

Engineering Procedure

SAEP-327

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Disposal of Wastewater from Cleaning, Flushing, and Dewatering Pipelines and Vessels

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Saudi Aramco DeskTop Standards

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1 Scope

This procedure establishes the environmental limitations and responsibilities for the disposal of wastewater from cleaning, flushing and dewatering pipelines, tanks, and vessels. This procedure applies to all onshore and offshore activities, and includes hydrostatic tests.

2 Applicable Documents

Saudi Aramco Engineering Standards

<u>SAES-A-007</u>	<i>Hydrostatic Testing Fluids and Lay-Up Procedures</i>
<u>SAES-A-103</u>	<i>Discharges to the Marine Environment</i>
<u>SAES-A-104</u>	<i>Wastewater Treatment, Reuse and Disposal</i>
<u>SAES-M-006</u>	<i>Saudi Aramco Security and General Purpose Fencing</i>

Saudi Aramco General Instructions

<i>GI-0002.716</i>	<i>Land Use Permit Procedures</i>
<i>GI-0430.001</i>	<i>Waste Management</i>

3 Instructions

- 3.1 The hydrocarbon or other contaminants in disposed wastewater are limited by [SAES-A-104](#) / [SAES-A-103](#). The instructions below are to minimize adverse environmental and public health impacts of wastewater disposal after cleaning, flushing and hydrostatic tests.
- 3.2 Disposal Requirements / Restrictions
 - 3.2.1 New pipelines, and pipelines in gas service do not require oil/water separation prior to wastewater discharge/disposal.
 - 3.2.2 Do not discharge wastewater to local wadi environments. Discharge separated wastewater (Figure 1) to non-sabkhah areas into approved pits or to lined evaporation ponds constructed (Figure 2).
 - 3.2.3 As far as possible locate the disposal site within the existing pipeline corridor while ensuring adequate pipeline access and without causing damage to the existing roadways, pipelines, private entities or other structures.

3.2.4 Do not dispose wastewater within or adjacent to wetland or sensitive environments, including specified conservation areas (list of locations is available from EPD).

3.3 Disposal to Sabkhah

Discharge separated wastewater directly to the sabkhah for evaporation provided that the wastewater remains on land, and does not flow directly to the marine environment. An oil/water Separator Pond (Figure 1) is required before wastewater is discharged to sabkhah to ensure retention of residual hydrocarbon for subsequent collection and proper handling. Separator pond should be sited to minimize exposure risk to nearby facilities personnel, (i.e., downwind).

3.4 Disposal to an Evaporation Pond

Oil/water separator ponds (Figure 1) are required upstream of evaporation ponds (Figure 2) to collect residual hydrocarbon and improve evaporation in the evaporation ponds. Evaporation ponds must meet the requirements of [SAES-A-104](#) Section 14.2 (see Figure 1).

3.5 Disposal to Industrial Wastewater Treatment Plant

Discharge wastewater directly to the local industrial wastewater treatment plant if disposal does not affect the normal operations of the plant. Obtain concurrence from the operators of the treatment plant prior to selection of this disposal option.

3.6 Disposal to Injection Well

Dispose wastewater into injection wells if it does not affect the well operation. Obtain concurrence from the operators of the well prior to selection of this disposal option. Injection well operators will provide water quality criteria for any wastewater that will be introduced to their system for disposal.

3.7 Disposal Offshore

Dispose wastewater offshore to the Arabian Gulf or Red Sea in accordance with the criteria in Table 1 below and [SAES-A-103](#). Ensure adequate dispersal of wastewater in the marine environment by employing diffusers or similar technologies. Alternatively, transfer wastewater onshore for treatment/disposal as per Sections 3.2 through 3.6.

3.7.1 Biocides, other than Troskil-1 (Polyhexamethylene biguanide hydrochloride or PHMB) will require evaluation and approval by EPD/EED prior to disposal to the Arabian Gulf or the Red Sea. Submit Water Disposal Approval Form.

- 3.7.2 Dispose wastewater with Rhodamine B and TROS (fluorescent) dyes into deep water, shallow water and embayment systems per Table 1. For other dyes provide toxicity data, submit Water Disposal Approval Form. Notify Frontier Force of any discharges of dyes to the sea to prevent alarm.
- 3.7.3 Use a spray nozzle to allow maximum oxygenation of discharge of waters containing oxygen scavenger added per [SAES-A-007](#).
- 3.7.4 Submit Water Disposal Approval Form and obtain approval from EPD/EED before discharge of any wastewater to embayments and/or conservation areas in the Arabian Gulf.
- 3.7.5 Discharge of contaminated wastewaters must meet [SAES-A-103](#) requirements. Discharge locations should be selected where the water column is deepest. Discharge at that location shall be as close to the water surface as practicable. If only oxygen scavenger is used, discharge shall be into the air at the selected discharge location. Lower the discharge rate to less than five cubic meters per minute to allow mixing and mitigate adverse impact to the marine environment. Alternatively, [SAES-A-104](#) allows the injection of wastewater into any petroleum reservoir from which hydrocarbons are produced.
- 3.7.6 Submit Water Disposal Approval Form and obtain approval from EPD/EED before disposal of wastewater to the Red Sea.

Table 1 – Guidelines for Offshore Disposal of Wastewater to the Arabian Gulf and the Red Sea

Quality / Volume of Water for Disposal into the Arabian Gulf	Deep Water* (>30m)	Shallow Water (<30m)	Embayments / Sensitive Habitats / Conservation Areas
No additives except oxygen scavenger and/or non-toxic dye	**Discharge Allowed	**Discharge Allowed	Submit Form
<1,000 m ³ , <200 mg/l biocide***	**Discharge Allowed	Submit Form	Discharge Not Allowed
>1,000 m ³ , <200mg/l biocide***	Submit Form	Discharge Not Allowed	Discharge Not Allowed
Any volume >200mg/l biocide***	Discharge Not Allowed	Discharge Not Allowed	Discharge Not Allowed
Quality / Volume of Water for Disposal into the Red Sea			
Any quality / volume	Submit Form	Submit Form	Submit Form

* See complete definition in Section 6

** Submit Water Disposal Approval Form if volume is equal to or greater than 10,000 m³

*** concentration at time of discharge.

4 Responsibilities

4.1 Project Management or Facility Operating Department

- 4.1.1 For new facilities the Project Management, and for existing facilities the Manager of the Facility is responsible for the completion and submittal of Water Disposal Approval Form.
- 4.1.2 Prepare a disposal plan and submit with the Water Disposal Approval Form to EPD/EED 60 days before the proposed water disposal date. (See form for details).
- 4.1.3 Ensure that the water disposal does not cause soil erosion, safety, environmental and/or health problems.
- 4.1.4 Ensure that requirements of the Water Disposal Approval Form are carried out at time of discharge.
- 4.1.5 Submit Water Disposal Approval Form with Certified Completion signature to EPD/EED within 30 days after disposal completion.

4.2 Environmental Protection Department (EPD/EED)

- 4.2.1 Reviews and approves Water Disposal Approval Form. If applicable The EPD/EED will solicit concurrence on Water Disposal Approval Form from:
 - Reservoir Characterization Department/Groundwater Division
 - Government Affairs Services Department/Land and Lease Division
- 4.2.2 Provide a written explanation as soon as possible to the proponent and to all concerned parties if Water Disposal Approval Form is disapproved, or receives conditional approval, to plan timely alternatives or to meet the conditions.
- 4.2.3 Return to the proponent approved/conditionally approved Water Disposal Approval Form no later than 30 working days after initial receipt.

5 Water Disposal Approval Form

- Water Disposal Approval Form is required for all water disposal from cleaning, flushing, and hydrostatic tests when any one of the following is true:
- Specified in Table 1 – "Guidelines for Offshore Disposal of Wastewater to the Arabian Gulf and the Red Sea" OR

- Disposal water is contaminated, and will not be discharged to existing approved plant process drainage facilities OR
- Wastewater volume is between 1,000 m³ and 10,000 m³, and the disposal water TDS and conductivity vary by more than 25% of the TDS and conductivity of the receiving surface water or underlying groundwater, OR
- Disposal water volume equals or exceeds 10,000 m³.

6 Definitions

The following definitions apply to this procedure.

Biocide: The only biocide approved for disposal to the environment (under limited circumstances) is Polyhexamethylene biguanide hydrochloride (Trade name: Troskil-1).

Chemical Additives: Any added chemical present in the water prior to discharge.

Contaminated: Wastewater that does not meet the discharge water quality criteria specified in either [SAES-A-103](#) or [SAES-A-104](#) or has unapproved biocides/dyes.

Deep Water: Seawater greater than 30 meters deep (relative to Lowest Astronomical Tide), and farther than 5 km from the shoreline, an offshore island, coral reef, or other sensitive marine habitat including embayments and conservation areas.

Receiving Surface Water: Any surface water body that receives disposed water. This includes open bodies of water (such as the Arabian Gulf and Red Sea).

Sabkhah: Are defined on geologic maps available for review from Reservoir Characterization Dept./EXPEC.

Shallow Water: Sea water less than 30 meters deep (relative to Lowest Astronomical Tide), and less than 5 km from the shoreline, an offshore island, coral reef or other sensitive marine habitats including embayments and conservation areas.

Uncontaminated: Wastewater that meets the discharge water quality criteria specified in either [SAES-A-103](#) or [SAES-A-104](#).

Wadi: A stream bed channel, or dry wash, that is usually dry except during the rainy season.

Revision Summary

31 May, 2003

Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor revisions.

Water Disposal Approval Form

Submit Water Disposal Approval Form before disposal of all wastewater from cleaning, flushing, and hydrostatic tests where ANY of the following is true:

- Specified in Table 1 - "Guidelines for Offshore Disposal of Wastewater to the Arabian Gulf and the Red Sea", OR
- Disposal water is contaminated and will not be discharged to existing approved plant process drainage facilities, OR
- Wastewater volume is between 1,000 m³ and 10,000 m³, and the disposal water TDS and conductivity vary by more than 25% of the TDS and conductivity of the receiving surface water or underlying groundwater, OR
- Disposal water volume equals or exceeds 10,000 m³.

Submit this completed form for approval 60 days before the planned disposal date to: General Supervisor, Environmental Engineering Division, Environmental Protection Department, Dhahran.

Submit with this form the activity schedule and water disposal plan. Include map(s) showing activity location and the UTM coordinates or pipeline kilometer points for all water disposal locations. Other supplemental information may be required and should be provided upon request.

Identification of Equipment: _____

Location: _____
(km End Points for Pipeline, Plant Location of Equipment)

Type	Service	Condition
☐ Pipeline	☐ Oil	☐ New
☐ Tank	☐ Gas/Condensate	☐ Existing
☐ Other Vessel	☐ Other	☐

Diameter of Pipeline / Vessel: _____ (include units)

Length of Pipeline / Height of Vessel: _____ (include units)

Expected Water Disposal Volume: _____ (include units)

The disposal water is / is not contaminated. (strike one)

The disposal water will / will not contain chemical additives. (strike one)

☐ The disposal water is between 1,000 m³ and 10,000 m³, and the disposal water TDS and conductivity vary by more than 25% of the TDS and conductivity of the receiving surface water or underlying groundwater.

☐ The volume of disposal water equals or exceeds 10,000 m³.

List Chemical Additive(s) and their concentration(s): _____

Water Disposal Approval Form (Continued)

Source Water:

☐ Well water _____ (provide well number) or

☐ Seawater _____ (provide well number)

Source Water Conductivity or Total Dissolved Solids: _____ (include units)

Receiving water Conductivity or Total Dissolved Solids: _____ (include units)

Planned Disposal Date(s): _____

Planned Disposal Location(s): _____

APPROVAL REQUEST: (as applicable per Section 4.1)

Project Manager's Signature

Date

Facility Manager's Signature

Date

CONCURRENCE: (as applicable):

Director, Land Affairs Division
Saudi Aramco Affairs

Date

Chief Hydrologist, Groundwater Division
Reservoir Characterization Department

Date

APPROVAL:

General Supervisor, Environmental Engineering Division
Environmental Protection Department

Date

CERTIFIED COMPLETION: (as applicable per Section 4.1)

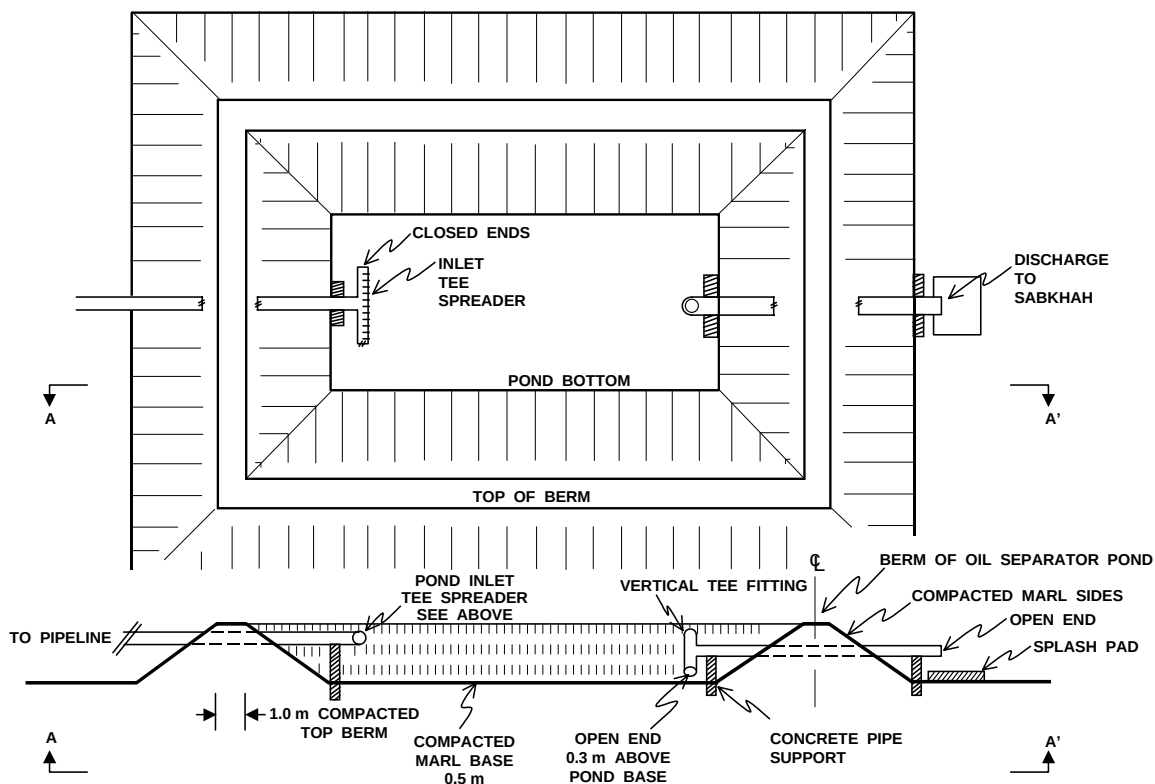
Project Manager's Signature

Date

Facility Manager's Signature

Date

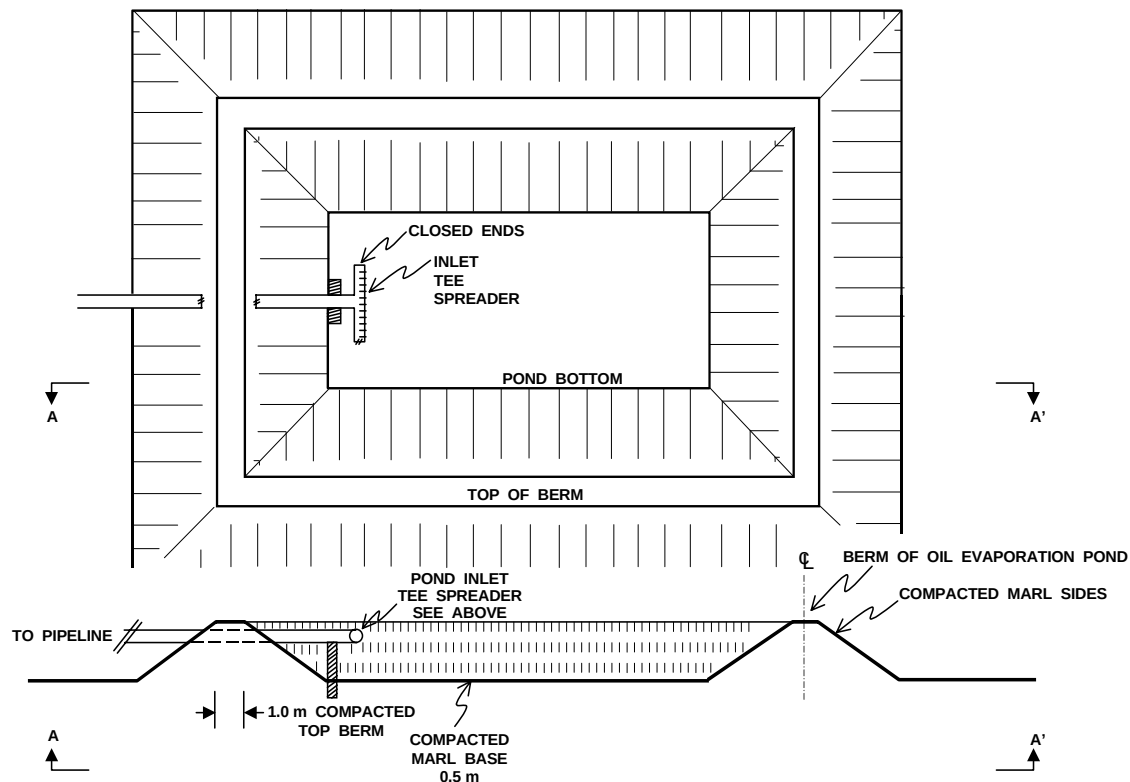
Figure 1 – Oil/Water Separation Pond



Notes:

- Drawing not to scale
- This figure shows a flow-through pond (between pipeline and evaporation pond or between pipeline and sabkha discharge).
- Size Piping to prevent pond flooding during discharge.
- Pond should have Spreader Tee or other appropriate method of liner erosion control.
- Pond shall be fenced per [SAES-M-006](#) Fencing (Type V)
- Remove accumulated hydrocarbons to an approved treatment/disposal site.
- Provide Vertical, open Tee fitting to prevent inadvertent siphoning from oil/water separation pond.
- Pond design shall meet [SAES-A-104](#) section 14.2.

Figure 2 – Wastewater Evaporation Pond



Notes:

- Drawing not to scale
- Pond should have Spreader Tee or other appropriate method of liner erosion control.
- Pond shall be fenced per [SAES-M-006](#) Fencing (Type V)
- Use oil/water separator pond upstream for pipelines in liquid hydrocarbon service.
- Maximum depth for evaporation pond shall be 1.5 m. HDPE sealed, lined ponds have no depth maximum.
- Pond design shall meet [SAES-A-104](#) section 14.2.