

Water Health and Economic Analysis Tool

Purpose

The U.S. Environmental Protection Agency (EPA), in collaboration with drinking water and wastewater (water sector) partners, developed version 2.0 of the Water Health and Economic Analysis Tool (WHEAT). WHEAT is designed to assist utility owners and operators in quantifying public health consequences, utility-level financial consequences, direct and indirect regional economic consequences, and the downstream impacts of an adverse event that pose risks to the water sector. WHEAT currently analyzes two types of event scenarios: the release of a hazardous gas and the loss of operating assets in a drinking water or wastewater system. WHEAT provides information that can be used as part of a comprehensive risk assessment as summarized in Figure 1. Future WHEAT modules will analyze drinking water contamination scenarios.

The WHEAT methodology uses a step-by-step process that assists users in conducting a consequence analysis. Users can easily enter information about their utility; build and run a consequence analysis scenario; and generate a report that summarizes the potential public health impacts (i.e., injuries and fatalities), utility-level financial costs, regional economic impacts and potential downstream impacts (for wastewater systems). The WHEAT loss of operating assets module estimates economic consequences; the hazardous gas release module estimates public health and economic consequences.

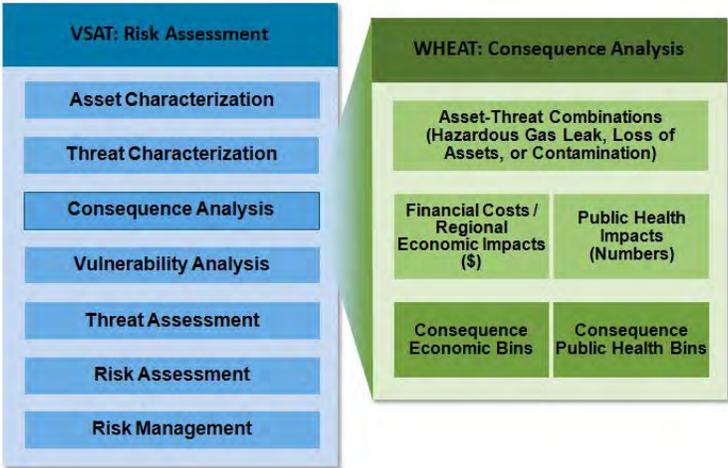


Figure 1: WHEAT Integration with Water Sector Risk Assessment Methodologies

WHEAT Consequence Analysis Process

The WHEAT utility-level financial consequences correlate to the extent and duration of loss in drinking water or wastewater service and the extent of damage to operating asset(s). The tool estimates lost sales revenues, increased utility operating costs (e.g., labor, equipment, materials, replacement water, environmental damage remediation) and asset repair and replacement costs resulting from the incident. Regional economic consequences are estimated for both direct and indirect impacts. Direct impacts are proportional to the extent and duration of disruption of normal drinking water and wastewater service and take into account the resilience of affected businesses and their ability to adapt to an adverse event. Indirect and induced ripple impacts are assessed in WHEAT in terms of lost revenue from other businesses that are economically associated with businesses that have a direct impact.

WHEAT uses a step-by-step process (illustrated in Figure 2) that guides users through a consequence analysis:

1. **System and Scenario Selection** – Users select the type of system being analyzed (drinking water or wastewater) and select a type of scenario for analysis (loss of assets or hazardous gas release).

2. **Baseline Inputs** – Users provide a set of simple inputs to characterize their system, including the service area, population served, water production, utility revenue, utility expenses and other relevant financial inputs.
3. **Scenario Inputs & Service Loss and Response** – Users provide inputs, based on questions presented by WHEAT, to specify the details of the scenario. These inputs include a characterization of the likely effects the scenario may have on the provision of drinking water or wastewater services.
4. **Public Health Consequences** – WHEAT analyzes and generates estimates of public health consequences, measured in terms of potential injuries/illnesses and fatalities.
5. **Utility-Level & Regional Economic Consequences** – WHEAT analyzes and generates estimates of both utility-level consequences and regional economic consequences associated with the specified scenario. WHEAT reports the utility-level consequences as lost revenues, increased operating costs, and asset repair and replacement costs.
6. **Downstream impacts** – WHEAT analyzes and generates results that are descriptive of downstream impacts expected due to a loss of wastewater treatment (primary, secondary, and tertiary) that would lead to the discharge of raw or partially treated domestic wastewater into a receiving water body.
7. **Summary Report** – WHEAT produces a report summarizing the baseline inputs, scenario analyzed,

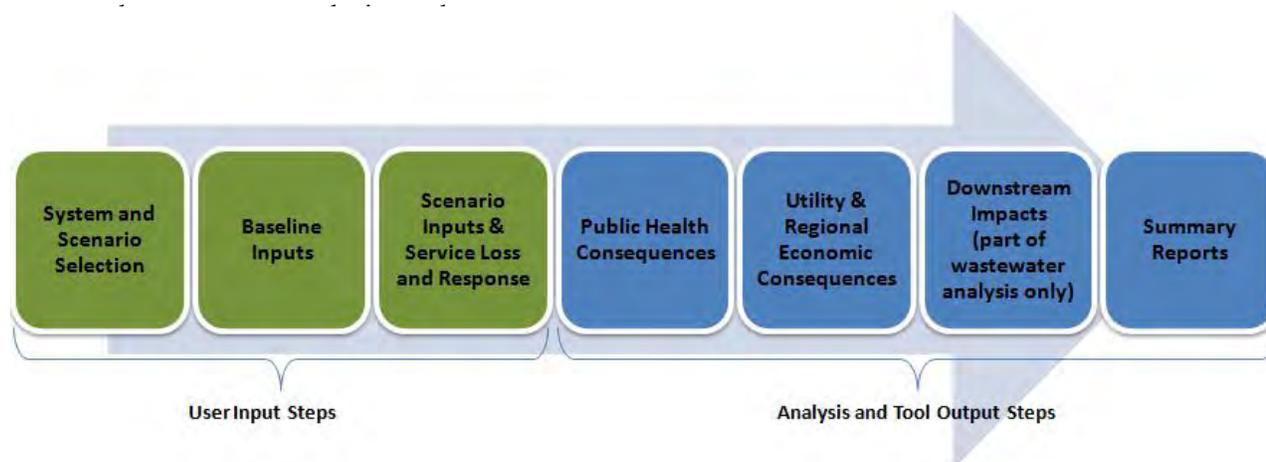


Figure 2: WHEAT Consequence Analysis Process

Features

- Provides step-wise guidance to build scenarios, and where appropriate, provides users with preliminary estimates
- Allows users to analyze the consequences of the release of a hazardous gas and the loss of operating assets for drinking water and wastewater systems
- Enables users to save and reuse utility information for multiple analyses
- Creates a consequence analysis summary report in Microsoft Excel format
- Includes a help page at each step of the analysis to guide the user

Contact

For more information or questions, contact EPA staff at WHEAThelp@epa.gov.

Office of Water (4608T) EPA 817-F-12-004 www.epa.gov/safewater December 2012