Southern California Edison
and
THE FOUR CORNERS PROJECT

The Four Corners Project -- a network of six enormous coal-burning power plants, two in operation, three under construction, and one in planning -- is extraordinary in two respects. First is its location. The plants lie across the heart of America's scenic Southwest: Nevada, Utah, Arizona, and New Mexico. Five national parks -- Grand Canyon, Mesa Verde, Bryce, Zion, and Canyonlands -- are all less than 100 miles from one or more plants, as are nearly one-fourth of the country's national monuments. Two of the plants themselves are located on Indian reservations.

Second is the assault on the environment that this network is bringing about. The two plants now in operation have already spread a haze over parts of Arizona, New Mexico, Utah, Colorado, and Nevada. (From 1964 through 1971, the Four Corners plant alone emitted 200 to 250 tons of soot and ash per day, approximately equal to the daily production of particulates in New York City and Los Angeles County combined).[13] The coal to fire the network is being strip-mined from Indian reservations and Department of Interior lands; and the large amounts of water required to run power plants in this dry desert area will come from the already depleted Colorado River.

The plants are being planned, built, and operated by a consortium of twenty-three private utilities and state and federal agencies, with companies being allotted power from the plants in proportion to their investments in the construction. Almost half of the projected output will go to Southern California, where utilities are caught between increasing demand for electricity and strict anti-pollution laws. The other half is earmarked for the fast-growing urban centers of the Southwest -- Phoenix, Tuscon, Las Vegas, Albuquerque -- including two separate projects to pump water from the Colorado River for Arizona's cities and corporate farms.

The impact of merely the first two plants on the desert environment has so far been astonishing. Even after the upgrading of the Four Corners plant now in progress, thirty tons of soot and ash will be emitted daily, supplemented by another twenty tons from the Mohave plant. The two plants together daily emit five hundred tons of SO2 and four hundred tons of NOx. With the four new plants, the nation's last great clean air region faces many decades of serious air pollution.

The coal to be burned by all six plants will be strip-mined -- a second major source of environmental disruption. The Peabody Coal Company, which will provide coal for both the Mohave and Navaho plants, has begun to strip one hundred square miles of Black Mesa, a highland in northern Arizona and a beautiful green oasis which is both home and spiritual center for thousands of Hopi and Navaho Indians. Successful "reclamation" is doubtful, particularly given the so-called "normal wear and tear" allowed for in the contract.

CAPACITY (in Megawatts) of FOUR CORNERS POWER PLANTS

Plant	Four Corners	Mohave	San Juan	Navaho	Hunt. Canyon	Kaiparowits	Total MW
Location	NW N. Mex.	So. Nevada	NW N. Mex.	No. Ariz.	Cent. Utah	So. Utah	
Units/ Operative	'63-'70	'71	'73-'79	'74-'79	'74-?	'78-'82	
Ownership/MW							
S C E	725	846				2500*	4071
Arizona P.S.	801			323		1500*	2624
Utah P & L					2000		2000
San Diego G&E						1000*	1000
Salt Riv. Proj.**	151	151		501			803
L.A. Municipal		302		490			792
Tucson G&E	106		495	173			774
P.S. New Mex.	196		495				691
US Reclamation				561			561
Nevada Power		211		261			472
El Paso Elec.	106						106
TOTAL	2085	1510	990	2310	2000	5000*	13895

The water needs of the six plants will severely tax this arid region. Although every plant is being equipped with cooling ponds or wet towers which will control thermal damage, huge quantities of water will be required just to make up for evaporative losses. Four Corners and Mohave together consume 67 million gallons per day; the proposed 5000-MW Kaiparowits plant will draw another 92 million gallons -- more than the entire domestic water use of San Francisco city and county.[14] All this cooling water will come from the Colorado River or its direct tributaries, already strained in supplying much of the water needs of the Southwest.***

*Kaiparowits dates and capacity are CEP estimates based on "Southwest Hearings," since firm plans have not been announced by companies.

**The Salt River Project is an Arizona state agency, supplying electricity to 170,000 people, and providing irrigation water for over 200 square miles of farmland and 70% of the total water requirements of Phoenix and five other cities.

***Five of the six plants will withdraw water from the relatively unsaline upstream part of the river, thereby reducing the water available to offset the Colorado's saline tributaries downstream. High salt content is already ruining farms irrigated by the Colorado River in California's Imperial Valley and Mexico's Mexicali Valley.

Moreover, up to three million gallons of water per day are removed from the deep wells on Black Mesa, to be mixed with pulverized coal and shipped to Mohave via a 273-mile underground pipeline. A federal study has forecast that, as a result, the water table in parts of Black Mesa will drop up to one hundred feet over the next thirty years.[15]

Virtually every phase of the construction and operation of the six power plants uses Indian or federally-owned resources, and therefore has required authorization from some government agency. Indian land furnishes coal for three plants and the site for two, as well as water for the Mohave coal pipeline. Coal and site land for most other plants has been leased from the Interior Department or the Bureau of Land Management. All six plants will be cooled by water authorized directly or indirectly by Interior or its Bureau of Reclamation. Transmission lines and access roads also required federal permits.

Most of the contracts were negotiated quietly at high government levels.[16,17] No public hearings were held, few environmental studies were filed. Indian and environmental groups have charged federal authorities with serious dereliction of duty--particularly the Bureau of Indian Affairs for helping lease Indian water, coal, and land rights for "inadequate" compensation and without warning of environmental consequences. The Bureau of Reclamation has also been criticized for possible conflict of interest in arranging cooling water for the Navaho plant, one-fourth of which will go to the Bureau to pump water for the Central Arizona Project.

Pollution from the original Four Corners plant has provoked limited local protests since 1963; however, the entire project began to draw national attention in 1970, as news of forthcoming power plants filtered out of the Southwest. People who had grown accustomed to utility pollution elsewhere became alarmed at the prospect of massive environmental damage in one of the country's greatest unspoiled regions. "The places people escape to are being sacrificed to make more of what they escape from," said one ad.[18] Complacency that the country was vast enough to absorb even exponential growth gave way to nightmarish visions of a world saturated with power plants:

> [The utilities] claim that the West's power needs will quadruple by 1990. That means we will need plants like San Juan, Navaho, and Kaiparowits. And almost as soon as they are operational, we will need to duplicate them. Our demand will quadruple again by 2010, and again by 2030. The picture that emerges is that of a 2000-megawatt plant every ten miles; and power poles lined up in every direction, as far as the eye can see, through a dense smog over endless stretches of Peabody Coal Company's 'reclaimed' land. It is not a pretty picture, but it is not entirely a fantasy. This is the path we are on right now.[19]

Although some Hopi and Navaho Indians tolerate the development for the jobs it provides, others have assailed it, as in this letter

from traditional village chiefs to President Nixon:

> The white man, through his insensitivity to the way of nature, has desecrated the face of Mother Earth . All over the country, the waters have been tainted, the soil broken and defiled, the air polluted...and the path of the Great Spirit has become difficult to see by all men...[20]

For many non-Indians, it seems to represent the destruction of one culture to feed another:

> The native American cannot be separated from his land... Black Mesa, the Colorado River, Grand Canyon, the eagle, piñon, sage, sandstone, and sun are part of this culture. The Indian exists as an equal. It is all one integrated, delicate, and beautiful whole...It is the last spot in the United States where men and land exist in harmonious balance.[21]

The outcry came to a head in May 1971, in five days of hearings in various southwestern cities before the Senate Committee on Interior and Insular Affairs.* The Committee heard power company officials and local supporters of the plants, but mostly it was addressed by eloquent and sometimes remarkably sophisticated environmental groups, scientists, Indians, housewives, ranchers, and tourist workers, pleading for a halt to further development and often emphasizing that tourism far outweighs power as a source of income in the region. Subsequently, the Interior Department imposed a one-year moratorium on beginning construction at Kaiparowits, but the operation or building of the other five plants is proceeding on schedule.

Public protest and tougher new laws have already compelled the utilities to upgrade particulate control at Four Corners and Mohave. Two of the new plants -- Navaho and Huntington Canyon -- will be equipped for 99.5% particulate removal, and SO2 control may eventually be applied there and at the other plants.

However, there are no plans for efficiencies near 99.9%, the level at which small particles most destructive to health and visibility begin to be meaningfully reduced. NOx control would likewise seem to be a high priority, but no research is planned. Although dry towers can be purchased (which do not evaporate water), all plants will use evaporative wet towers or cooling ponds. Application of state-of-the-art measures would go a long way toward curtailing the damage caused by the plants.

Environmentalists are now fighting to stop Kaiparowits -- the largest plant in the network and the only one on which construction

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*Five-volume copies of the hearings, comprising a virtual compendium of environmental philosophy as well as "hard" information, are available from the Committee.

has not actually begun -- as well as additional plants slated for the 1980s.* Since coal-burning plants with even slight environmental impact cannot be built, most of the project's opponents insist that the only genuine way to spare the Southwest's particularly fragile environment is to not build them there in the first place. As one man expressed it:

> This canyon country is not only one of the most scenic regions on earth, it is also a reservoir of good clean air and uncontaminated sunshine. It must be kept this way. The region's resources of wilderness and beauty are far more valuable to the American people than any amount of electrical megawattage.[23]

*Beyond Kaiparowits, utilities are planning another 22,000 megawatts to bring the project's total capacity by 1990 to 36,000 MW--three times the size of the nation's largest private utility.[22]

FOUR CORNERS - SCE

LOCATION	Fruitland, New Mexico
CAPACITY	2085 MW*
PLANT COST	$249.0 million (SCE share: $79.9 million)
YEAR BUILT	1963 LAST UNIT: 1970
TIME OPERATING 1970	100%
FUEL USE 1970	Coal: 5,458,000 tn of 0.78% sulfur, 21.82% ash (98% energy) (roughly 6.9 million in 1972)**
	Gas: 2.0 million mcf (2% energy)
COOLING WATER USE	Closed-cycle system
WATER SOURCE	San Juan River

POLLUTION CONTROL CHART

Pollutant	Control Equipment				Emissions	Evaluation
	Boiler #	Equip.	Date Inst.	% Efficiency		
PARTICULATES (ash, soot, etc.)	1,2 & 3	Wet Scrubbers	1972	Design: 99.2 Tested: N/AV	900 lb/hr (est.)	?
	4 & 5	Elect Precip	1969-70	Design: 98.4 Tested: 97.9	4300 lb/hr (average)	X
					Total 5200 lb/hr	Overall X
SO2 (gas)	"Low-sulfur" content (0.78%) is partially offset by coal's low heat value; more coal is burned to generate given amount of electricity, raising "equivalent" sulfur content to roughly 1%.				29,400 lb/hr 96,600 tn/yr	*** ?
NOx (gas)	Control technology not available for coal-fired boilers.				20,000 lb/hr 65,700 tn/yr	*** —

*Boilers 1,2,and 3 totalling 575 MW, owned by Arizona Public Service Co. Boilers 4 and 5, totalling 1510 MW, are owned by SCE (48%) and by five other utilities. See "Four Corners Project" for breakdown.

**Based on 75% capacity factor.

***Roughly 28.6% of SO2 and NOx emissions are from Boilers 1 through 3. Remainder from 4 & 5. Hourly figures are based on fuel input reported in "Southwest Hearings," pp. 471-474. Annual figures are based on 75% capacity factor.

POLLUTION CONTROL CHART

Pollutant	Control Equipment	Emissions	Evaluation
THERMAL POLLUTION	Man-made cooling pond; water recirculated to plant in closed system. Make-up water for pond pumped from San Juan River at rate of 40 million gallons per day.	Cooling Water Temp WINTER Dischg: - Ambient: - Incr: - SUMMER Dischg: - Ambient: - Incr: -	✓ ✓

POLLUTION CONTROL EXPENDITURES TO DATE: $47.2 million for air ($360,000 for mechanical collectors and $14.5 million for wet scrubbers on boilers 1 through 3; $8.3 million for precipitators plus $24 million for baghouses now being installed on boilers 4 and 5. Thermal costs (for cooling pond) not available.

LEGAL STATUS: Wet scrubbers on boilers 1 through 3 are being tested to determine compliance with New Mexico 99.2% particulate control standard; boilers 4 and 5 are operating under state variance, and are expected to comply with particulate standard when installation of baghouses is completed (mid-1973). Four Corners complies with water regulations.

FUTURE PLANS FOR POLLUTION CONTROL: None, beyond installation of equipment described above.

CEP ESTIMATE OF EXPENDITURES NEEDED FOR STATE-OF-THE-ART-CONTROL

$27.7-$47.8 million total (SCE share: $10.9-$18.1 million)

$5.0-10.0 million to control SO2 (from boilers 1 through 3)

$22.7-$37.8 million to control SO2 (from boilers 4 and 5)

(Plant will achieve state-of-the-art particulate control if equipment being installed operates as planned.)

PROFILE: Four Corners, in northwest New Mexico, with which SCE became involved only in the late 1960s, is probably the most notorious power plant in the U.S. For almost a decade, it has spread haze over much of the nation's most beautiful canyon and desert lands. It has also paved the way for a slew of other giant coal-burning plants which together may obliterate most of the Southwest's remaining clear air.

Four Corners is the world's largest coal-fired plant--burning 25,000 tons of low-grade coal daily-- and the first large generating station to be sited in the Southwest. Its first three boilers, totalling 575 MW, owned exclusively by Arizona Public Service Co., began operation in 1963-64. According to APS President William P. Reilly:

> APS and its design-engineer concluded that because of the relatively remote location of the plant, plus the expected rapid dispersion of the ash particulate, there would not be an air pollution problem.[24]

Consequently, the plant was equipped only with outdated 87% efficient mechanical particulate collectors. Soon after it began operation, APS found that the collectors, grossly inadequate to begin with, were performing at only 78% efficiency[25], equivalent in actual emissions produced to less than 60% at most plants, because of the high ash content and low heating value of the coal. Although attempts to upgrade failed, the company made no plans to install more modern equipment.

As visibility deteriorated through much of the Southwest, public outrage mounted in New Mexico over Four Corners emissions. The plant's smoke plume was traced up to several hundred miles away, reportedly as far as the Grand Canyon, and in 1966 was photographed by orbiting astronauts as the only man-made object visible from outer space. (APS meterologists later argued that the plume was caused by jet aircraft contrails).

Despite the increasing shroud of pollution over the Southwest, SCE, APS, and four other utilities were busily planning two new boilers (4 and 5) of 755 MW each for the plant. SCE would manage construction and receive 48% of the new capacity. APS, the operating agent, was allotted 15% with the remainder divided up among the other companies in proportion to their investment in the project.

In April 1966, the Interior Department, whose authorization was necessary, since the plant, the coal mine, and much of the transmission lines are within a Navaho reservation, granted the permits necessary to triple Four Corners' capacity -- provided that "the most effective commercially proven electrostatic [precipitators]... to minimize smoke, fly ash, and dust [particulates] in stack emissions..." were installed on the new boilers and were retro-fitted on boilers 1, 2, and 3.[26] No SO2 or NOx controls were required.

In fact, this agreement did not provide for state-of-the-art particulate control. Without consulting the air pollution authorities at Health, Education and Welfare, the Interior Department specified an efficiency requirement of only 97%, and when Units 4 and 5 began full operation in 1969 and 1970, they were equipped with 97.9%

ESPs. APS's claim that "the ESPs reflected the most effective commercially proven collection devices for particulate matter available using existing technology, considering the low sulfur content of the coal,"[27] was flatly denied by an HEW report on Four Corners published in January, 1970.[28] The report noted that ESP size was "about one-third [of] that required" for proper "hot-side" operation needed on low-sulfur coal, and that "proper application of other elements of ESP design...would have permitted engineering of much more effective particulate matter control into the ESPs for Units 4 and 5."[29]

Southwesterners who had expected a particulate clean-up at Four Corners were jolted in July 1969, when boiler 4 began adding its 26 tons per day to the 200 tons already being spewed out by Units 1 through 3. (A year later, boiler 5 began contributing another 26 tons daily). The clamor for more stringent controls led to legislative hearings in New Mexico which culminated in the State's January 1970 adoption of a new 99.2% particulate control requirement.

Impressive clean-up plans swiftly materialized. Four days before the law was even announced, APS contracted for $14.5 million wet scrubbers for boilers 1 through 3. SCE was slower to respond, but a year later, announced purchase of a $24 million baghouse filter for boilers 4 and 5 (the first such device to be built at full scale on a coal-fired plant anywhere in the world).

The scrubbers, installed in February 1972, have reportedly been meeting the required 99.2% efficiency (reducing boiler 1 through 3 particulate emissions from 200 to ten tons per day) and, although not equipped with limestone additives to control SO2, may have caused a surprising 40% drop in SO2 emissions.* The baghouse filter, to be in operation in mid-1973, will reduce particulate emissions from boilers 4 and 5 from fifty-two to twenty tons per day. Until then, the two boilers will operate with a variance from the state.

Environmental problems at Four Corners do not end with air. The plant also severely threatens the water supply of this arid region. Although it uses a closed cooling system, forty million gallons of water per day are drawn from the San Juan River just to replace evaporative losses from the giant 61-square-mile "cooling pond" - Lake Morgan[31]. The run-off from the plant's settling ponds (where fly ash from boilers 1 through 3 is collected), moreover, taxes the river with a heavy dissolved solids load. New Mexico's Water Quality Chief noted that, on May 20, 1971, for instance, the level of dissolved solids in the ash pond discharge was "seventy-four times greater than the prescribed limit"[32]. This pollution could be easily abated by redesigning the ponds so that the ash and water

*According to preliminary tests, reported to CEP by the scrubber manufacturer.[30]

are properly separated before discharge, or by eliminating them and, instead, burying the fly ash in the nearby strip mines (as is currently done with ash from boilers 4 and 5).

Aside from being a siting calamity, Four Corners has a history reflecting appalling utility negligence. APS, and later SCE, downplayed the plant's degrading effect on the environment, and claimed clean-up technology was unavailable. They responded only to rules laid down -- after public outcry -- by the Interior Department and New Mexico. Now the plant is on its way to becoming a showcase for particulate control, with utilities and environmentalists around the country watching to gauge the success of the innovative baghouse and scrubbers.

However, the discouraging truth is that the air for a large area around Four Corners will never be truly clean. The new control equipment, reducing particulates from 250 tons per day to less than 30 tons by late 1973, will not affect most of the haze-creating submicron particles nor will it prevent emission of tons of SO2 and NOx. Were state-of-the-art practices to be implemented for both air and water, the existing Four Corners plant would still present an environmental threat to the Southwest...one that may be compounded, as there is serious talk of constructing three more boilers (adding another 3200 megawatts to the plant's 2085-MW capacity.)[33]

MOHAVE - SCE

LOCATION	Clark County, Nevada
CAPACITY	1510 MW*
PLANT COST	Not available
YEAR BUILT	1971 LAST UNIT: 1971
TIME OPERATING 1970	None
FUEL USE 1970	Plant under construction in 1970. Now burns 4,325,000 tons coal per year**, 0.5% sulfur, 8.0% ash. Less than 5.0% energy input is from gas.
COOLING WATER USE	Closed-cycle system
WATER SOURCE	Colorado River

POLLUTION CONTROL CHART

Pollutant	Control Equipment				Emissions***	Evaluation
	Boiler #	Equip.	Date Inst.	% Efficiency		
PARTICULATES (ash, soot, etc.)	1	Elect Precip	1971	Design: 98.6 Tested: 97.9	875 lb/hr	X
	2	Elect Precip	1971	Design: 98.6 Tested: 97.9	875 lb/hr (higher at full capacity)	X
					Total 1750 lb/hr	Overall X
SO2 (gas)	Plant burns 0.5% sulfur coal.				13,000 lb/hr 42,700 tn/yr**	✓
NOx (gas)	Control technology not available for coal-fired boilers.				12,000 lb/hr 39,400 tn/yr**	—
THERMAL POLLUTION	Two mechanical-draft wet cooling towers. Cooling water is recirculated in closed cycle. Towers require 27 million gallons per day of Colorado River make-up water.				Cooling Water Temp WINTER Dischg: - Ambient: - Incr: - SUMMER Dischg: - Ambient: - Incr: -	✓ ✓

*Plant is jointly owned, with 56% belonging to SCE. See table in "Four Corners Project" section for breakdown.
**Annual emissions based on 75% annual capacity factor.
***Hourly emission data reported by operating companies in "Southwest Hearings", pp. 475-476.

POLLUTION CONTROL EXPENDITURES TO DATE: $4.6 million for precipitators; cost of cooling towers not available.

LEGAL STATUS: Clark county requires 98.9% particulate control and 80% SO2 control at Mohave. SCE is currently operating the plant under compliance plan worked out with the county, with compliance expected by end of 1972.

FUTURE PLANS FOR POLLUTION CONTROL: SCE is testing precipitator modifications and SO2 systems to achieve compliance with above rules.

CEP ESTIMATE OF EXPENDITURES NEEDED FOR STATE-OF-THE-ART CONTROL

$22.7-$37.8 million total (SCE share: $12.7-$21.2 million)

$22.7-$37.8 million for SO2 control (particulate control alone would cost $12.1-$15.1 million or somewhat less if existing ESP can be upgraded).

PROFILE: Mohave, in Southern Nevada, south of Las Vegas and west of Grand Canyon, is the second of six giant coal-burning plants now operating or being built in the Southwest. Slightly more than half of its 1510 megawatts belong to SCE, which runs the plant, with the remainder divided among three other participating utilities.

When Mohave began operating in 1971, its pollution controls already fell short of Clark County's requirements. Possibly alarmed by Four Corners' pollution, the county adopted a 98.9% particulate control rule in late 1970 and a year later an 80% SO2 control limit. Mohave could not meet either standard.

The plant's $4 million ESP, designed originally for 98.4% efficiency, was upgraded to 98.6%, costing $600,000 (which illustrates the penalty of upgrading when spare capacity has not been built into pollution control). Even with experiments in flue gas "seeding," its efficiency as of January 1972 was still only 97.9%.[34] The one percent difference amounts to ten tons of particulates per day. SCE has defended its efforts to control particulate emissions at Mohave ("to the extent that commercially proven technology is available, we have installed it"[35]) and has attributed inadequate performance of its ESPs to the low-sulfur content of plant coal. However, the idea of expanding the precipitator for "hot-side" operation -- a proven but possibly expensive solution for low-sulfur coal -- seems to have been excluded.

Although Mohave burns the lowest-sulfur coal (0.5%) in the country, its SO2 emissions exceed county standards. Yet company Vice-President Howard Allen testified in 1971 that SCE may wait until 1973 before

committing itself to more air pollution controls:

> We have this extensive research project at Mohave with scrubbers, and until that is concluded and until the baghouse is put on at Four Corners...we are reserving further judgement of what to do.[36]

Clark County has granted the company variances for both particulate and SO2 emissions, specifying that installation of control systems must begin by June 1972. Even if additional variances are obtained, SCE will not be able to postpone a decision much longer.

Cooling at Mohave is accomplished by two mechanical-draft cooling towers, which draw water from the Colorado River three miles away and recirculate it to the condenser in a closed system. Although the towers prevent direct discharge of waste heat into the river, they consume 27 million gallons per day of river water -- a significant drain on the already water-short Colorado -- just in replacing evaporative losses.[37]

Despite the air and water problems at this plant, and the furor regarding its strip mining of Black Mesa (see "Four Corners Project"), SCE and the other utilities participating in the Mohave Project are actively studying a doubling of the plant's capacity later in the decade.[38]

SCE COMPANY DATA

Address: 2244 Walnut Grove Avenue, Rosemead, California 91770
Major Services Electricity (100%) (213) 572-2189

Financial Data ($ millions)

	1970	1969	1968	1960
Gross Operating Revenues	721.0	642.4	589.1	305.8
Net Income	127.5	107.9	99.9	51.0
Capital Expenditures	305.0	300.0	350.0	-
R & D Expenditures	3.9	1.2	1.1	-
Advertising Expenditures	6.4	6.4	5.1	2.3 (1961)
Sales Expenditures	9.3	-	-	-

Directors

Norman Barker, Jr., Pres., United California Bank
Arnold O. Beckman, Chmn. of Bd., Beckman Instruments
Edward W. Carter, Pres., Broadway-Hale Stores, Inc.
William B. Coberly, Jr., Pres., California Cotton Oil Corp.
Terrell C. Drinkwater, retired Chmn. of Bd., Western Airlines
Stanton G. Hale, Pres., Pacific Mutual Life Ins. Co.
Jack K. Horton, Chmn. of Bd. and Chief Exec. Officer
Frederick G. Larkin, Jr., Chmn. of Bd., Security Pac.Natl. Bk.
T.M. McDaniel, Jr., Pres.
John V. Newman, rancher
Fred Oldendorf, Jr., Senior V.P.
Gerald H. Phipps, Pres., Gerald H. Phipps, Inc.
Richard R. Von Hagan, Pres., Lloyd Corp., Ltd.
Vaile G. Young, Chmn. of Bd., Buffums (Dept. Stores)

Officers
Jack K. Horton, Chairman of the Board and Chief Executive Officer
T.M. McDaniel, Jr., President
Number of Employees 12,229
Number of Stockholders 34,212 preferred, 110,835 common
Annual Meeting Third Thursday in April

Operating Data (1970)

Total Generating Capacity 10,904 MW* (increased to 11,871 MW in 1971**)
Total Electricity Production 45,848,244,000 kwh
Total Generating Facilities 50

	Fossil Fuel	Hydro Electric	Pumped Storage	Nuclear	Gas Turbine
Number of Plants	12	36	0	1	1
Megawattage	8700	842	-	344	12

Total Customers (1970) 2,413,917

	% kwh sales	Average Cost per kwh			
		1971	1970	1969	1968
Residential Users	24.3	2.45¢	2.41¢	2.27¢	2.29¢
Comm. & Indus. Users	64.5	1.05¢	1.00¢	0.98¢	0.98¢
Other Users	11.2	-	-	-	-

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*Includes roughly 1000 MW of hydro capacity "available from others."
**846 MW added with Mohave fossil-fuel plant, and 121 MW with new gas turbine.

FOOTNOTES

1. Letter to CEP from F.A. McCrackin, Manager, Environmental Planning, SCE, November 24, 1971. Information confirmed by Los Angeles Pollution Contol District.

2. "A history of SCE Research and Development on Protecting the Quality of the Environment," published by SCE, 1970, p. III-4. ("A History").

3. SCE reports to the Federal Power Commission, 1970, Form 67, Part II, Schedule A, Section 3, for Alamitos, El Segundo, Huntington Beach, Mandalay, and Redondo Beach plants.

4. Los Angeles Pollution Control District; phone interview. February 4, 1972, quoting from "1971 California Gas Report" by State's electric & gas utilities.

5. "A History", p. IV-9.

6. "A History", pp. IV-10 - IV-12.

7. Wall Street Journal, August 13, 1971.

8. SCE response to CEP Questionnaire, June, 1971.

9. The New York Times, April 12, 1971, p. 74.

10. Testimony before California Public Utilities Commission by P.J. West, SCE Associate Chief Civil Engineer, October, 1970.

11. Testimony before California Public Utilities Commission by R.D. Smith, Bendix Marine Advisors, Inc., October, 1970.

12. AEC, "Thermal Effects and U.S. Nuclear Power Stations", August 1971, pp. 35-36.

13. "Fact Summary of the Southwest Power Plants" prepared by Native American Rights Fund, March 15, 1971, reprinted in "Problems of Electric Power Production in the Southwest," hearings before the U.S. Senate Committee on Interior and Insular Affairs, p. 810. ("Southwest Hearings").

FOOTNOTES (CONT"D)

14. Comparison to San Francisco is in "Fact Summary," op.cit., p. 812.

15. Letter from E.H. McGavock, Subdistrict Chief, Water Resources Division, Geological Survey, U.S. Interior Department, to National Park Service, San Francisco, California, Oct. 20, 1970, reprinted in "Southwest Hearings", p. 149.

16. "Fact Summary", op. cit., passim.

17. "The Murder of the Southwest", by Alvin M. Josephy, Jr., in Audubon Magazine, July 1971, p. 54.

18. Advertisement by coalition of environmental groups in San Francisco Chronicle and New York Times, May 20, 1971.

19. Testimony by Richard Morgan, Research Associate, Southwest Research and Information Center, May 24, 1971, at "Southwest Hearings", p. 154.

20. Letter reprinted in "Fact Summary", op. cit. p. 823.

21. Testimony by William H. Marling, Journalist, University of Utah, at "Southwest Hearings", May 26, 1971, p. 1002.

22. Testimony by Joseph H. Montoya, U.S. Senator form New Mexico, at "Southwest Hearings," May 24,1971, p.5.

23. Letter by Edward Abbey, writer and Park Service fire lookout, to Senate Committee on Interior and Insular Affairs, May 19, 1971, reprinted in "Southwest Hearings", pp. 883-884.

24. Testimony by William P. Reilly, President of APS, in "Southwest Hearings", May 24, 1971, p. 304.

25. Ibid, p. 304.

FOOTNOTES (CONT'D)

26. Letter from Stewart Udall, Secretary of the Interior, to Jack Horton, President of SCE, April 7, 1966, reprinted in "South-West Hearings", p. 337.

27. Reilly Testimony in "Southwest Hearings," p. 317.

28. "Estimates of Air Pollution Concentration from Four Corners Plant, New Mexico", prepared by HEW's Bureau of Abatement and Control, January 1970, reprinted in "Southwest Hearings", p. 863.

29. Ibid.

30. Phone interview with Chemical Construction Company, February 17, 1972.

31. APS intra-company correspondence, January 13, 1969, reprinted in "Southwest Hearings", p. 415.

32. Testimony by John R. Wright, Chief, Water Quality Section, Environmental Services Division, Health and Social Services Department, State of New Mexico, in "Southwest Hearings", May 24, 1971, p. 18.

33. Testimony by S.E. Reynolds, New Mexico State engineer, in "Southwest Hearings", May 24, 1971, p. 25.

34. F.A. McCrackin, Manager, Environmental Planning, SCE, in letter to CEP, January 19, 1972.

FOOTNOTES (CONT'D)

35. Howard P. Allen, Vice President, SCE, in "Southwest Hearings," May 25,1971, p. 714.

36. Ibid., p. 708.

37. CEP calculation based on annual consumption figure given by G. A. Schreiber, President, Public Service Company of New Mexico, representing SCE and other participating utilities in "Southwest Hearings", May 24, 1971, p. 475.

38. "A History", op. cit., p. IV-12.