

# Threat of Oil Spill accidents from Shipping, Production Facilities and Terminals is always present

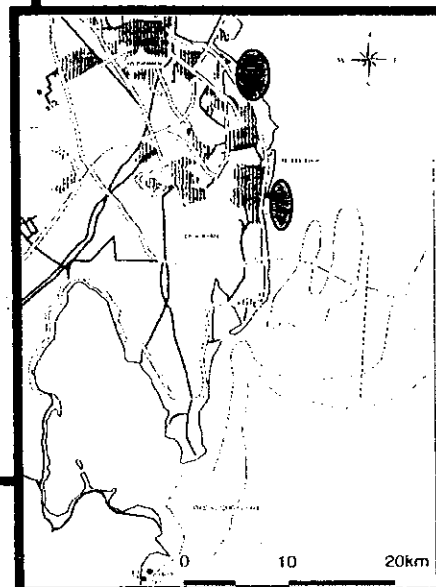
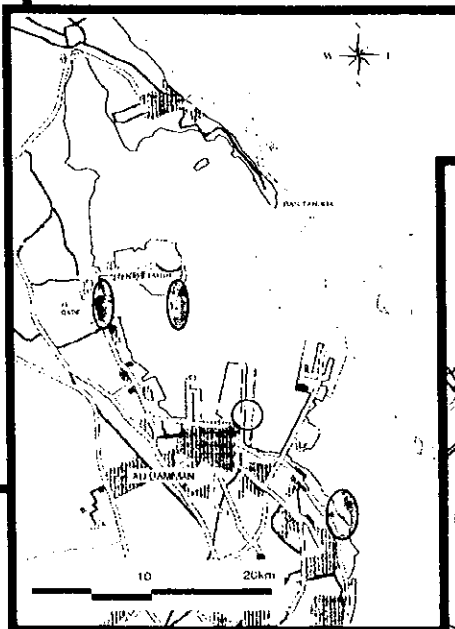
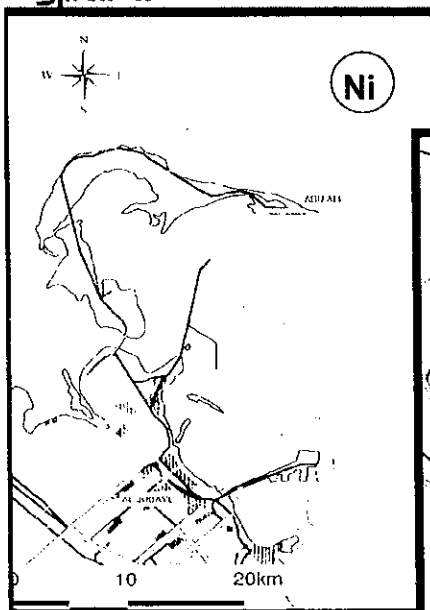


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## Metal Contamination

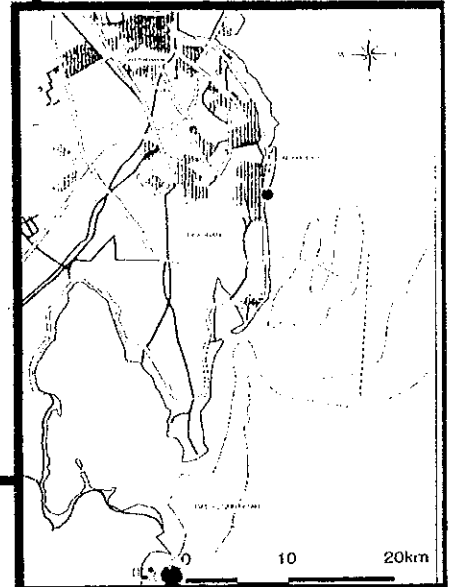
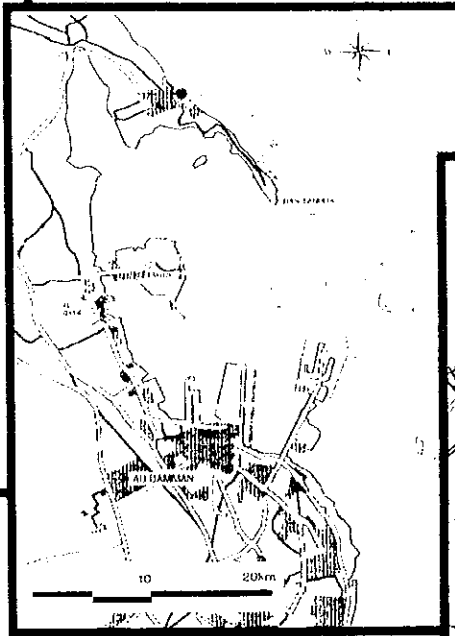
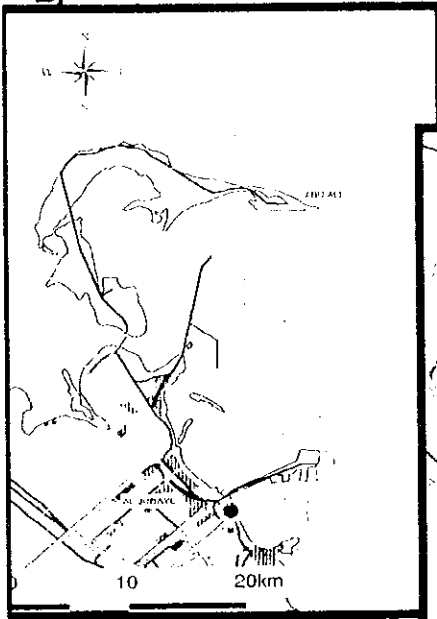
## Summary



 = includes Hg

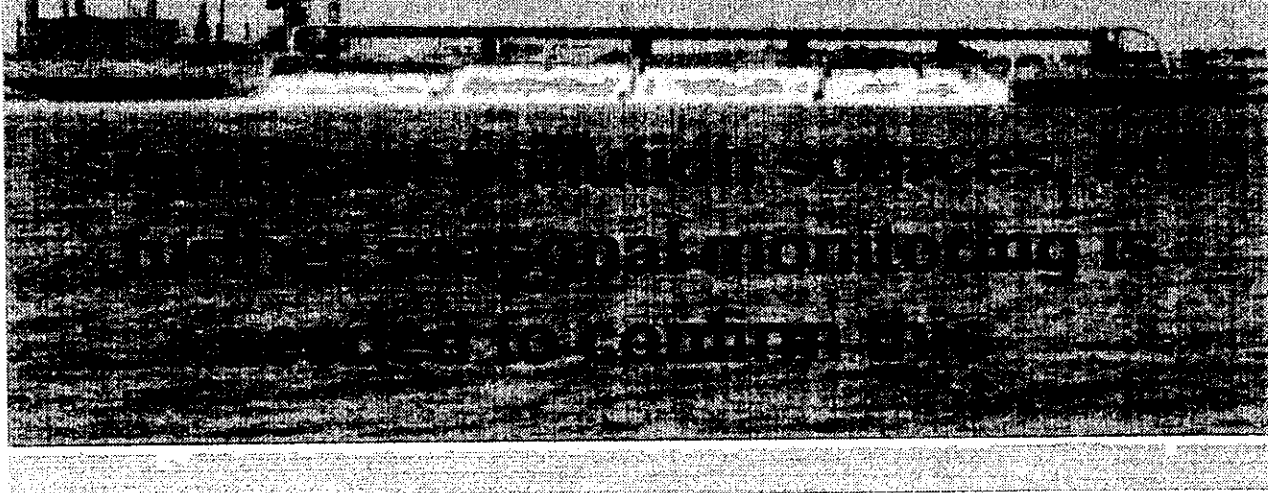
 = in sediments (Cu, Ni, Pb, Zn)

# Residual Free Chlorine Summary



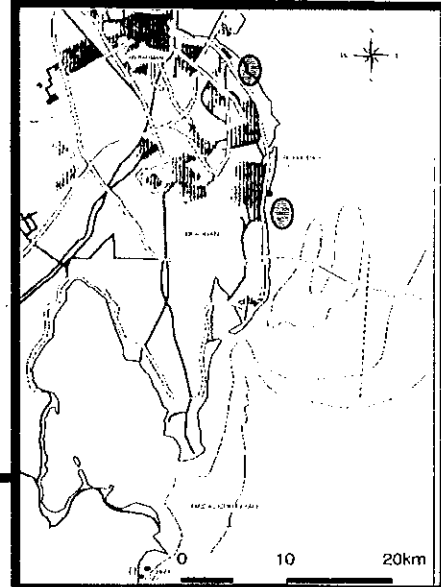
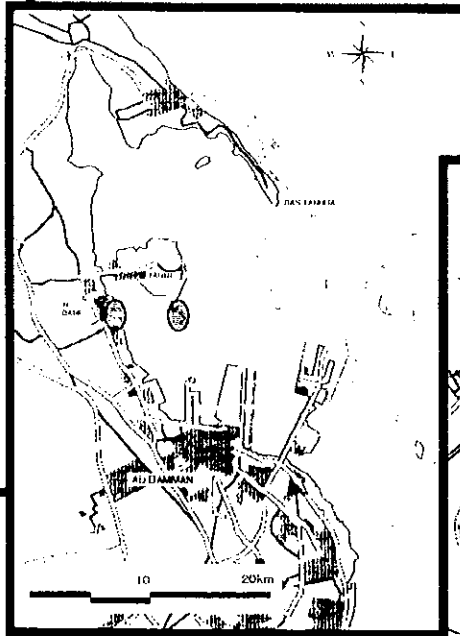
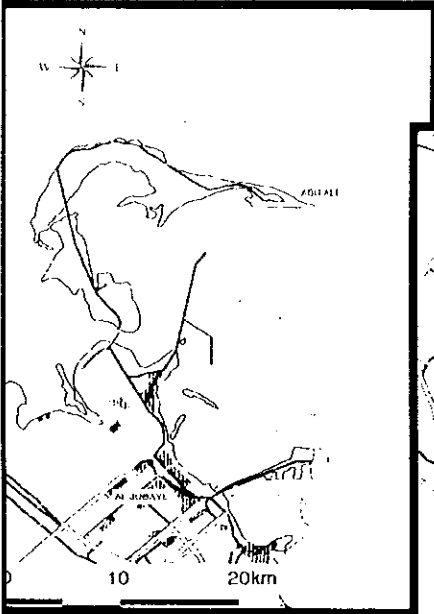
● = in water

**The first baseline data indicate that the major industrial outfalls are not**

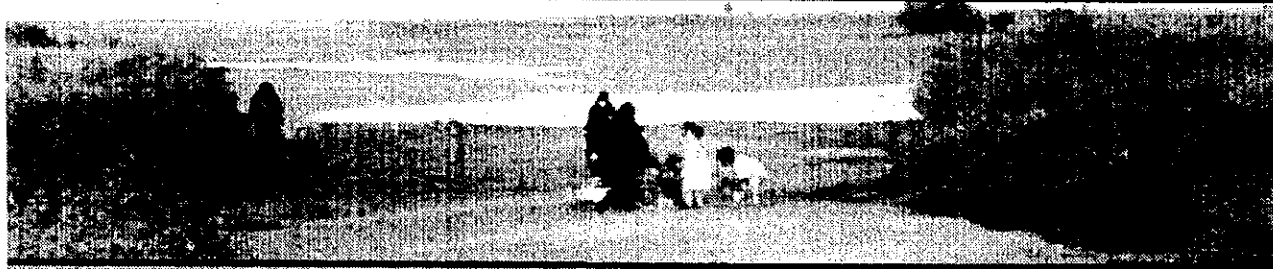
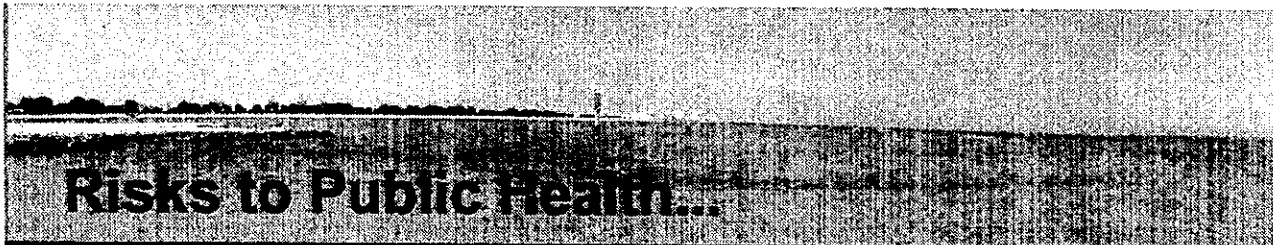


# Coliform Bacteria

## Summary

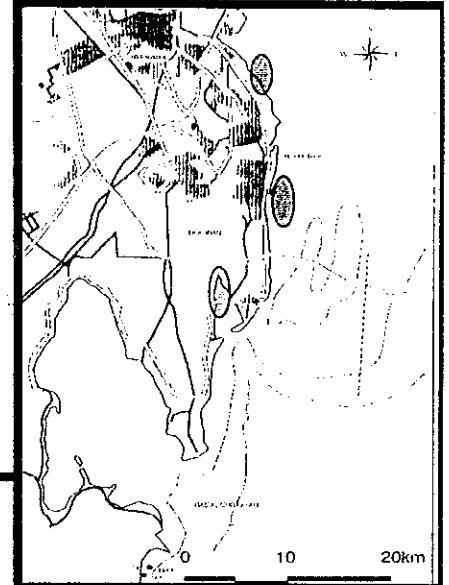
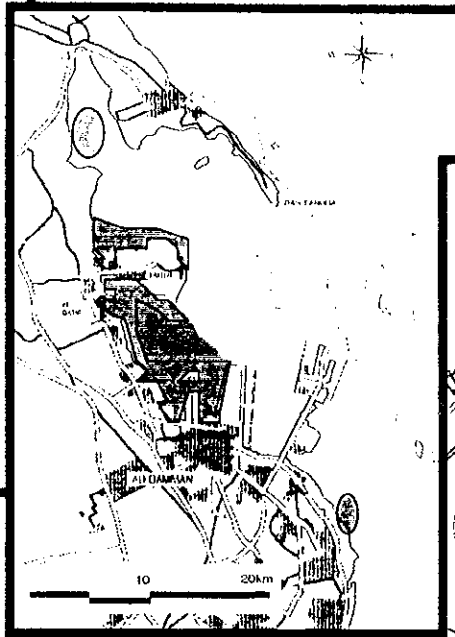
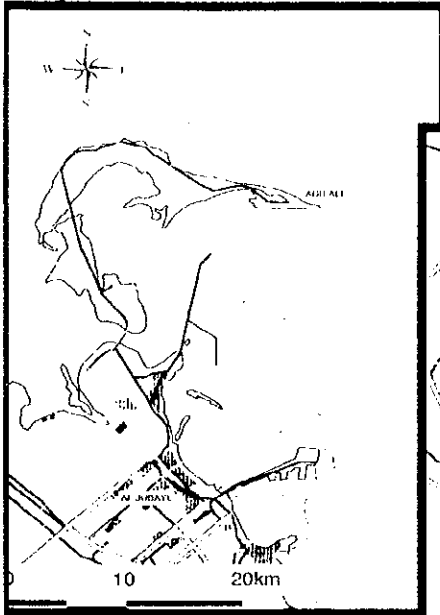


 = in water



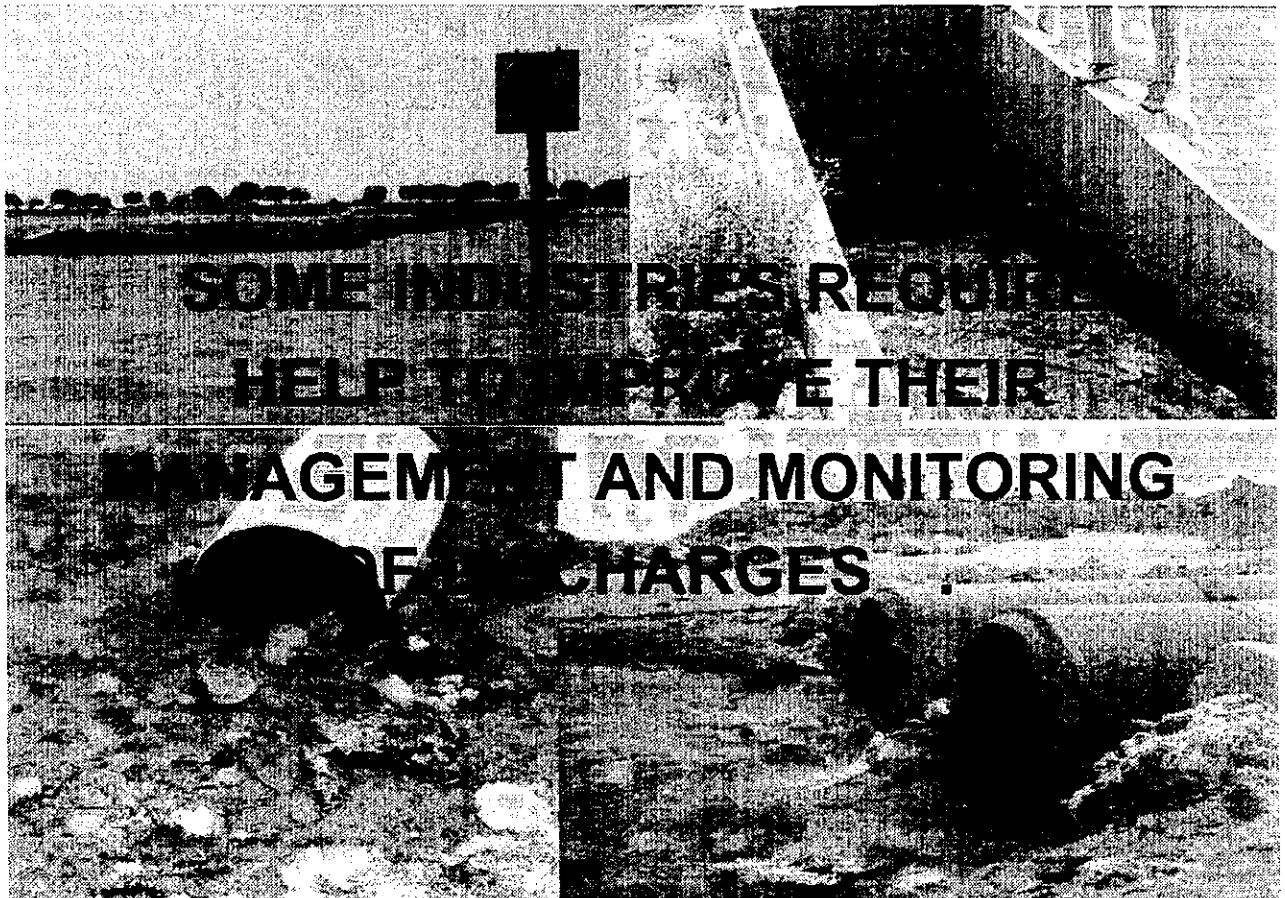
# Eutrophication Signs

## Summary



 = suspected

 = includes TKN, NH<sub>3</sub>, TP, Chlor. α



SHALLOW INSHORE AREAS SUCH AS  
TARUT BAY ARE AT GREAT RISK  
FROM EUTROPHICATION, CAUSING:

LOSS OF SEAGRASS MEADOWS  
PLANKTON BLOOMS

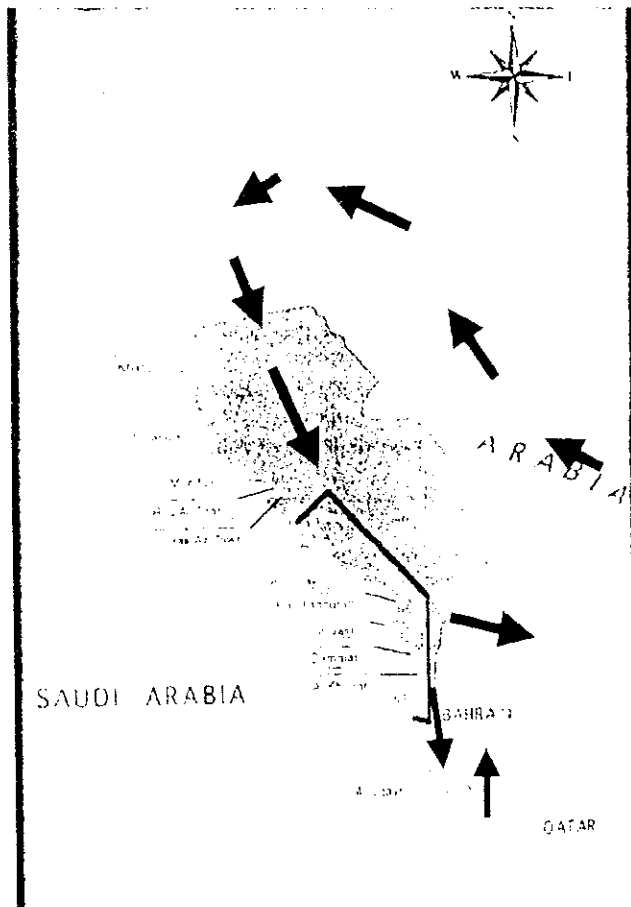
\* FISH KILLS

\* TOXIC RED TIDES

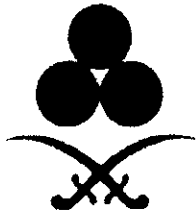
\* PUBLIC HEALTH RISKS



### Water Circulation in the Gulf



**JICA/MEPA Workshop III**  
**"Sampling Practice"**  
**Khalid Al-Rasheed**



# **MEPA & JICA Project**

## **SEA WATER QUALITY & MONITORING OF ARABIAN GULF**

### *Sampling Practices*

*Khaled S. Al-Rasheed*

#### *The Need for The Study*

- **The area along the Arabian Gulf has been developed rapidly causing:**
  - 1. Environmental deterioration from water pollution.**
  - 2. Waste Water discharges from industries.**
  - 3. Excessive nutrients and bacteria from sewage outfalls, urban drains, fishing boats and residential areas.**
  - 4. Dredging and reclamation of shallow sea areas has gradually grown larger.**
  - 5. Oil spills cause severe short-term and mid-term environmental degradation, as occurred during the Gulf War in 1991.**



## Objectives of The Study

- To facilitate the technology transfer and training program.
- To examine coastal sea water quality and causes of water quality degradation along the Arabian Gulf.
- To review existing water quality monitoring activities by MEPA and other parties.
- To help develop more integrated, comprehensive and appropriate coastal water quality monitoring program.



## Project Description

First Stage:

Third Stage:

- First round of Site Work (Water Quality,

Fourth Stage:

- Second round of Site Work (Water Quality, Sediment, Tidal Flow & Plankton).
- Analysis of data collected & Satellite Photography .
- Evaluation of Results and Monitoring.
- Guideline for Water Quality Monitoring.
- Water Quality Monitoring Planning.
- Finalization of Technology Transfer.

Fifth Stage:

- Valuation of Technology Transfer.
- Final Report preparation.





## Out Line of Field Work

- Field Monitoring Design.
- Field Instrument Management.
- Field Data Records.
- Collection of Water & Sediment Samples.
- Data Analysis & Interpretation.



## Area of the Study

