



# Nu-PathNET<sup>®</sup>: Emergency Response and Exercise Software

Photo: Benoit Brummer

## IAEA Good Practice

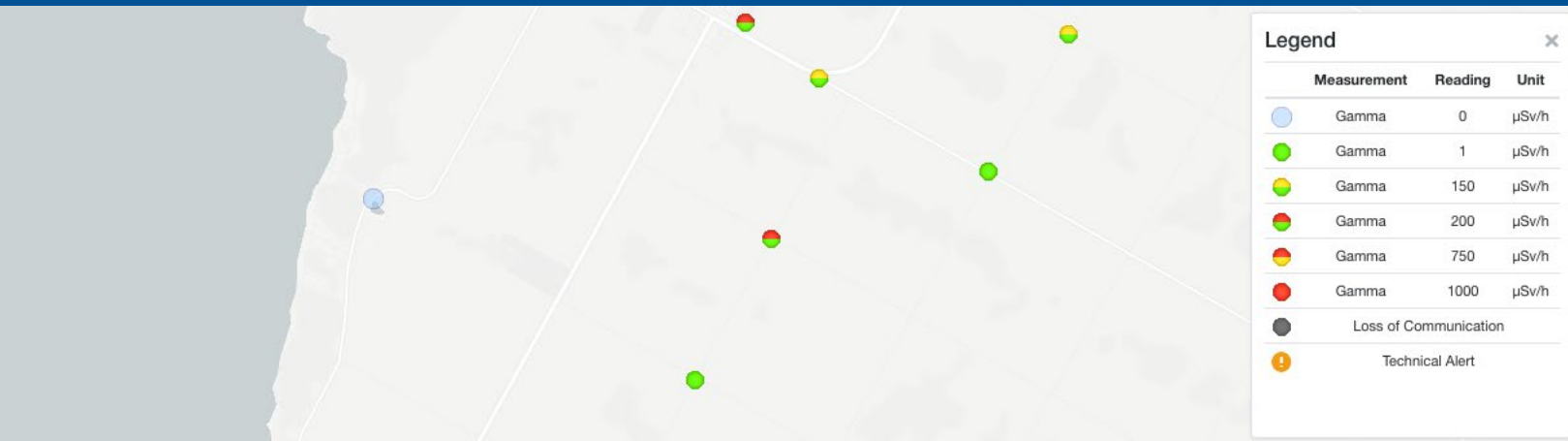
Bruce Power received International Atomic Energy Agency (IAEA) Good Practice recognition for use of Nu-PathNET.

RTI International worked with a major industrial firm during the 2011 Fukushima Daiichi accident to develop a comprehensive assessment of radiological conditions in the Fukushima Prefecture. More than 10 years later, this experience—coupled with years of experience working with facilities in Canada, Europe, and the Gulf Cooperation Council (GCC) region— has resulted in the development of Nu-PathNET, a database and software application designed to provide advanced analytical power to assess off-site radiological conditions, facilitate collaboration for effective decision-making, and support drills and exercises to maintain readiness.

Nu-PathNET provides a powerful capability for understanding and analyzing the nature and extent of off-site radiological conditions in real time. All data collected are available with a keystroke, making data review and decision-making quick and efficient and providing substantial benefits for nuclear power plant operators and public response agencies. These benefits include lower total cost of maintaining manual field survey response capability, a common understanding of facts among key decision-makers, and better collaboration with provincial/state and federal response organizations. In addition, automated monitoring reduces emergency response survey team workers' exposure to radiation, and automated reporting reduces the chance of error during actual events or exercises. When used in exercise mode, Nu-PathNET generates simulated data for use in drills and exercises for a realistic train-as-you-respond experience to maintain and enhance readiness.

## More Information

Joe Johnson  
Product Manager  
919.541.6726  
joejohnson@rti.org



## Features

- Real-time data: dose rate, deposition, air concentration, spectral analysis
- Integration of Nu-PathNET and radiological monitoring equipment (regardless of manufacturer)
- Graphical tools provide easy-to-read data visualization
- Tabular data view and output allows for sorting and searching by user-defined parameters (e.g., date, location, dose rate)
- Spatial analysis for quick understanding of the nature and extent of radiological and meteorological conditions
- Radiological dose rate and isotope activity alarms
- Technical alerts relay equipment status and malfunctions to quickly identify and fix maintenance problems
- Multi-level access control and permissions
- Integration of data collected by field teams and laboratory analysis
- Customized integration with emergency response procedures (e.g., reporting, field surveys, dose models, meteorological data)
- Simulation of field data for drills and exercises, providing a realistic train-as-you-respond experience.
- Compliance with rigorous industry and government cybersecurity requirements; provides secure data transmission along the entire data path and secure data management in redundant data centers.

## Technical Details

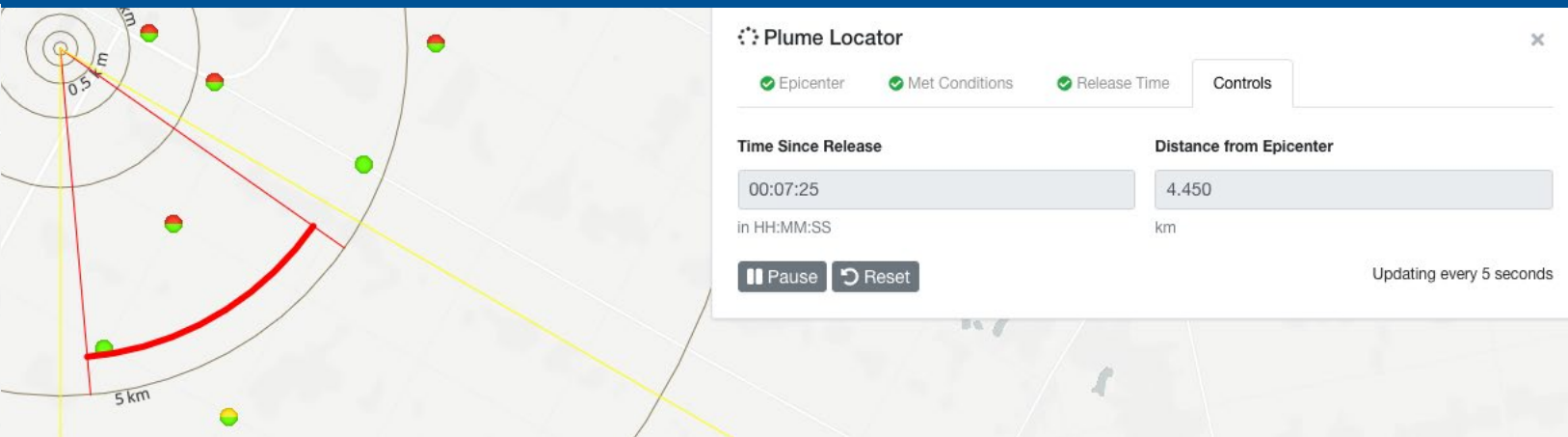
Nu-PathNET is a modern, web-based software application available as a software-as-a-service (SAAS) or an on-premises solution. Role-based access to the application is provided to authorized users and secured by two-factor authentication, data encryption (both at rest and in transit), and discrete firewall rulesets.

Nu-PathNET provides capabilities in three distinct areas: normal operations; emergency response; and exercises, training, and drills.

## Normal Operations

This mode enables Nu-PathNET to continuously present all relevant information for ongoing radiological assessment in the vicinity of the monitored facility. Nu-PathNET offers users the following components and features:

- The **Map module** provides a spatial display to immediately orient users to the location and current status of network assets, sensitive receptors, and geographical features. Additionally, users can customize their Map module display to best suit their immediate need using the following features and tools:
  - Showing or hiding specific *Monitoring Asset Groups* and/or emergency preparedness (EP) *Response Sectors*. Each monitoring asset will be displayed according to the map legend indicating current radiation levels and device status. These levels and color codes can be configured to thresholds established by user-specific emergency procedures.
  - Using *Map Annotation* features to show, highlight, or hide information on the map display to focus on information that is most relevant. Users can export annotated maps for sharing with other agencies.
- The **Network module** provides both real-time information about the current status of network assets (e.g., fixed monitoring assets, meteorological stations, air samplers) as well as a history of radiation alarms and asset equipment status.
  - Tools within the Network module are used during all modes of operation to understand the current status of network assets and support network maintenance.
  - These tools convey current and recent instrument readings, as well as current and historical radiation alarms and technical alerts in an easily accessible form that network administrators, emergency responders, and maintenance personnel can search, sort, and filter for analysis. Technical alerts provide equipment status alerts for an instrument in an off-normal status.



- The **Data module** provides tools for subject matter experts to evaluate the nature and extent of radiological conditions.
- The **Event module** allows system administrators to place the system into Event Mode, thereby activating features designed specifically for emergency response.
- The **Administration module** provides system administrators with tools to authorize users, assign user-specific permissions, enter notification preferences, and set alarm thresholds. Users can subscribe to notifications for radiation alarms or technical alerts via a variety of delivery methods.

### Emergency Operations

Nu-PathNET provides tools and features to aid emergency responders in directing field monitoring, engaging in protective action decision-making, and protecting emergency workers. Response organizations and personnel can effectively manage emergencies using the following available tools and features:

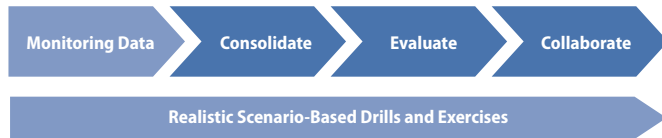
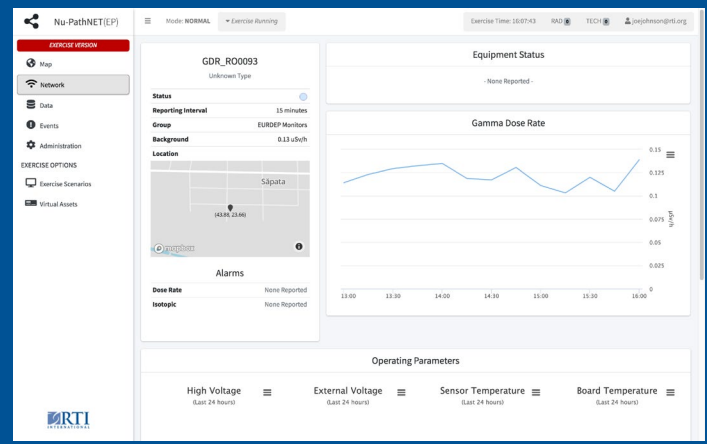
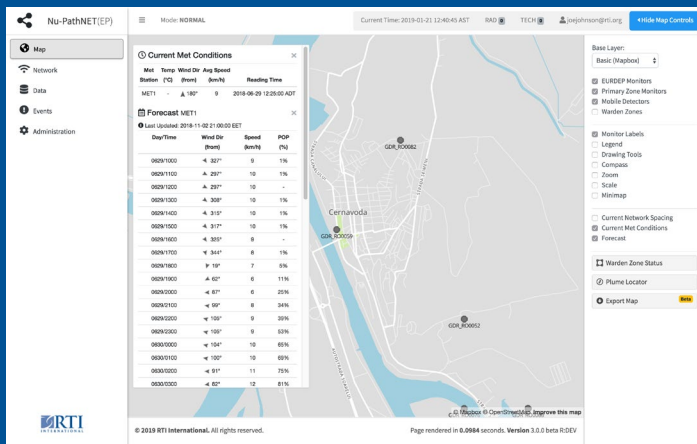
- **Plume Locator.** Locate plume leading edge and direction for positioning field monitoring teams.
- **Data Visualization.** Visualize data in real-time from various monitoring assets (e.g., fixed and mobile monitors, drop boxes, dosimeters) via graphs and tables that can be customized by user and exported for use outside the systems for reports, presentations, or meetings.
- **Analysis Tools.** Make field monitoring and emergency response decisions quickly and easily. User-selected dose model results can be imported through automated or manual methods for viewing in map space.
- **Dose Model Outputs.** Display dose model predictions overlaid on current or previously recorded radiation levels.

- **Response Zone Status.** Set and display protective action status for each response zone so all responders can maintain situational awareness.
- **Reporting.** Automate reports in accordance with established emergency response procedures.
- **Time Slider.** View previously recorded monitoring data for a selected time period.

### Exercises, Training, and Drills

Full-scale exercises can be executed with participants engaging scenario data via their normally used monitoring assets, and tabletop drills utilize virtual assets; both methods save valuable man and equipment hours.

- **Exercise Setup and Controls.** An exercise leader can design an exercise scenario for off-site conditions that is internally consistent with other aspects of the exercise scenario (e.g., simulator for nuclear reactor) and exercise objectives. Users can then select the scenario to run. During the tabletop or full-scale exercise, users can control the scenario (e.g., start, stop, pause, skip to time) as needed to adjust to exercise activities as they unfold.
- **Tabletop Exercises.** For tabletop exercises, virtual monitoring assets (e.g., drop boxes, vehicles) can be created and used in lieu of field-deployed assets. For example, adding a virtual driver is easy to do by defining parameters in the Virtual Driver tool. Users can set a route (shown as a blue line on a map) for the virtual vehicle to drive during a tabletop exercise.
- **Full-Scale Exercise.** During full-scale exercises, Nu-PathNET can send simulated readings to actual assets that are deployed in the field (e.g., drop boxes, hand-held devices, vehicles). Exercise participants will have a realistic training experience as they work through a virtual data field, thus enhancing the entire team's readiness.



## Designed for Effective EP Programs

Our design philosophy recognizes that EP programs need to do more than simply view monitoring data. We have designed Nu-PathNET for the multifaceted and fast-paced EP environment. Nu-PathNET offers state-of-the-art systems and tools that enhance operational capabilities, improves emergency operations center functionality, and facilitates effective collaboration among emergency responders under a variety of radiological events.

**Consolidate.** All relevant data regarding off-site radiological conditions—including radiological measurements, meteorological data, dose model output, and field team survey measurements—are compiled to ensure optimal facility management and real-time access to critical data.

**Evaluate.** Analysts quickly understand the nature and extent of radiological conditions before, during, and after an event. Nu-PathNET maintains all relevant event data in a single analytical framework, allowing analysts to immediately apply data visualization and analysis tools.

**Collaborate.** Health physics experts from the utility and federal/local governments as well as other agencies interact with data directly from any location using secure log-in credentials; these experts work together to determine the most effective protective actions to take.

## Recent Developments

RTI collaborated with Calian Ltd., based in Ottawa, Canada, to incorporate the features, capabilities, and experience of S3FAST and S3EXERCISE—both well-tested emergency response and training/exercise support tools used throughout Canada, Europe, and the GCC region. The latest version of Nu-PathNET has unmatched capabilities for radiological monitoring, emergency response, and drill/exercise support for EP programs.

RTI assisted Bruce Power in improving its emergency response processes for a Beyond Design Basis event at its nuclear power plant in Tiverton, Canada. This plant is located on a 2,300-acre site on the shore of Lake Huron, Ontario, and has the capability to power one in four hospitals, homes, and schools in Ontario. Real-time remote monitoring stations integrate with Nu-PathNET, thus providing a vast amount of readily available information and advanced analytical capability to Bruce Power’s Emergency Management Center.

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