Freight Incident Analysis Tool FIAT User Manual

By Drarelle Blassingame and Rebecca Brown

Vision Statement

FOR - Developers and Analysts in Ohio

WHO - have a need for additional GIS toolset

OUR - Freight Incident Analysis Tool FIAT

IS - a python-based software toolset that analyses National Transportation Safety Board (NTSB) incidents regarding Hazardous Materials Spills during Freight Transportation

THAT - is open-source, developer supported and easy-to-use

UNLIKE - other tools that do not exist

OUR PRODUCT - preforms risk analysis and evacuation zones

Installation Guide

1. Download the Hazard Spill Simulation Tool package (zipped folder) and unzip the content to a desired location on your computer.
2. Open ArcGIS Pro and create a new project.
3. In the Catalog pane, right-click on the "Toolboxes" folder, and select "Add Toolbox".
4. Navigate to the unzipped folder containing the Hazard Spill Simulation Tool, and select the toolbox file to add it to the project.
5. Add the provided data (CSV file) to the project folder.

##Developers

D. Blassingame - GIS Major Undergraduate | The Ohio State University

R. Brown - GIS Major Undergraduate | The Ohio State University

Limitations

Due to the complex nature of chemical spills and hazardous we have excluded the affected population by chemical and have left the manual buffer radius for the chemicals in (miles) units.

Developers are implementing a way to use Python RegEx as an ETL process to cleanse data, this feature will be released on future versions located at: https://github.com/djbosu/RRAnalysis

DATA Preparation

While this specific tool was developed for the state of Ohio, it should be applicable for other states if the csv file is formatted correctly

To use your own data with the Hazard Spill Simulation Tool, ensure your CSV file includes the following columns, casing and spelling are critical for a successful run of the tool. Proper column headers are **bold & capitalized** below. **Test data has been provided in the package.**

LONGITUDE: The longitude coordinates of each point.

LATITUDE: The latitude coordinates of each point.

CARSHZD: A column indicating whether a spill is hazardous (1) or non-hazardous (0).

NARR2: (sometimes Narr1-6 or just narrative): Type of spill

PERSONS_EVACUATED: Amount of local population evacuated, if any.

Usage Guide

1. Open the Hazard Spill Simulation Tool from the Catalog pane. 2. Fill out the parameters in the tool dialog:

Workspace: Set the workspace folder where the output data will be stored.
Source File: Browse to the CSV file containing the input data (must have LONGITUDE, LATITUDE, and optional CARSHZD columns).
Buffer Radius: Enter the buffer radius (in map units) to be applied around each point. Hazard Spill (optional): Select a hazardous material from the dropdown list, or enter a custom value if the desired material is not listed. Output Layer: Enter a name for the output layer.

3. Click "Run" to execute the tool.

*__NOTE:__ The tool accumulates information and does not rewrite.

The tool will create a point layer with a buffer based on the entered buffer radius, simulating a chemical spill. The output will be added to the ArcGIS Pro map.

Results of the Product

Below is a photo of the results of the product, Figure 1. If an evacuation was required, the the tool will output a buffer around the railroad accident.

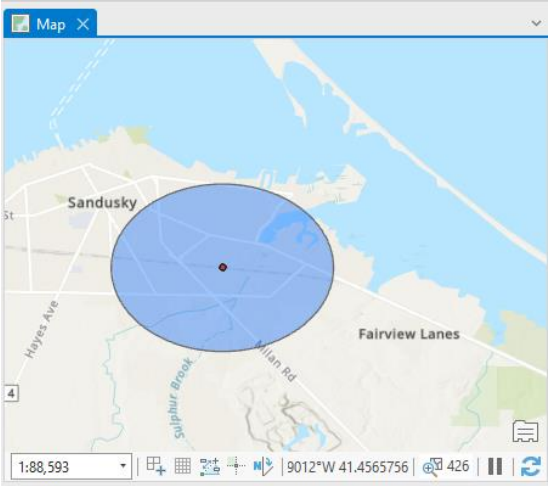

Figure 1 (left). This is the output of our tool. A Tain carrying paraffin wax derailed in Sandusky, requiring evacuation of the area.

Selecting the point allows you to see relevant data, the buffer is simply a visual guide.

Discussion of Software Processes

This tool outputs the point data with a buffer of where a railroad accident requiring evacuation occurred. A buffer is put around the point. It is very important to check that the longitude and latitudes are within the range of the tool. The development processes required some extensive research into Python and into the operations of freight companies, their payload and how their export data. The general findings for acquiring data is that there are no standards across multiple reporting agencies and companies self-report, this may result in some inaccuracies in the tool as the tool simply manipulates the data, rather than produce it.