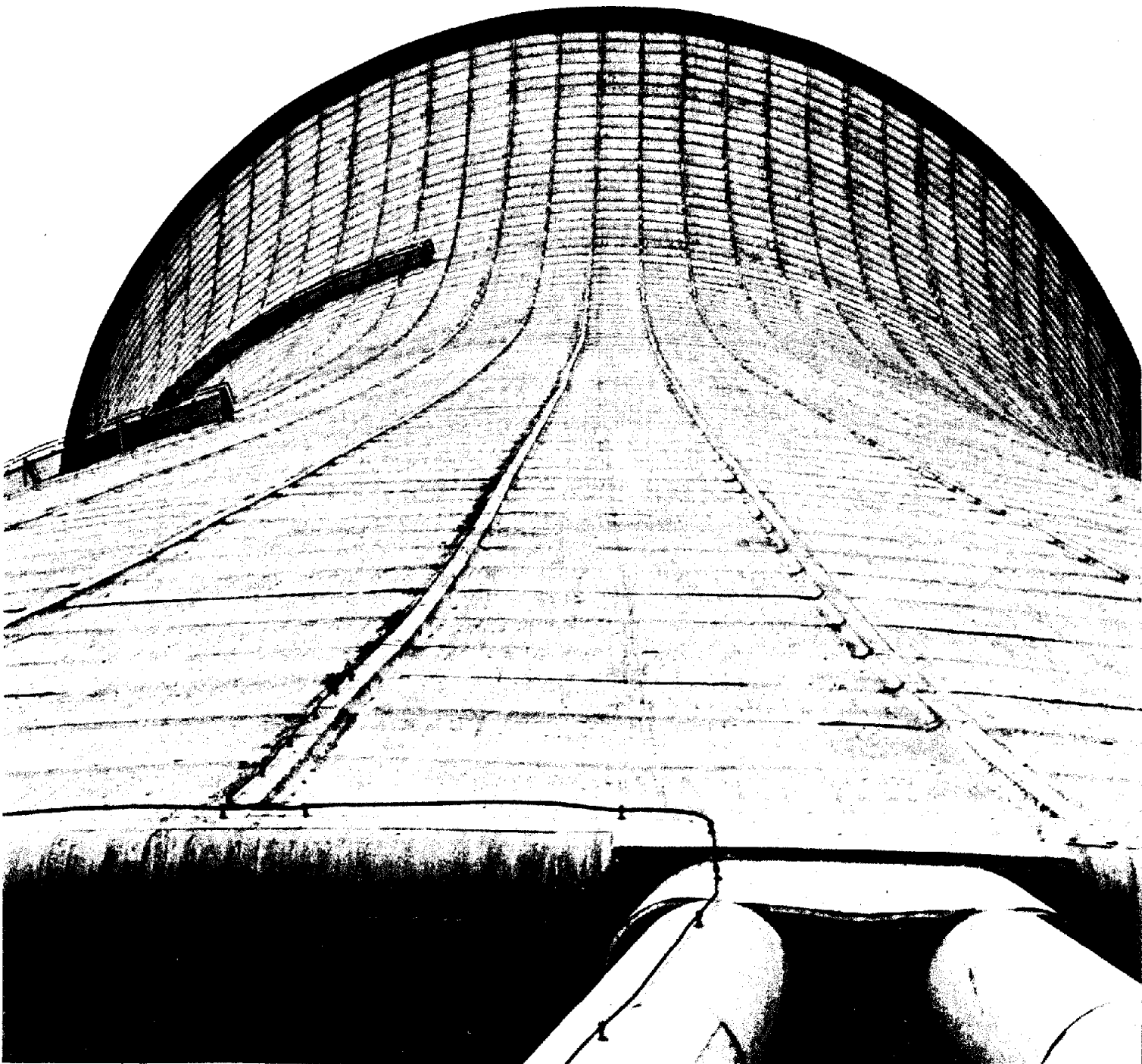
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Evaporative cooling tower at Rancho Seco.
Credit: R. E. Walstrom



FORECASTS FOR THE FUTURE — ELECTRIC ENERGY

CHAPTER 1 INTRODUCTION

This introduction identifies major issues necessary to compile a State Water Planning report about electric energy, for the period 1970-2020.

MAJOR ISSUES

Effects Upon Nevada

Electric energy use and generation should be considered in terms of their effects upon population, economic activity and resource use. The people of Nevada make use of electric energy in their everyday economic activities — residential, commercial and industrial. Generation of electric energy in Nevada makes use of the State's scarce water and related land resources. With these effects in mind, tremendously powerful and long term internal and outside forces will determine whether Nevada is nearly self sufficient with respect to electric energy or is a significant net importer or exporter.

Nevada's Present Internal Position

Nevada presently imports about 1/4 of its total electric energy use and imports essentially all of the fuel needed for the local generation of electric energy. Large portions of the State are sparsely populated, and are devoid of electrical service. In addition, the State's scarce water and related land resources suitable for use in electric

energy generation are under increasing competitive demand for other uses, particularly in urbanized areas.

External Factors

Over a long period of time, external factors due to the energy situation have been felt by individual citizens of Nevada. These pressures have appeared to individuals in terms of availability and costs of fuel for transportation and agriculture, as well as for electric energy. Effects upon the State's citizens will continue to be felt because forces which will impact Nevada are being applied from outside of Nevada, on an ascending scale of size. There is hardly any escape from external factors, given Nevada's present energy resource position.

The following significant external factors are expected to combine to produce energy related pressure upon the citizens of Nevada:

California: This state passed a "coastline initiative" in November 1972. Coupled with exclusions due to populated areas and environmental values, the coastline initiative has slowed the availability of new electric energy generating facilities. This may hurt Nevada's ability to purchase electric energy in California, and could possibly result in the need for additional generating capacity in Nevada.

11 Western States: In view of the uncertainty in the present energy situation, entities in the 11 Western States

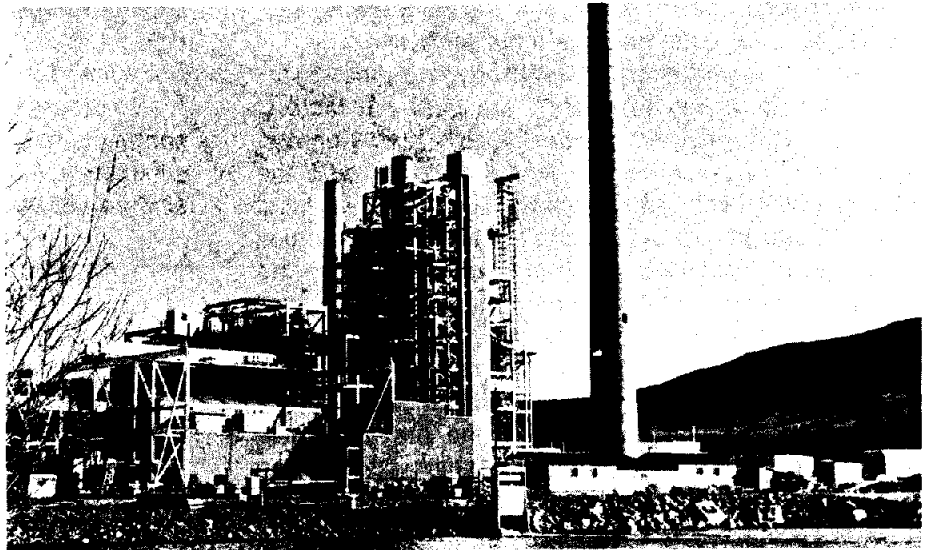
Hoover Dam Generating Station near Boulder City, Nevada. Hydropower.

Credit: U. S. Bureau of Reclamation



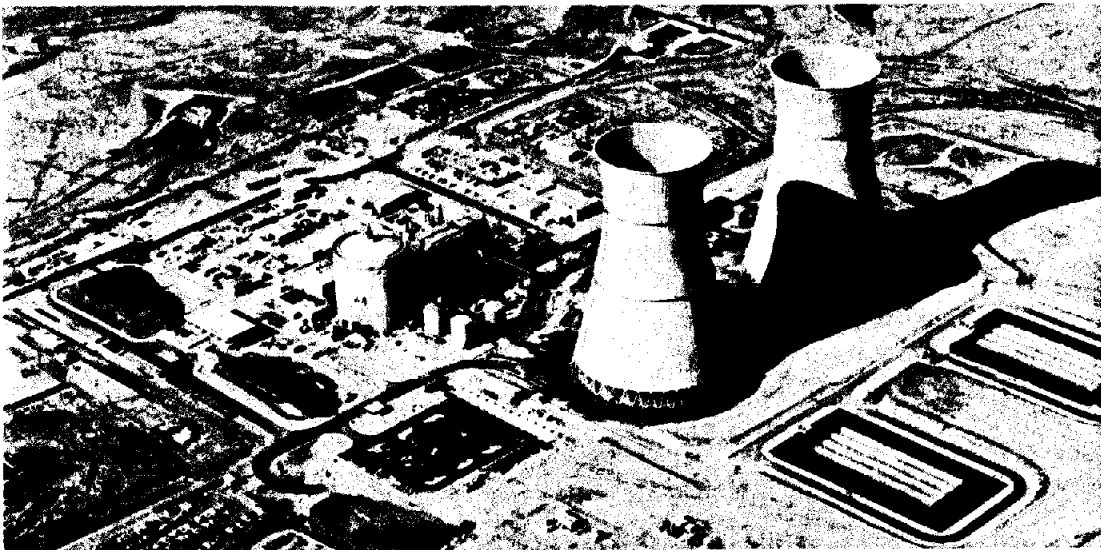
Tracy Generating Station near Reno, Nevada. Fossil Fueled.

Credit: R. E. Walstrom



Rancho Seco Generating Station near Sacramento, California. Nuclear Fueled.

Credit: Sacramento Municipal Utility District



and Alaska are looking at methods for better matching use and generation of electric energy. A regional approach for all forms of energy is developing.

USA: On a national scale, government controls operate upon the production of natural gas and the importation of petroleum. It is uncertain how the combinations of sources and uses of energy will interact with government in the future.

World: Energy practically available for use is presently short in the world. Increased competition among the industrialized nations is increasing the price, particularly for petroleum and coal. As the availability of petroleum and coal diminish and the price increases, nuclear sources must become more attractive.

Timing: Present energy technology and time limitations upon its ability to change are pertinent factors. Individual and government decisions — their number, type, timing and sequence — limit technology and the efficiency with which it is applied. Timewise, we must phase-in and phase-out practical energy technologies according to limitations which are not shorter than the interval to train operators and probably not much longer than a human generation.

For instance, development of advanced nuclear reactor technology was directly undertaken about a generation ago and has recently become practical on a large scale. Taking nuclear electric energy generation as a limiting case, regulatory approvals and construction require about 10 years in addition to development of the technology.

Under these conditions, it is important to plan for electric energy within the foreseeable time limits of practical application of new technology. Therefore, we must look at least to the year 2000, and probably somewhat beyond, with major emphasis upon presently dependable large scale generating technology. Hydro, conventional fossil fuel and nuclear electric energy generating stations are the only practical producers which satisfy the need.

Alternative Postures

Nevada must consider its own best interest in energy matters, but still cannot be separated from its position in the Western States. Map 1A provides perspective upon Nevada and a portion of the West as a region, viewed from the Pacific Ocean. Map 1B shows the associated regional major transmission lines for electric energy.

The important point is that Nevada is near the electric

load center of the region and there are available valleys in Nevada with sites for generating electric energy. Economical generation requires increasingly large-scale facilities, which require huge amounts of capital, often resulting in regional participation. Interest in development of Nevada sites will fluctuate greatly with only small regional shifts in policy. Of course a number of sites would be needed under any condition by Nevada to meet its own future needs.

A big question is whether development of sites in Nevada valleys for regional benefit amounts to an opportunistic or a vulnerable economic-environmental posture for Nevada. The answer would depend upon the amount and method of use of Nevada's scarce water and related land resources.

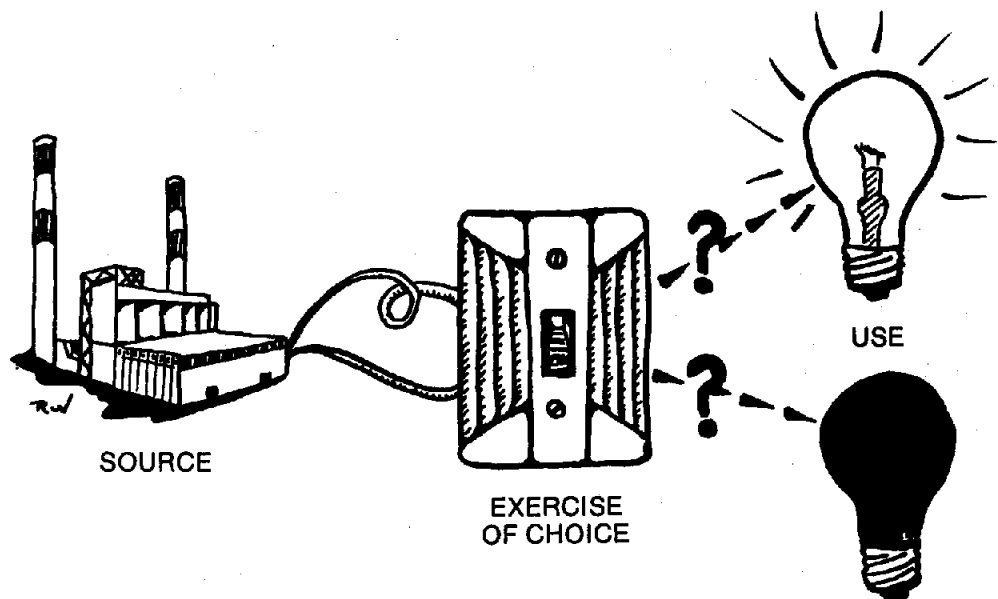
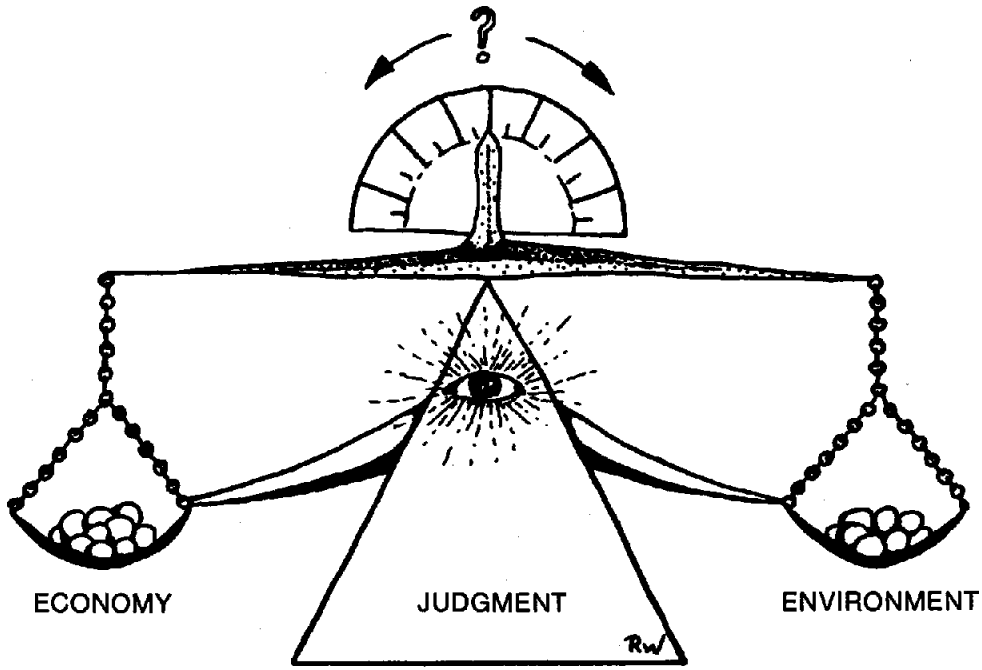
To prudently assure protection of the State's interest, serious consideration should be given to achieving self sufficiency. A significant import or export posture should also be considered.

Alternative Postures

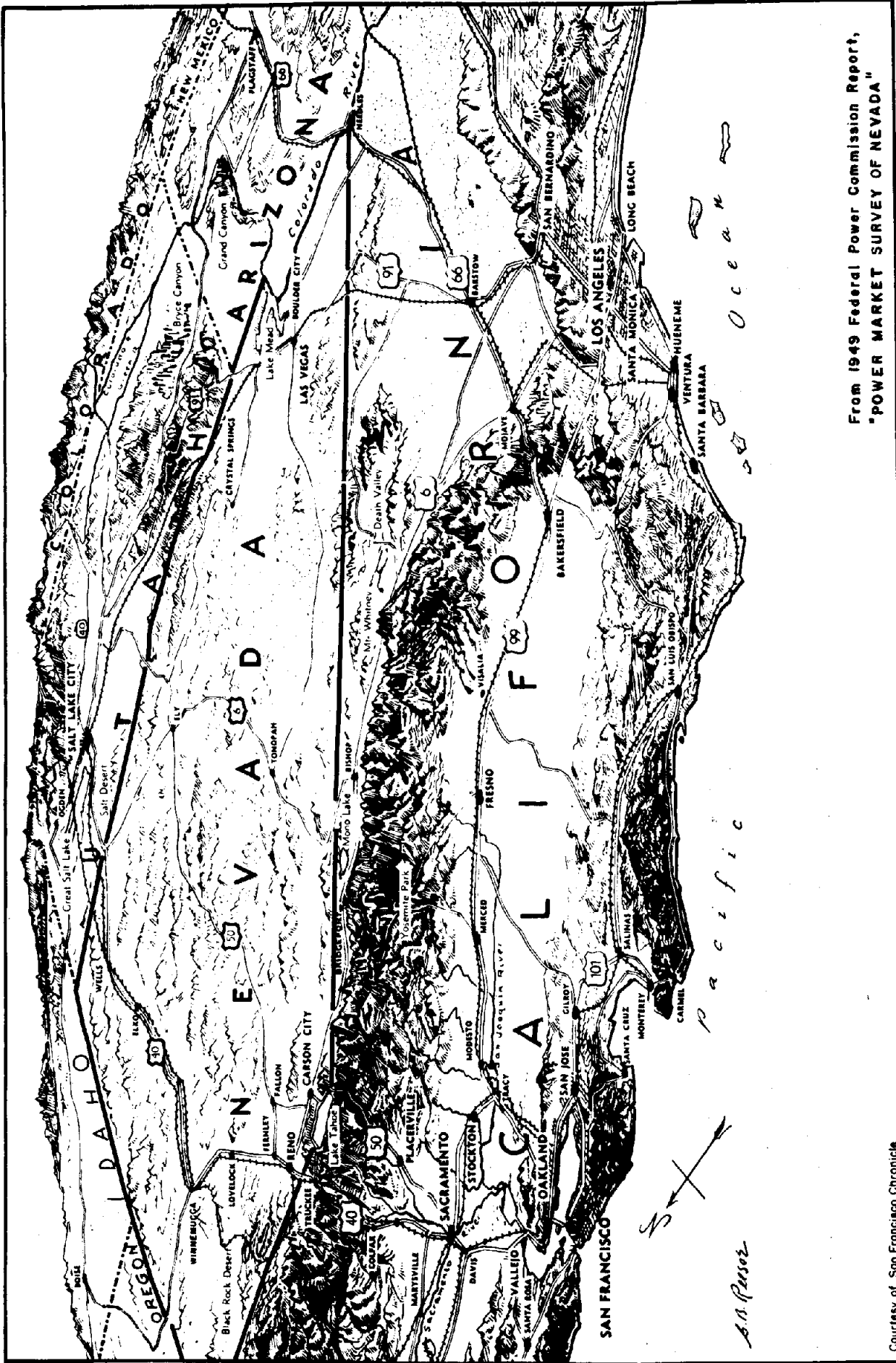
1. Continued significant import.
2. Nearly self sufficient.
3. Significant export.

For any posture, short term use of scarce water and related land resources should allow for the option of reasonable long term recovery of these same resources. With this option in mind, a preliminary siting-rating system utilizing the concept of reasonable economic-environmental balance has been developed. A number of valleys appearing to have the best potential for siting conventional and nuclear electric energy generating facilities were tentatively selected, using the siting-rating system.

Barring unforeseen upsets, this report has provided basic information for future water and related land resource options, as the normal course of events determines a future electric energy posture for Nevada.



QUALITY OF LIFE



From 1949 Federal Power Commission Report,
 "POWER MARKET SURVEY OF NEVADA"

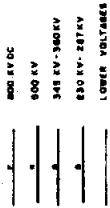
MAP 1A
 NEVADA AND A PORTION OF THE WEST
 AS VIEWED FROM THE PACIFIC OCEAN

Courtesy of San Francisco Chronicle

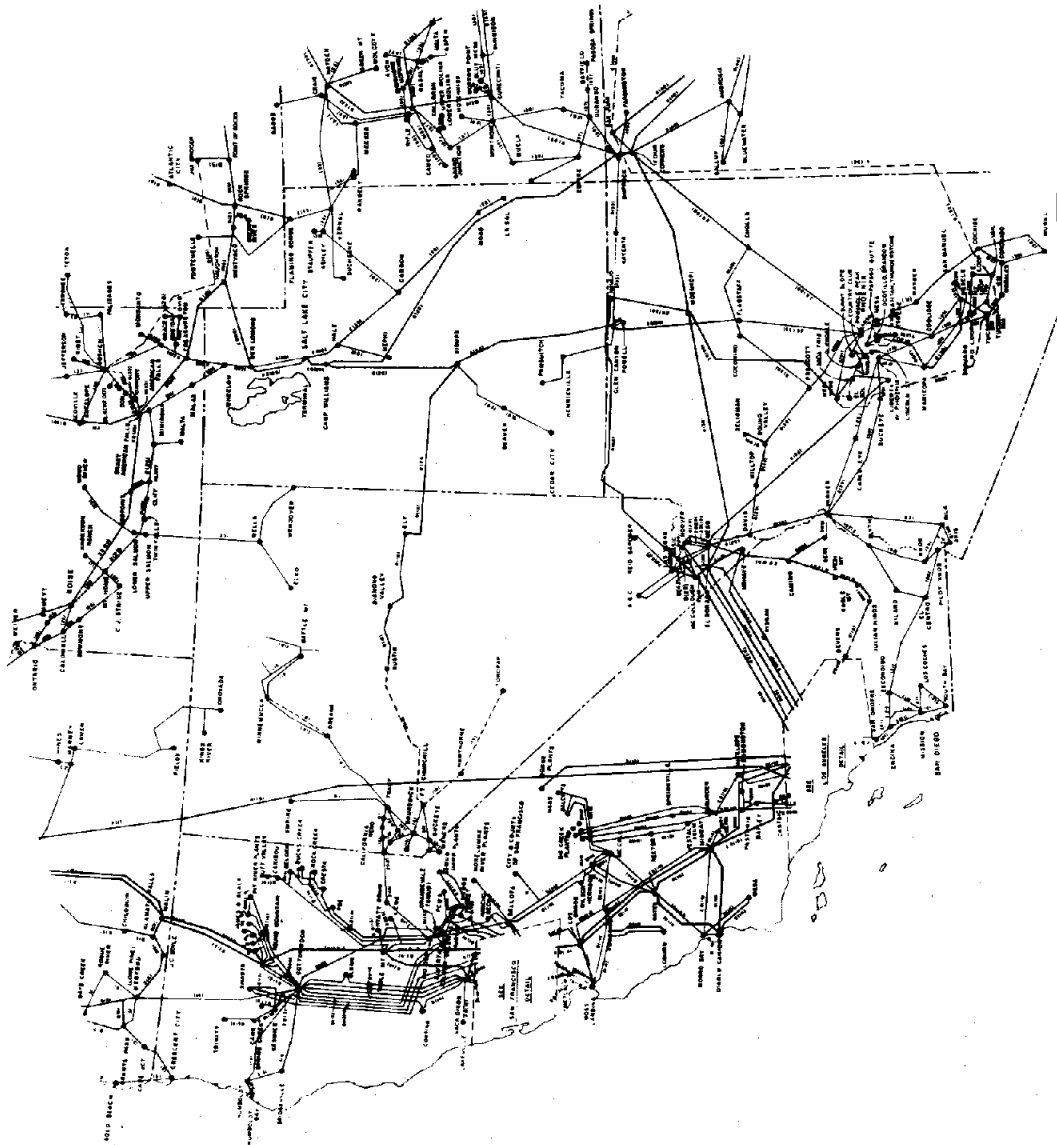
**WESTERN SYSTEMS COORDINATING COUNCIL
OPERATIONS COMMITTEE
MAP OF PRINCIPAL TRANSMISSION LINES**

JANUARY 1, 1974

MAIN LINES SHOWN ARE SCHEDULED
FOR OPERATION IN 1974



1. BONEVILLE POWER ADMINISTRATION
2. BAYBROTHER WATER, POWER COMPANY
3. BEACON CITY LIGHT
4. BEACON POWER & LIGHT COMPANY
5. PORTLAND GENERAL ELECTRIC COMPANY
6. PUGET SOUND POWER & LIGHT COMPANY
7. CHELAN COUNTY PUBLIC UTILITIES DISTRICT
8. DOUGLAS COUNTY PUBLIC UTILITIES DISTRICT
9. GRANT COUNTY PUBLIC UTILITIES DISTRICT
10. NEWNASHA PUBLIC POWER DISTRICT
11. TRI-STATE GENERATION & TRANSMISSION ASSOCIATION
12. U.S. BUREAU OF RECLAMATION-MID PACIFIC REGION
13. PACIFIC GAS & ELECTRIC COMPANY
14. STATE OF CALIFORNIA-DEPT. OF WATER RESOURCES
15. SIERRA PACIFIC POWER COMPANY
16. SACRAMENTO MUNICIPAL UTILITIES DISTRICT
17. DEPT. OF WATER & POWER-CITY OF LOS ANGELES
18. SOUTHERN CALIFORNIA Edison COMPANY
19. METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
20. SAN DIEGO GAS AND ELECTRIC COMPANY
21. BRITISH COLUMBIA HYDRO & POWER AUTHORITY
22. WEST MONTANA POWER & LIGHT
23. IONIA POWER COMPANY
24. U.S. BUREAU OF RECLAMATION-UPPER MISSOURI REGION
25. U.S. BUREAU OF RECLAMATION-LOWER MISSOURI REGION
26. U.S. BUREAU OF RECLAMATION-LOWER COLORADO REGION
27. SALT RIVER PROJECT
28. TUCSON GAS & ELECTRIC COMPANY
29. U.S. BUREAU OF RECLAMATION-UPPER COLORADO REGION
30. COLORADO PUBLIC SERVICE COMPANY
31. PUBLIC SERVICE COMPANY OF COLORADO
32. CITY OF COLORADO SPRINGS
33. COLORADO UTE ELECTRIC ASSOCIATION
34. PLAINS ELECTRIC GENERATION & TRANSMISSION
35. U.S. BUREAU OF RECLAMATION-SOUTHWEST REGION
36. PUBLIC SERVICE COMPANY OF NEW MEXICO
37. EL PASO ELECTRIC COMPANY
38. NEVADA POWER CO



**MAP 1B
PRINCIPAL ELECTRIC ENERGY TRANSMISSION LINES
OF NEVADA AND A PORTION OF THE WEST**

CHAPTER 2

PURPOSES OF THIS REPORT

OVERVIEW

As part of the State Water Planning effort, the Division of Water Resources is publishing a series of planning reports pertaining to future population, economic activity and resource use features for communities of interest within Nevada. Included are counties, cities, water and related land resource areas, economic regions, and rural areas.

Electric energy¹, statewide and regionally, requires substantial support from water and related land resources. A comparable situation was last assessed on a statewide basis in 1949, when the Federal Power Commission published *Power¹ Market Survey, State of Nevada*. The 1949 report was done largely at the instigation of then State Engineer Alfred Merritt Smith, also Secretary of the Colorado River Commission of Nevada.

Use of electric energy is a nearly all pervading economic activity. From a planning standpoint, it is prudent to have a good idea of the amount and distribution of electric energy use and generation with the passage of time, so as to better focus upon internal and outside opportunities and problems.

PURPOSES

The major purpose underlying this report has been to attempt to provide appropriate answers for these

major questions:

For Electric Energy Use And Generation

1. *How many* mega watt-hours (energy), *where* and *when*? (See Tables 2 and 6 and associated narrative.)
2. How might energy be practically *conserved*? (See Chapter 4.)

For Electric Energy Generation Only

3. *How many* acre-feet of plant water use, *where* and *when*? (See Tables 4 and 5 and associated narrative.)
4. Where might facilities best be *located*, considering both economy and environment? (See Chapter 4 narrative under "Siting." See also Appendix A in separate addendum to this report.)

Despite the obvious necessity for internal Nevada focus on these questions, it is important to emphasize that the State cannot escape moving in a Western regional context and sometimes a national context for sources of electric energy. Therefore, the previous major questions for Nevada are highly applicable to the Western States, and are justifiably addressed on both State and regional bases.

Regional balance between generation and use of electric energy has been predicted to occur about 2000, based upon analysis of past amounts and distributions