

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)



Presented By:
Abraham Jacob/ Subit Chandran
Operations Manager/ Environmental Consultant
The Environmental Consulting Bureau



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

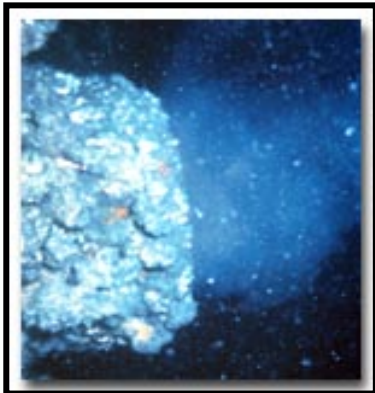
Presentation Outline

- Environmental Concerns of WWTP Operations
- Legal Requirements for Environmental Impact Assessments in Saudi Arabia (PME Requirements)
- The EIA Process
 - Screening & Initial Scoping Study
 - Environmental Impact Assessment
 - Alternatives to the Project
 - Review and Decision Making
- Typical EIA Report Content (Comparison of Minimum Content for EIA Reports prescribed by PME and Saudi Aramco)



TYPICAL ENVIRONMENTAL CONCERNS FROM WASTEWATER TREATMENT PLANTS

	Typical Concerns
Construction Phase	Dust
	Odor
	Waste Disposal
Operational Phase	Spills
	Soil Contamination
	Releases and Discharge
Emergencies	Displacement of Flora and Fauna
	Loss of Habitat and Resources
	Loss of Aesthetic Value
	Eutrophication
	Groundwater Contamination
	Health and Safety Hazards
	And Other Concerns



ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

ENVIRONMENTAL REGULATORY FRAMEWORK IN KSA

- MINISTERIAL COUNCIL FOR ENVIRONMENT
- PRESIDENCY OF METEOROLOGY AND ENVIRONMENT
- ROYAL COMMISSION FOR JUBAIL AND YANBU
- OTHER MINISTRIES



Presidency of Meteorology
and Environment



Royal Commission for Jubail
and Yanbu

Other Agencies issuing regulations and standards in consultation with PME:

- Ministry of Petroleum and Natural Resources
- Ministry of Agriculture
- Ministry of Water
- Ministry of Municipal and Rural Affairs
- National Commission for Wildlife Conservation and Development
- King Abdul Aziz City for Science and Technology

ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

PRESIDENCY OF METEOROLOGY AND ENVIRONMENT



Presidency of
Meteorology and
Environment

- Final Environmental Regulatory Authority in the Kingdom
- Prescribes Environmental Regulatory Requirements for Existing and Planned Projects in the Kingdom
- Released the Executive Regulations Released in 2002 applicable to all industries and projects in the Kingdom
- Regulations includes requirements for Environmental Service Providers (i.e. Wastewater Treatment Plants, Landfills, etc)

ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

PRESIDENCY OF METEOROLOGY AND ENVIRONMENT

REQUIREMENTS GOVERNING EIAs for WWTP

- Permit Application and Environmental Approvals
 - Requirements for EIAs are in **Appendix 2** of PME's Executive Regulations of 2002
 - Requirements for Environmental Approvals to Operate a WWTP are stated in **Appendix 3** of PME's Executive Regulations of 2002
- Discharge Standards
 - Direct Discharge and Pre-Treatment Standards are provided in **Appendix 1** of PME's Executive Regulations of 2002
- Other Requirements include those stated in the Articles and Appendices - for Health & Safety, Dust Control, Soil and Groundwater Protection, Waste Management, etc)



ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

PRESIDENCY OF METEOROLOGY AND ENVIRONMENT

REQUIREMENTS GOVERNING EIAs for WWTP

- OVERVIEW OF EIA REQUIREMENTS STATED IN APPENDIX 2

Projects Classification based on:

- Nature of the Project
- Size of the Project
- Location
- Use of Natural Resources
- Expected Impacts

Category 1: No Negative Impact

- Ex. Expansion of Drainage System by < 10%
- Submit Category 1 Application using an agency approved by PME

Category 2: Significant Impacts generally contained within the site but requires an Environmental Evaluation

- Ex. Expansion of Building, Modification of Pipelines etc
- Submit Category 2 Application using an agency approved by PME

Category 3: Significant Negative Impacts – Requires a Comprehensive EIA Study

- Ex. Major WWTP Expansion, Marine Outfalls, Dredging etc.
- Conduct EIA using an agency approved by PME



ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

PRESIDENCY OF METEOROLOGY AND ENVIRONMENT

WWTP TREATMENT AND DISCHARGE STANDARDS (APPENDIX 1)

Direct Discharge:

- Applicable for Discharge to a Water Body
- Standards Provided in Table 13 of Appendix 1
- Standards include – Physiochemical (TSS), Organic (COD, BOD), Non Organic (Metals) and Biological Parameters (Coliform)

Pre-Treatment:

- Applicable for Discharge to a WWTP
- Standards Provided in Table 14 of Appendix 1
- Standards include – Physiochemical (TSS), Organic (COD) and Non Organic (Metals)

Receiving Water Guidelines:

- Applicable for Receiving Water Bodies
- Standards provided in Table 12 of Appendix 1
- 5% Allowable Change from Baseline Conditions



ENVIRONMENTAL REGULATORY REQUIREMENTS GOVERNING EIAs FOR WASTEWATER TREATMENT PLANTS

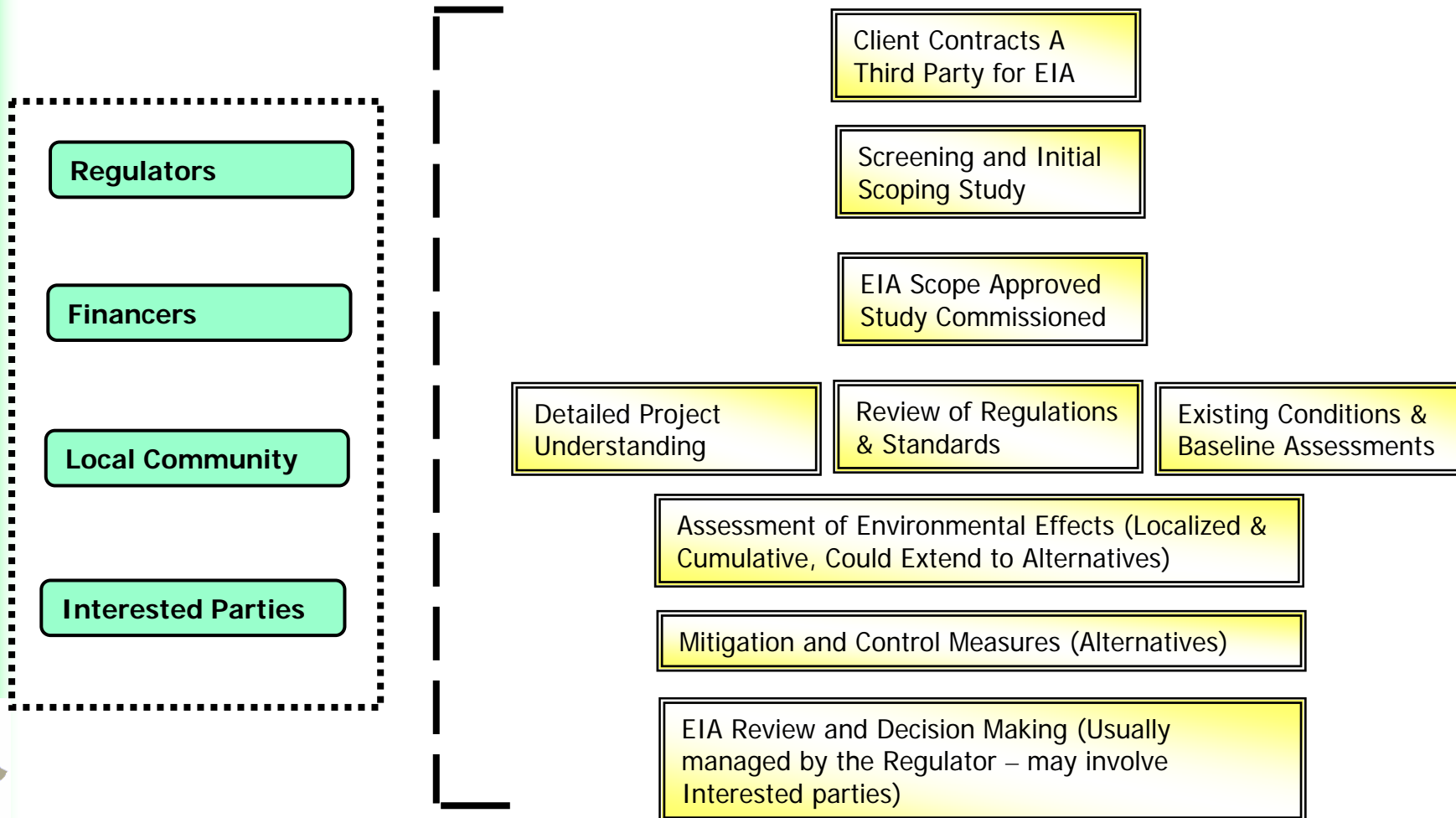
PME's Wastewater Treatment & Discharge Env'tl. Protection Standards, Requirements, & Guidelines for WWTP

- Appendix 3 Manual of Environmental Rehabilitation Procedures:
 - Wastewater Treatment
 - Manual of requirements for the treatment of wastewater including industrial drainage & groundwater treatment
 - Submit Application with Supporting Documents (includes EIA Report)
 - Obtain Certificate of Approval from PME



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The Typical EIA Process for WWTP



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Screening and Initial EIA Scoping Study:

What is the purpose of the Project?

Why is this Project required?

What does the Project involve?

What are the environmental concerns?

What environmental receptors could be affected?

Screening and Scoping involves an Initial Project Review to determine:

- Project Components
 - Documentation Gaps
 - Client and/or contractor requirements and concerns
 - Concerns of Interested Parties
 - Environmental Receptors likely to be affected
 - Requirements for Field Surveys and Assessments
 - Modelling Requirements
 - Etc,

Are there any alternatives to the Project?



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Output from the Screening and Initial EIA Scoping Study:
 - EIA Purpose & Objectives
 - Planning & Developing appropriate EIA strategy & phases
 - Identifying and appropriately assessing the impact(s) considering the environmental concerns
 - EIA Reporting Mechanism Outline

Initial Screening and Scoping allows for:

- 1. Narrowing down the range of issues**
- 2. Setting Priorities**
- 3. Preparing the Terms of Reference for the EIA**

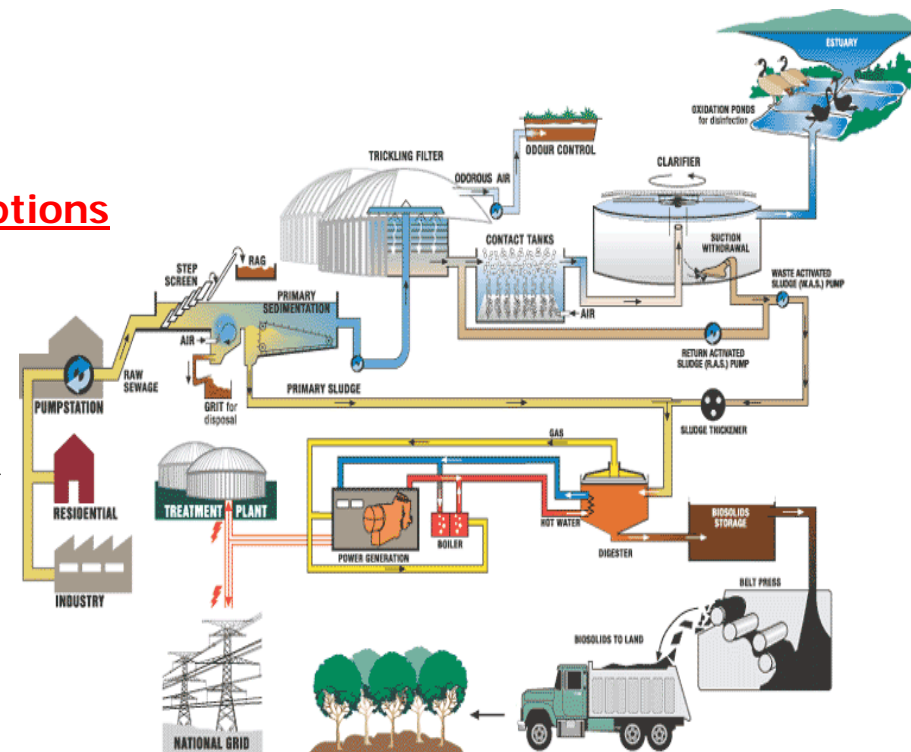


ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Review of Project Specifications:
 - Design Standards & Components of existing STP's/Outfall Channel & proposed project(s)
 - Project Schedule & Justification
 - Alternatives
 - **Output: Detailed Project Descriptions**

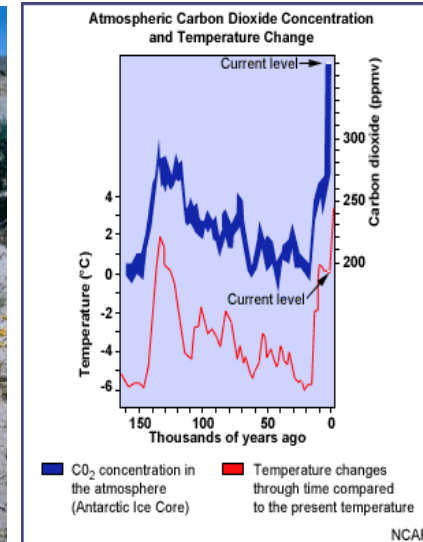
A comprehensive Project Description allows the assessors and reviewers to better understand the Project and assess the impacts!



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Baseline & Existing Environment:
 - Site/Location
 - Existing environmental conditions at STP/ETP sites a:
 - Climate
 - Air Quality
 - Oceanography
 - Geology & Soils
 - Seawater Quality
 - Ecological baseline
 - Socio-Economic Conditions



Existing Conditions to be determined by:

- Document Reviews
- Field Surveys
- Consultations

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

Typical environmental media/receptors and/or concerns from Marine Outfall Discharge:

■ Outfall Construction:

- Oceanography (bathymetry alterations)
- Seawater Quality (pipe laying, spills)
- Shoreline Ecology (mangroves)
- Marine Ecology (sea grass beds, fish resources)

■ Outfall Discharge:

- **Seawater Quality (Dispersion Modelling)**
- Shoreline & Marine Ecology (mangroves, planktons, sub-tidal benthos, sea grass beds, fish resources)
- Raw Sewage Discharge (Emergency)



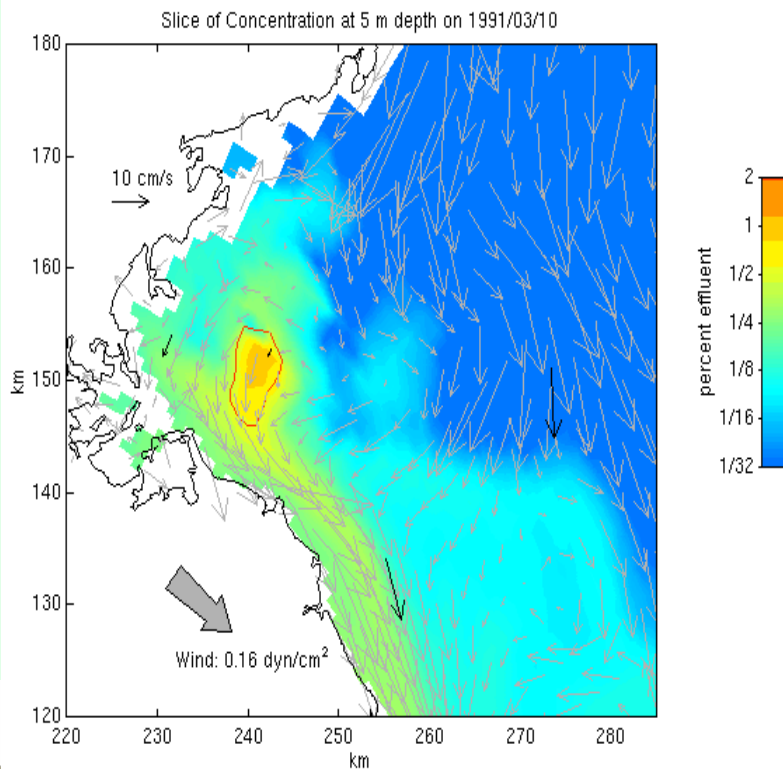
(Underwater) Diffuser Section of Outfall on Sea Floor

Photograph shows the discharge of the treated wastewater of the diffuser. The slight discoloration shown is caused by the green algae (naturally) produced in the Te Maunga Oxidation Pond and wetlands.

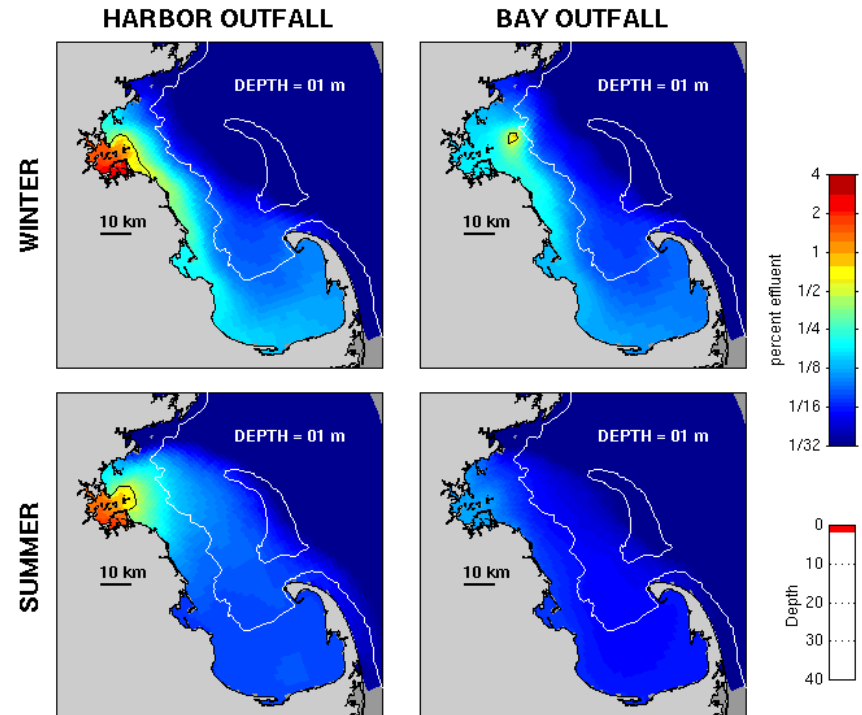
ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Assessment of Impacts:
 - Marine Discharge Dispersion Modelling (Applications)



Plume Direction and Dilutions



Comparative Assessment of Outfalls



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Assessment of Impacts:
 - Construction & Operation phase Impact Assessment using following guidelines:
 - Operating Condition
 - Spatial Extent
 - Duration
 - PME Regulations or Stds.
 - Inter-Relationships
 - Cumulative Effects

Assessment Criteria is Project Specific and is typically established during the Scoping Study



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Assessment of Impacts:
 - Cumulative Impacts
 - **USE EPA Definition:** the impacts on the environment, which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency

Example 1:

Marine Reclamation & Dredging

- Multiple Shoreline Reclamation Projects along the Arabian Gulf Coast
- Each Project EIA concludes effects are localized
- Cumulative Assessment shows significant negative environmental effects from multiple projects
- Negative Effects include large scale loss of marine habitat

Example 2:

Multiple ETP Effluent Discharge

- Discharges from several ETP/STP Outfalls in the region
- Dispersion Modeling predicts 5-10% increase in ambient conditions for each outfall
- Cumulative Assessment shows ambient conditions are significant rising
- Negative Effects include – increased nutrients in water leading to eutrophication



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

The EIA Process for WWTP

- Environmental Management Plans (EMP's) & Alternatives:
 - Mitigation, Control, or Monitoring Programs

- STP/ETP:

- Air Quality
 - Surface & Groundwater
 - Geology & Soils
 - Flora & Fauna
 - Local Population
 - On-Site SHE
 - Waste Management
 - Emergencies

- Marine Outfall:

- Inter-tidal Zone
 - Marine Resources:
 - Outfall Design
 - Waste Management
 - Sea grass beds & Fish resources



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

Environmental Impact Assessment (Minimum Content for Reports)

- Introduction
- EIA Purpose, Objectives and Methodology
- Project Description (Objectives, Schedules, Justification, Components, Alternatives)
- Policy and Legal Framework
- Existing Environmental Conditions (Air, Water, Soil and Groundwater, Flora and Fauna, Socio Economic Conditions, Land Use, etc)
- Identification and Assessment of Environmental Impacts (Positive, Negative, Cumulative, Residual, Long Term, Short Term, etc)
- Analysis of Alternatives
- Mitigation Plan
- Environmental Monitoring Plans
- Training Requirements
- Conclusion

(Based on PME Regulations of 2002 and Saudi Aramco's SAEP 13 Procedure)



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

Concluding Remarks

- The Environmental Impact Assessment (EIA) is a process - NOT JUST A REPORT
- The Environmental Impact Assessment is not a road block but rather the road itself!
- A useful Environmental Impact Assessment is always done in the early stages of Project Planning – NOT AS A PERMIT FORMALITY



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)

THANK YOU



ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOR WASTEWATER TREATMENT PLANTS (WWTP)



Presented By:
Abraham Jacob/ Subit Chandran
Operations Manager/ Environmental Consultant
The Environmental Consulting Bureau

