Emergency Preparedness

Planning is the key to emergency preparedness and response! Although modeling disaster scenarios is quite complex, the complexity of modeling cannot stand in the way of compliance with regulatory requirements and public expectations.

With the extreme consequences of liquid leaks or spills, it is imperative that a land-based spill model be realistic. A comprehensive spill model is founded on proven algorithms that account for variations in surface cover, fluid properties, soil absorption, and terrain variations.

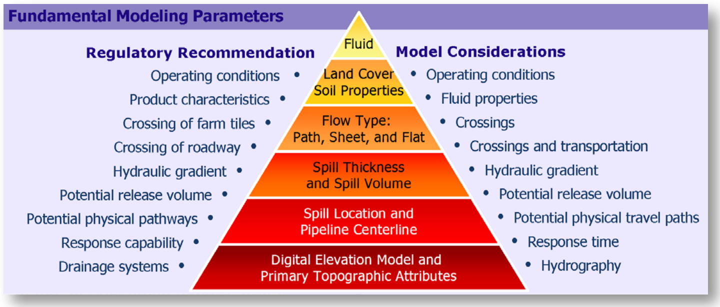
Overland Spill Model

Through review of various regulations and literature it is possible to determine the fundamental parameters required for modeling overland spills. These factors include terrain (or topography), drainage systems (natural or man-made), fluid properties, operating condition, potential release volume, and emergency response time. This listing is certainly not comprehensive and misses a few critical factors such as surface cover, soil properties, and weather conditions. These factors allow for flow resistance, soil absorption, and fluid evaporation to be included in the Overland Flow model.

The methodology developed by Integrated Informatics is able to model liquid spills through inclusion of all factors defined by the regulations augmented by the suggested critical factors.

The Integrated Informatics approach is based on rigorous methods for establishing realistic resistance to flow over the ground surface. The algorithm used to establish a continuous surface of fluid flow resistance takes into account variation in surface cover, slope (directional), fluid properties, and several other key inputs.

With the Overland Flow resistance established, the next step is to calculate the path or paths a spill would make by passing over a topographic surface and accounting for resistance. These calculations can be constrained by defining upper limits on spill travel time, spill volume, spill area, or maximum travel distance.



Results and Reporting

Integrated Offsite is a specialized tool based on geographic information system technology and is able to produce meaningful results readily useable by safety, environmental, planning, and public relations personnel.

The main output of the model is spill travel time but tightly coupled with this is the spill area or spill travel distance. Depending on the constraints applied to the model, the results generated may represent potential spill travel paths or specific flow paths for a given scenario.

If required, fluid volume retained at any location can be calculated and is yet another output from the spill modeling process. Results are dependent on fluid properties, soil absorption, evaporation, and more!

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Model Flexibility

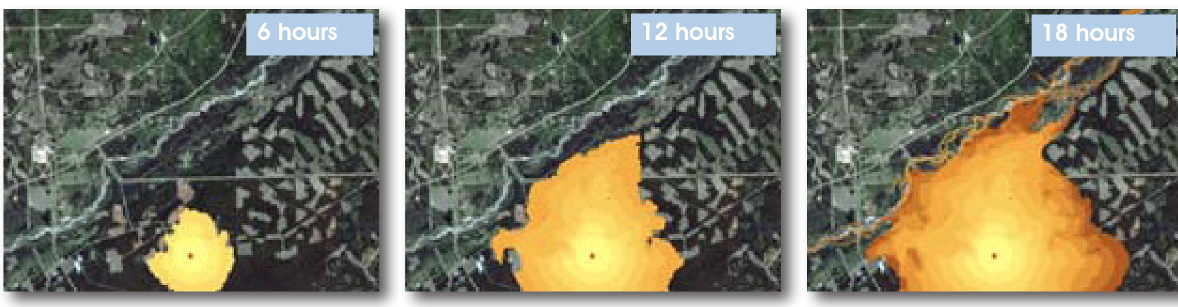
The example shown below is the result of calculating spill travel time from a single source with an unlimited amount of spill product. The example shows snapshots in time of the spill travel calculated from a single spill location.

This particular example highlights some of the features of the Overland Spill model. For instance, the model has chosen to flow over flat land, seek out valley bottoms, and move around hills, that is, the model knows not to flow uphill!

Another feature of the model is its ability to show the relationship between spill travel time and spill travel distance. Looking at the 6 hour snapshots shows more distance traveled in the third 6 hours (18 hour window) because of the spill interaction with a river.

Additional Applications

The main driver behind this Overland Spill model is to address the need of the oil and gas industry to meet their emergency preparedness requirements. However, the model has direct applicability to other industries and can also be used to help first responders with their planning process for emergency response times, establish effective emergency response control points, and estimate cleanup and remediation costs.



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