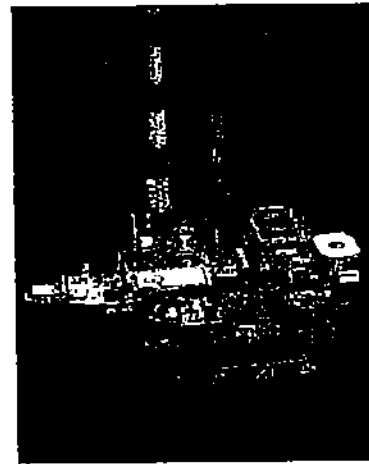


Water Regulatory Issues Affecting Offshore Operations – A National Perspective

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and the



Topics for Discussion

- Laws and regulations
- Requirements in general NPDES permits
- How and why were these requirements chosen?
- How do regulators use the information?
- Toxicity testing information
- Other water regulations of interest



U.S. Regulatory System



Laws

- Clean Water Act



Discharge Regulations

- National Pollutant Discharge Elimination System (NPDES) program
- Effluent limitations guidelines (ELGs) for offshore oil and gas
- Ocean discharge criteria evaluation

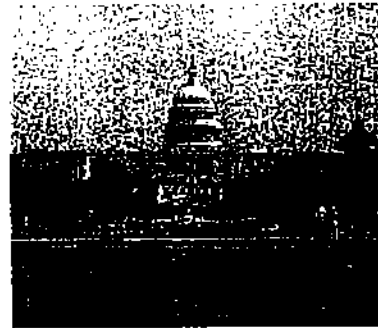


Permits and Guidance

- Environmental Protection Agency (EPA) issues NPDES general permits for discharges

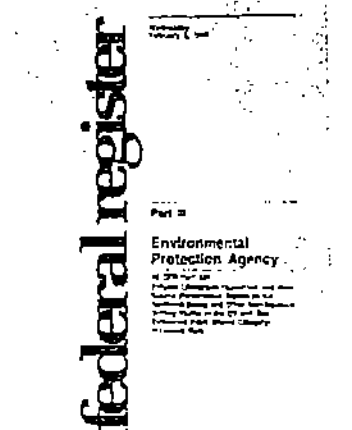
Federal Regulatory Requirements

- ELGs (effluent limitations guidelines)
- EPA regional offices issue National Pollutant Discharge Elimination System (NPDES) general permits



EPA Offshore Oil and Gas Effluent Limitation Guidelines (ELGs) for Produced Water and Treatment, Workover, and Completion Fluids

- Best Available Technology (BAT) for Produced water:
 - Oil and grease limits before discharge
 - 29 mg/l monthly average
 - 42 mg/l daily maximum
 - ELGs for coastal waters require zero discharge except in Cook Inlet, Alaska
 - Offshore limits are required there



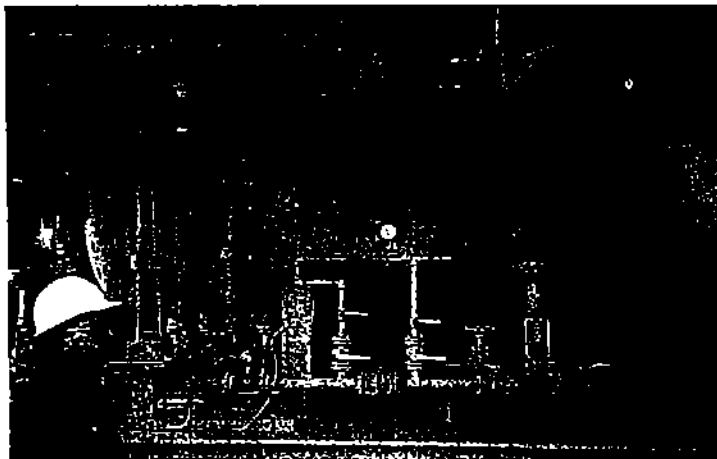
ELGs for Drilling Wastes



- no discharge allowed from 0-3 miles from shore (except for Alaska)
- >3 miles from shore
 - limits are placed on drilling fluid toxicity, and mercury and cadmium in barite
 - no discharge of free oil or diesel allowed (no discharge of oil-based muds and cuttings)
 - additional limits on PAHs, sediment toxicity, biodegradation rate, and fluid retained on cuttings for synthetic-based muds

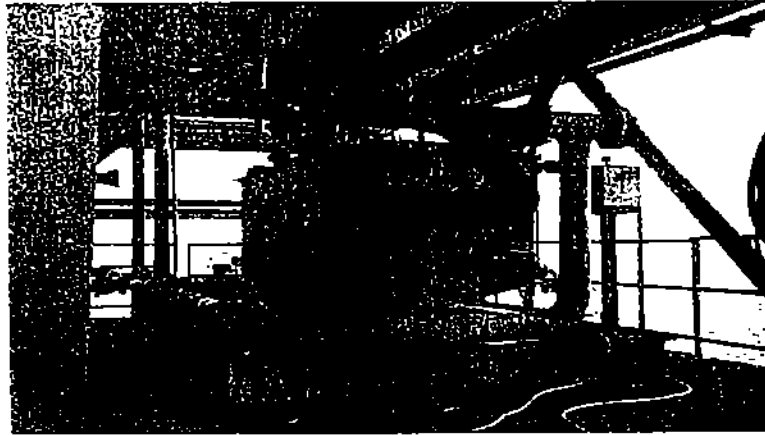
ELGs for Produced Sand

- zero discharge



ELGs for Deck Drainage

- no free oil discharge allowed



ELGs for Domestic Waste

- no discharge of floating solids or foam
- no discharge of garbage or plastics (food waste only beyond 12 miles)
 - food waste must be ground up before discharge

ELGs for Sanitary Waste

- facilities with 10 or more persons - minimum chlorine limit
- facilities with <10 persons - no discharge of floating solids



What is BAT?

- *Best available technology* economically achievable
- National minimum technology-based standard



How Is BAT Determined?

- Best performance of existing plants in the industry
- Factors to consider:
 - Cost to achieve BAT
 - Age of equipment and facilities
 - Processes employed
 - Engineering aspects of technologies employed
 - Potential process changes
 - Non-water quality environmental and energy impacts



What Is the Effect of BAT?

- Does not depend on water quality impact of the discharge
 - Example: produced water
 - Assume that there is no impact of produced water discharge at oil and grease concentrations < 100 mg/l
 - BAT for offshore produced water is based on the existing technology of gas flotation
 - 29 mg/l average; 42 mg/l maximum
 - All plants must meet BAT even if there is no aquatic impact below 100 mg/l

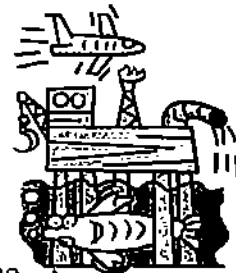
BAT is a One-Way Street

- Permit limit can never be higher than BAT, even if there is no environmental impact
- However, if EPA believes that BAT limits will not be strict enough to protect water quality and aquatic life, it can require stricter water-quality-based limits



All Discharges to Oceans Must Have an Additional Review

- Existing EPA regulations on ocean discharge criteria
 - Must determine if discharge will cause unreasonable degradation of the marine environment by considering:
 - Amounts and potential for bioaccumulation of pollutants
 - Transport of pollutants
 - Nature of biological communities
 - Special biological functions of receiving waters
 - Potential impacts to human health
 - Impact on fishing

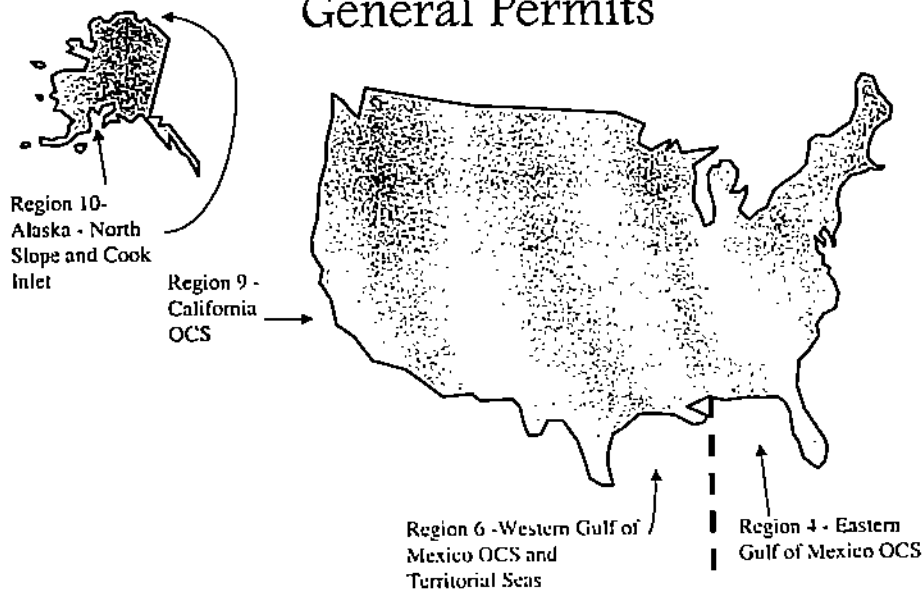


EPA Proposed Changes to Ocean Discharge Criteria – January 2001

- Establishes new water quality standards for “Healthy Ocean Waters”
- Sets up “Special Ocean Sites” that would be off-limits to new oil and gas exploration and production
- Requires ocean dischargers to evaluate alternative disposal options to ocean discharge
- Requires ocean dischargers to study treatment and production processes that would reduce the pollutants in the discharge



EPA Regions Issuing Offshore General Permits



Other Produced Water Requirements for Region 4 (Eastern Gulf of Mexico)

- No discharge allowed within 1,000 meters of Area of Biological Concern
- Toxicity
 - 96-hour LC50 must not exceed concentration determined by using critical dilutions
 - Mysid shrimp (*Mysidopsis bahia*)
 - Inland silverside minnow (*Menidia beryllina*)
 - Critical dilutions based on water depth, pipe diameter, and flow rate
 - Dilution calculated using CORMIX 2 model
 - Dilution can be increased by using a diffuser or adding seawater



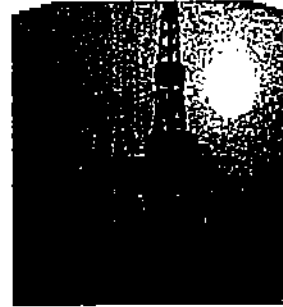
Other Produced Water Requirements for Region 6 (Western Gulf of Mexico; > 3 miles offshore)

- No discharge within Area of Biological Concern
- Toxicity
 - 7-day NOEC must not exceed concentration determined by using critical dilutions
 - Mysid shrimp (*Mysidopsis bahia*)
 - Inland silverside minnow (*Menidia beryllina*)
 - Critical dilutions based on water depth, discharge depth, pipe diameter, and flow rate
 - Dilution calculated using CORMIX 2 model
 - Dilution can be increased by using a diffuser or adding seawater
 - Frequency of testing based on volume of discharge

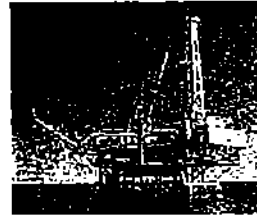


Other Produced Water Requirements for Region 6 (Western Gulf of Mexico; 0-3 miles from shore)

- No discharge allowed:
 - To areas intermittently exposed
 - In parks or wildlife refuges
 - Within 1,300 feet of oyster or sea grass bed
- Toxicity
 - Similar to Region 6 (>3 miles offshore)
- Other chemical monitoring
 - benzene lead phenol
 - thallium radium 226 radium 228
 - Limits based on dilution



Other Produced Water Requirements for Region 9 (California)



- Sample produced water for 26 chemicals and effluent toxicity to determine if those substances are likely to cause a water quality problem
 - Determine available dilution using PLUMES model
 - Dilution can be increased by using a diffuser or adding seawater
 - EPA has already set limits on selected chemicals at some platforms
- Discharge volume limits are set for each platform
- Conduct study of on-line oil and grease monitors

Region 9 – Produced Water Toxicity Requirements

- Quarterly chronic testing with red abalone (*Haliotis rufescens*)
- Annual chronic testing with plant (giant kelp – *Macrocystis pyrifera*) and fish (topsmelt – *Atherinops affinis*)
- EPA will set separate NOEC limits for each platform based on dilution
- If limits are exceeded, must sample more frequently
- If limits are still exceeded, must undertake a toxicity reduction evaluation (TRE)
 - Identify sources of toxicity
 - Take actions to mitigate toxicity
 - Retest to confirm results
- Study of impacts of produced water discharges on fish



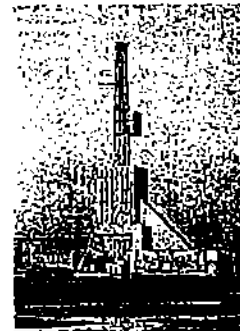
Other Permit Requirements for Region 10 - Alaska

- Offshore general permit does not authorize produced water discharges in offshore areas of Alaska
- Cook Inlet general permit allows discharges of produced water
 - No discharge:
 - To water < 5 meters depth
 - Within 1000 meters of coastal marsh, river mouth, parks, or wildlife areas
 - Other sensitive areas
 - Separate numerical limits for each of the 8 platforms for 8 toxic pollutants



Region 10 – Toxicity Requirements

- NOEC limits set for each platform
- Annual chronic testing using 3 species
 - Inland silverside minnow (*Menidia beryllina*)
 - Mysid shrimp (*Mysidopsis bahia*)
 - Mussel (*Mytilus* sp.) or Pacific oyster (*Crassostrea gigas*)
- If limits are exceeded, must sample more frequently
- If limits are still exceeded, must undertake a toxicity reduction evaluation (TRE)
 - Identify sources of toxicity
 - Take actions to mitigate toxicity
 - Retest to confirm results



Basis for Offshore ELG Requirements

- Oil and grease limit used as a “surrogate” for other pollutants
 - When oil and grease are controlled, other pollutants will also be controlled
- Limit is based on a statistical analysis of data from 60 U.S. platforms
 - Monthly average = 95th percentile = 29 mg/l
 - Daily maximum = 90th percentile = 42 mg/l



A Closer Look at Toxicity Testing



- All general permits require several types of toxicity tests for produced water discharges
 - Different tests in different EPA regions
 - Acute vs. chronic
 - Species selection
 - In deep water, produced water affect only the water column
 - In shallow water, can affect benthic organisms too

Why Is Toxicity Testing Required?

- Gives a biological indication of impacts of produced water and other production waste discharges on aquatic life
 - ELGs limit only oil and grease
 - Toxicity is an integrator of all other pollutants
- Combination of tests using different biological taxa improves regulator's confidence
 - Fish
 - Invertebrates
 - Shrimp
 - molluscs
 - plants



Design Criteria for Toxicity Tests

- Ecological relevance
- Discriminatory power
- Reproducibility
- Practicality
- Cost effectiveness

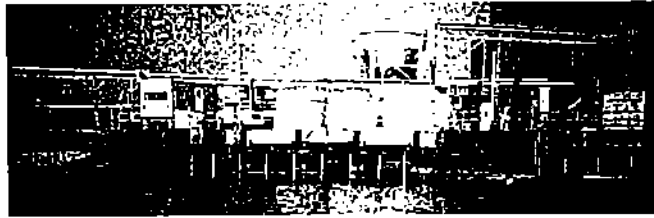


How Do Regulators Use This Information?

- Building confidence that discharges are not harming aquatic life
- Determining the need for additional NPDES permit conditions
 - Permits get renewed every 5 years
 - Toxicity data is reviewed to see how limits must be modified
- Determining compliance with permits



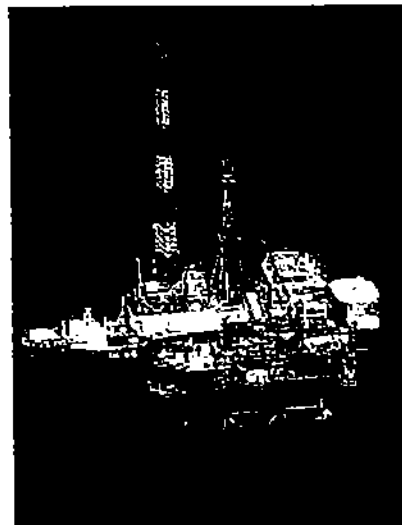
Cooling Water Intake Regulations



- EPA is on a court-ordered schedule to issue regulations for cooling water intake structures
- Phase I – new facilities rule issued 11/01
 - Excluded offshore oil and gas operations
- Phase II – existing power generators
- Phase III – other existing cooling water users
 - Will probably include offshore facilities
 - Proposal due 6/03
 - Final rule due 12/04

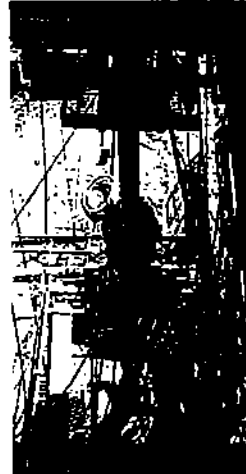
Potential Impacts of Cooling Water Intake Rule

- Drill ships and other drilling rigs may need to be redesigned or retrofitted
- Cost for additional permit applications and monitoring studies



Summary of Regulatory Information

- National ELGs provide general controls on chemical pollutants in produced water and other production wastes
- Regional NPDES permits include additional monitoring, reporting, and operational requirements
- Toxicity testing plays an important role in the discharge requirements



Questions?



