PRINCE WILLIAM SOUND SPILL SURROGATES WORKGROUP

Regional Citizens' Advisory Council

Initial Meeting – February 10, 2016
9:00 am – 3:30 pm
PWSRCAC Conference Room, Valdez

WELCOME!

Thank you for your participation in this workgroup and your time/attendance today.

- Introductions
- Housekeeping

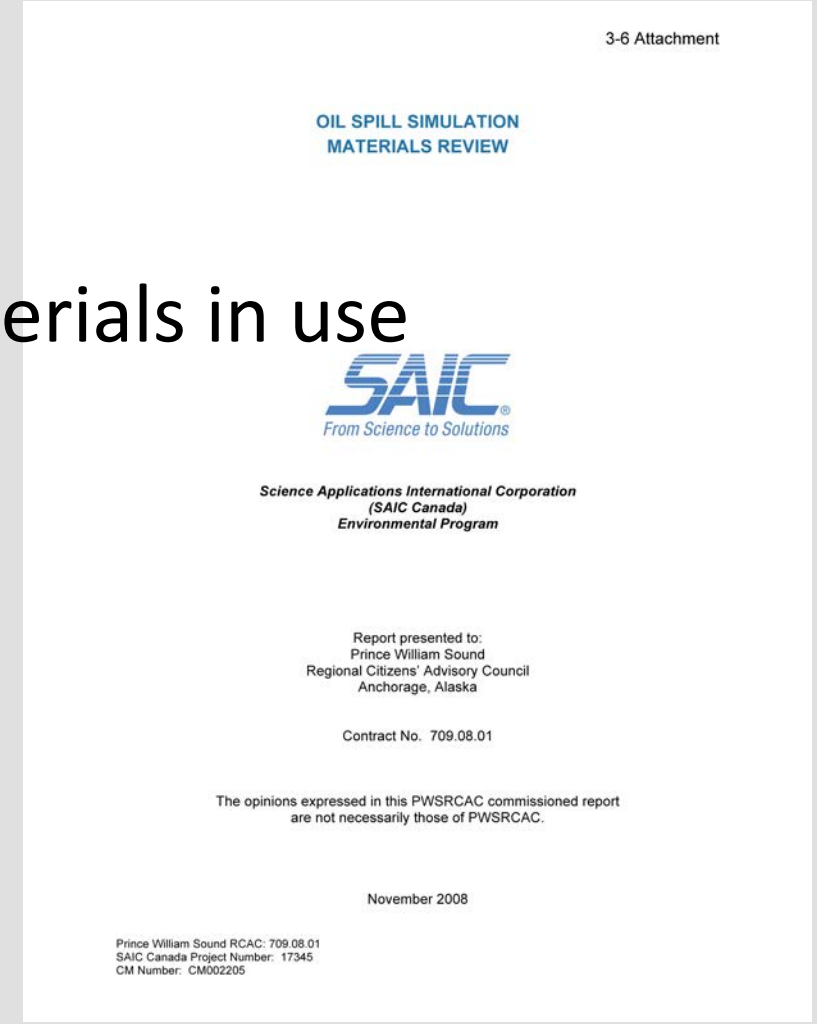
Importance to PWSRCAC

- PWSRCAC interest since 2008.
- Norway uses real oil, leads the world in technology development
  - Intentional oil spills not feasilble in US
  - Simulants as lower-impact alternative?
- Explore whether simulants may be used more broadly in Alaska to improve spill response technologies and training/drills

Project History: PWSRCAC

2008 Study: "Oil Spill Simulation Materials Review"

- Literature review
- Catalogue oil simulant materials in use
- Pros/cons
- Typical uses
- Regulatory regime
  - International, federal, state



3-6 Attachment

OIL SPILL SIMULATION
MATERIALS REVIEW

SAIC
From Science to Solutions

Science Applications International Corporation
(SAIC Canada)
Environmental Program

Report presented to:
Prince William Sound
Regional Citizens' Advisory Council
Anchorage, Alaska

Contract No. 709.08.01

The opinions expressed in this PWSRCAC commissioned report
are not necessarily those of PWSRCAC.

November 2008

Prince William Sound RCAC: 709.08.01
SAIC Canada Project Number: 17345
CM Number: CM002205

Project History: PWSRCAC

Simulants Workshop - 2012-2013

- Develop consensus regarding oil simulant use in Alaska
- Process:
  - Develop whitepaper
  - Convene workgroup to engage experts/agencies
  - Hold 1-day workshop in Seattle (March 2013)
  - Publish consensus report from workshop with suggested way forward.

Project History: PWSRCAC

March 2013 workshop

- Invitation only
- High-level decision-makers with authority to commit agency/organization

ADEC	NOAA	States/BC TF
APICOM	Pew Trusts	USCG
BSEE	OSRI	UNH/CRRC
CIRCAC	PWSRCAC	WA DOE
EPA	SCAA	

Project History: PWSRCAC

March 2013 Workshop Outcome

- Consensus Items:
  - Include simulants in national response framework
  - Clarify approval process
  - Address tradeoffs
  - Consider liability
  - Improve knowledge management
- Final report on PWSRCAC website

Project History: BSEE

- BSEE-funded project initiated OCT 2013
- Build on PWSRCAC/OSRI workshop
- Scope:
  - Establish & facilitate work group
  - Clarify federal context for permitting oil simulant and surrogate releases
  - Develop decision-making tool for simulant release and permitting
  - Develop test permit

Project History: BSEE

- ✓ Establish & facilitate work group
- ✓ Develop decision-making tool for simulant release and permitting

- ✗ Clarify federal context for permitting oil simulant and surrogate release
- ✗ Develop test permit

Project History: BSEE

Primary accomplishment: Decision-making Tool

- Terminology & Definitions
- List of simulant/surrogate materials
- Decision-making guidance
  - Flow charts, tables
- Template for use plan
- Fact sheets on simulant/surrogate materials

Project History: BSEE

- Decision-making Tool vetted through workgroup
- NRT Science & Technology Committee reviewed, provided comment, support final document
- EPA working on internal policy regarding permitting

2016:
CURRENT PROJECT GOALS

- Establish consensus among the local response community, regulators, and resource trustees on the following issues:
  - Appropriate surrogate materials for release in Prince William Sound waters to improve on-water training and exercises
  - Parameters for surrogate release in Prince William Sound (materials, volume, location, other conditions)

WORKSHOP PURPOSE

- Review current state-of-knowledge on oil surrogate use, focusing on training and exercises.
- Establish consensus on workgroup goals and process
  - Is there interest/will to try to incorporate oil surrogates into PWS exercises/training?
  - If so…next step → Develop a work plan

WORKSHOP PARTICIPANTS

- Companies, organizations and agencies with a role in Prince William Sound oil spill response exercises and training
- Initial invitee list: PWSRCAC, ADEC, EPA, Alyeska/ SERVS, RPG, USCG, NOAA
  - Are we missing anyone else?
- Format will be for PWSRCAC/contractor team to do most of the legwork – tee up information or questions for workgroup to review and make decisions

PRE-WORKSHOP SURVEY

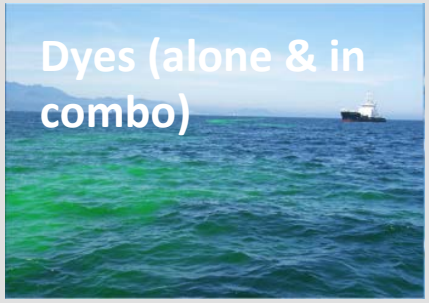
Have you ever been involved in a drill, exercise, training, R&D, or other activity that involved the release of an oil surrogate or simulant?

PRE-WORKSHOP SURVEY

Feeback and results from survey will be incorporated into discussion throughout the day.

PRE-WORKSHOP SURVEY

Simulant/surrogate materials the group has had experience with…



PRE-WORKSHOP SURVEY

Benefits?

- Enhance exercises
  - Visual feedback on equipment operation
  - Effectiveness of tactics (Does GRS work?)
  - Opportunity to adapt, modify tactics in real time – improve future deployments
  - Highlight areas for improvement – i.e. need shallow water or fast current equipment, opportunistic use of natural collection points
  - Show observers how things work; exposure for inexperienced

PRE-WORKSHOP SURVEY

Benefits?

- Enhance exercises
  - Target for responders
  - Practice for vessel operators
  - Sense of accomplishment for responders

PRE-WORKSHOP SURVEY

Benefits?

- Movement of oil and water
  - Visualize currents/eddies
  - Visualize effect of wind, waves, etc. on “oil” and equipment
  - Mimic fate/movement/stranding
  - Less toxic than oil

PRE-WORKSHOP SURVEY

Challenges or drawbacks?

- Overcoming misconceptions
  - Many substances accepted for science, but not for practical exercises/training
  - People don't understand the potential benefits
  - Public perception
- Permitting process
  - Uncertainties
  - Inconsistencies

PRE-WORKSHOP SURVEY

Challenges or drawbacks?

- Limitations of available material
  - Most substances in use don't truly mimic oil
  - Hard to find a true simulant that is not some type of oil
  - Anything not oil will not act exactly like oil
  - Avoiding harming wildlife unintentionally (particularly birds/mammals)
  - Other unintended environmental consequences

PRE-WORKSHOP SURVEY

Challenges or drawbacks?

- Practical
  - Understanding biodegradability
  - Ensuring surrogates are collected
  - Contamination of equipment
  - Costs
- Scorecards
  - Will surrogates be used to “score” exercises?

PRE-WORKSHOP SURVEY

What do you hope to get out of this?

- Catalog of simulant materials for PWS
  - Short list that can be readily used
  - Agreement to incorporate into exercises
- Clearly link surrogate use to responder proficiency, training value
- Dispel misconceptions

PRE-WORKSHOP SURVEY

What do you hope to get out of this?

- Better understanding of permitting/ regulatory constraints
- Discussion/learn from others in group
- **Agreement on an accepted surrogate(s) for PWS or agreement that there isn't one**

TODAY'S AGENDA

THIS MORNING:

PRESENTATION: State of Knowledge & Practice

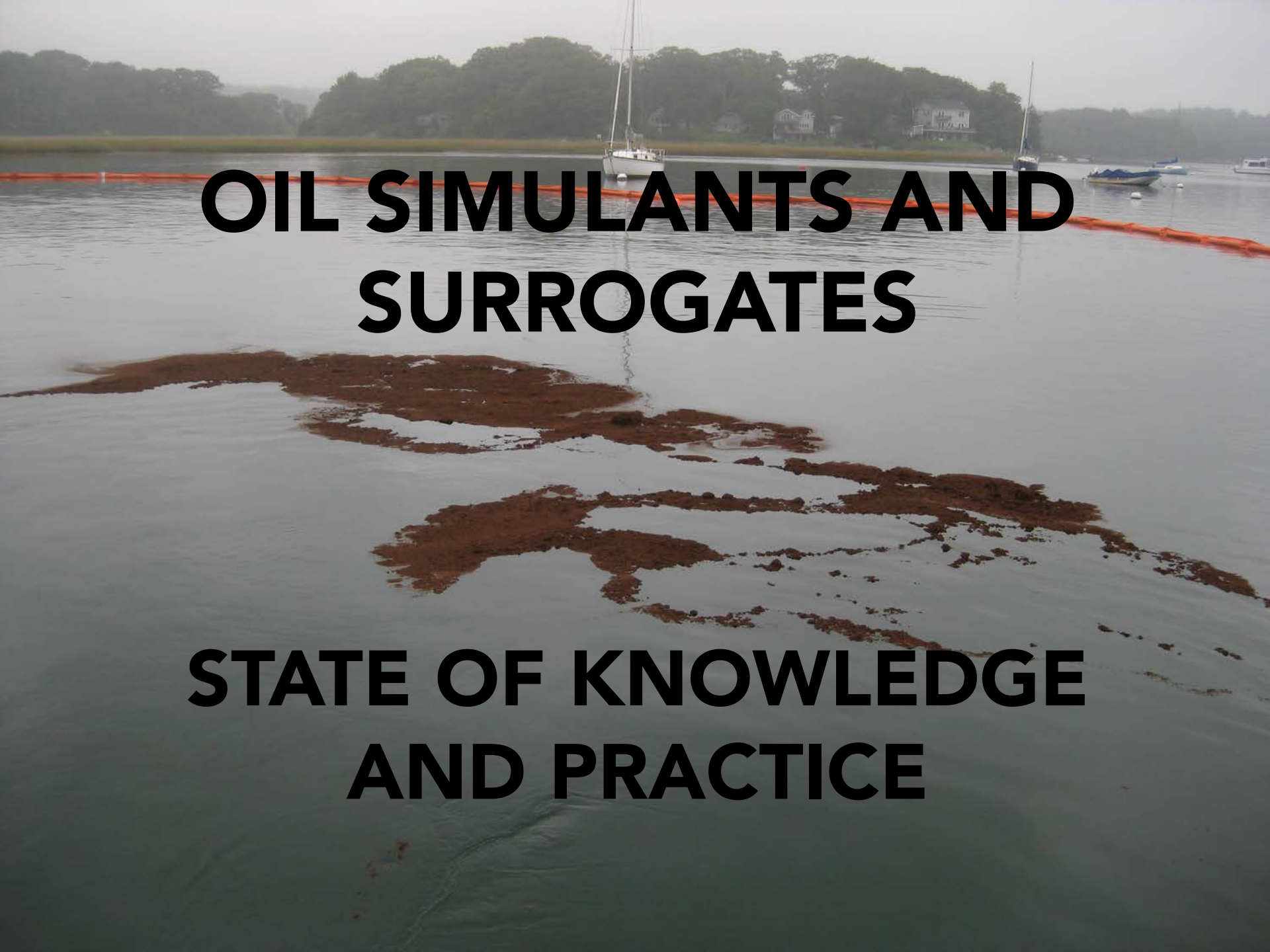
GROUP DISCUSSION

AFTER LUNCH:

WRAP-UP MORNING DISCUSSION

WORK SESSION: Workgroup Goals & Process

WORK SESSION: Work plan & next steps



OIL SIMULANTS AND SURROGATES

STATE OF KNOWLEDGE AND PRACTICE

TOPIC 1:
STATE OF KNOWLEDGE

- What do we know about surrogate and simulant materials?
- What do we need to know in order to better utilize simulants and surrogates in oil spill response training and exercises in PWS?
- How can we fill any knowledge gaps?

TOPIC 2:
STATE OF PRACTICE

- How are surrogates being used in the US?
- Where have they been released?
- What types of materials have been used?
- What types of permits are needed?

TERMINOLOGY

Oil Simulant

- Non-oil substance with physical and/or chemical characteristics that closely mimics the fate and behavior of an oil released to a water body
- Not petroleum oil, but may include non-petroleum oils

We cannot find any evidence
of a liquid simulant release to U.S. waters.

TERMINOLOGY - MATERIALS

Oil Surrogate

- Substance that does not necessarily share the physical or chemical characteristics of oil but when released to water would represent the movement of oil
- Oil surrogates may be liquid or particle-based, but are more commonly particle-based.

TERMINOLOGY - USES

Research and development: tests or experiments that are performed to evaluate the performance of oil spill response technologies, equipment, or techniques.

Oil Spill Fate and Behavior Studies: scientific or practical research projects that aim to improve the understanding of the fate and behavior of oil, including transformation and transport tendencies– both physical and chemical- when spilled into water.

TERMINOLOGY - USES

Training and Exercises: field activities during which practical aspects of oil spill response is exercised to achieve specific objectives related to response techniques, responder proficiency, equipment performance, logistics, or other related topics.

SURROGATE MATERIALS

BSEE Project identified 19:

- Algae or seaweed
- Bagasse (sorghum)
- Citrus fruit
- Coir (coconut fiber)
- Cork
- Dog food
- Drift cards
- Dyes
- Evergreen needles
- Hay
- Misc. organic materials
- Peanut shells
- Peat moss
- Perlite
- Popcorn
- Protein-based foam
- Rice hulls
- Sunflower seeds
- Wood chips

SURROGATE MATERIALS

BSEE Project – Fact Sheets

4.19 Wood Chips

Wood chips are a solid material produced from cutting or chipping larger pieces of wood. They are a particle-based surrogate and have a history of use as a surrogate in U.S. waters. They are a byproduct of logging and timber industry and may be plentiful in regions such as the Pacific Northwest. Wood chips are used for a wide range of purposes, from gardening and landscaping to cage lining for small pet rodents.

Properties

Properties	Wood Chips
Spreading	Yes: Will spread to some extent
Clumping	Yes; May clump together or move in discreet units depending on particle size
Buoyancy	Floats: Long term buoyancy may decend on extent of drying and/or heat treatment - Density: 0.38 g/cm3
Trajectory	Affected by current
Emulsification	Will not emulsify
Visibility	Good initial visibility

Photo: Nuka Research

Photo: iStock

Wood chips come in a variety of shapes, sizes, and colors depending on the wood used and method of processing

Practical Considerations

Practical Considerations	Wood Chips
Deployment	Manual; Can be thrown overboard or deployed from shore/dock
Retrieval	Moderate: Can be retrieved by nets
Degradation	Will persist in the environment
Particle Size	Medium or large (depends on processing)
Known Toxicity	Generally non-toxic
Other Information	• Inexpensive • Has been suggested as sorbent for spill clean-up • There is an existing patent from 1969 for oil spill clean-up method using wood chips

History of Use in U.S.

History of Use		Wood Chips
Regions of U.S. where material has been used		Written evidence of use, location undocumented
Past Use in U.S. waters	Research & Development	No documented use
	Training & Exercises	Evaluation of boom arrays
	Fate & Behavior	Model potential oil trajectory for observers
Lessons Learned from Past Use		

SURROGATE MATERIALS

BSEE Project – Fact Sheets

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BSEE Project – Fact Sheets

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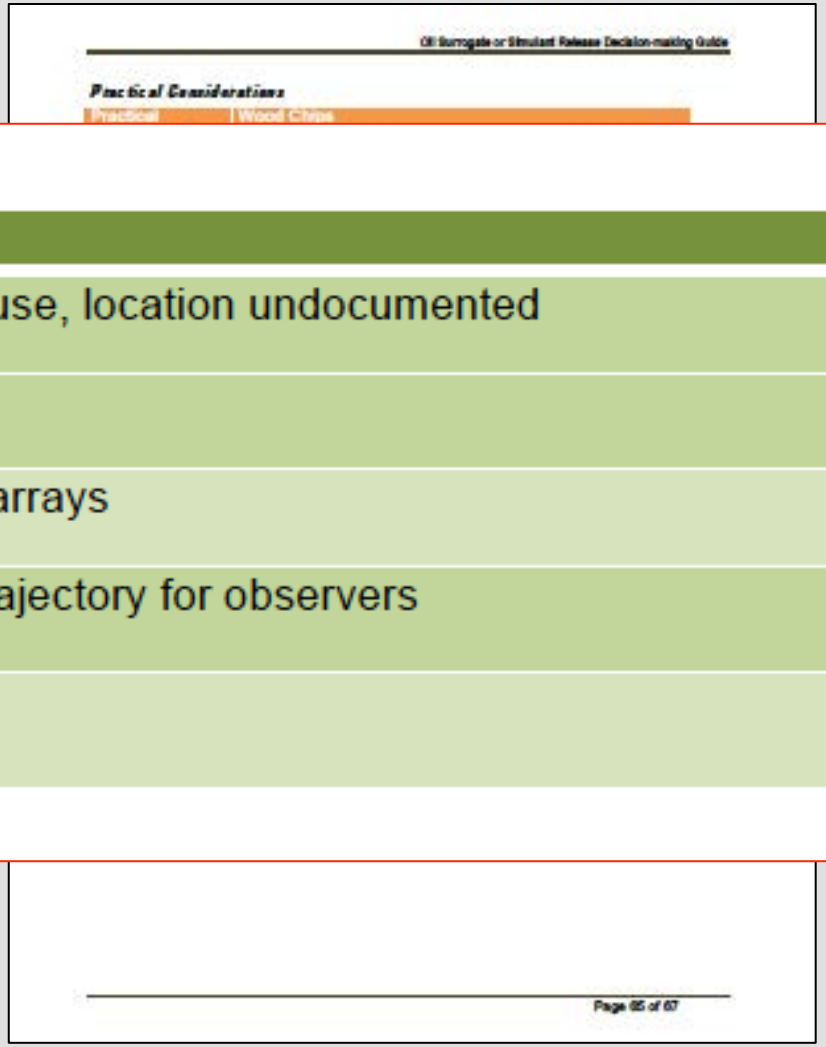
SURROGATE MATERIALS

BSEE Project – Fact Sheets



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Lessons Learned from Past Use		

TOPIC 1: STATE OF KNOWLEDGE

TERMINOLOGY

What do you think of the Terminology from BSEE Project?

- ***Would this work for PWS?***
- ***Is there information or terminology missing that you'd like to see this group develop?***

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

BSEE Project came up with a process

Vetted through work group consisting of:

- **NOAA**
- **BSEE**
- **USCG**
- **SCAA**
- **APICOM**

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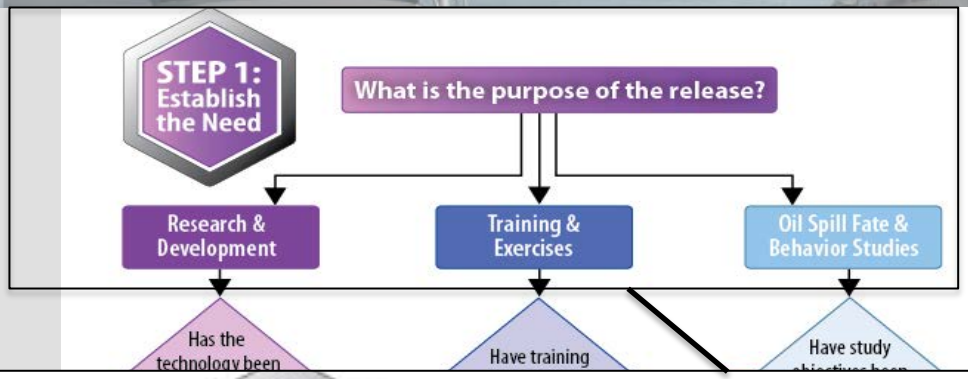
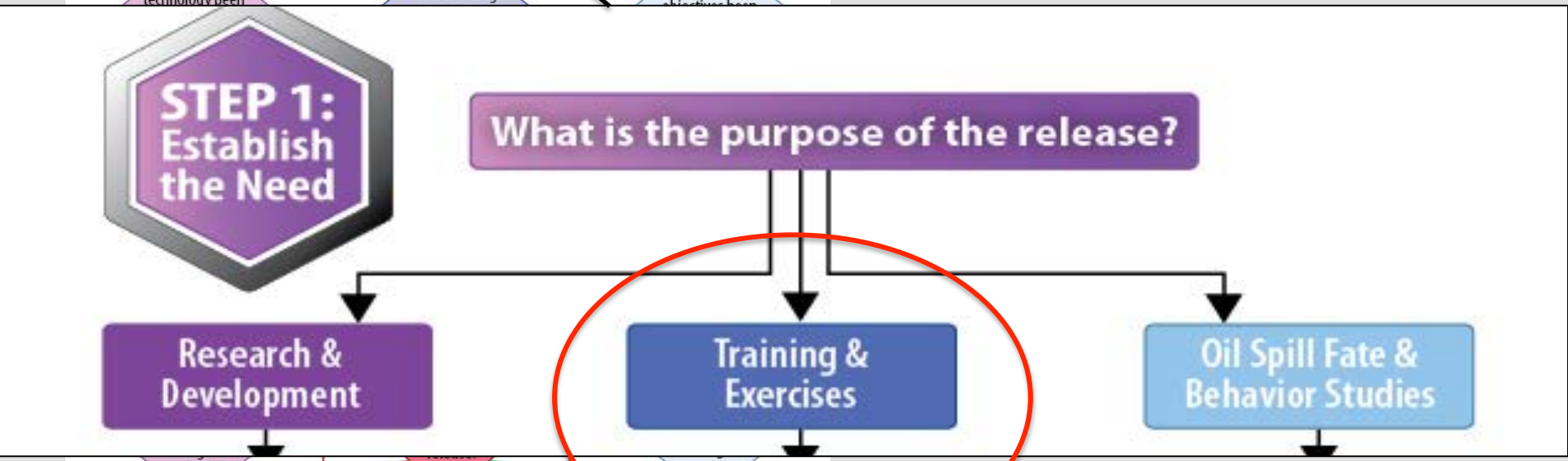
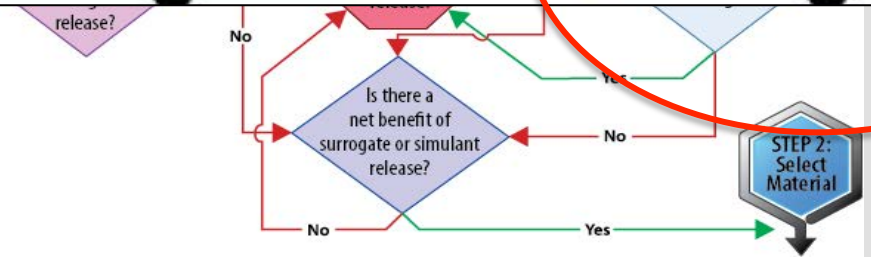
TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

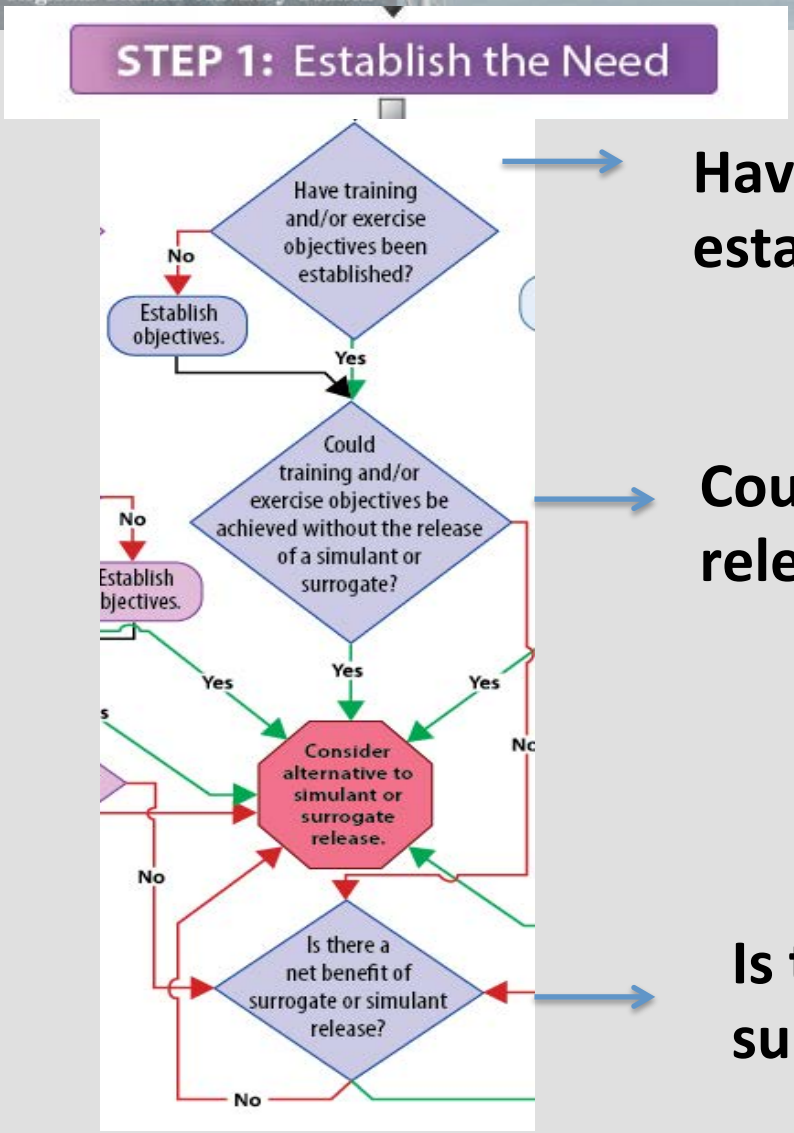






TOPIC 2: STATE OF PRACTICE

DECISION-MAKING



Have training or exercise objectives been established?

Could the objectives be achieved without releasing a surrogate or simulant?

Is there a net benefit to releasing a surrogate or simulant?

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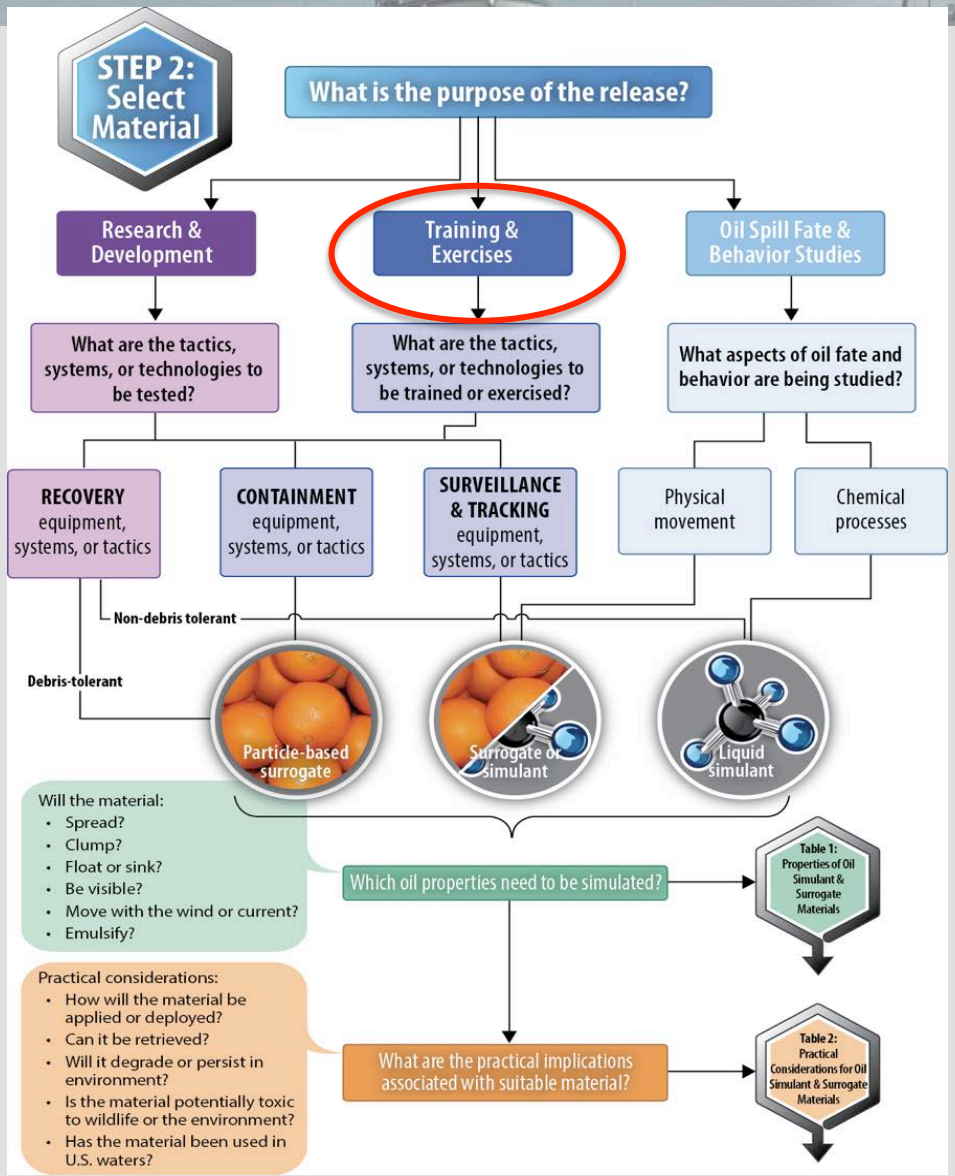
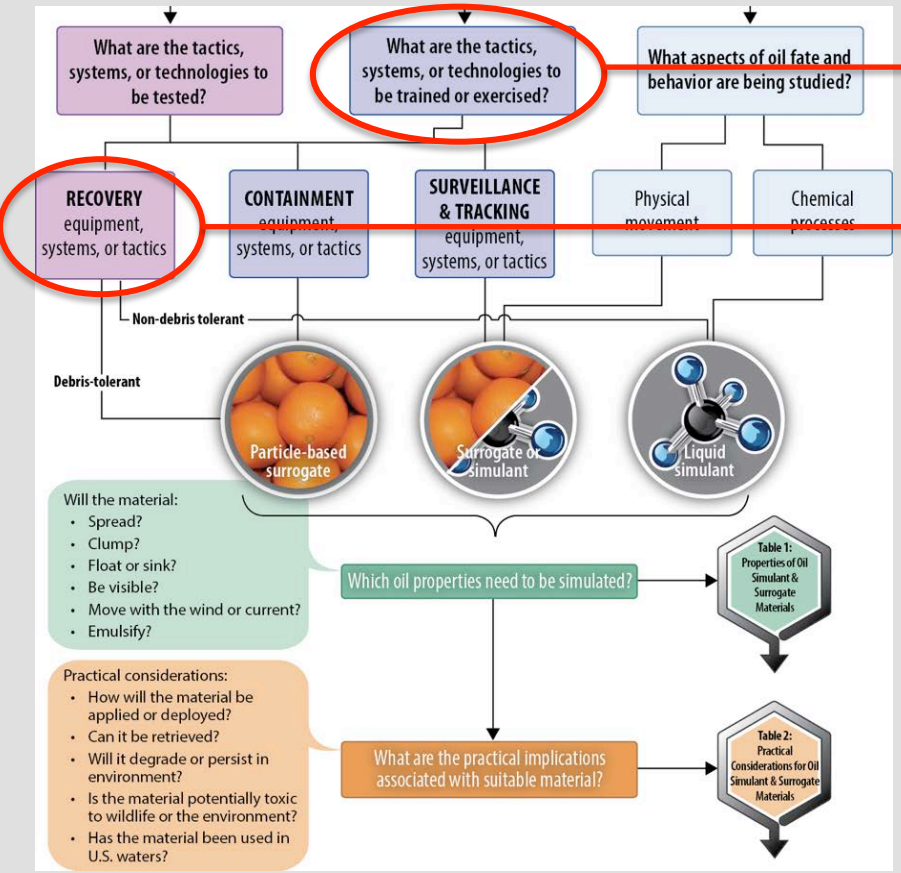
TOPIC 2: STATE OF PRACTICE

DECISION-MAKING



TOPIC 2: STATE OF PRACTICE

DECISION-MAKING



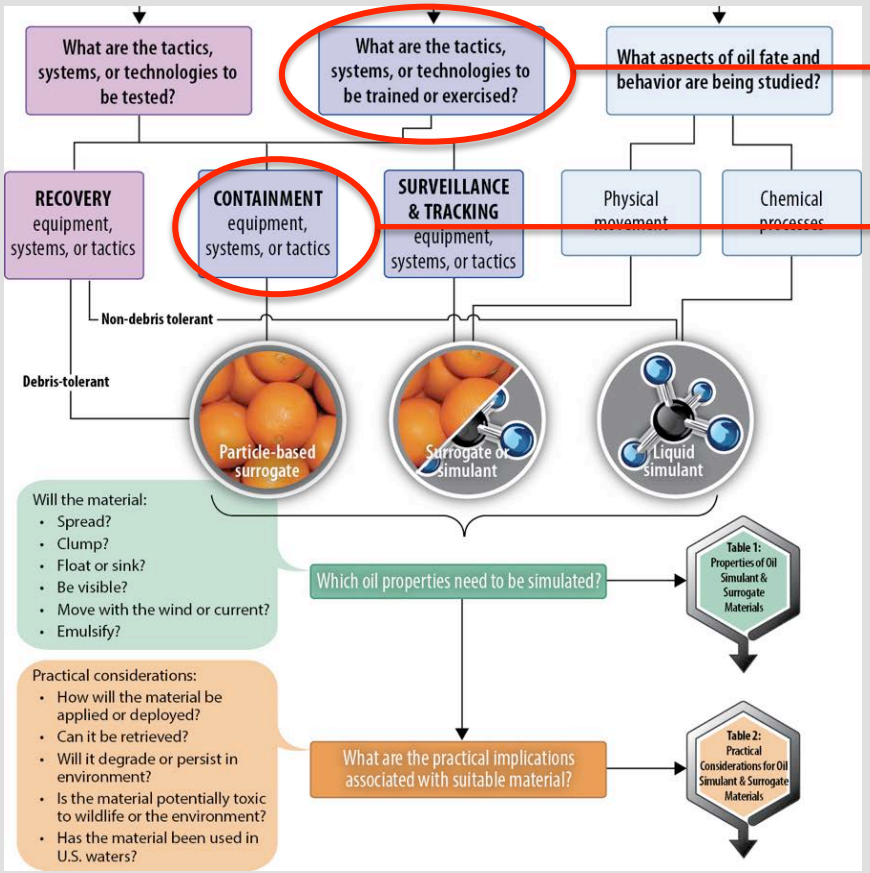
What are the tactics or systems to be tested or exercised?

RECOVERY

- **Is the system debris-tolerant?**
  - Yes → Particle-based
  - No → Liquid

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING



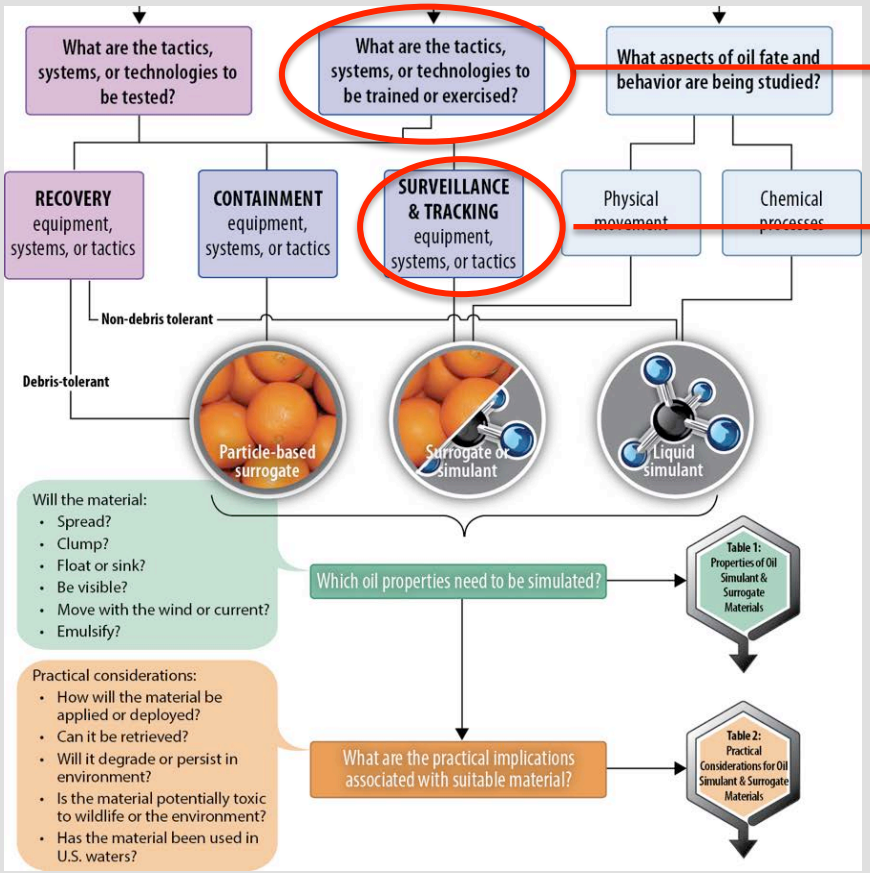
What are the tactics or systems to be tested or exercised?

CONTAINMENT

- Particle-based surrogate or liquid simulant

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING



What are the tactics or systems to be tested or exercised?

SURVEILLANCE & TRACKING

- Particle-based surrogate or liquid simulant

DECISION-MAKING

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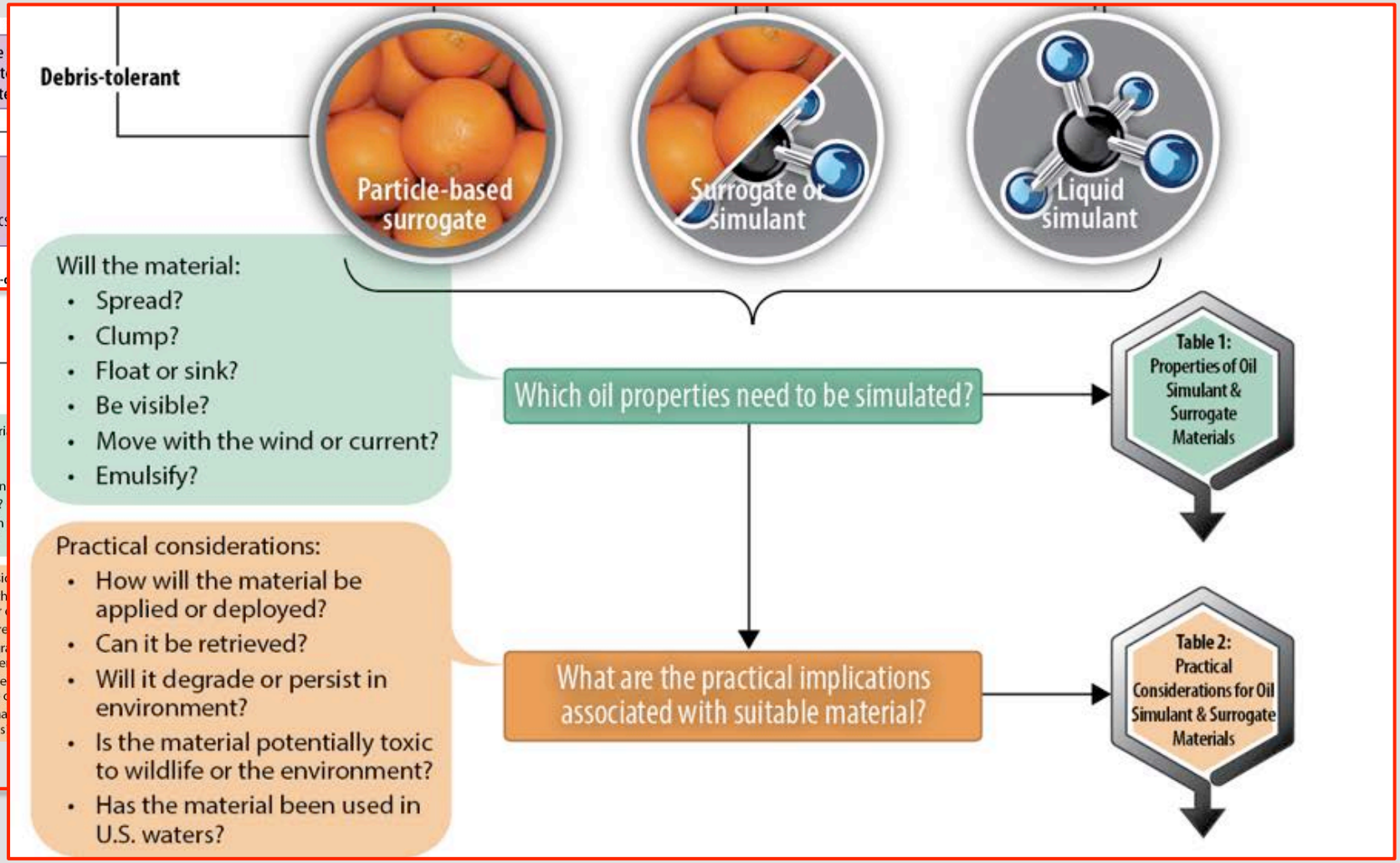
STEP 2: Select Material



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TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

STEP 2: Select Material

Which oil properties need to be simulated?

Will the material:

- Spread?
- Clump?
- Float or sink?
- Be visible?
- Move with wind or current or both?
- Emulsify?

Material	Properties					
	Spread	Clump	Buoyancy	Trajectory	Emulsi-fication	Visibility
Algae or seaweed	Yes	Possibly	Depends on material	Wind and current	No	Depends
Bagasse	Yes	Possibly	Float	Wind	No	Moderate
Citrus fruit	Yes	No	Float	Wind and current	No	High
Coir (coconut fibers)	Yes	Yes	Float	Current	No	Moderate
Cork	Yes	Yes	Float	Wind	No	High initial
Dog Food	Yes	Not initially	Float	Current	No	Moderate
Drift cards	Yes	No	Float	Current	No	High
Dyes	Yes	No	Mixes in water column	Current	Yes	High
Evergreen needles	Yes	Yes	Float	Current	No	Low
Hay	Yes	Yes	Float	Wind	No	Moderate
Native organic materials	Yes	Possibly	Depends on material	Wind and current	No	Depends
Peanut shells	Yes	Yes	Float	Current	No	Moderate
Peat moss	Yes	Yes	Float	Current	No	Low to Moderate
Perlite	Yes	Yes	Float	Wind	No	High initial
Popcorn	Yes	Maybe	Float	Wind	Not initially	High initial
Protein-based foam	Yes	Maybe	Float	Current	Not initially	High
Rice hulls	Yes	Yes	Float	Current	No	Moderate
Sunflower seeds	Yes	Yes	Float	Current	No	Low to Moderate
Wood chips	Yes	Yes	Float	Current	No	High initial

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TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

STEP 2: Select Material

What are the practical considerations?

- How will the material be deployed?
- Can it be retrieved?
- Will it degrade or persist in the environment?
- Is the material potentially toxic to wildlife or the environment?
- Has the material been released in U.S. waters?

Material	Practical Considerations					
	Deploy-ment	Retrieval	Degrad-ation	Particle Size[1]	Known Toxicity	Past Use in U.S.
Algae or seaweed	Manual	Low	Degrade after week	Large. Can be ground to small or medium	Non-toxic (if local)	Unknown
Bagasse	Manual	Low	Degrade	Medium (individual fibers)	Unknown	Training & Exercises
Citrus fruit	Manual	Moderate	Degrade after weeks	Large	Low, potential pesticide residue	Training & Exercises; Fate & Behavior
Coir (coconut fibers)	Manual	Low	Persist	Medium (individual fibers)	Low, possible phytotoxin	Unknown
Cork	Manual	Moderate	Persist	Small, Medium, or Large (depends on processing)	Non-toxic/None indicated	Unknown
Dog Food	Manual	Moderate	Degrade after days	Medium or Large	Non-toxic, May have preservatives	Training & Exercises; Fate & Behavior
Drift cards	Manual	High	Persist	Large	Non-toxic paint	Training & Exercises; Fate & Behavior
Dyes	Manual or special equipment	Low	Dissolves into the water column	Small	Varies by material	Training & Exercises; Research & Development; Fate & Behavior
Evergreen needles	Manual	Low	Persist	Medium or Large length, Small width	Sometimes, possible mycotoxin	Training & Exercises
Hay	Manual	Low	Persist	Medium (individual fibers)	Non-toxic	Training & Exercises
Native organic materials	Manual	Varies	Degrade after weeks	Small, Medium or Large (depends on material and processing)	Typically non-toxic if locally derived	Unknown
Peanut shells	Manual	Low	Persist if heat-treated	Medium or Large (can be processed to small)	Sometimes, possible mycotoxin	Unknown
Peat moss	Manual or blowers	Low	Persist	Medium or large	Non-toxic/No data	Training & Exercises; Fate & Behavior
Perlite	Manual or	Low	Persist	Small, Medium,	Non-toxic/No	Training &

[1] Small refers to surrogates that are liquids, foams, or dusts with particle sizes that measure in microns. Medium refers to surrogates with particles Large refers to surrogates with particles that can be measured as 1 centimeter or greater.

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

Regional Citizens' Advisory Council

STEP 3: Develop Use Plan

- Use plan is essentially a template that follows along with the flow charts.
- Template was developed in part because of lack of resolution regarding precise permit requirements.
- BSEE workgroup agreed that this template captured a lot of the information that would likely be required for permitting, depending upon the authority.

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TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

STEP 3: Develop Use Plan

First, the basics:

- Who,
- What,
- When,
- Where…

Name of activity/proposed release:	
Date:	
Lead organization:	**Other Organization(s) involved:**
Location of release:	**Jurisdictional authorities:** (Specify federal, state, local)
Type of waterbody:	**Distance from nearest shoreline:**
Material intended for release:	**Type of material** ☐ **Simulant** ☐ **Surrogate**
Source of material:	**Intended release volume:**
Map or sketch of release area:	

DECISION-MAKING

STEP 3: Develop Use Plan

Next, the purpose:

- Why???

What is the purpose of this release? (Check all that apply) ☐ Research & Development ☐ Fate & Behavior Study ☐ Drill and/or Exercise
What are the study objectives? (Please list all objectives, and be clear about how they will be evaluated)
Have alternatives to simulant or surrogate release been considered? **If so, explain.**
How will simulant or surrogate release contribute to study objectives?
Identify any precursor work that is relevant to the proposed release.
Based on the net environmental benefit analysis (NEBA) or net environmental and economic benefit analysis (NEEBA) method, how are the costs of a release justified by the benefits?

DECISION-MAKING

STEP 3: Develop Use Plan

Then we start to work through the suitability of the surrogate or simulant materials.

Describe the activities to be evaluated. (Check all that apply)

- ☐ Systems
- ☐ Technologies
- ☐ Tactics

Additional details. (Attach sketches, specification sheets, etc. as appropriate)

Which oil properties will the material mimic? (Check all that apply)

- ☐ Spreading
- ☐ Clumping
- ☐ Buoyancy
- ☐ Trajectory
- ☐ Emulsification
- ☐ Visibility

Explain how the properties of the selected simulant/surrogate material are suited to the study objectives as well as the technologies, tactics, or systems involved.

DECISION-MAKING

STEP 3: Develop Use Plan

Move on to practical and logistical considerations:

What is the deployment method? (Manual, blower, etc.)		
What equipment is required for deployment, if applicable?		
Justification for intended release volume:		
Describe any monitoring activities that are planned to track the volume released, its movement, and potential recovery? (i.e. Aerial, visual, remote sensing)		
Particle Size ☐ Large (1 cm or more) ☐ Medium (mm to 1 cm) ☐ Small (microns)	**Recoverability of material** ☐ High ☐ Moderate ☐ Low	**Degradability of material** ☐ High ☐ Moderate ☐ Low
Describe primary plan for recovery, if applicable.		
What volume or quantity of material must be recovered to satisfy recovery plan?		
Describe the method used to account for total amount of material recovered.		
For materials that will not be recovered, describe the short- and long-term persistence of material (on surface & in water column), potential for shoreline stranding, and other considerations with long-term fate.		

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

STEP 3: Develop Use Plan

Potential impacts to environment and wildlife, and steps to mitigate these impacts.

Is material organic or synthetic?
Is material naturally present in the local environment?
Cite published references on environmental or eco-toxicity, and provide documentation.
Published information on human health effects. (e.g. SDS, toxicity assays, etc.)
Describe receiving environment. (Type of water body, climate zone, water depth and sea conditions, etc.)
Distance and estimated travel time from release site to shoreline:
Identify other sensitive receptors or environments that are within the proposed release area.
List any seasonal considerations for the proposed release. (e.g. Presence of migratory wildlife, sensitive life stages, etc.)
List all wildlife that could come into contact with material and potential adverse impacts. (e.g., Sea birds, marine mammals, finfish or shellfish)
Identify any threatened or endangered species that may be present in the area at the time of release.
Describe measures that will be taken to protect sensitive wildlife or environments from potential adverse impacts from release.

TOPIC 2: STATE OF PRACTICE

DECISION-MAKING

STEP 3: Develop Use Plan

Finally, who grants permission?

Has material been deployed in U.S. waters before? ☐ Yes ☐ No ☐ Unknown	Was the release permitted? ☐ Yes ☐ No ☐ Unknown
Provide any additional information available about releases of this material in U.S. (e.g. Release details, permitting authority, contact details for lead investigators)	
Identify all relevant permitting authorities. (List jurisdictional authorities – local, state, federal, tribal, other)	
Applicable statutes and regulations:	
Estimated time to complete permit application:	
What documentation must be provided prior to the release, and to whom?	
What documentation must be provided after the release, and to whom, if applicable?	

DECISION-MAKING

STEP 3: Develop Use Plan

Last but not least,
can you afford it?

How much will the release materials cost?
What is the estimated clean up cost?
Has the time estimated for the permitting process been incorporated into the project budget? If so, what amount? How much time can this amount afford to buy?


COFFEE BREAK

DISCUSSION:
State of Knowledge & Technology

KNOWLEDGE:

- What do we know about surrogate and simulant materials?
- Is the BSEE project enough of a springboard?
- Consider the list of simulants in the BSEE report…which of these would be appropriate for PWS? Which would not? Did they miss anything?

DISCUSSION:
State of Knowledge & Technology

BSEE LIST

- Algae or seaweed
- Bagasse (sorghum)
- **Citrus fruit**
- Coir (coconut fiber)
- Cork
- **Dog food**
- Drift cards
- **Dyes**
- Evergreen needles
- Hay
- Misc. organic materials
- Peanut shells
- **Peat moss**
- Perlite
- Popcorn
- Protein-based foam
- **Rice hulls**
- **Sunflower seeds**
- **Wood chips**

PWSRCAC LIST

- Apples
- Cottonseed hull
- Drifter buoys
- Hula hoops
- Ping pong balls
- Sawdust

Items in **bold red** listed both by BSEE project & by this workgroup.

DISCUSSION:
State of Knowledge & Technology

KNOWLEDGE:

- What do we need to know in order to better utilize simulants and surrogates in oil spill response training and exercises in PWS?
  - Properties of surrogate/simulant materials
  - Practical considerations
  - Other factors
- How can we fill any knowledge gaps?
  - **Is there any additional work/research/background investigation that this workgroup should undertake?**

DISCUSSION:
State of Knowledge & Technology

PRACTICE:

- How are surrogates being used in Alaska/PWS?
  - What types of training/exercises would benefit from using a surrogate?
  - How would they benefit?
- Where have they been released?
  - Recovery of substances
  - Observed adverse impacts or challenges
- What types of materials have been used?
- What types of permits were granted?

LUNCH BREAK

WRAP UP:
State of Knowledge & Technology

SLIDES TBD BY ELISE DURING LUNCH BREAK TO SUMMARIZE KEY OUTCOMES OF MORNING DISCUSSION

WRAP UP:
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WORK SESSION: Workgroup Goals

- What do you hope to achieve through this process?
  - Answers from survey
  - Discussion in room
  - Identify desired outcomes
- Do we have the right people & organizations at the table?
  - Who else might have an interest?
  - Who else could contribute knowledge or expertise?

WORK SESSION: Workgroup Goals

- What are the potential hurdles or challenges that we may face?
  - Ideas for overcoming them


COFFEE BREAK

WORK SESSION:
Project Work Plan

- Roadmap to achieve stated goals
- Milestones and deliverables
- Timeline
- Meeting frequency


THANK YOU!