

# Water for Nevada

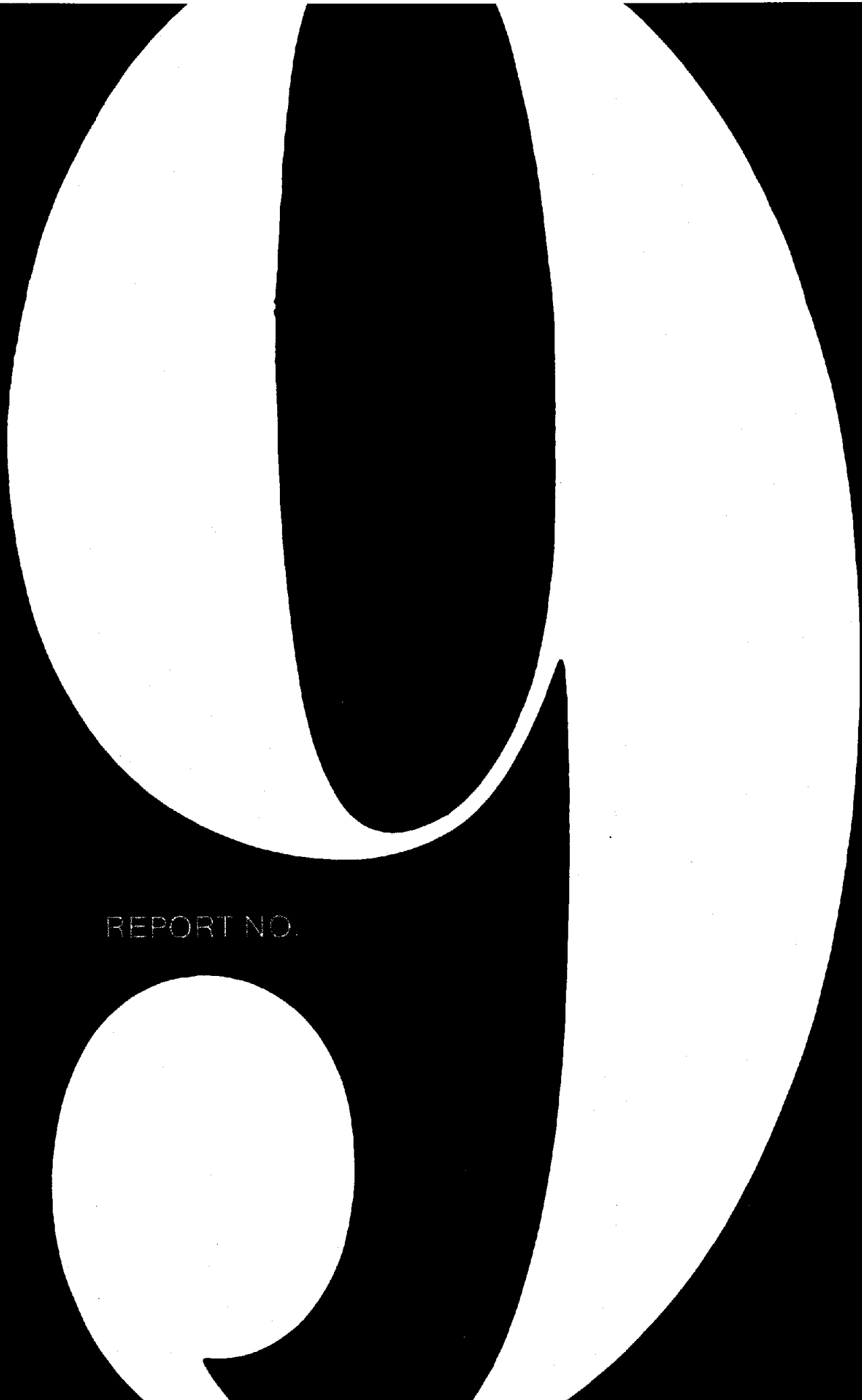


FORECASTS FOR THE FUTURE — ELECTRIC ENERGY

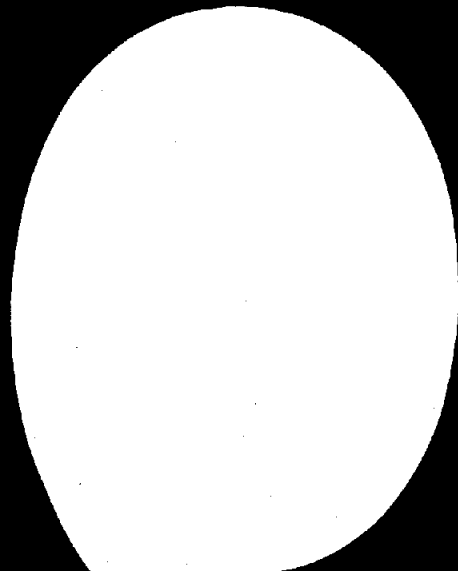
# FORECASTS FOR THE FUTURE — ELECTRIC ENERGY

## 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

TABLE OF CONTENTS

**CHAPTER 1:**

INTRODUCTION ..... 1

Major Issues ..... 1

Effects Upon Nevada ..... 1

Nevada's Present Internal Position ..... 1

External Factors ..... 1

Alternative Postures ..... 3

**CHAPTER 2:**

PURPOSES OF THIS REPORT ..... 7

Overview ..... 7

Purposes ..... 7

**CHAPTER 3:**

AMOUNTS OF ELECTRIC ENERGY GENERATION AND USE . 11

Future Meaning ..... 11

Powerful Forces Interacting ..... 11

Listing of Projections ..... 11

Most Probable Basis ..... 11

Growth Patterns Inside Nevada ..... 11

Study Boundaries ..... 11

Nevada Projection Approach ..... 13

Past and Expected Patterns ..... 13

Population — Water — Energy Situation ..... 14

Number of Nevada Generating Stations ..... 14

Growth Patterns Outside Nevada ..... 14

Interpretation of Outside Pressures ..... 14

Study Boundaries ..... 15

Regional Projection Approach ..... 15

Past and Expected Patterns ..... 15

Prudence of Self Sufficiency ..... 16

**CHAPTER 4:**

CONSERVATION FOR ELECTRIC ENERGY  
GENERATION AND USE ..... 33

Limitations ..... 33

Efficiency ..... 33

Factors of Efficiency ..... 33

**APPENDICES: (Published as a separate addendum to the report)**

**FOCUS UPON EFFICIENCY** ..... 38

Appendix A, Siting ..... 38

Appendix B, Alternative Processes ..... 83

Appendix C, Rate of Use ..... 128

Appendix D, Design ..... 140

Appendix E, Natural Limits ..... 148

Appendix F, Regulatory Situation ..... 173

Appendix G, Technology of Water Use for Energy Processes ..... 184

**BIBLIOGRAPHY (In separate addendum to the report)** ..... 203

### LIST OF TABLES

Table 1 Projections in this Report ..... 20

Table 2 Nevada Electric Energy Use Growth Patterns,  
Historic and Projected, in the Period 1930-2020 ..... 21

Table 3 Nevada Growth Patterns for Population, Per Capita  
Use and Total Use of Electric Energy ..... 23

Table 4 Coolant Water Needs for Nevada's Future Electric  
Energy Generation ..... 24

Table 5 Projections for Nevada's Population, Municipal and Industrial  
Water Use and Electric Energy Use, 1970 to 2020 ..... 24

Table 6 Population and Electric Energy Growth Patterns for  
Groupings of States by Area and Class, 1920-2020 ..... 25

Table 7 Important Inflection Times for Long Term Growth ..... 16

(Tables following are in separate addendum to the report)

Table 8 Listing of Valleys Tentatively Selected ..... 47

Table 9 Large Historic Earthquakes in the Western Basin  
and Range Province, Nevada and California ..... 49

Table 10 Vegetation General Categories Showing Estimated Amounts ..... 57

Table 11 Known and Listed Archeological Resources Per the  
Nevada Archeological Survey (NAS), 1974 ..... 69

Table 12 Nevada Archeological Survey Basins Corresponding to  
Division of Water Resources Hydrographic Areas, 1974 ..... 70

Table 13 Proposed Buffer Zone for Plant Siting ..... 75

Table 14 Less Favorable Areas for Plant Siting ..... 77

Table 15 Known Geothermal Resource Areas (KGRA) in Nevada ..... 93

Table 16 Exploratory Geothermal Drilling in Nevada Through 1973 ..... 95

|          |   |     |
|----------|---|-----|
| Table 17 | <i>Estimated Future Geothermal Energy Statistics by County</i> .....  | 101 |
| Table 18 | <i>Estimated Future Geothermal Energy Statistics by Hydrographic Region</i> .....                                 | 102 |
| Table 19 | <i>Geothermal Resource Development on Federal Lands</i> .....   | 103 |
| Table 20 | <i>Nevada Potential Pumped Storage Sites</i> .....  | 112 |
| Table 21 | <i>Site Selection Criteria Summary</i> .....  | 114 |
| Table 22 | <i>Number of People at Hard Manual Labor Equivalent to Electric Energy to Operate Devices and Processes</i> ..... | 129 |
| Table 23 | <i>Sources of Residential Average Annual Use</i> .....  | 131 |
| Table 24 | <i>Organization of Appendix to Show Meaning</i> .....   | 157 |
| Table 25 | <i>Description and Measurement of Focus</i> .....   | 161 |
| Table 26 | <i>Variables and Combinations as an Identity</i> .....  | 163 |
| Table 27 | <i>Meanings of Combinations of Variables in the Identity</i> .....  | 163 |
| Table 28 | <i>Relationships Among Densities</i> .....  | 167 |
| Table 29 | <i>What It Means to Try to "Control the Whole Thing"</i> .....  | 171 |
| Table 30 | <i>Major Regulatory Factors and Their Major Effects on the Major Sources of Energy</i> .....                      | 176 |
| Table 31 | <i>Regulatory and Advisory Agencies and Functions with Respect to Energy</i> .....                                | 179 |

## LIST OF FIGURES

|  |  |    |
|--|--|----|
| Figure 1   | <i>Nevada Electric Energy Growth Patterns by Area</i> .....  | 26 |
| Figure 2   | <i>Nevada Electric Energy Growth Patterns by Class of Usage</i> .....  | 27 |
| Figure 3   | <i>Nevada Per Capita Electric Energy Growth Patterns</i> .....   | 28 |
| Figure 4   | <i>Coolant Water Needs for Nevada's Future Electric Energy Generation, Assuming No Net Import or Export of Electric Energy</i> ..... | 29 |
| Figure 5   | <i>Percent Increase in Importance Above 1970 Conditions with Time</i> .....  | 30 |
| Figure 6   | <i>Population Growth Patterns for the Nation and Groupings of States by Area and Class, 1920-2020</i> .....                          | 31 |
| Figure 7   | <i>Electric Energy Generation Growth Patterns for the Nation and Groupings of States by Area and Class, 1920-2020</i> .....          | 31 |
| Figure 8   | <i>Per Capita Electric Energy Generation Growth Patterns for the Nation and Groupings of States by Area and Class, 1920-2020</i> ..  | 32 |
| (Figures following are in separate addendum to the report) |  |    |
| Figure 9   | <i>Stages of Siting Process</i> .....  | 41 |

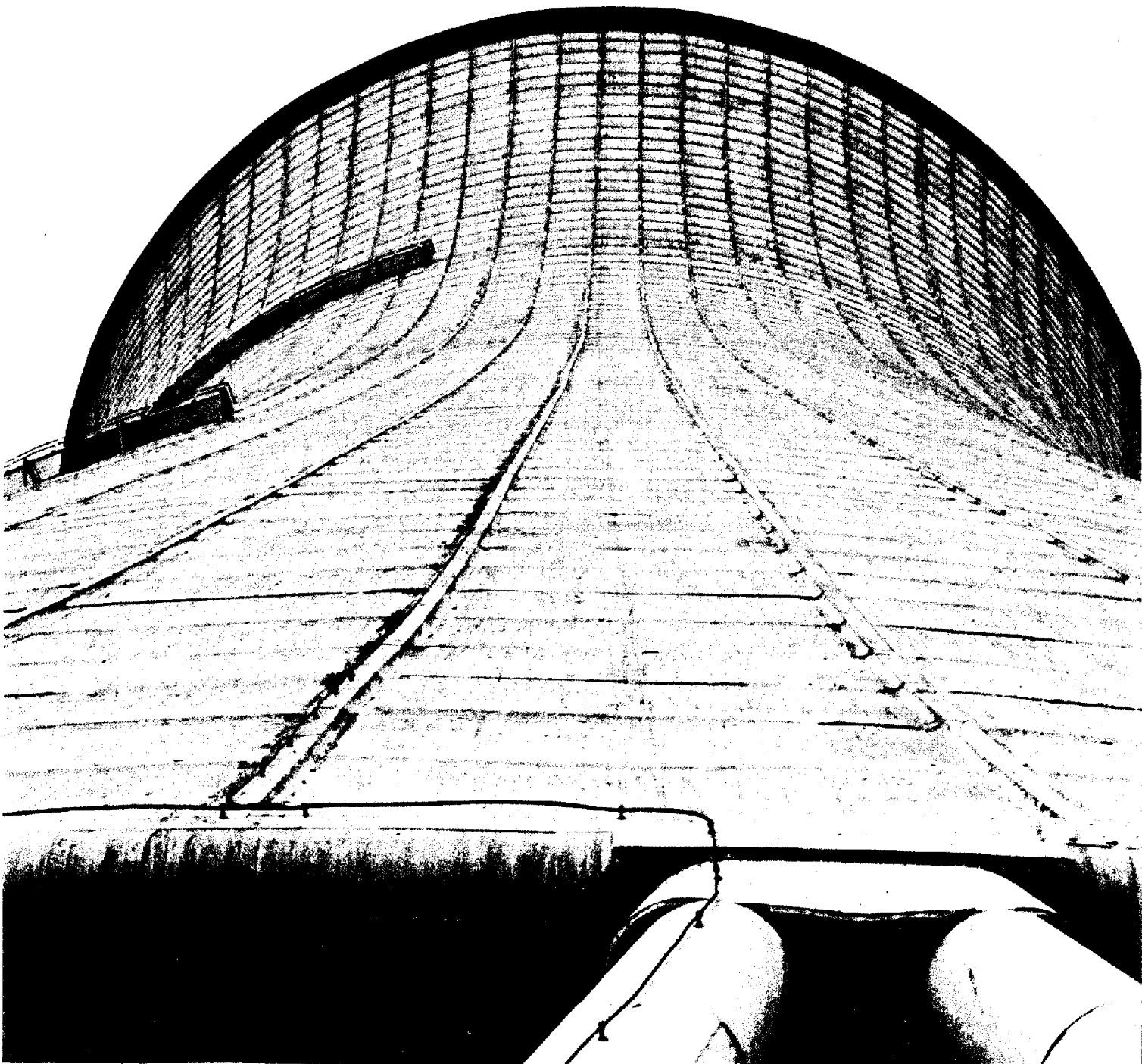
|           |  |     |
|-----------|--|-----|
| Figure 10 | <i>Economic-Environmental Balance Mechanism for Siting-Rating System</i> ..... | 43  |
| Figure 11 | <i>Earthquakes in Nevada for 1971</i> .....                                    | 52  |
| Figure 12 | <i>Provisional Fault Map of Nevada</i> .....                                   | 53  |
| Figure 13 | <i>Faults in the Reno-Tahoe-Carson City Area</i> .....                         | 54  |
| Figure 14 | <i>Proposed Buffer Zone</i> .....  | 76  |
| Figure 15 | <i>Pumped Storage Plant Operation</i> .....                                    | 110 |
| Figure 16 | <i>Typical Weekly Electric Utility System Load Curve</i> .....                 | 115 |
| Figure 17 | <i>Head-Storage Capacity Relationship</i> .....                                | 116 |
| Figure 18 | <i>Typical Cross Section of an Earthfill Dam</i> .....                         | 118 |

**LIST OF MAPS**

|  |   |     |
|--|---|-----|
| Map 1A   | <i>Nevada and A Portion of the West, as Viewed from the Pacific Ocean</i> .....               | 5   |
| Map 1B   | <i>Principal Electric Energy Transmission Lines of Nevada and A Portion of the West</i> ..... | 6   |
| Map 2  | <i>Nevada Portions of FPC Power Market Areas I, II, III and IV</i> .....                      | 17  |
| Map 3  | <i>Nevada Portions of FPC Power Supply Areas 41, 46B, 47 and 48</i> .....                     | 18  |
| Map 4  | <i>United States of America, the 48 Contiguous States in 4 Regions</i> .....                  | 19  |
| <i>(Maps following are in separate addendum to the report)</i> |   |     |
| Map 5  | <i>Nevada Archeological Survey Basins and Resources</i> .....                                 | 71  |
| Map 6  | <i>Known Geothermal Resource Areas (KGRA) and Lease Applications Activity in Nevada</i> ..... | 97  |
| Map 7  | <i>Hot Springs and Geothermal Wells in Nevada</i> .....                                       | 98  |
| Map 8  | <i>Nevada Potential Pumped Storage Sites</i> .....  | 113 |



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

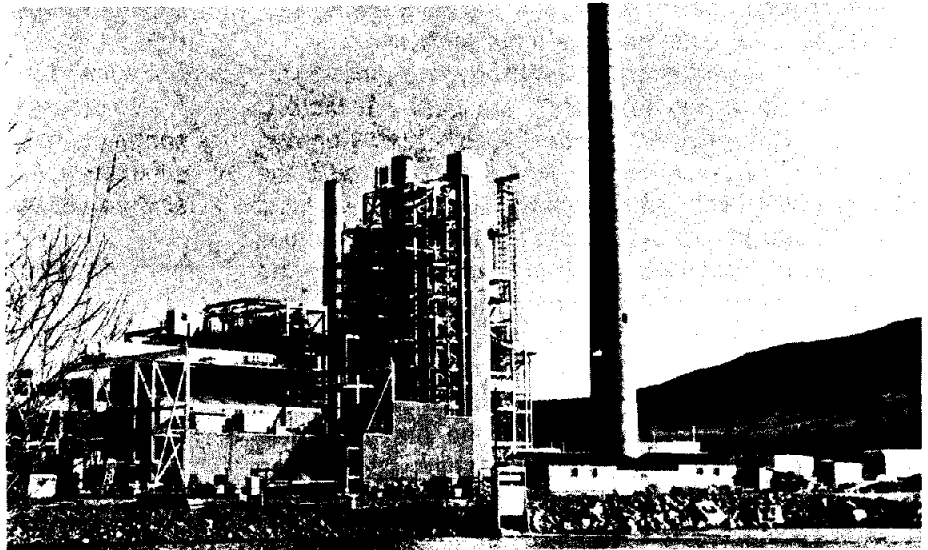
Hoover Dam Generating Station near Boulder City, Nevada. Hydropower.

*Credit: U. S. Bureau of Reclamation*



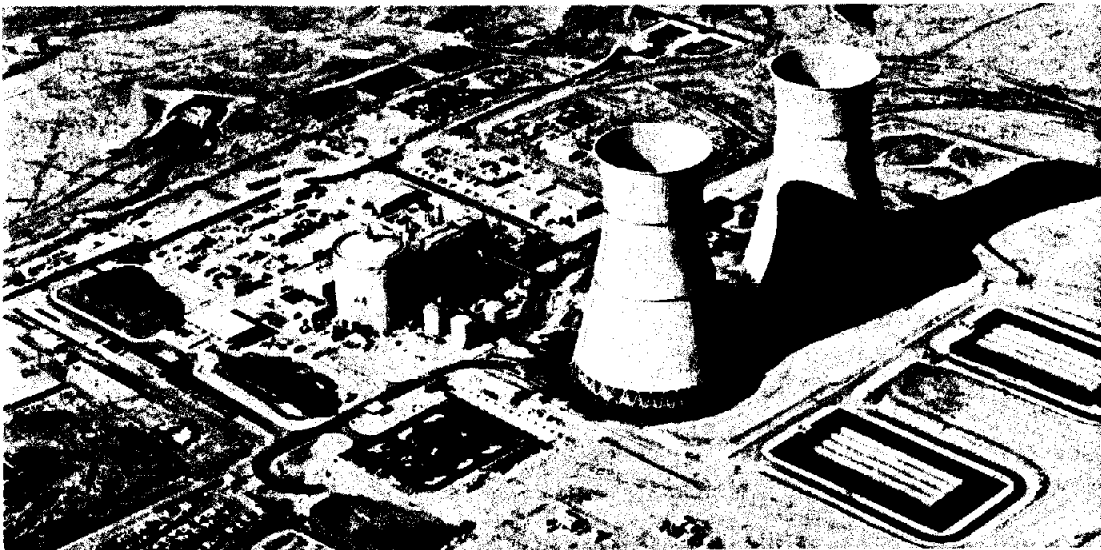
Tracy Generating Station near Reno, Nevada. Fossil Fueled.

*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.

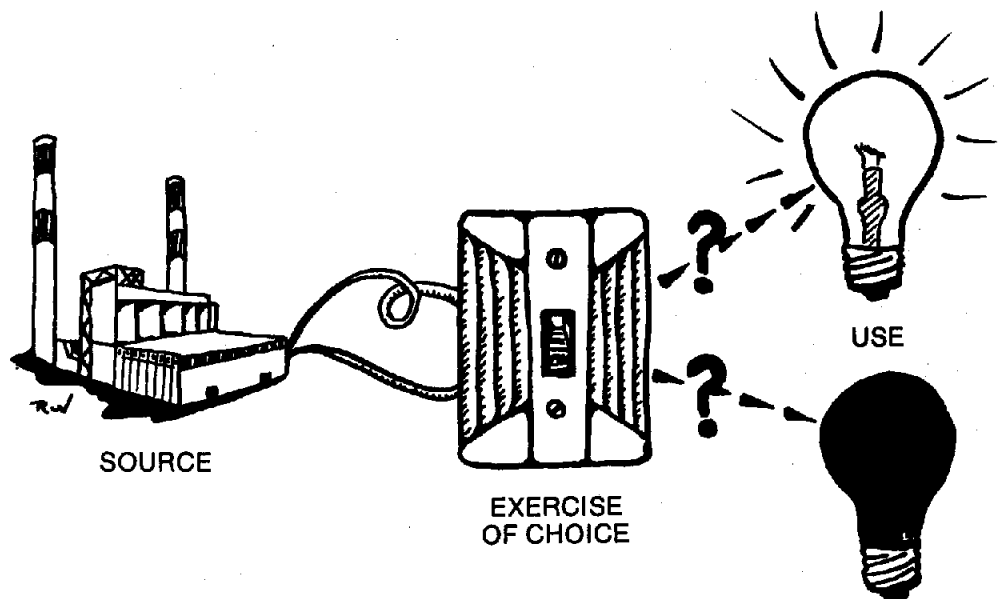
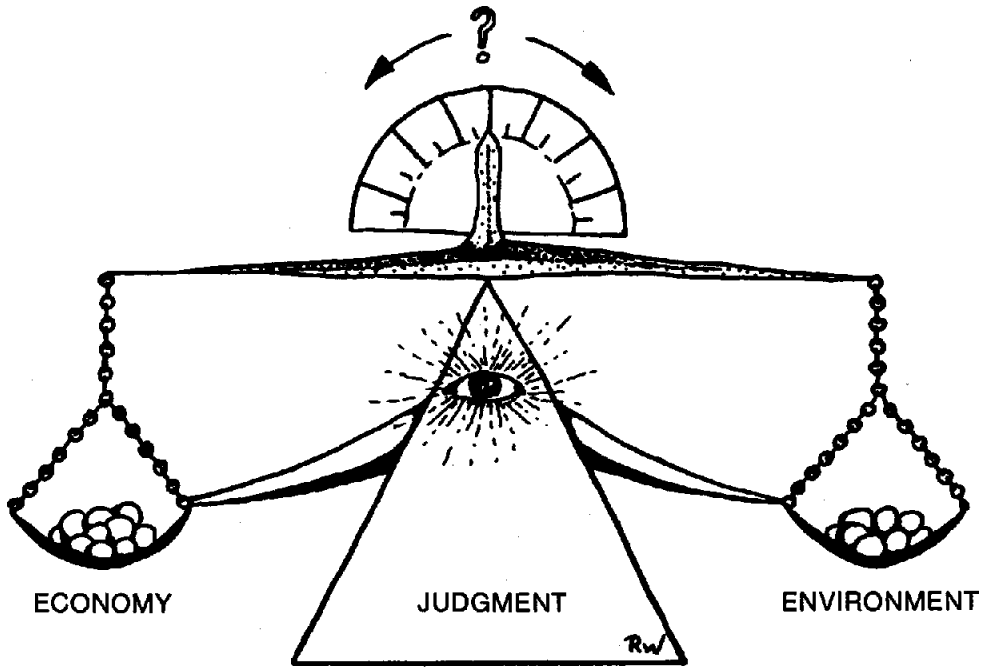
To prudently assure protection of the State's interest, serious consideration should be given to achieving self sufficiency. A significant import or export posture should also be considered.

#### **Alternative Postures**

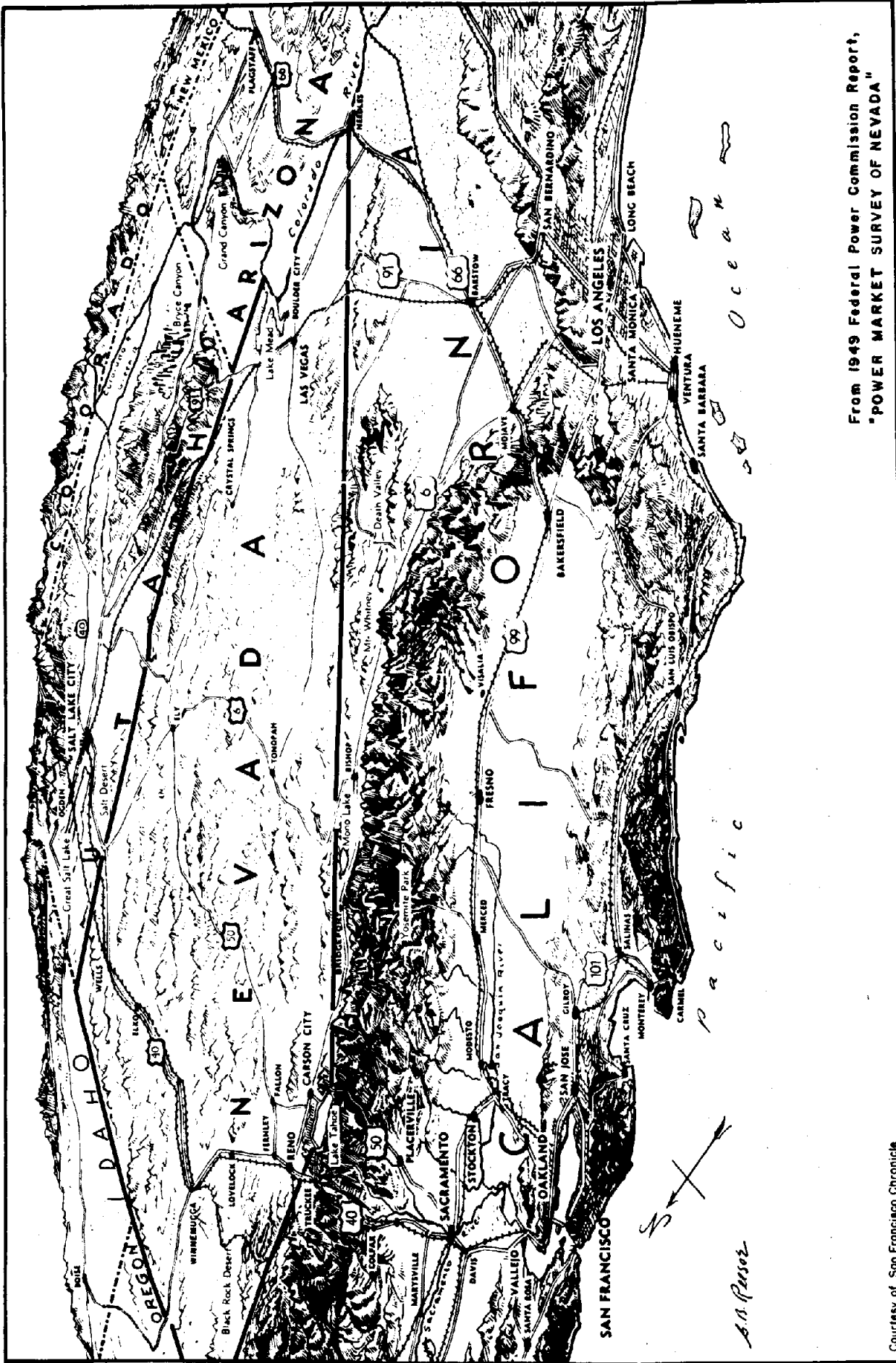
1. Continued significant import.
2. Nearly self sufficient.
3. Significant export.

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"

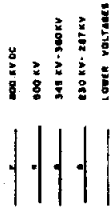
MAP 1A  
 NEVADA AND A PORTION OF THE WEST  
 AS VIEWED FROM THE PACIFIC OCEAN

Courtesy of San Francisco Chronicle

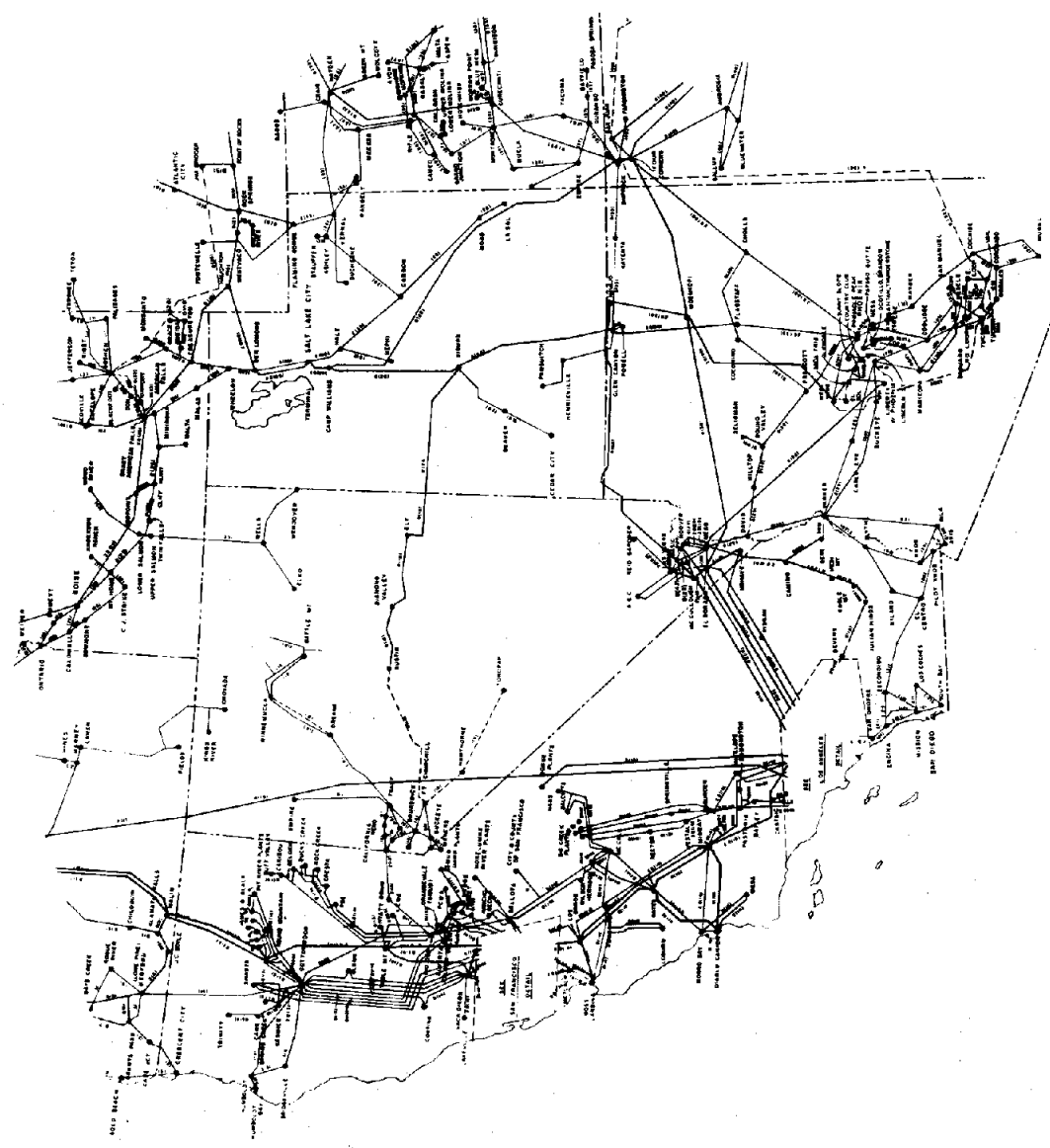
WESTERN SYSTEMS COORDINATING COUNCIL  
 OPERATIONS COMMITTEE  
 MAP OF PRINCIPAL TRANSMISSION LINES

JANUARY 1, 1974

MAIN LINES SHOWN ARE SCHEDULED  
 FOR OPERATION BY 1974



1. BONEVILLE POWER ADMINISTRATION
2. BAYBROTHER WATER, POWER COMPANY
3. BEACON CITY LIGHT
4. BENTON POWER & LIGHT COMPANY
5. PORTLAND GENERAL ELECTRIC COMPANY
6. PUGET SOUND POWER & LIGHT COMPANY
7. CHELLAR COUNTY PUBLIC UTILITIES DISTRICT
8. DOUGLAS COUNTY PUBLIC UTILITIES DISTRICT
9. GRANT COUNTY PUBLIC UTILITIES DISTRICT
10. NEWASHAWA 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 energy<sup>1</sup>, 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 *Power<sup>1</sup> 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