

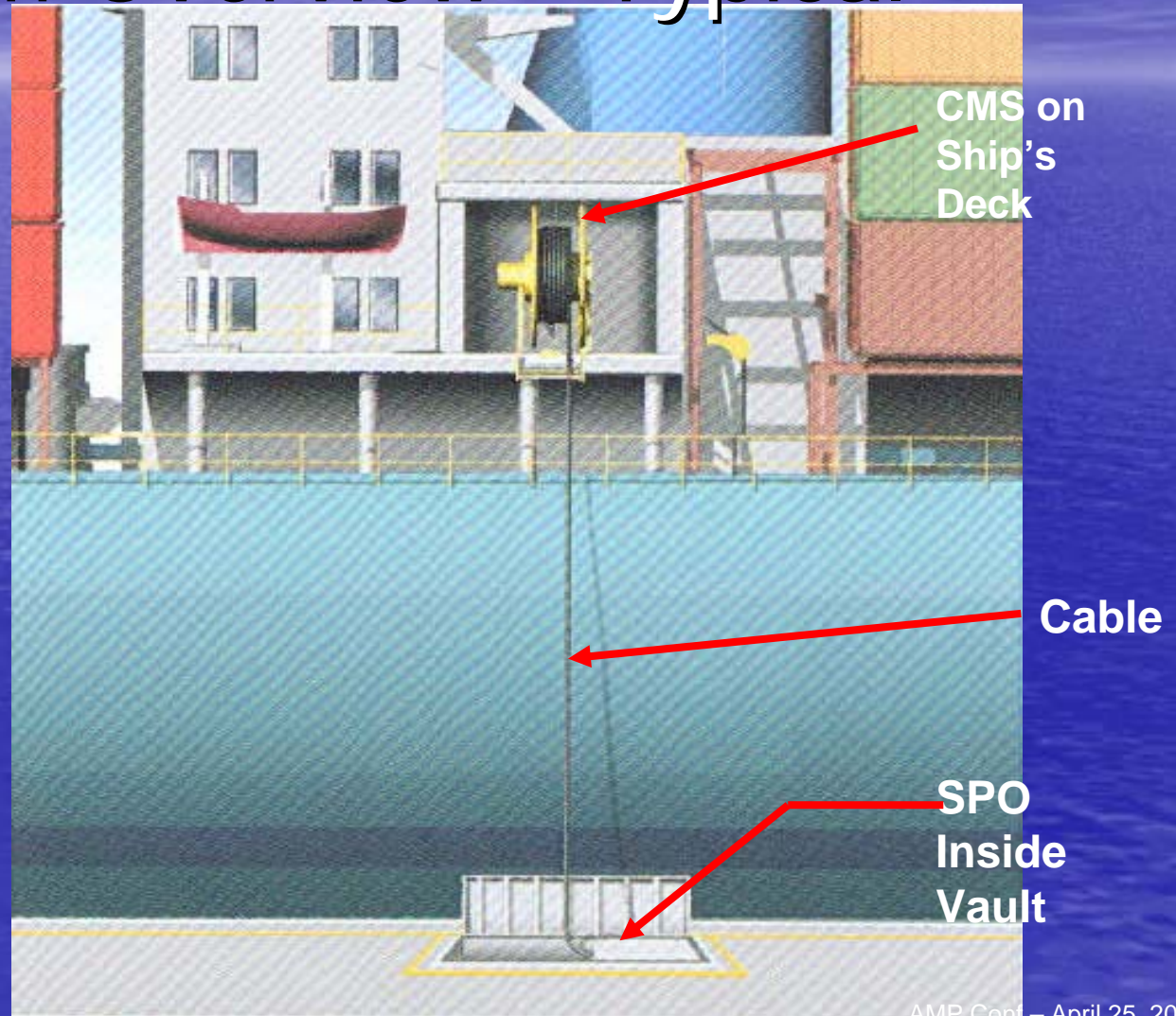


Port of Long Beach Landside Infrastructure

Presented by
P. Ben Chavdarian
Senior Electrical Engineer
April 25, 2006

Shore to Ship Power System Overview - Typical

- CMS Location
- SPO qty/berth
- Cable length



IDEAL Design criteria

- Keep wharf free of cables
- Limited conduit space in wharf
- Satisfy ALL/ANY ship
- Not expensive
- Quick connect/disconnect
- Safe operation

Compromised Solution

Design parameters

- 7.5 MVA or 7,500 KVA
 - Sufficient for all ships?
 - MVA or MW (KVA or KW)
- 6.6 KV or 6,600 Volt
 - No other voltage available on shore
- No steam from shore
 - Boilers to remain on, aboard ships
- Underground wiring 500 MCM, 2 per Phase
 - Largest wire size 1000 MCM
- Wharf to ship wiring 350 MCM, 2 per phase
 - Size and weight acceptable

Compromised Solution

Design parameters

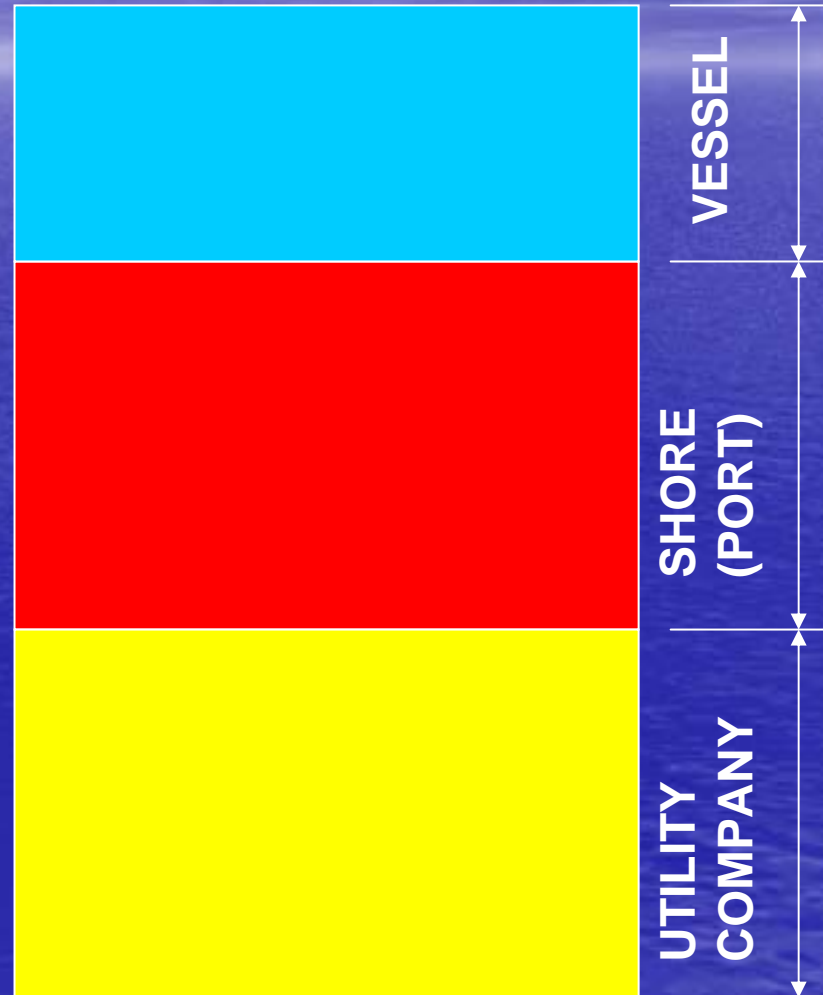
Other considerations

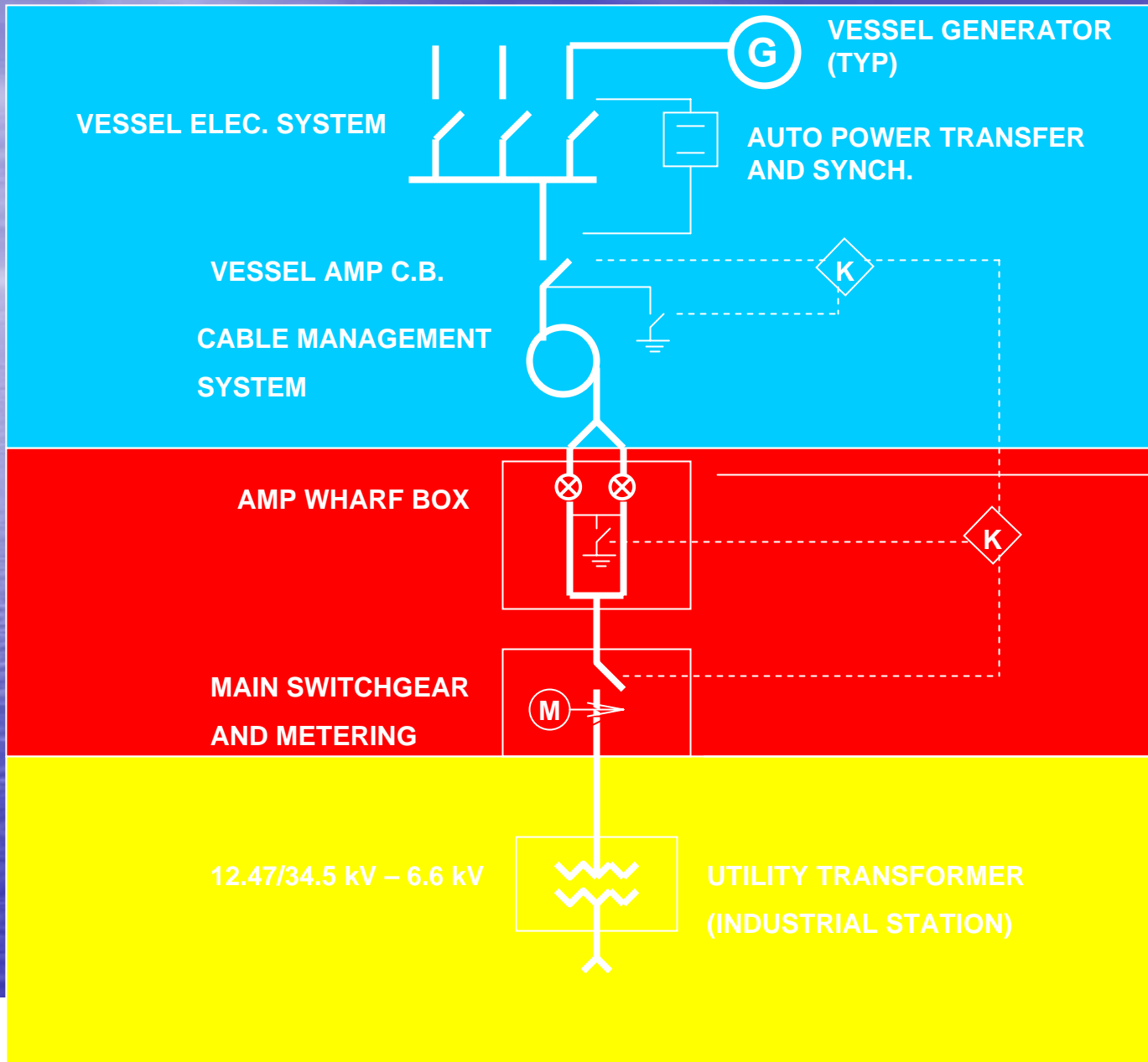
- Control wires and Conduits
 - Copper vs fiber
 - Conduit(s) for future control/comm.?
- Two 5 In. Conduits - Power.
 - One Spare 5 In. for future?
- Wharf cavity for receptacles.
 - Limited depth, width and length
- Rebars in wharf.



Power Circuit

- One Circuit (Feeder)
 - Circuit in multiple zones
- Utility Co.
 - Generates power/distributes
 - PUC compliance
- Shore (Port).
 - User of power
 - Code compliance
- Vessel.
 - Generates power
 - MOTEMS compliance
 - User of power
- Laws of Electricity
 - Independent from PUC, Code and MOTEMS





↑
VESSEL

↑
SHORE
(PORT)

↑
UTILITY
COMPANY





Pier J Berth 226



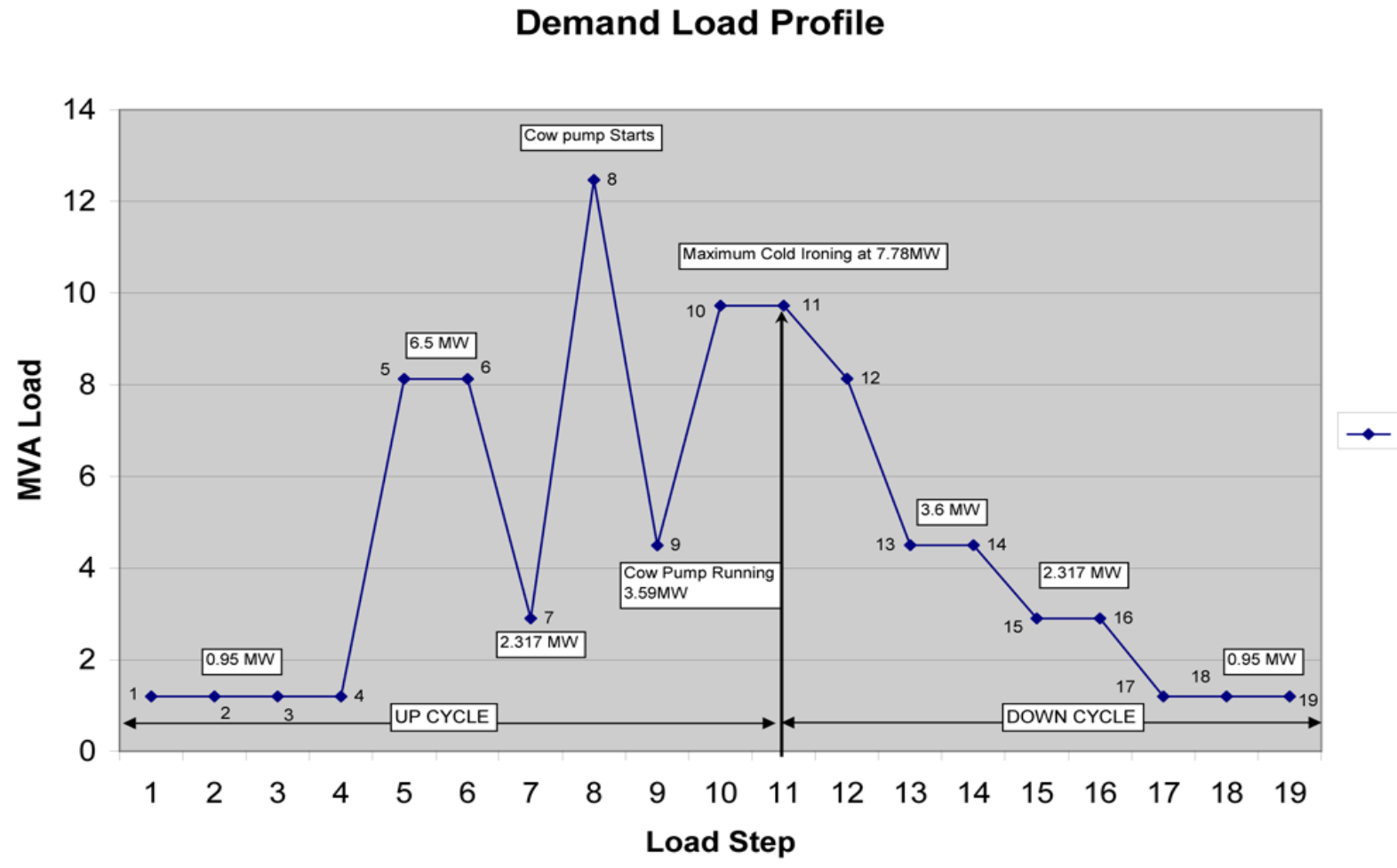
**Pier T Berth
121**

Electrical Engineering

- Evaluate existing infrastructure
 - 12kV SCE (adequate capacity, shore side pumps)
 - 4160V switchgear physical location (adequate capacity)
- Determine ship power requirements
 - 7.78 MegaWatts @ .8 PF
 - 9.73 Mega-Volt-Amperes
 - Coordination/understand
- New Infrastructure
 - Step up LTC transformer
 - Cable size, number
 - Plugs



Ship Power Requirements



Other Electrical Issues

- Grounding System.
- Voltage Drop Study.
- Short Circuit Analysis.
- Coordination Study and Settings.
- H.V. Cable Discharge Study.
- Arc Flash Analysis and Labeling.
- Harmonic Analysis.
- Safety Analysis. What if....
- Testing: When, What, Frequency.

Design Parameters - 1989

in 608 MW of summer capacity down to 550 MW.
But NEES, which last year listed no planned plants, now plans 306 MW of summer capacity.
Most of the new NU and NEES capacity would come from adding new combustion turbines and new heat recovery steam generators to existing natural gas/oil-fired units: NEES at its Manch-9, -10, and -11 units, and NU at its Devon-3, -4, -5, and -6 plants.
While the scheduled retirement dates of some units have been pushed back, NEPOOL now expects to retire 885 MW of summer capacity and 1,010 MW of winter capacity by 2002, up from 740.6 MW and 826.5 MW last year.
Most of the change is due to 57 MW in added retirements planned by NU.

FINANCING IN PLACE FOR O'BRIEN'S \$71-MILLION HARTFORD, CONN., PLANT
O'Brien Energy Systems has completed financing arrangements for a \$71-million cogeneration project in Hartford, Conn. Chrysler Capital Corp. will act as a limited partner, with the Los Angeles branch of Sumitomo Bank Ltd. providing construction and term funding.
The gas-fired facility is scheduled to be on-line by late 1990 and will sell 400,000 pounds of steam per hour to Hartford's district heating system and 54 MW of electricity to Connecticut Light & Power. Annual revenues are expected to be about \$30-million.
The O'Brien/Chrysler Capital partnership will own and operate the plant, with turnkey construction provided by Hawker Siddeley Power Engineering Inc., headquartered in Houston, Texas.
O'Brien has more than 280 MW of projects under construction, representing about \$300-million, according to Bruce Levy, marketing vice president (IPR, 10 March, 4).
"This is the fifth major cogeneration project we've financed, [and] we expect at least two additional project closings before the end of the calendar year," he said.

AIR PLAN WOULD REQUIRE LOS ANGELES, LONG BEACH PORTS TO OBTAIN 200 MW
The proposed air quality management plan for the Los Angeles basin adopted in mid-March by the South Coast Air Quality Management District will require the combined ports of Los Angeles and Long Beach to either develop or buy about 200 MW to power the ships that would no longer be allowed to run their own oil-fired boilers while in port (IPR, 24 March, 5).
The ports would also be required to spend \$70-million more to install the wiring and electrical connections required to hook up approximately 60 ship berths spread over the 7,000-acre complex, said Port of Los Angeles engineer Ren Chavdarian.
Port officials are now studying the details of near-term requirements in relation to the SCAQMD plan, which is designed to reduce air pollution to below federally mandated standards by the year 2007.
The power needs of the ports—which are adjacent—will be clearer after completion of a study now being conducted by staff and expected to be finished in early May.
However, said Chavdarian, if the ocean-going ships that now call at the port are required to "cold iron," that is, completely shut down all boilers while in port and rely on shore-side electric power for lights, heating, cooling and other needs, the ports will have to deliver a total of about 200 MW in 3,500-kVa increments to some 60 berths.
The ports do not now have any generating equipment. The Port of Los Angeles is now served by the Los Angeles Dept. of Water & Power, and the Port of Long Beach by Southern California Edison.
A cogeneration system is possible, said Chavdarian, particularly if a use can be found for the thermal heat. The power could also be purchased from an independent producer, he said. Decisions on where to acquire the power will largely depend on cost, he said.
Port officials said about 7,000 ship calls are booked yearly at the combined ports, each lasting an average of about 30 hours.

AGENCY WANTS TO SEND DEVELOPERS OVERSEAS TO DEAL WITH POWER CRISIS
The U.S. Agency for International Development is looking for power project developers to send to Third World countries as consultants to help local power authorities speed capacity expansion, said John Hammond, senior energy advisor in the AID office of energy, in an interview.
AID will pay fees and expenses for the consultants, which will be sent as part of technical assistance teams, mostly to national utilities.
The teams will help locals develop workable power-purchase agreements, development plans, proposal criteria and other items needed to smooth development of an independent power sector.
"And we fully expect the teams to do a little marketing while they are there. Ideally, we would like to see the consultants find and develop their own projects," said Hammond.
Toward that end, AID will also pay up to 50% of the cost of feasibility studies on foreign power projects (CR, 12 Feb '88, 12), said Hammond.
AID has budgeted \$15-million over the next five years to fund its efforts to assist U.S. firms in Third World private power development.
AID is also holding a series of in-country workshops and conferences with government officials, utility officials and cogeneration and independent power representatives "to develop acceptable approaches to private sector participation in the power sector," said Hammond.
However, he warns, although the potential market is

-LA file

"3,500-KVA"

"Independent Power Report
April 21, 1989"

INDEPENDENT POWER REPORT — April 21, 1989



Cost Per Berth - 1986

CITY OF LOS ANGELES
HARBOR DEPARTMENT

DESIGN
Ben Chavira

OFFICE MEMORANDUM

Date August 1, 1986

To	From
BOARD OF HARBOR COMMISSIONERS	
CC EXECUTIVE DIRECTOR	
CC CHIEF DEPUTY EXEC. DIRECTOR	
CC DEPUTY EXECUTIVE DIRECTOR	
DIRECTOR OF ADMINISTRATION	
CHIEF FINANCIAL OFFICER	
ACCOUNTING	
CC CITY ATTORNEY/H.D.	
CLERICAL SERVICES 5TH FLOOR	
CLERICAL SERVICES 4TH FLOOR	
CLERICAL SERVICES 3RD FLOOR	
CC CONSTRUCTION & MAINTENANCE	
CONSTRUCTION MANAGEMENT	
ENGINEERING	XX
XX ENVIRONMENTAL	
EXECUTIVE ASSISTANT	
FINANCIAL MANAGEMENT	
CC GOV'T & COMMUNITY RELATIONS	
GRAPHIC SERVICES	

To	From
INFORMATION SYSTEMS	
INTERNAL AUDITOR	
CC LEGISLATIVE REPRESENTATIVE	
MANAGEMENT SERVICES	
MARINA OFFICE	
MARKETING	
PERSONNEL SERVICES	
PLANNING & RESEARCH	
PORT PILOTS	
PORT WARDEN	
CC PROPERTY MANAGEMENT	
PURCHASING	
RISK MANAGEMENT	
STAFF ANALYST	
TEST LAB	
WHARFINGER	

SUBJECT: PROPOSED SOUTH COAST AIR QUALITY MANAGEMENT (SCAQMD) NITROUS OXIDE (NOx) TACTICS: IMPACT ON THE PORT OF LOS ANGELES

This is in response to your memorandum dated March 31, 1986 to Engineering and other divisions. Attached is a brief report on the subject of NOx controls and some of our concerns.

To cover this subject thoroughly would require much time and effort by Engineering. Due to many projects under design and construction at this time, diverting our attention to this subject will not be easy and may not be necessary at this stage. It may not be necessary because SCAQMD is not ready to take any final action and is continuing informal discussions with the two ports.

Our first meeting was held on May 22, 1986 at the Port of Los Angeles. A copy of a roster of those in attendance is attached. A second meeting is scheduled for August 5, 1986 at the Port of Long Beach.

In short, we would like to emphasize that the cost of providing shore power to ships, as SCAQMD is suggesting, would cost much more than the \$30,000 - \$40,000 per berth. The impact of the SCAQMD ruling if and when it passes, would be so great that if enforced, the Port will cease being a container handling Port.

Engineering personnel are available to discuss with the Environmental Division and SCAQMD staff members the impact of their suggestions for NOx controls and provide them with engineering facts and costs. However, it is recommended that you continually monitor the SCAQMD status on the subject and advise Port's top executives to immediately intervene if SCAQMD inclines towards implementation of their recommendations.

• "August 1, 1986"

"\$30,000-\$40,000 per berth"



Summary

- 7.5 MVA Ship Load
- 6.6 KV Shore Power at Wharf
- Fiber Controls (Copper as 2nd choice)
- Reliable Operation
- Safe Operation (Minimal Cost)

Port of Long Beach Standards
www.polb.com

