Development of the Inland Estimated Recovery System Potential (ERSP) Calculator

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ABSTRACT (687631)

Mechanical oil spill recovery response planning currently depends on an equation contained in regulations which assigns an oil removal capability value to an individual oil skimmer. The Effective Daily Recovery Capacity (EDRC) calculator, the current planning standard oil spill recovery planning calculation method, depends solely on a prescribed percentage of the skimmer's nameplate capacity. EDRC came under heavy scrutiny as an inadequate means for vessel and facility plan holders to calculate their oil spill equipment needs in the wake of the 2010 Deepwater Horizon incident. EDRC's calculation omitted factors such as the encounter rate and onboard storage of skimmers.

These limitations led the Bureau of Safety and Environmental Enforcement (BSEE) to develop a new calculator called the Estimated Recovery System Potential (ERSP) calculator in collaboration with the United States Coast Guard (USCG). ERSP is an oil encounter rate-based calculator that evaluates mechanical recovery equipment as a complete "system" as opposed to focusing on an individual component such as the skimmer capacity or an intake pump. This calculator incorporated the previously neglected factors such as decreasing oil thickness over time, swath width of skimmers, speed of the skimmers relative to the oil spill, oil/water separability, pump rate, onboard fluid storage, and transition time. Although ERSP appears to significantly

improve mechanical recovery planning for offshore and nearshore skimming operations, USCG recognized that it may not be applicable for the inland operating environments where large numbers of oil spills occur. The USCG Research and Development Center (RDC) initiated a project to conduct research into oil spill response planning factors for the inland operational environment.

RDC and RPS Group (Project Team) interviewed numerous governmental, industry, and Oil Spill Removal Organization (OSRO) subject matter experts to gain a broad perspective on this tool, what factors were critical to include, and how best to implement the tool. These interviews and further research led to the creation of the Inland ERSP Calculator conceptual model. Employing a system-based approach, the conceptual model provides the relationship between these factors and the ways in which they contribute into the calculator's estimation of oil spill recovery capacity. The Project Team presents this Inland ERSP Calculator conceptual model as consideration for regulatory implementation as a planning tool. It may improve planning capabilities for oil spill events in inland environments.

INTRODUCTION

Mechanical oil spill recovery planning currently depends on an equation contained in the regulations which assigns an oil removal capability value to an individual oil skimmer. The Effective Daily Recovery Capacity (EDRC) calculator, which is the current standard oil spill recovery planning calculation method, depends only on the skimmer's nameplate capacity. Specifically, EDRC is calculated by taking 20 percent of the manufacturer's rated throughput capacity over a 24-hour period. The EDRC calculator came under heavy scrutiny as an inadequate means for vessel and facility plan holders to calculate their oil spill equipment needs in the wake of the 2010 Deepwater Horizon incident. The EDRC calculation omitted factors such as the encounter rate and onboard storage requirements. These limitations led the Bureau of Safety and Environmental Enforcement (BSEE) to develop a system called the Estimated Recovery System Potential (ERSP) calculator in collaboration with the United States Coast Guard (USCG).

The ERSP calculator is based on oil encounter rate and evaluates mechanical recovery equipment as a complete "system," as opposed to focusing on an individual component such as skimmer capacity or an intake pump. However, in many circumstances, the offshore ERSP calculator will overestimate the amount of oil that would be recovered in a specific situation. A contractor demonstrated this phenomenon in a study conducted for BSEE for response capability planning for offshore blowouts (see Figure 1. Example of potential (ERSP) removal capability and achieved removal for hypothetical blowout (Buchholz et al., 2016).).

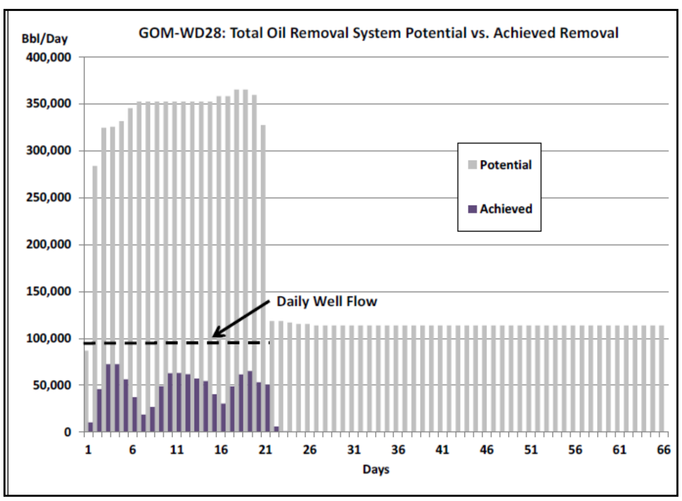

Figure 1. Example of potential (ERSP) removal capability and achieved removal for hypothetical blowout (Buchholz et al., 2016).

In that study, the contractor showed that the effects of environmental conditions (e.g., currents, wave height, darkness), as well as the behavior of the oil in the environment (i.e., weathering and spreading on the water surface), limited the amount of oil recovered.

USCG recognized that the offshore ERSP calculator may not be applicable for inland operating environments. In more confined, shallow areas with restrictions on maneuverability and variable surface water width, the offshore skimming systems with large swath width and large onboard or tethered storage solutions are less likely to be effective. To mitigate these shortcomings and support the ERSP calculator's possible adaptation by USCG and/or inclusion into the regulations, USCG Research and Development Center (RDC) investigated how to incorporate the inland and nearshore operating environments into the existing ERSP calculator.

In June 2017, RDC invited prominent industry representatives and USCG stakeholders to a workshop to explore the applicability of the ERSP calculator to the inland and nearshore operating environments. The participants brainstormed a preliminary conceptual approach to upgrade the calculator's algorithms for the inland environment. Following this workshop, RDC began a project to develop an Inland ERSP Calculator for these environments using the conceptual approach developed at this workshop. The Project Team that developed the Inland ERSP Calculator conceptual model was made up of RDC, RPS, Environmental Research Consulting, and SEAConsult, LLC.

The framework for developing the conceptual model for the Inland ERSP Calculator is based on the premise that the calculator is primarily a response planning tool for oil spills. The intended use of the calculator is to estimate the potential mechanical oil recovery capability of a skimming system based on its encounter rate, configuration, swath width, pumping rate, operating time, and storage capacity under generally favorable environmental conditions. The calculator does not account for environmental factors, such as debris, ice, sediment, extreme weather conditions, site accessibility issues, or any extenuating circumstances, that may significantly reduce the effectiveness of mechanical recovery operations under geo-specific field or actual operating conditions.

Neither the Inland ERSP Calculator under development nor the existing offshore ERSP calculator take into account uncontrollable environmental conditions that may affect recovery system effectiveness in response operations. As a response planning tool, the Inland ERSP Calculator is specifically **not** designed for application as a measure or predictor of actual oil spill recovery performance in the field. While the use of the Inland ERSP Calculator in conjunction with other customized modules may provide better estimates of performance based on geo-specific field conditions or in certain mitigating circumstances, it is outside of the intended purpose of the calculator.

An example of the way in which a response planning tool such as the Inland ERSP Calculator could be applied is estimating the amount of recovery capability (skimming systems) that would be needed to meet the requirements for a Maximum Most Probable Discharge (MMPD) for facilities in generically-defined inland environments. Other examples for the Inland ERSP Calculator include: calculating the estimated recovery in a specific oil spill scenario [such as for a Facility Response Plan (FRP) or Vessel Response Plan (VRP) in inland waters], calculating the estimated recovery based on specific mobilization and transit times to a specific site, or customizing the characteristics of an inland waterway with the estimated amount of resource requirements for open-water and shoreside recovery operations.

METHODS

In order to begin developing the Inland ERSP Calculator conceptual model, the Project Team sought feedback on the calculator from government regulatory agencies, OSROs, and industry. The Project Team conducted interviews with multiple representatives from each of the groups to determine what factors should be included in the Inland ERSP Calculator and to foresee any concerns members of the spill response community might have regarding its implementation.

Interviews

The Project Team selected interviewees to represent a broad spectrum of expertise related to oil spill response operations. They included representatives from the following USCG offices: the Office of Marine Environmental Response Policy (CG-MER), the Office of Operating and Environmental Standards (CG-OES), RDC, the National Strike Force Coordination Center (NSFCC), and several District offices. Other government agencies included the United States Environmental Protection Agency (EPA), BSEE, and National Oceanic and Atmospheric Administration (NOAA). From industry, the Project Team interviewed oil company representatives and oil spill response experts. After the Project Team concluded interviews, it analyzed results to determine what factors should be included in the Inland ERSP Calculator conceptual model. These factors are presented in the Results/Discussion section of this paper.

Conceptual Model Development

The major technical challenges for developing the Inland ERSP Calculator included:

- Incorporating factors that would reasonably be considered essential to the purpose of the calculator as a response planning tool rather than as a performance tool;
- Steering away from incorporating those factors that are too highly specific to particular spill scenarios; and
- Eliminating those factors that are environmental conditions that would affect recovery performance in the field rather than affect system potential.

RESULTS / DISCUSSION

Interview Results

The interviewees generally expressed two different viewpoints about the purpose of the Inland ERSP Calculator and its implications. One viewpoint was that the use of the Inland ERSP Calculator as a *tactical response tool* during an incident required accounting for multiple geographic and environmental conditions (e.g., corralling of oil within containment boom with thicker oil for skimming operations, size of containment area, ice conditions, debris conditions, geography of the river, and shoreline cleanup). The second was that the use of the Inland ERSP Calculator should be used as a *response planning tool* to verify regulatory compliance of the FRP or VRP. Plan holders must ensure they are contracted with OSROs for sufficient response capability in the event of an incident. OSROs must verify their equipment capabilities with USCG NSFCC.

Accepted Factors for the Inland ERSP Calculator

Table 1 shows the factors that the Project Team included in the Inland ERSP Calculator and how they are incorporated into the conceptual model.

Table 1. Factors incorporated into Inland ERSP Calculator conceptual model.

Factor	Mode of Incorporation into Inland ERSP Calculator
Current Velocity	Essential input for Open-Water Recovery Calculator and for Shoreside Recovery Estimation Tool
Oil Collection Points	Indirectly included as part of swath width for Shoreside Recovery Estimation Tool
Skimmer Class/Type	Determines inputs for Equipment Specifications in Open-Water Recovery Calculator and for Shoreside Recovery Estimation Tool
Product Fate	Included as part of Oil Behavior Module
Inland Feasibility of Advancing Skimmer Systems	Assumed for Open-Water Recovery Calculator
Inland Feasibility of Non-Advancing Skimmer Systems	Assumed for Shoreside Recovery Estimation Tool
Great Lakes/Open Waters Issues	Open water addressed in Open-Water Recovery Calculator; Great Lakes removed from waterways covered by Inland ERSP Calculator
River/Restricted Water Issues	Waterway configuration addressed as part of generic waterway classification
Sea State	Sea state assumed to be issue only on certain large lakes or wide rivers under episodic wind events; equipment currently rated for inland and River/Canal use is assumed to withstand wave heights that would be encountered.
Swath Width	Essential input for Open-Water Recovery Calculator and for Shoreside Recovery Estimation Tool
Water Depth	Assumed to be sufficient for Open-Water Recovery Calculator and assumed to be insufficient for Shoreside Recovery Estimation Tool
Mobilization and Transit Time	Essential input for Open-Water Recovery Calculator and for Shoreside Recovery Estimation Tool
Oil Type	Included as part of Oil Behavior Module
Decanting	Assumed to be disallowed under most inland spill operations

The factors that the Project Team specifically excluded in the conceptual model were ice, debris, and sediment. The Project Team concluded that, while these factors could affect recovery rates and feasibility, they are too scenario-specific to be incorporated into the Inland ERSP Calculator. The Project Team determined responders would need to consider the way in which specific types of equipment might operate in ice, debris, and sediment conditions as part of the development of specific Oil Spill Response Plans (OSRPs). The Project Team also decided that the Great Lakes could be adequately addressed with the regular application of the existing offshore ERSP calculator.

Structure of the Conceptual Model

The Inland ERSP Calculator incorporates significant portions of the existing offshore ERSP calculator with respect to the approach of calculating oil recovery based on the amount of recoverable oil, swath width, throughput efficiency, and recovery efficiency for open-water areas. The Inland ERSP Calculator also adapts the approach of the offshore ERSP calculator to shoreside conditions by considering the current flow that moves oil towards the skimmers in shoreside collection points rather than the speed of the advancing skimmer. However, there are some significant departures from the offshore ERSP calculator in that the Inland ERSP Calculator considers oil behavior by oil group to better quantify the amount of recoverable oil.

The Inland ERSP Calculator is composed of two basic parts: the Open-Water Recovery Calculator Module, which is applied to estimate mechanical recovery in the open-water portions of an inland waterway, and the Shoreside Recovery Estimation Tool, which is applied to estimate recovery in shoreside collection areas where advancing skimmers cannot operate. The Shoreside Recovery Estimation Tool includes two subcomponents: the Shoreside Active Collection Calculator and the Shoreside Passive Collection Calculator, which are applied to estimate recovery in shoreside areas with and without currents, respectively. The purpose of this tool is ***for response planning to estimate recovery potential in a more general manner for generic inland waterway types***. Figure 2 shows the relationship between the various component modules of the main Inland ERSP Calculator.

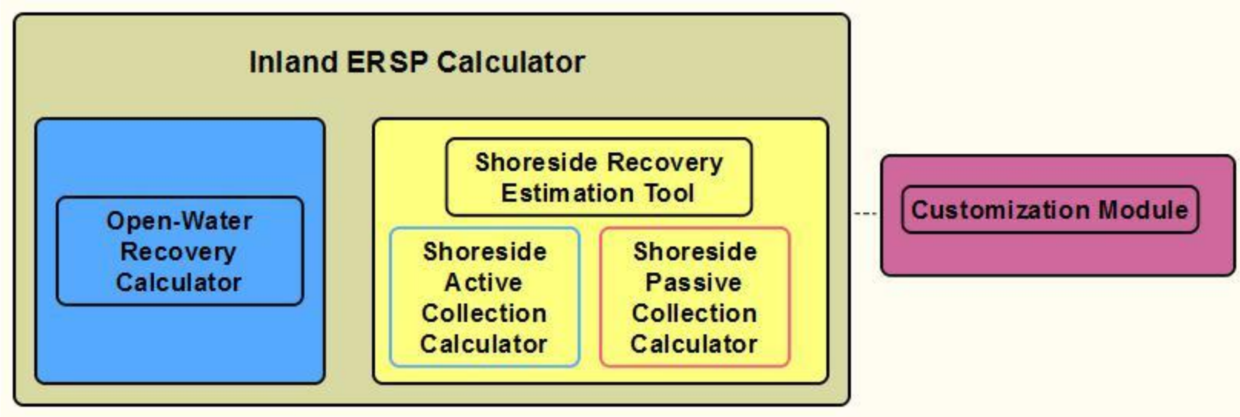

Figure 2. Component modules of the main Inland ERSP Calculator.

The Customization Module will modify the results of the Inland ERSP Calculator based on geo-specific site characteristics inputs, including mobilization and transit time to the site, that the user will provide, if desired. The purpose of this module is to provide a means to estimate recovery potential for specific Oil Spill Response Plans (OSRPs).

For the main Inland ERSP Calculator, the user selects the essential inputs as part of the identification of the scenario, and these set up what is occurring with the spilled oil in its environment. Next, there are various factors (e.g., recovery factors from the scenario) from the user inputs that will affect the degree to which oil can potentially be recovered. The user then adds the recovery system which will be removing a portion of the spilled oil, and there are various factors associated with the recovery system. Finally, the user feeds all the inputs into the Inland ERSP Calculator to determine the potential recovery.

The term "inland waterways" encompasses a broad spectrum of different types of waterways within the United States. In the context of the Inland ERSP Calculator, "navigable" and "non-navigable" waterways are included if responders use a skimming system (advancing and/or stationary) to conduct mechanical recovery operations in the event of an oil spill.

Since the Inland ERSP Calculator itself is not intended to be a geo-specific or spill scenario-specific recovery estimation tool, the Project Team elected to develop a more generic classification approach for inland waterways. The classification captures the most important features of waterways with respect to mechanical recovery operations in oil spills. The Great Lakes were specifically excluded from the classification as per the results of the White Paper (Rowe et al., 2020). However, the Great Lakes connecting channels (e.g., St. Clair River, St. Marys River, and Detroit River) would be acceptable as waterways for the Inland ERSP Calculator.

The Project Team divided waterway dimension into two main types. The first is "confined," which occurs when the configuration and depth of the waterway could not reasonably accommodate open-water recovery operations (e.g., a small creek or stream, or a small pond). The second is "open-water," which occurs when there is sufficient space and depth to accommodate open-water recovery operations with boats and advancing skimmers (e.g., Hudson River or Ohio River, or a moderate-sized lake).

Waterways classified as "open-water" can also include nearshore areas that require shoreside collection techniques, which are more applicable to confined waterways. In the Inland ERSP Calculator, the calculations for spills in open-water locations include both the application of the Open-Water Recovery Calculator Module and the Shoreside Recovery Estimation Tool.

The Project Team also divided waterway flow into two main types. The first is "flow," which means there is generally some degree of detectable current. The second is "stagnant," which means the water is not generally moving (e.g., a small pond or creek with virtually no current).

Figure 3 shows the waterway classifications for the Inland ERSP Calculator.

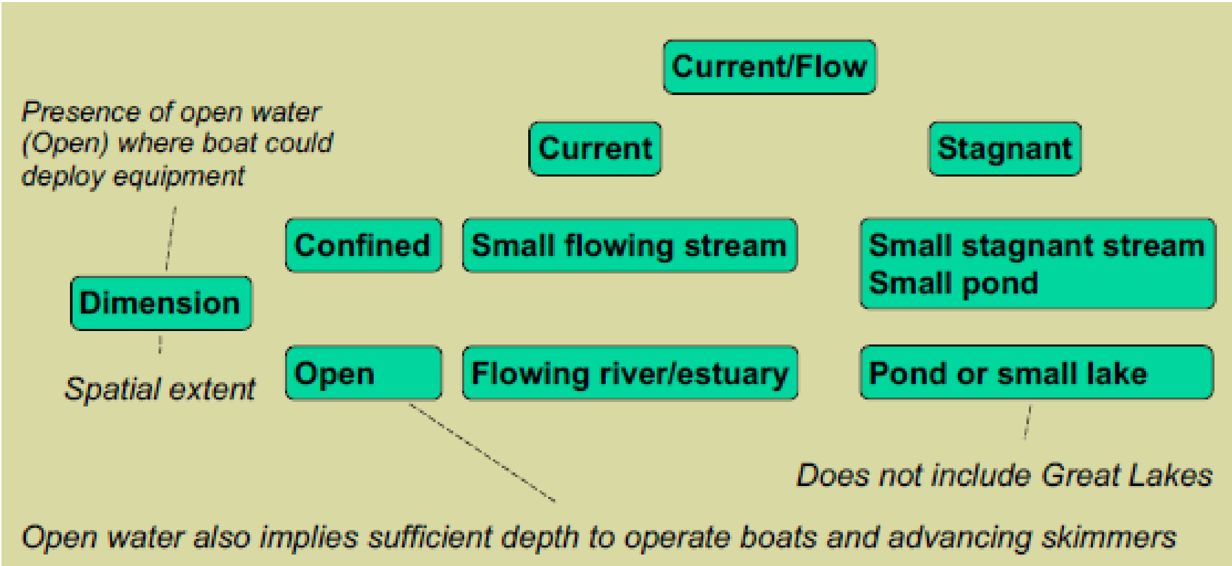

Figure 3. Waterway classifications for the Inland ERSP Calculator.

The Project Team identified two basic inputs the user will apply to identify the types of oil spills: 1) discharge-related inputs and 2) site-specific operational inputs.

Discharge-Related Inputs

Discharge-related inputs to the Inland ERSP Calculator include two major categories: discharge-related factors and oil behavior-specific factors. The discharge-related factors are defined as the volume of spill release as well as its duration. The volume or magnitude of the release could be considered as a specific volume or as a general category, such as Average Most-Probable Discharge (AMPD), Maximum Most-Probable Discharge (MMPD), or Worst-Case Discharge (WCD).

The oil behavior-specific inputs are based on oil type, which is simplified to Oil Groups I-IV. The Inland ERSP Calculator will not include Group V oils as they are non-floating substances that cannot be recovered with conventional skimming systems. Based on the oil type, the Inland ERSP Calculator determines the fate of the oil, including the degree to which it evaporates, emulsifies, dissolves or disperses, spreads on the water surface, and/or adheres to shoreline substrates. The “weathering” process- primarily evaporation, dissolution, and emulsification- changes the nature and amount of oil available for recovery on the water surface.

Site-Specific Inputs

The Project Team identified site-specific factors as those that would ultimately affect the encounter rate based mainly on the site characteristics rather than on the equipment characteristics. The three main inputs were: recovery period (hours per day of skimming operations and/or night/darkness restrictions), water current, and workable swath (for shoreside collection, on-water collection in shallow water) based on site configurations as opposed to equipment specifications. The Project Team incorporated the last two of these factors into the classification of the waterway, although not quantified therein.

Recovery System Factors

The Project Team classified the recovery factors related to the equipment as opposed to site conditions as “recovery system-specific factors.” The two main components are the recovery factors from the skimming components of the system and storage factors. These are roughly analogous to the factors in the offshore ERSP calculator in that they include throughput efficiency and recovery efficiency. The Project Team did not incorporate decanting into the Shoreside Collection Estimation Tool. Storage capacity and limitations are important factors in inland recovery operations. Not including decanting ensures a more conservative approach for storage capacity requirements.

Relationship Between Scenario Inputs, Recovery Factors, and Tools

The scenario inputs (waterway classification, discharge factors, oil behavior factors, and site-specific factors) determine the encounter rate and are required to determine the availability of recoverable oil. The recovery system-specific factors determine recovery system capability.

Depending on the classification of the waterway, users can apply different parts of the Inland ERSP Calculator. Users can apply the Customization Module for geo-specific spill response plan development to specify characteristics of the waterway with respect to shoreline types.

Table 2 summarizes the waterway types and the applicable tools. For the Open-Water classifications (Open-Flow and Open-Stagnant), both the Open-Water Recovery Calculator Module and the appropriate Shoreside Recovery Estimation Tool– either the Shoreside Passive Collection calculator (for Open-Stagnant) or the Shoreside Active Collection calculator (for Open-Flow) – will be applied. There will be two distinct recovery operations involved on the open water and at the shoreside, as these operations involve different types of skimming systems. An individual spill scenario may involve portions of the response that involve more than one type generic waterway classification. For example, oil spilled into a confined waterway may flow downstream into a different waterway (or a different portion of the same waterway) that is more open. The Inland ERSP Calculator is not designed to estimate the recovery for a specific spill scenario. A response planner would need to view the two portions of this hypothetical spill response as separate entities.

Table 2. Inland ERSP calculator application by waterway classification.

Waterway Classification	Open-Water Recovery	Shoreside Recovery
Open-Flow	Open-Water Recovery Calculator Module	Shoreside Active Collection Calculator
Open-Stagnant	Open-Water Recovery Calculator Module	Shoreside Passive Collection Calculator
Confined-Flow	None applied	Shoreside Active Collection Calculator
Confined-Stagnant	None applied	Shoreside Passive Collection Calculator

Scenario-Type Specification for Recovery Calculations

The Inland ERSP Calculator requires a specification of a “scenario type” in the calculation process. While there is a broad spectrum of possible spill scenarios, the Project Team applied three basic factors to define generic spill scenarios for the use in the response planning tool:

1) Waterway classification (four types: Confined-Flow, Confined-Stagnant, Open-Flow, and Open-Stagnant);
2) Oil type (four types: Group I, Group II, Group III, and Group IV); and
3) Magnitude of release (three types: AMPD, MMPD, and WCD) or specified volumes.

The release type could be further classified as a "batch spill" or a "continuous spill." This distinction would come into play with respect to determining the different amounts of recoverable oil after the first day. For batch spills, the availability of recoverable oil decreases with weathering over time, depending on the oil type. For continuous spills, the Inland ERSP Calculator only computes the estimated recovery for the first three days and assumes the amount of recoverable oil on Days 2 and 3 are the same as on Day 1. This more unusual circumstance for inland environments is handled separately in the Inland ERSP Calculator algorithms. The "default" spill is a batch spill in which the oil is spilled over a short period of time (generally minutes to hours, rather than days to weeks, as in a continuous release).

A "scenario" for the Inland ERSP Calculator is based on a combination of Waterway Classification, Oil Type, and Release Magnitude. With four Waterway Classifications, four Oil Types, and three Release Magnitudes, there are 48 hypothetical generic scenarios. For the user, the process is simplified. Rather than having to consider one of 48 scenarios, the user makes only three selections: one waterway type, one oil type, and one spill release magnitude.

Oil Behavior Incorporation into Recovery Estimations

The incorporation of oil behavior into the Inland ERSP Calculator represents a significant departure from the approach of the offshore ERSP calculator. The oil behavior modification (in the Oil Behavior Module) is applied both to the Open-Water Recovery Calculator Module and to the Shoreside Recovery Estimation Tool calculators (Shoreside Active Collection Calculator and Shoreside Passive Collection Calculator) (see Figure 2).

The Inland ERSP Calculator considers the differing properties and behavior of the four oil groups (I-IV). By doing so, the Inland ERSP Calculator factors in the amount of recoverable oil in a more accurate manner than is done with the offshore ERSP calculator. The amount of oil available for recovery by skimming (i.e., the recoverable oil) is a function of the degree of evaporation, dissolution, dispersion, and emulsification (i.e., oil weathering) that occurs over time. Weathering of oil differs significantly between the four oil groups. In the Inland ERSP Calculator, the estimated amount of oil available for recovery is a vital component (see Figure 4). For this reason, the Project Team opted to incorporate an “Oil Behavior Module” into the conceptual model for the Inland ERSP Calculator.

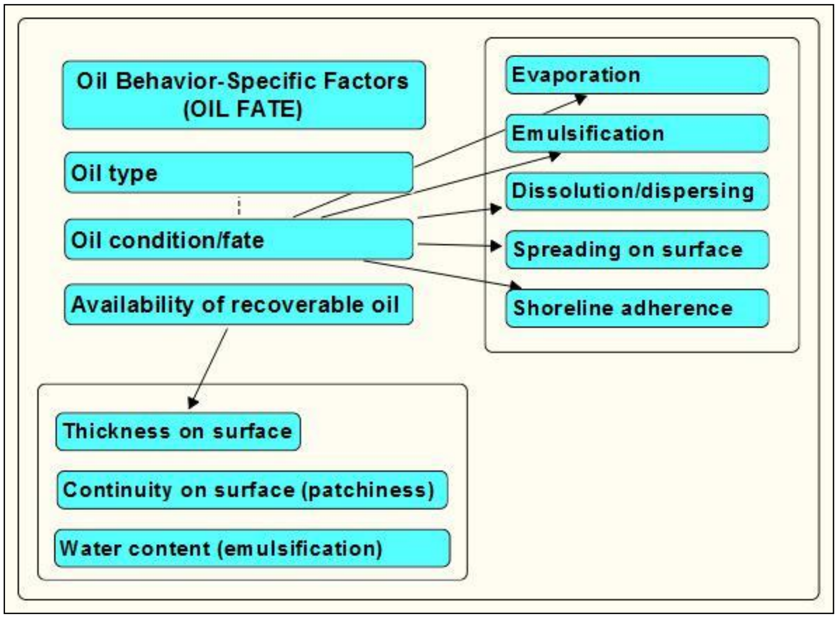

Figure 4. Determining the estimated amount of oil available for recovery.

The Oil Behavior Module performs two major functions. It calculates the amount of oil remaining on the water surface for potential recovery based on weathering and the degree of emulsification. The calculations on weathering and emulsification are based on representative oils for Oil Groups I-IV.

Figure 5 shows all the user inputs into the Inland ERSP Calculator. The calculator's outputs are dependent on these user inputs and the calculations for recoverable oil that the Oil Behavior Module generates.

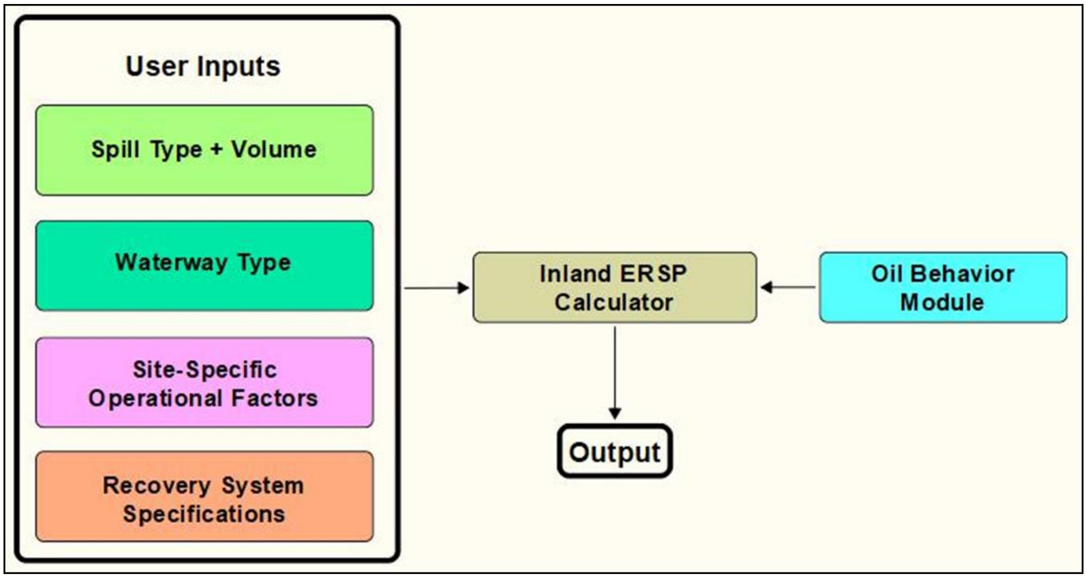

Figure 5. User inputs into the Inland ERSP Calculator with oil weathering modifications made to recoverable oil that the Oil Behavior Module generates.

Essential Dichotomy within the Inland ERSP Calculator

Because of the significant differences in recovery operations in open-water and shoreside portions of inland waterways, the Project Team concluded that it was essential to split the two types of operations with different calculating approaches. The skimming equipment is generally different– advancing and non-advancing (stationary) systems. They are not to be "combined" in calculating the overall response requirements for an inland spill setting. In the calculation of recovery potential, each individual piece of equipment (or each system) is calculated independently. Sufficient booming to cover both open-water and shoreside operations must be calculated separately if there is overlap in the type of boom deployed for these operations.

The four basic waterway types (see Table 2) all assume that there is some degree of shoreside operations involved. For the Open-Flow and Open-Stagnant environments, there may be varying "percentages" of equipment required for open-water operations versus shoreside operations. In general, the wider the waterway, the more open-water system capability may be required. However, for a specific waterway or a specific spill scenario, there will be varying proportions of open-water versus shoreside equipment that is required. Even within a single waterway, such as the Hudson River, there will be different response operations required at different points along the 150-mile river. In the event of a large spill moved by tides and currents, there may be some portions of the spill response in narrower parts of the river that require 75 percent of the response to be in shoreside areas and 25 percent in more open areas in the middle of the river. The user needs to keep waterway characteristics in mind when allocating different types of equipment to open-water and shoreside recovery. As a response planning tool, the Inland ERSP Calculator is not designed to address specific spill scenarios or locations. Unlike the offshore ERSP calculator, there are far too many possible geo-specific variations in the broad category of "inland waterways."

To address this limitation, the user may apply the characteristics of an individual waterway based on shoreline characteristics by using the Customization Module. Oil tends to adhere differently based on shoreline type.

The outputs of the Inland ERSP Calculator are separated by daily ERSP for both the Open-Water Recovery Calculator Module and the Shoreside Recovery Estimation Tool. These values are given in barrels for Day 1, Day 2, Day 3, and as a total for all three days. Figure 6 shows the graphical user interface for the Inland ERSP Calculator outputs.

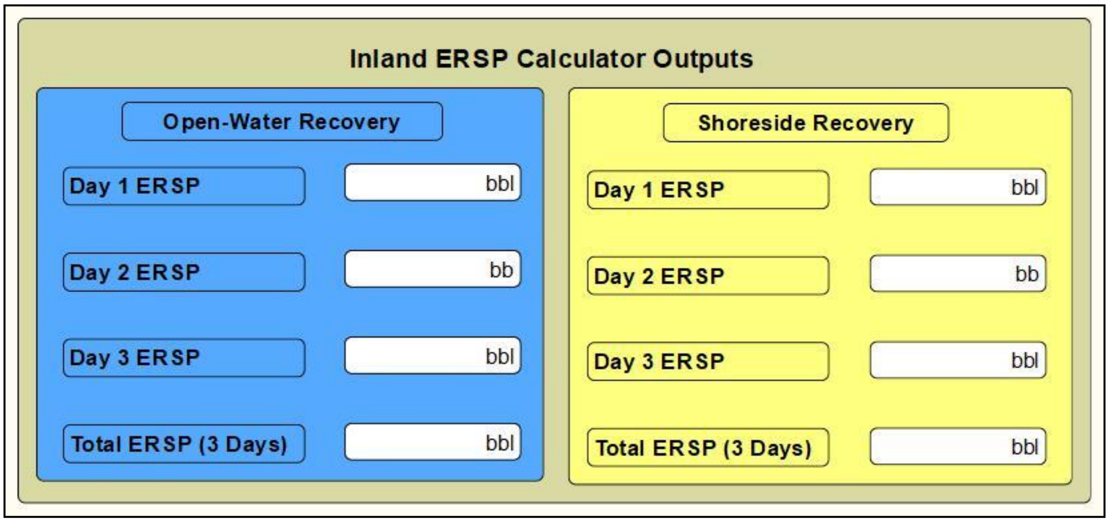

Figure 6. Inland ERSP Calculator outputs.

CONCLUSIONS

The Inland ERSP Calculator addresses the need for estimating the recovery capability of different types of mechanical recovery systems in inland waterways. This paper represents a brief and broad overview of the Inland ERSP Calculator. The Inland ERSP Calculator incorporates significant portions of the existing offshore ERSP calculator with respect to the approach of calculating oil recovery based on the amount of recoverable oil, swath width, throughput efficiency, and recovery efficiency for open-water areas. It also adapts the approach of the offshore ERSP calculator to shoreside conditions by considering the current flow that moves oil towards the skimmers in shoreside collection points rather than the speed of the advancing skimmer. However, there are some significant departures from the offshore ERSP calculator, one in that the Inland ERSP Calculator considers oil behavior by oil group to better quantify the amount of recoverable oil.

After RDC develops the Inland ERSP Calculator prototype in the near future and the National Academy of Sciences (NAS) provides its independent review, RDC will transfer the prototype calculator to CG-MER. CG-MER will engage with the public to ensure that users clearly understand the intentions of the Inland ERSP Calculator as a planning tool. RDC's project reports, including the White Paper, Conceptual Model Report, and Design Document Report, will be available to the public after NAS completes its review. The long-term goal of this project is to improve spill response planning efforts for most inland operating environments, which would invariably lead to more efficient inland oil spill responses.

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