Central Arizona Project

CAP
CENTRAL ARIZONA PROJECT

Tom McCann
Manager, Resource Planning & Analysis

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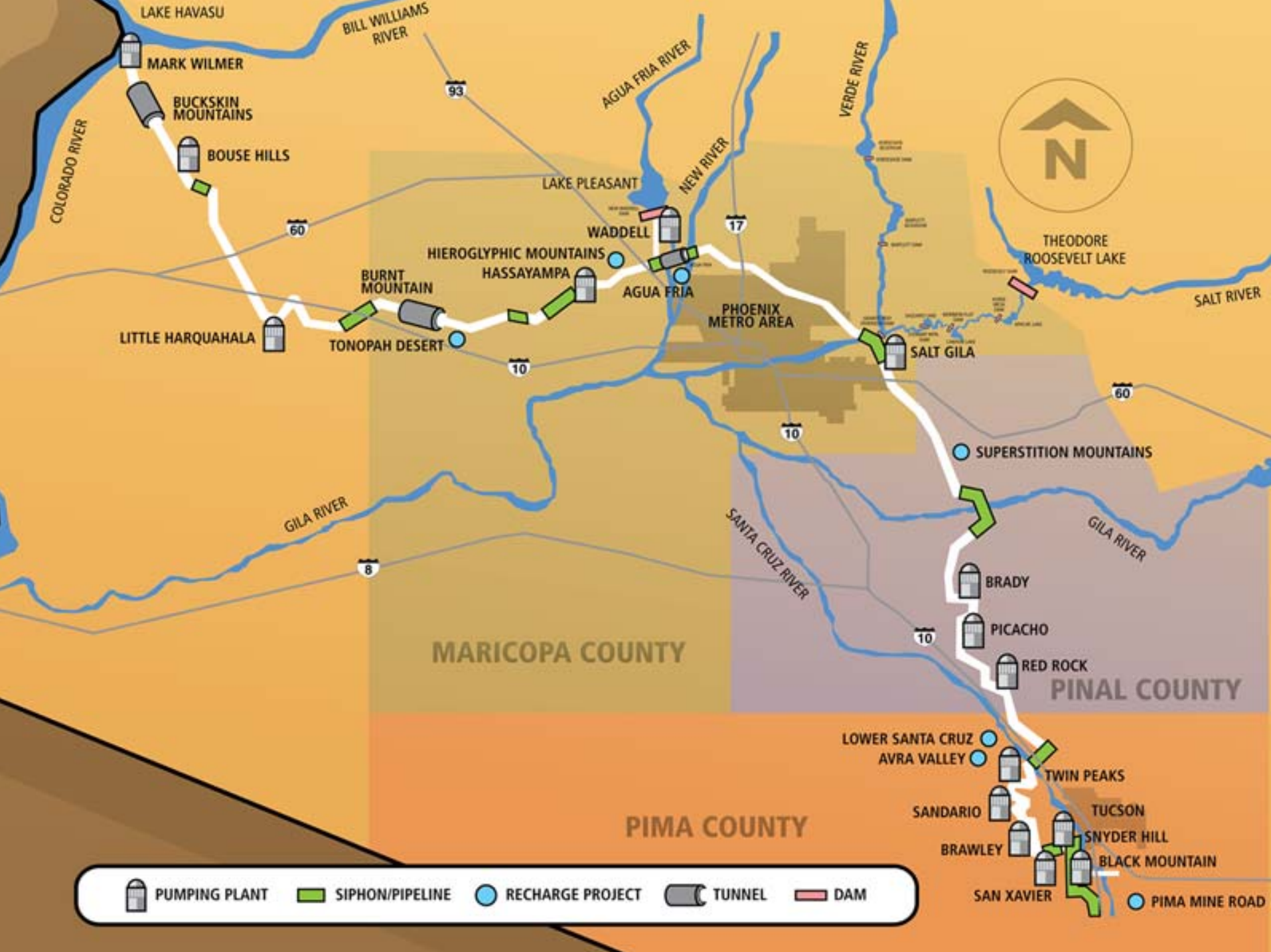
Central Arizona Project

- Constructed by U.S. Bureau of Reclamation
- Construction began in 1973
- First CAP water delivered in 1985
- Main aqueduct system completed in 1993
- Total cost around $4 billion

Water Delivery System

- 336-mile aqueduct
  - Concrete-lined canal
  - 3000 cfs capacity (85 m^3/s)
- 14 pumping plants, 1 pump/generating plant
  - More than 3000 feet (1000 meters) of total lift
- 8 inverted siphons, 3 tunnels
- 1 storage reservoir
  - 812,000 acre-feet maximum storage capacity (1 billion m^3)


LAKE HAVASU
BILL WILLIAMS RIVER
MARK WILMER
BUCKSKIN MOUNTAINS
BOUSE HILLS
COLORADO RIVER
93
AGUA FRIA RIVER
VERDE RIVER
N
LAKE PLEASANT
NEW RIVER
WADDELL
17
THEODORE ROOSEVELT LAKE
SALT RIVER
60
HIEROGLYPHIC MOUNTAINS
HASSAYAMPA
BURNT MOUNTAIN
AGUA FRIA
PHOENIX METRO AREA
LITTLE HARQUAHALA
TONOPAH DESERT
10
SALT GILA
SUPERSTITION MOUNTAINS
GILA RIVER
SANTA CRUZ RIVER
8
BRADY
PICACHO
RED ROCK
MARICOPA COUNTY
PINAL COUNTY
LOWER SANTA CRUZ
AVRA VALLEY
TWIN PEAKS
SANDARIO
TUCSON
SNYDER HILL
BRAWLEY
BLACK MOUNTAIN
SAN XAVIER
PIMA MINE ROAD
PIMA COUNTY
PUMPING PLANT
SIPHON/PIPELINE
RECHARGE PROJECT
TUNNEL
DAM

Energy Needs

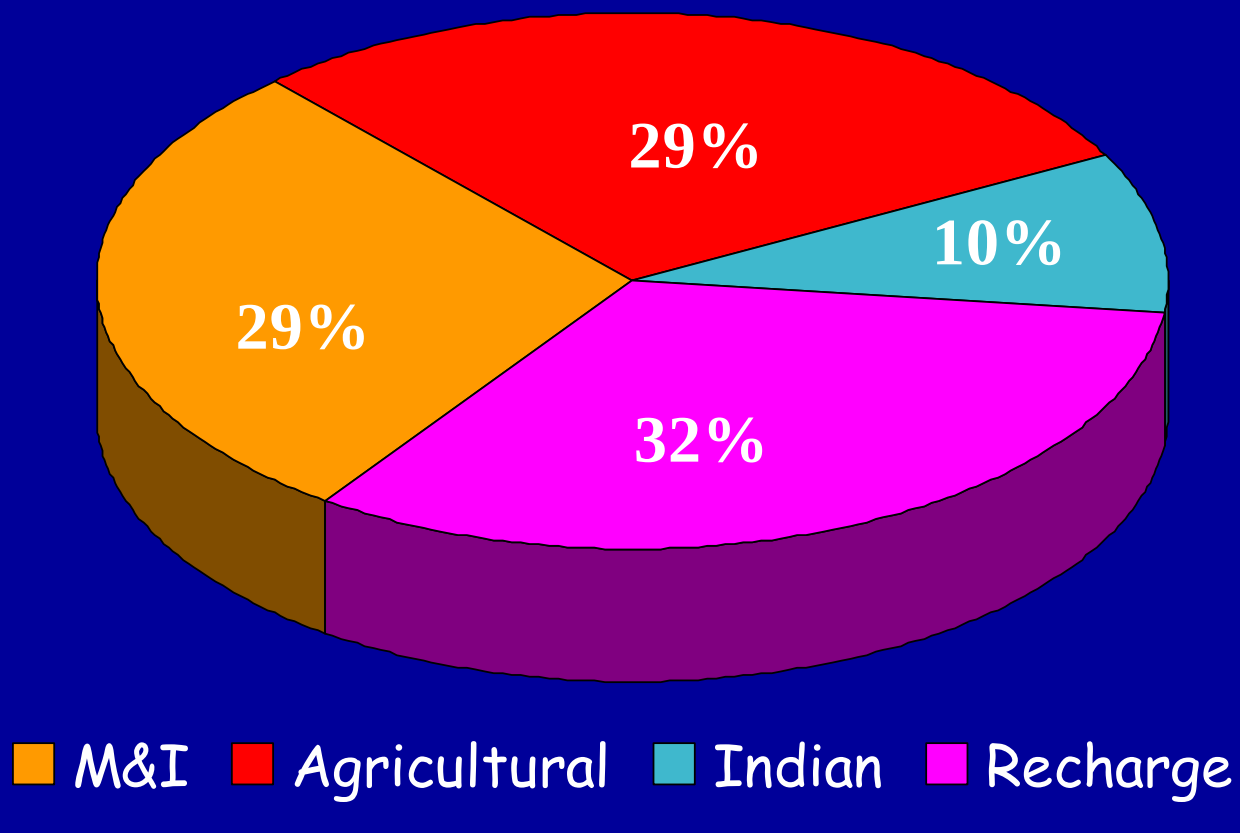
- CAP pumps use 2700 GWHr energy per year
- CAP is entitled to 24.3% of Navajo Generating Station
  - 546 MW capacity
  - 4200 GWHr energy

CAP Water Supply

- Arizona is entitled to 2.8 million acre-feet (MAF) of Colorado River water annually
- Within Arizona, pre-1968 mainstream water users have priority over CAP
- CAP shares priority with post-1968 mainstream contracts (up to 164,652 AF)
- CAP diverts about 1.5 MAF (1.85 billion m^3) of Colorado River water in a "normal" year

2006 Water Deliveries

Total = 1,504,327 acre-feet (1.85 billion m^3)



Concerns

- Potential constraints on water supply
  - Climate change
  - Environmental needs
- Increasing water demands
  - Lower Basin States using full entitlement
  - Arizona and Nevada are fastest growing states in U.S.
  - Basin States population projected to increase 47% or 23.5 million people from 2000-2030

Responses

- Underground storage
- System conservation
- Augmentation

Underground Storage

- 5 MAF (6.2 billion m^3) stored in central Arizona since 1985
- Purposes:
  - Firming Arizona supplies
  - Interstate banking for Nevada and California

System Conservation

- Saving water that would otherwise be lost from the Colorado River system reduces the risk of shortage
- Examples:
  - Yuma Desalting Plant
  - Drop 2 reservoir
  - Vegetation management

Augmentation

- Adding new water supplies to what we already have
- Examples:
  - Desalination
  - Imported surface water
  - Weather modification

Desalination: Not a New Idea

Two 1968 studies on possible nuclear power/desalination facilities:

- U.S. Bureau of Reclamation considered a 2 MAF facility either in California or northern Mexico, with aqueduct to transport water to Lake Mead
- U.S./Mexico/IAEA team studied a 1 MAF facility in northern Mexico to serve southwest U.S. and northwest Mexico

USBR 1968 Reconnaissance Report (Alternative)

INDEX MAP

Lake Mead

Aqueduct

Los Angeles

San Diego

Nuclear Desalting Plant

EXPLANATION

- (A) PACIFIC-MOHAVE AQUEDUCT
- (B) PACIFIC-HAVASU AQUEDUCT
- (C) GULF-MEAD AQUEDUCT
- (D) GULF-HAVASU AQUEDUCT
- AQUEDUCT
- [N] NUCLEAR DESALTING PLANT
- POWER DROP
- PUMPING PLANT
- TUNNEL
- RESERVOIR

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

AUGMENTING THE COLORADO RIVER
BY DESALTING OF SEA WATER
ALTERNATIVE ROUTES
FEBRUARY 1968

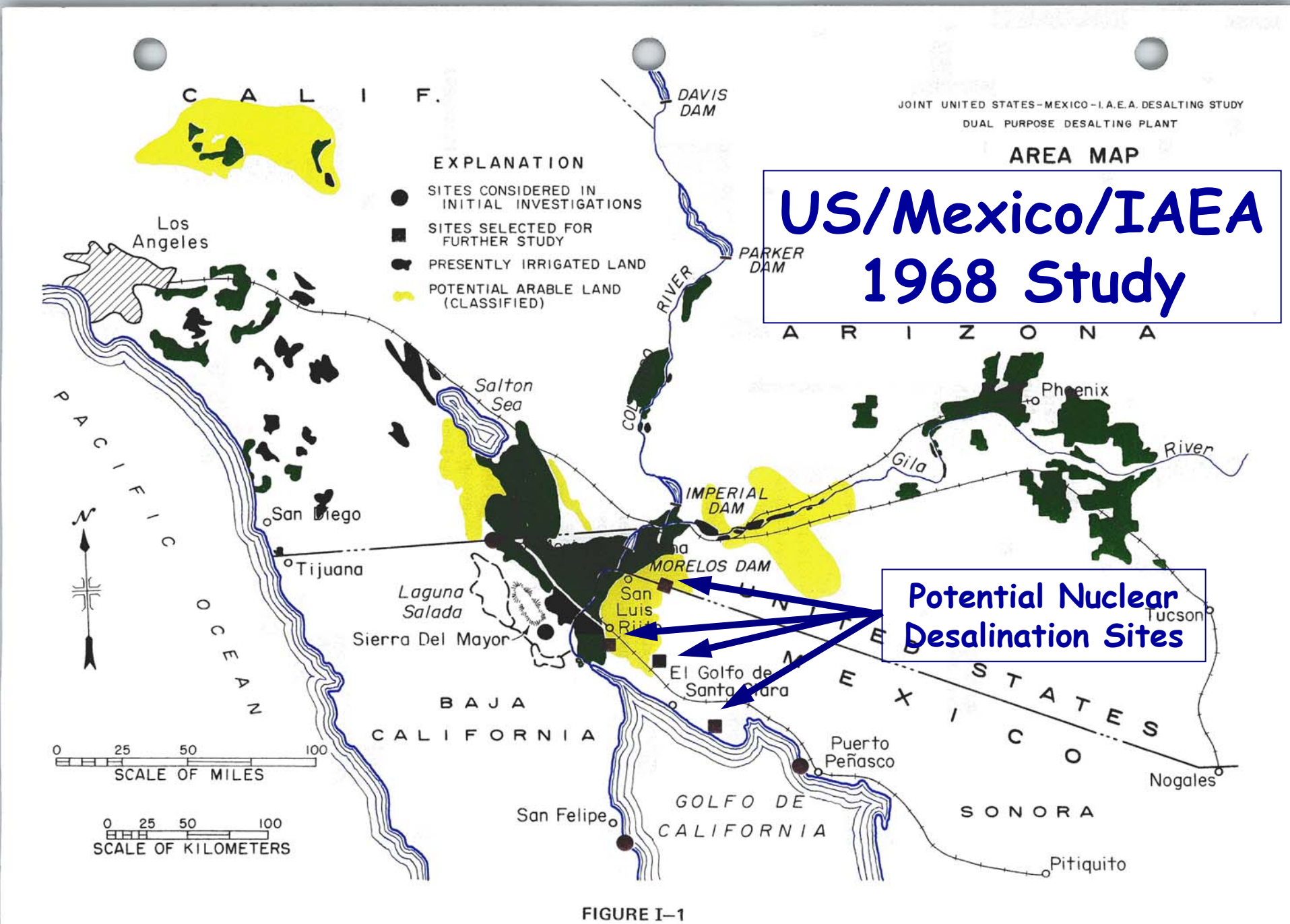
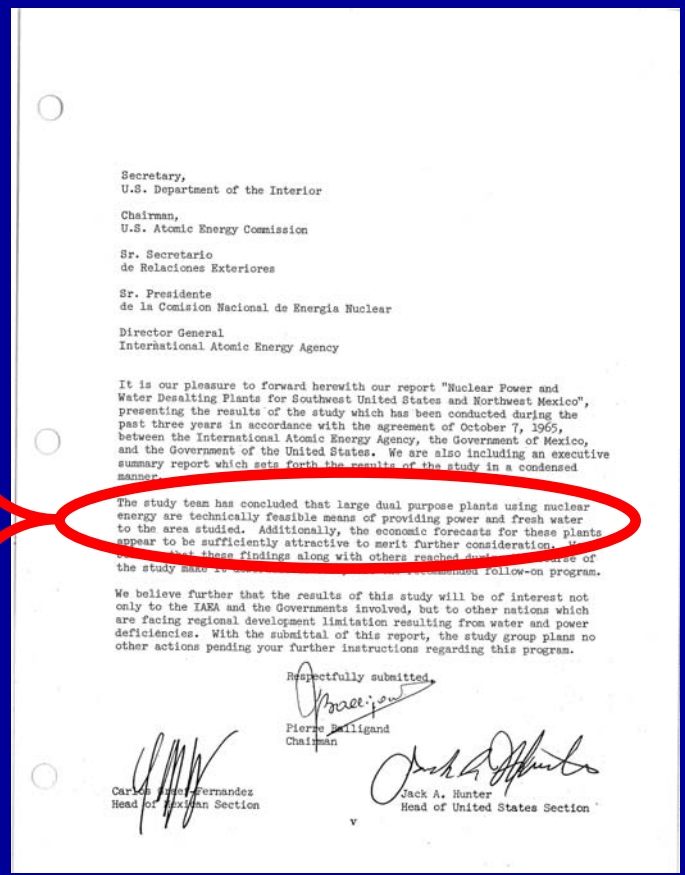

JOINT UNITED STATES-MEXICO-I.A.E.A. DESALTING STUDY
DUAL PURPOSE DESALTING PLANT
AREA MAP
US/Mexico/IAEA
1968 Study
EXPLANATION
SITES CONSIDERED IN INITIAL INVESTIGATIONS
SITES SELECTED FOR FURTHER STUDY
PRESENTLY IRRIGATED LAND
POTENTIAL ARABLE LAND (CLASSIFIED)
CALIF.
ARIZONA
DAVIS DAM
PARKER DAM
RIVER
Los Angeles
Salton Sea
IMPERIAL DAM
MORELOS DAM
Gila
River
Phoenix
Tucson
San Diego
Tijuana
Laguna Salada
Sierra Del Mayor
San Luis
El Golfo de Santa Clara
Potential Nuclear Desalination Sites
PACIFIC OCEAN
BAJA CALIFORNIA
GOLFO DE CALIFORNIA
UNITED STATES
MEXICO
SONORA
Puerto Peñasco
San Felipe
Nogales
Pitiquito
N
0 25 50 100
SCALE OF MILES
0 25 50 100
SCALE OF KILOMETERS

FIGURE I–1

1968 Conclusion

"The study team has concluded that large dual purpose plants using nuclear energy are technically feasible means of providing power and fresh water to the area studied. Additionally, the economic forecasts for these plants appear to be sufficiently attractive to merit further consideration."



Secretary,
U.S. Department of the Interior

Chairman,
U.S. Atomic Energy Commission

Sr. Secretario
de Relaciones Exteriores

Sr. Presidente
de la Comision Nacional de Energia Nuclear

Director General
International Atomic Energy Agency

It is our pleasure to forward herewith our report "Nuclear Power and Water Desalting Plants for Southwest United States and Northwest Mexico", presenting the results of the study which has been conducted during the past three years in accordance with the agreement of October 7, 1965, between the International Atomic Energy Agency, the Government of Mexico, and the Government of the United States. We are also including an executive summary report which sets forth the results of the study in a condensed manner.

The study team has concluded that large dual purpose plants using nuclear energy are technically feasible means of providing power and fresh water to the area studied. Additionally, the economic forecasts for these plants appear to be sufficiently attractive to merit further consideration.

We believe further that the results of this study will be of interest not only to the IAEA and the Governments involved, but to other nations which are facing regional development limitation resulting from water and power deficiencies. With the submittal of this report, the study group plans no other actions pending your further instructions regarding this program.

Respectfully submitted,

Pierre Balligand
Chairman

Jack A. Hunter
Head of United States Section

Partnership Opportunity

Benefits of binational power/desalination project on the Gulf of California:

- High quality drinking water to meet municipal demands in Mexico
- New water supplies for Arizona and other Basin States by exchange
- Energy to meet needs in U.S. and Mexico
- Regional economic stimulus