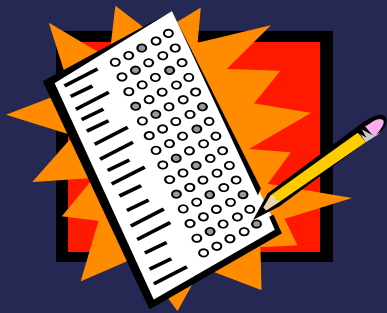


Plan Reviews, Inspections and GIUEs under the FRP Rule



USWAG SPCC Workshop, August 2023
EPA FRP Day 2
J. Troy Swackhammer
EPA OEM



Module Objectives

At the end of this module, attendees should have a better understanding of:

- Plan Reviews – *key aspects of the review and common deficiencies*
- FRP-related inspections, including QI interviews – *common inspection issues*
- GIUEs – planning and *what EPA expects*

Required FRP Content

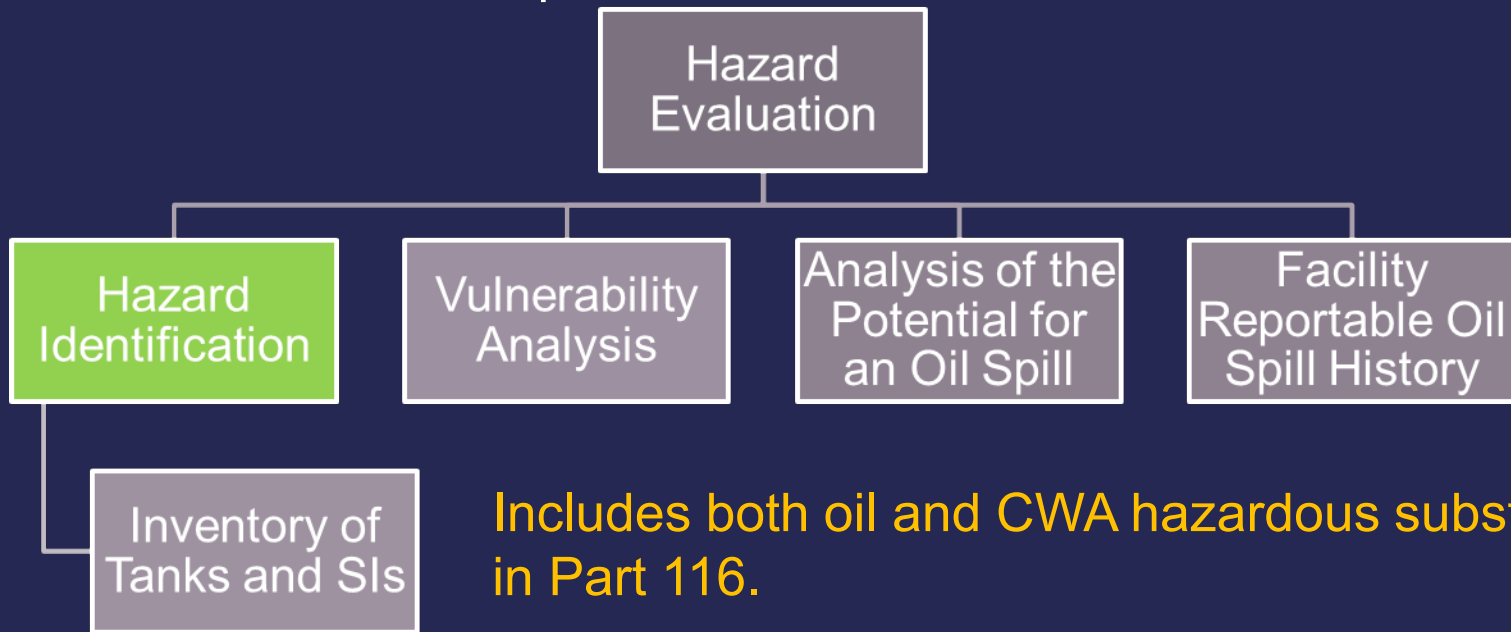
1. Emergency Response Action Plan (ERAP)
2. Facility information
3. Information about emergency response
4. Hazard evaluation
5. Response planning levels
6. Discharge detection systems
7. Plan implementation
8. Self-inspection, drills/exercises, & response training
9. Diagrams
10. Security systems
11. Response plan cover sheet



Connecting the dots within the FRP requirements, *recap*



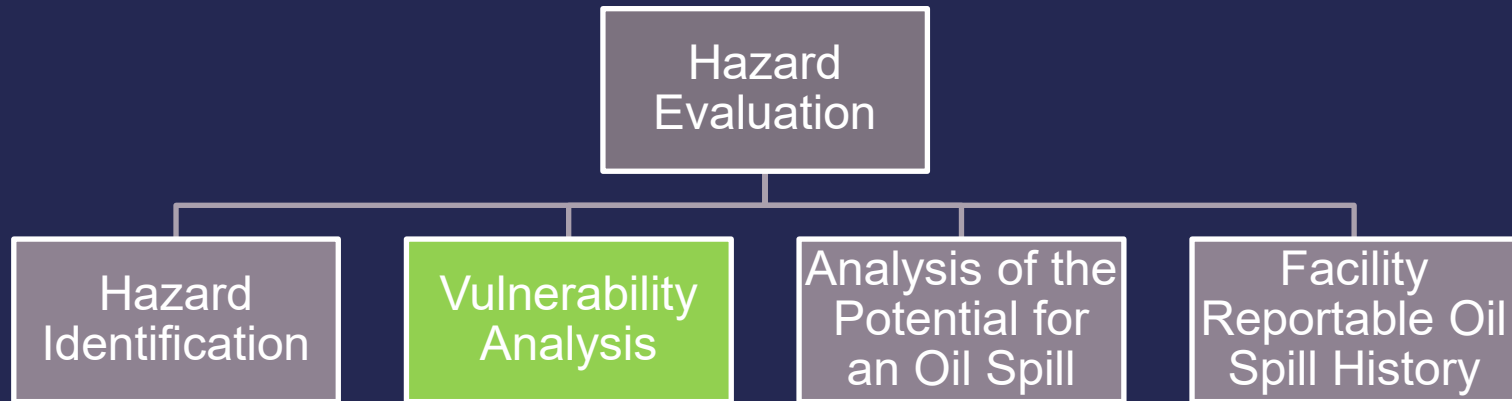
Start with the calculated planning distance and the SPCC plan and then check the Hazard Evaluation (Section 4); make sure tank schedule is the same as in the SPCC plan.



Connecting the dots within the FRP requirements



Check the correct planning distance was used in the Vulnerability Analysis and then check the relevant ACP that vulnerable areas are correct.

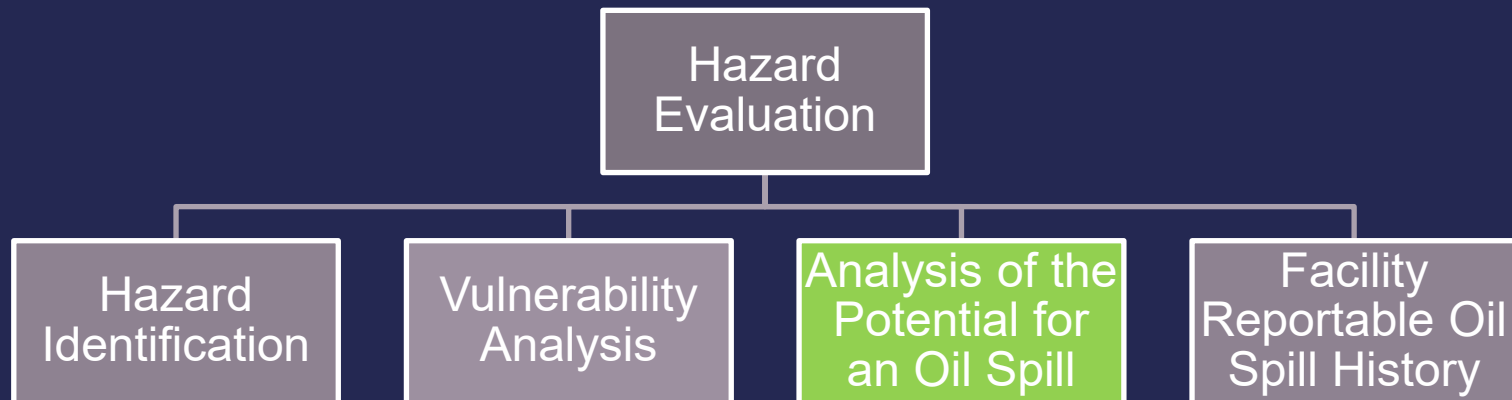


- Recall that the planholder uses Appendix C, Attachment C-III) to calculate the **planning distance**. Check that planholder is using the correct formula.

Connecting the dots within the FRP requirements



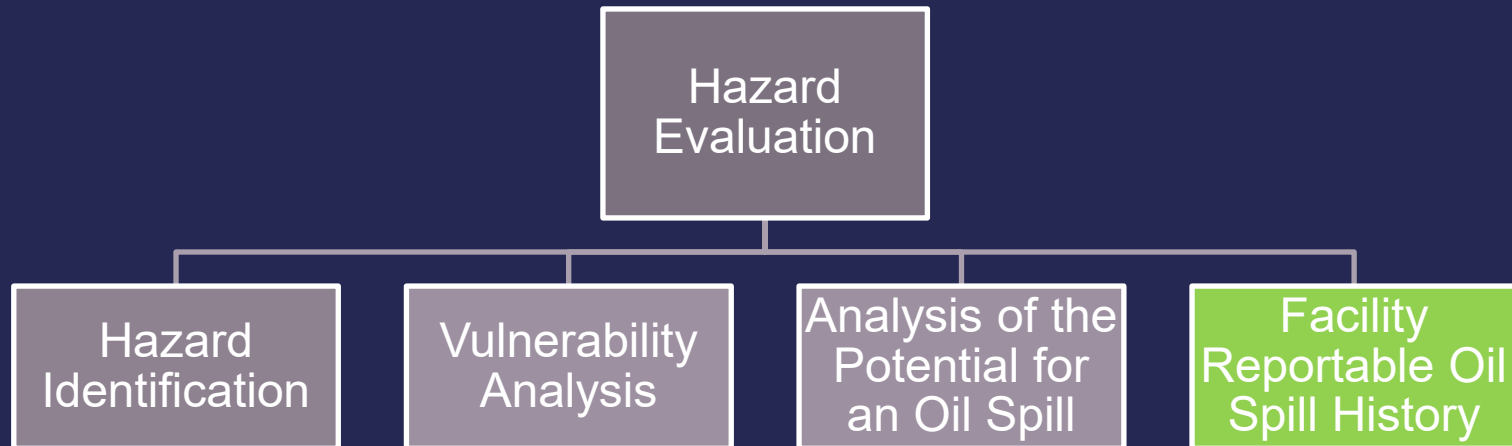
Next check the plan's oil spill trajectory; where is the oil going?



Connecting the dots within the FRP requirements



Check facility spill history; this should reflect oil spills since startup.



- The information may be similar to SPCC requirements in 40 CFR 112.4(a). This data should inform the spill trajectory.
- Facility Reportable Oil Spill History requirement here can also help you cross-check if facility should check this harm factor in Attachment C-II. Note: **only for last 5 years.**

Plan Reviews

- Review process
 - Plan submitted, typically electronic submission
 - If facility has changed ownership, check old plan to determine if more detailed review required
 - START and/or OSC review; complete plan review checklist
 - Cross-check by FRP Coordinator
 - Coordinate with planholder to correct any deficiencies; provide plan review checklist to planholder
- Determine if sig/sub harm even if sub harm determination was made previously; any changed conditions?
- If sig/sub harm, provide letter to operate if plan approval will take time.

Sample Plan Review Checklist

Facility Response Plan Plan Review Checklist								
Facility Information								
Oil Dis ID								
FRP ID								
Facility Name								
Facility Address								
Activity Information								
Activity Type	FRP Plan Review							
	Initial Plan Submittal (new FRP)							
	5-year Review							
Reason for Review (check one)	Plan Amendment (note type)		Note (type of amendment)					
	Other (note other reason)		Note (describe other reason)					
Activity Date								
EPA Inspector								
Plan Version Reviewed								
Note to reviewer:	For the following sections, check "Yes" or "No" to indicate whether each content requirement is addressed in the plan. If the question/requirement is not applicable, check "N/A".							
A. Response Plan Cover Sheet and Format			Review		Citations and other relevant guidance			
			YES	NO	N/A	40 CFR 112	Appendices	Other
Note to reviewer:	The following requirements are addressed in 40 CFR 112.20(h)(11) and Appendix F, Section 2.0.							
General Information								
Does the Response Plan Cover Sheet include the following:								
Owner/operator of facility								
Facility name								
Facility address (street address, city, state, zip code)								
Facility telephone number								
Latitude (degree, minutes, seconds)								
Longitude (degree, minutes, seconds)								
Dun & Bradstreet number					112.20(h)(11)	App F, Sec 2.1	—	
North American Industrial Classification System (NAICS) code								
Largest aboveground oil storage tank (AST) capacity (gallons)								
Maximum oil storage capacity (gallons)								
Number of aboveground oil storage tanks								
Worst case discharge amount (gallons)								
Facility distance to navigable waters (identify)								
Applicability of Substantial Harm Criteria								
Does the Response Plan Cover Sheet include the following:								
Attachment C-4 with an answer to each applicability question					112.20(h)(11)	App F, Sec 2.2	—	
Documentation of reliability and analytical soundness of alternate, comparable formula, if applicable								
Certification								
Is the plan holder certification included, with signature, title and date?								
					112.20(h)(11)	App F, Sec 2.3	—	
Response Plan Format								
Does the response plan follow the format in 40 CFR 112, Appendix F?								
If the response plan does not follow the format in Appendix F, is a cross-reference section included?								
If a cross-reference section is included, is it complete?								
					112.20(h)	—	—	
Reviewer notes on Response Plan Cover Sheet and Format:								

Example Sig/Sub Harm Letter



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

April 14, 2022

Rear Admiral Timothy J. Kott
Joint Base Pearl Harbor Hickam
Commander, Navy Region Hawaii
850 Ticonderoga St. Ste. 110
Pearl Harbor, HI 96860-5101
timothy.j.kott@navy.mil

RE: Joint Base Pearl Harbor-Hickam – Facility Response Plan Significant and Substantial Harm Determination

Dear Admiral Kott,

During the week of February 28, 2022, the U.S. Environmental Protection Agency (EPA) Region 9 conducted an inspection at the Joint Base Pearl Harbor-Hickam (JBPHH) facility (Facility) to determine the Navy's compliance with Section 311 of the Clean Water Act (CWA), 33 U.S.C. § 1321, and the Spill Prevention, Control, and Countermeasure and Facility Response Plan (FRP) requirements in Title 40 of the Code of Federal Regulations, Part 112, also known as the Oil Pollution Prevention (OPP) regulations.

As part of the inspection, EPA requested, and the Navy submitted, a copy of the FRP for the JBPHH Facility. The FRP required information is contained in the broader Integrated Contingency Plan, dated August 2018. The ICP lacks the required certification that documents and ensures, by contract or other approved means, the availability of personnel and equipment necessary to respond, to the maximum extent practicable, to a worst-case discharge or a substantial threat of such a discharge as required by 40 C.F.R. §§ 112.20 -112.21 and Appendix F. The certification is necessary for continued operation of the JBPHH Facility pending EPA approval of the FRP. See 33 U.S.C. § 1321(j)(5)(G). Accordingly, the Navy must submit a signed and certified response plan cover sheet to EPA as quickly as possible, but no later than April 29, 2022.

EPA must approve the FRP for the JBPHH Facility because it has determined the JBPHH Facility could reasonably be expected to cause "significant and substantial harm to the environment by discharging oil into or upon navigable waters or adjoining shorelines," pursuant to 40 C.F.R. § 112.20(c) and the criteria outlined in 40 C.F.R. § 112.20(f)(3). See 40 C.F.R. § 112.20(c)(3). The basis for this determination is that the JBPHH Facility conducts over-water transfers to or from vessels and there is an aggregate oil storage capacity of 42,000 gallons or more at the JBPHH Facility. 40 C.F.R. § 112.20(f)(1)(i); see also 59 Fed Reg. 34070, 34081 (July 1, 1994).

EPA is currently reviewing the Navy's FRP and will communicate any compliance concerns identified to the Navy. Please note that EPA will not provide final approval of the Navy's FRP until all compliance concerns are resolved.

5-Year Reviews

- Required for sig/sub plans only
- Purpose: Verify information is current, particularly if you have not heard from them in awhile

Common Plan Deficiencies

- Planholder had not submitted updates following material changes at the facility.
- Plan did not follow Appendix F format and inadequate cross-referencing.
- Missing ERAP
- Incorrect planning distance; missing sensitive areas in Vulnerability Analysis.
- Plan did not identify response personnel, contact numbers, job functions, etc.
- Plan is missing full list of response equipment on site; inadequate fire fighting narrative.
- Deficient evacuation plan, missing required elements outlined in Appendix F.
- Tank schedule missing information or not consistent with SPCC plan.

FRP-related Inspection Activities

- **QI Interview**
 - Evaluate overall knowledge of the person(s) identified as QI or key personnel in the Plan and who would be charged with directing/performing response actions.
- **FRP inspection**
 - Verify the implementation of the preparedness measures described in the FRP.
- **GIUE – *Expectations outlined in PREP Guidelines***
 - Verify that facility is able to activate its plan and respond to a simulated discharge incident.



QI Interview

QI duties and responsibilities - *Recap*:

- Activate internal alarms and haz comm systems to notify facility personnel
- Notify all response personnel, as needed
- Identify the character, exact source, amount, and extent of the release, as well as the other items needed for notification.
- Notify and provide necessary information to Fed, state and local authorities
- Assess the interaction of the discharged substance with water and/or other substances stored at the facility; notify response personnel at the scene
- Assess possible hazards to human health and the environment
- Assess and implement prompt removal actions to contain and remove the substance released
- Coordinate rescue and response actions
- *Have authority to immediately access company funding to initiate response actions*
- Direct cleanup activities until relieved

§ 112.20(h)(3)(ix)

Appendix F, Sec 1.3.6

QI Interview

- Verify that QI understands responsibilities and is the person responsible for implementing the facility's FRP.
- Discussion topics, particularly related to the response to a worst-case discharge:
 - Discharge discovery and assessment
 - Notifications and mitigation measures
 - Temporary storage of recovered product and contaminated materials
 - Treatment and disposal of contaminated materials
 - Roles and responsibilities of response team and other facility or contractor employees
 - Incident command and control
 - Training, exercise, and evaluation

FRP Inspection

Documents Review:

- OSRO / Cleanup contractors' CURRENT contracts.
- Contractor's equipment deployment exercise logs.
- Training / drills exercises logs including:
 - QI Notification exercises
 - Incident Management Tabletop exercises
 - Facility equipment deployment exercises
 - Unannounced exercises
 - Facility Personnel Response training
 - Discharge Prevention Meeting Logs
- Tank and Secondary Containment Inspection Records.
- Facility Response Equipment Inspection & Testing Records.



Field Inspection

- Hazard evaluation and vulnerability analysis
 - Review discharge history, areas where discharges could occur, anticipated spill pathways (e.g., storm drains).
 - Confirm WCD tank(s) and secondary containment volumes.
 - Are there vulnerable sites not considered in the Plan (e.g., water intakes, residential or recreational areas, wetlands)?
 - Good idea to review ACP/GRP ahead of field inspection.
- Worst-case discharge scenario and planned response actions
 - Are assumptions regarding failure modes and WCD flow paths consistent with the Plan?
 - Have there been changes in the facility characteristics not reflected in the current version of the Plan? Such as, change in product service or installation of larger tanks.

Field Inspection *(continued)*

- Spill response equipment
 - Type and amount available at the facility? Adequate quantities? Readily accessible? In working condition?
 - Contract with Oil Spill Removal Organization? Is it current?
- Discharge detection equipment and procedures
 - Review logs and records of equipment inspection, assess employee knowledge of required procedures
- Security measures
 - Implementation of emergency cut-offs, fencing, locking of valves, and lighting, as required under the SPCC rule.

Common Inspection Issues

- QI did not demonstrate knowledge of the vulnerability analysis and how/where to implement on-water response actions (boom locations, booming strategies, water access points and oil recovery locations).
- QI not familiar with disposal plans; typical response: “Our OSRO will handle that.”
- Facility has a QI regional structure, but not identified in the FRP.
- Inadequate drill and exercise program; not following required PREP exercises, such as equipment deployment or TTX’s at the WCD level.

GIUEs: Why Exercise?

The effectiveness of spill response directly relates to environmental damage and cleanup cost

- 2007 Government Accountability Office (GAO) report on oil spill costs:
 - “The longer it takes to assemble and conduct the spill response, the more likely it is that the oil will move with changing tides and currents and affect a greater area, which can increase costs.”
 - “The level of experience of those involved in the incident command is critical to the effectiveness of spill response, and they can greatly affect spill costs.”



Authorities for Conducting Drills/Exercises

Under the Oil Pollution Act of 1990 (OPA 90):

- §311(j)(6)(A): Equipment inspections: Pursuant to section 311(j)(6)(A) of the CWA as amended by OPA 90, require periodic inspections of containment booms and equipment used to remove discharges at non-transportation-related onshore facilities.
- §311(j)(7): Tests of facility removal capability: Pursuant to section 311(j)(7) of the CWA, conduct periodic drills of removal capability under the relevant response plans for facilities located in the inland zone.

Tie-in to PREP Guidelines

PREP Guidelines:

- Discusses framework of unannounced exercises by EPA, U.S. Coast Guard (USCG), Bureau of Safety and Environmental Enforcement (BSEE), and the Pipeline and Hazardous Materials Safety Administration (PHMSA)
- EPA discusses GIUE performance expectations in combined Agencies Section 2 and in EPA's Section 4 of PREP.



PREP Exercise Components



See Handouts (p.203)

Element	Frequency*	Initiating Authority	Notes
QI Notification Exercises	Quarterly	Facility owner or operator	At least one notification per year must be made off-hours
Emergency Procedures Exercises	Quarterly	Facility owner or operator	Optional: can be used by facilities as an unannounced exercise
Incident Management Team Tabletop Exercise	Annually	Facility owner or operator	At least one exercise every 3 years must involve a worst case discharge scenario
Equipment Deployment Exercises	Semiannually (annual, if OSRO dependent)	Facility owner or operator	If OSRO-owned equipment is identified in the Plan, the OSRO equipment must also be deployed and operated. OSRO must provide documentation to facility owner or operator
Government-Initiated Unannounced Exercises (GIUE)	Triennially	EPA, USCG, BSEE	If successfully completed, the facility can only be subject to a GIUE once every 3 years

* At least one exercise per year must be unannounced

Relevant FRP Content

1. Emergency Response Action Plan (ERAP)
2. Facility information
3. Information about emergency response
4. Hazard evaluation
- 5. *Response planning levels***
6. Discharge detection systems
- 7. *Plan implementation***
8. Self-inspection, drills/exercises, & response training
9. Diagrams
10. Security systems
11. Response plan cover sheet



FRP Spill Response Planning Levels-Recap



Planning scenario	Oil volume
Small	2,100 gallons or less – <i>This is the GIUE level.</i>
Medium	Greater than 2,100 gallons but less than or equal to 36,000 gallons or 10 percent of largest tank at facility, whichever is less
Worst Case	Calculated based on type of facility, number of containers, whether secondary containment is adequate, and capacity of largest aboveground storage tank (AST) Often the capacity of the largest AST

Response Capability: Small Discharge

Appendix E, Section 3.3:



See Handouts (p.204)

The response resources shall, *as appropriate*, include:

Equipment	Capacity	Timeline	Citation
Containment Boom*	1,000 feet <u>or</u> Twice the length of the largest vessel that regularly conducts oil transfers to or from the facility (whichever is greater)	<u>Means of deploying within 1 hour</u> of the discovery of an oil discharge	Appendix E, Section 3.3.1
Oil Recovery Devices	Effective daily recovery capacity equal to or greater than the amount of oil discharged in a small discharge	<u>Available at the facility within 2 hours</u> of the discovery of an oil discharge	Appendix E, Section 3.3.2
Oil Storage Capacity	Daily storage capacity equivalent to twice the effective daily recovery capacity, unless the owner/operator can show that a lower capacity is adequate	Available at the facility	Appendix E, Section 12.2

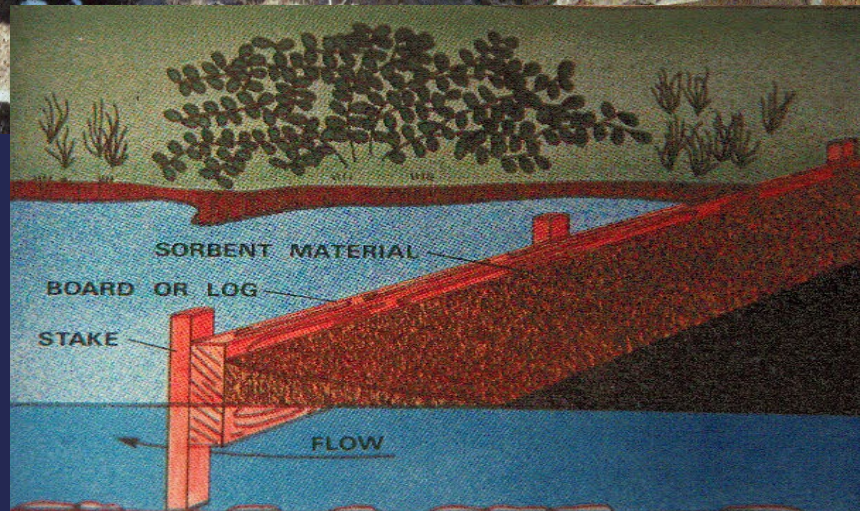
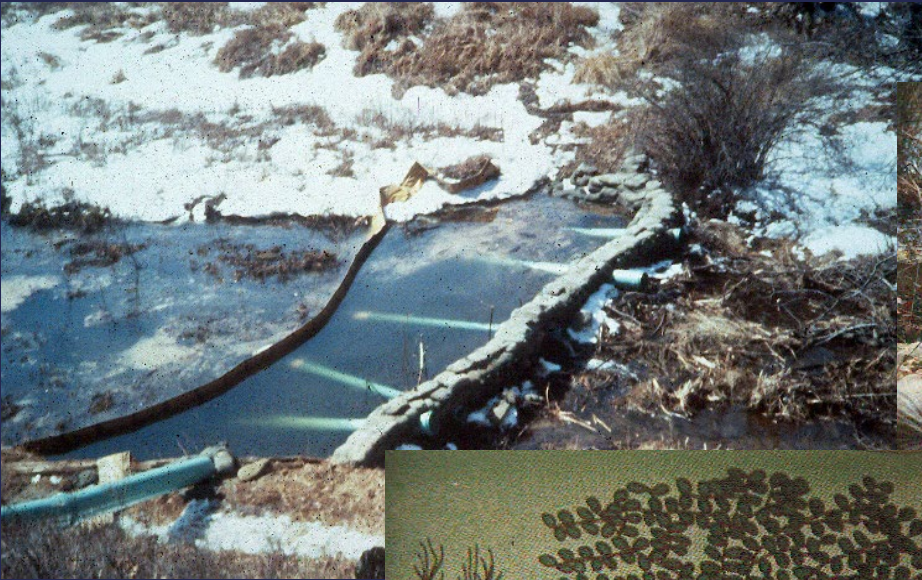
* Other means of containment may be appropriate for inland facility (see next slide)

Containment Boom Alternatives

Outlined in Section 2 of the PREP Guidelines

- “As appropriate” in Appendix E, Section 3.3.1
- Recall we discussed this topic in “FRP Required Content” module
- For example:
 - Alternative strategy may be more appropriate for inland facilities, where spill pathway could be a dry drainage pathway, drainage culvert or small creek
 - Alternatives include:
 - Underflow dams for small creek
 - Temporary containment dams (soil, etc.) for drainage ditches
 - Inflatable diaphragms to plug drainage culvert

Berms, Underflow Dams



Spill Gates



Preparing for a GIUE

Example outreach to potential candidate FRP facilities:

- General awareness outreach
 - Letters, mailings
 - Information sessions, seminars, webcasts
 - E-mails
 - Attend conferences, trade shows
- No advance notification of potential for a GIUE

Preparing for a GIUE *(continued)*

Selection of target facility

- EPA already has a list of FRP planholders
 - Significant and substantial harm facilities
 - Substantial harm facilities
- Candidate facilities:
 - New facilities that have never been drilled/exercised
 - Facilities that have failed an earlier drill/exercise
 - Facilities that have not performed a drill/exercise in the last 3 years
 - Facilities where recent incident occurred

Preparing for a GIUE *(continued)*

- PREP suggests a GIUE limit of 10% of FRP plan holders per EPA Region per year.
- Coordinate with other regulating agencies regarding complex facilities that maybe participating in upcoming area exercises.
- Coordinate with USCG to check if they have conducted a GIUE in the last 3 years.

Planning a GIUE

- Identify and invite GIUE observers/evaluators (continued)
 - Other Federal partners, USCG & DOT-PHMSA
 - State and local environmental regulatory representatives
 - Superfund Technical Assistance and Response Team (START) contractor or other regional contractor support
- EPA remains the lead evaluator if we initiate the exercise.

Planning a GIUE *(continued)*

- Develop drill/exercise scenario
 - Review plan and identify circumstances of small discharge
 - Review map, location of sensitive environments, drinking water intakes, areas to be protected
 - Review plan for pre-designated deployment locations, pre-deployed equipment, tactical plans
 - Determine timing of exercise (review tidal charts to assess current direction)
 - Be prepared for shift changes at the facility

Spill Scenario

- Typically taken from the Plan, unless agreed-to alteration by QI and EPA
- Use “small discharge” of 2,100 gallons or less
 - Discharge incident may involve a larger total volume on-site, of which 2,100 gallons escapes to water
- Specify
 - Tank
 - Type of product
 - Volume discharged and volume in water
 - Weather conditions, if assuming different from conditions at time of the exercise

Safety Considerations

Follow facility safety procedures

- Visitor sign in procedures
- Mandatory safety video on process hazards and facility evacuation plan
- Proper attire (footwear, helmet, safety glasses, personal flotation device, NOMEX/FRC clothing if required by the facility, etc.)
- Inspector should bring own safety equipment

Safety Considerations *(continued)*

Crucial that drill/exercise be conducted in a safe manner

- EPA representative can terminate drill at any time
- Hazardous conditions may include severe adverse weather or emergency situation at the facility or neighboring area
- If you determine that the drill/exercise is causing hazardous conditions, you should call a time out and confer with the facility owner/operator



EPA Equipment List

- Two-way radios or cell phones
- Hard hat, safety boots, safety glasses
- Agency inspector credentials
- Camera/video recorder
- Binoculars
- Checklist/logbook
- Copies of relevant sections of FRP, GIUE drill letter with description of scenario to be exercised
- Some facilities (such as refineries) require NOMEX (flame-resistant clothing) be worn
- Personal floatation device (PFD)

GIUE Scheduling/Costs

- Exercise is meant to be unannounced
 - Exercise must proceed even if the Qualified Individual (QI) happens to be on vacation (an alternate QI is often identified in the plan)
 - *However*, exercise may be paused or even cancelled, if existing conditions present a safety concern
- Facility is responsible for costs of performing the drill/exercise, including:
 - Internal costs of facility employees and equipment involved in the response
 - External costs associated with contractor-supplied equipment and resources (OSRO)

Initiate the GIUE

- Inform the QI that you are at the facility to conduct an unannounced exercise
- Provide GIUE drill letter, if used
 - Regions may send letters in advance to all FRP facilities, but not required
- Go over exercise guidelines with QI
- Start the exercise clock
 - Discharge has just been discovered
 - Oil has already reached water
- Overall exercise duration is **up to 4 hours per PREP**



During the GIUE

- Evaluate **command post** and **response activities**
- Intervene only for issues of health or safety
 - Examples: personal flotation devices, imminent harm to personnel or third party
- Only QI should modify scenario when the exercise is underway, such as when site conditions are inconsistent with scenario described in the Plan – *document this deviation*
 - Example: new construction which changes path of a waterway
 - QI should identify a realistic alternative scenario and exercise that specific scenario

During the GIUE *(continued)*

At the Command Post:

- Incident control
 - Are listed notifications conducted timely?
 - Notification to NRC, state, facility management, etc. as outlined in the FRP and ERAP
 - Some notifications may be reasonable to exclude, such as local hospitals, nursing homes, radio stations (reasonable judgement prevails here)
 - Has the spill response team and/or OSRO been activated?
 - When was response team/OSRO activated? When did they arrive? Can they deploy equipment?
 - Are communications with response personnel and other facility personnel effective?
 - Are the ERAP and/or FRP being used?
- QI
 - Is the QI responsible for implementing the facility's FRP?
 - Does the QI understand responsibilities?

During the GIUE

- Evaluate **response activities**, including boom deployment and skimmer package staging and positioning.
- Is the boom deployment consistent with plan?
- Are alternative boom deployment locations considered in the exercise?
- Are protection and exclusion strategies (i.e. mitigation measures) considered in the exercise?

Boom Deployment

- Boom Deployment
 - *Sufficient* containment boom and means for deploying it *within one hour* of discovery of the spill
 - **1,000 feet** of boom or twice the length of vessels loading/unloading at the facility
 - Must be **containment boom**, not made of absorbent materials
 - At inland facilities, boom may be deployed in dry ditches

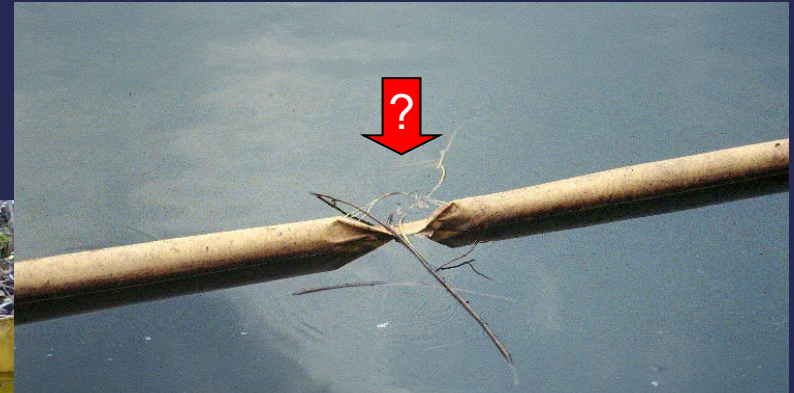


Evaluating GIUE Performance - Boom Deployment

- Can facility personnel and/or OSRO deploy the boom?
 - Do they have the required equipment?
 - Do they have access to boom deployment sites and anchor points?
- Is the boom properly deployed?
 - Proper anchoring, proper flotation, proper tension
 - No twists or gaps
- Is the boom properly rated for the stream flow rate?
- Is the boom maintained in a way to allow for rapid deployment?
- Does the facility have the appropriate hardware needed to link boom sections and stake the boom?



Example Boom Deployment Issues



2018 PREP Guidelines

Alternatives to Booming Systems

2.3.7.2.3 Non-Transportation-Related Facilities Regulated by the EPA (GIUE section in PREP)

Performance metrics to think about during the GIUE (should be outlined in the FRP):

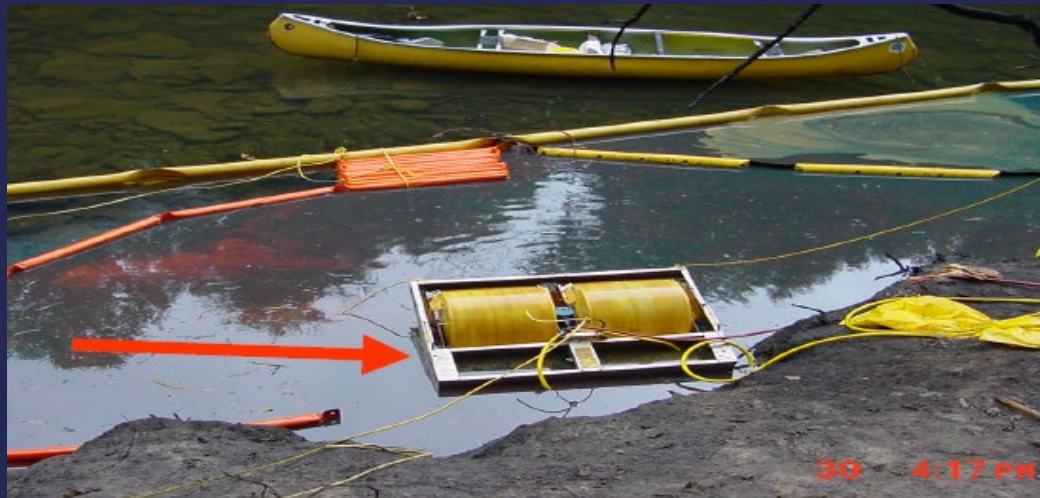
- Arrival of containment boom and/or alternative systems as specified in the FRP within one hour of detection of the discharge and subsequent successful deployment.
- For alternative systems using temporary dams or underflow dams, simulated installation of these systems according to the FRP is expected to be performed for a successful GIUE.
- For plans using both containment boom and alternative systems, successful boom deployment and simulated installation of the alternative systems is expected for a successful GIUE.

Inland “Small Stream” Containment

- Containment dams (*simulated installation*)
- Underflow dams (*simulated installation*)
- Inflatable diaphragms (*this can be deployed during a GIUE*)
- Spill gates (*may be possible to close during a GIUE*)

Oil Recovery Devices

- GIUE performance evaluation criteria:
 - Oil recovery devices available within 2 hours of discovery of the spill
 - Must have **effective daily recovery capability** equal to amount of oil released in a small discharge (i.e., 2,100 gallons)
 - Deployed and **ready to start** oil recovery
 - Actual pumping of water is not required



Oil Recovery Devices: Others

- Vacuum Truck



Provisions for Storage of Recovered Oil

- GIUE performance evaluation criteria:
 - Oil storage capacity for recovered oily material equivalent to **twice the effective daily recovery capacity** required on-scene, or 4,200 gallons per day (recall from App. E, Sec. 12.2)



Evaluating GIUE Performance- *Summary*

- PREP evaluation factors:
 - ✓ Conducting proper **notifications**
 - ✓ Arrival of **containment boom** as specified in the FRP within one hour of detection of the discharge and subsequent successful deployment (“boom in the water”) or successful simulated installation of boom alternatives.
 - ✓ Arrival of **oil recovery devices** as specified in the approved response plan within two hours of detection of the discharge and the subsequent successful operation/simulated recovery
 - ✓ Demonstrating the availability of adequate **storage capacity** for recovered oil
 - ✓ **Properly conducting the exercise** considering the size of a small discharge including skill and competency of responders and material readiness of response equipment

Evaluating GIUE Performance

(continued)

- Debrief with QI/facility personnel and OSROs (*with USCG, if joint GIUE*)
- Consequences of pass/fail
 - A facility that successfully completes a GIUE cannot be subject to another GIUE for 3 years
 - Failure of a GIUE may require the planholder to participate in additional unannounced exercises, revise the existing response plan, or both
 - In the event of GIUE failure, the region may choose to perform further inspection of the facility
 - In certain instances, EPA may revoke approval of FRP on the basis of GIUE performance until changes are made
 - Based on failure of a GIUE, the FRP coordinator may recommend to upgrade the facility to a significant and substantial harm facility
- Follow-up
 - Verify implementation of recommended improvements
 - Plan amendments

Questions?



Supplementary GIUE Material

Boom Deployment *(continued)*

- Boom elements
 - Above-water freeboard
 - Flotation device
 - Below-water “skirt”
 - Longitudinal support
- Selection considerations
 - River flowrate, current, and tidal information to determine if appropriate boom can hold the pressure and not fail
 - Length of deployment/goal of booming operation
 - Contain, deflect, protect
 - Anchoring method
 - Boat safety operations and capabilities



Boom Deployment *(continued)*

- Commercial boom types
 - Fence boom
 - Curtain boom
 - External tension member boom (uncommon)
- A sorbent boom is not a containment boom
 - Can be used for final polishing, to remove small trace of oil or sheen, or as backup to containment boom



Boom Deployment *(continued)*

- Boom functions
 - Protect (shorelines, creeks, wetlands, water intakes, etc.)
 - Deflect (move oil to a collection point)
 - Contain (hold oil within collection location)
- Booming strategies
 - Containment booming (*contain*)
 - Exclusionary booming (*protect*)
 - Diversionary booming (*deflect*)
 - Shore seal booming (*protect*)
- Other strategies
 - Berms, underflow dams (*contain*)

Exclusionary Booming



Other Response Actions

- Preventing further contamination



Oil Recovery Devices: Skimmers

- Suction



- Weir



- » Best in calm water
- » Low recovery oil/water ratio
- » Low to medium viscosity oil

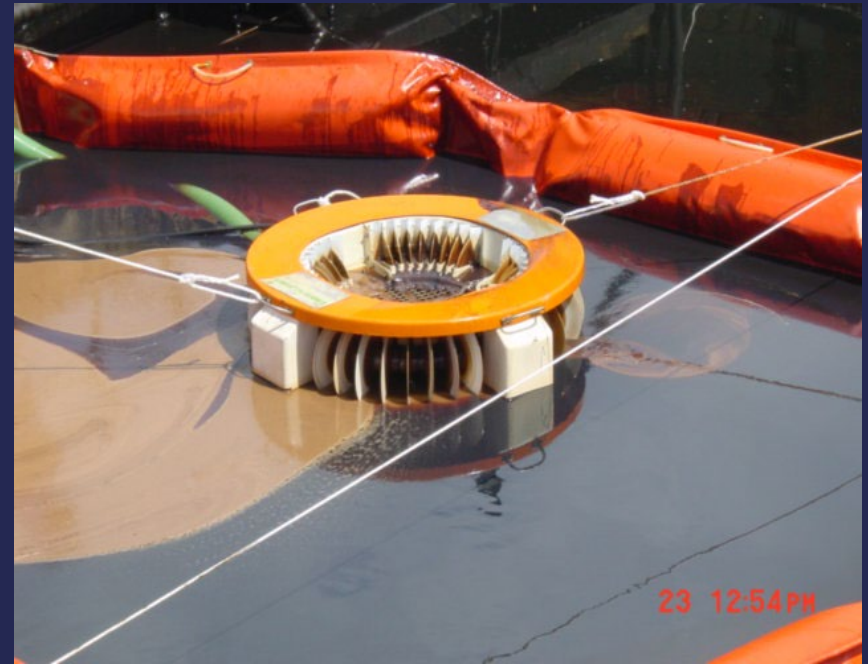
Oil Recovery Devices: Skimmers (continued)

- Rope mop



- Low to medium viscosity oil
- Good in debris and ice conditions and shallow water

- Disc



- Medium viscosity oils
- Higher oil/water ratio
- Calm and shallow waters

Oil Recovery Devices: Skimmers *(continued)*

- Drum



- Light and medium viscosity oils
- Good debris handling capability
- Calm and shallow waters

- Belt Type Skimmer
(e.g., Chain Brush)



- Medium to heavy oils
- Excellent debris handling
- Fast deployment