2026 JULY 19–22 VANCOUVER, BC
JOINT AAPM | COMP MEETING

Development of a Web-Based Radiation Survey Tool for Storing and Comparing Historical Radiation Levels Around Linac, CT, and Brachytherapy Units

Tamara Palamar, BSc[1,2]; Michael Jensen, PhD, MCCPM[2]; Raxa Sankreacha, FCCPM, DABR[2]
[1]University of Toronto Mississauga, [2]Carlo Fidani Regional Cancer Centre

UNIVERSITY OF TORONTO

Trillium Health Partners

ABSTRACT

Purpose: This project aimed to digitize the Radiation Survey used to collect annual measurements of background and operational radiation levels around LINAC bunkers, CT Sim units, and a brachytherapy unit at the Carlo Fidani Regional Cancer Centre (Trillium Health Partners). The primary goal was to create a centralized, web-based tool to streamline data entry, enable visualization, and support historical comparisons of radiation levels.

Methods: A front-end interface was designed and implemented to allow users to submit, view, and sort radiation survey entries. The data was stored and managed through QATrack+, an open-source quality assurance (QA) tracking system. The interface enables filtering by unit, submission year, and machine serial number. The survey included both predefined measurement locations and the ability for users to define additional customizable locations. An interactive diagram was incorporated into the interface, visually mapping these measurement locations onto schematics of LINAC, CT, and brachytherapy units to assist with spatial context and data interpretation. All submitted radiation measurements were automatically converted to a consistent unit of uSv/hr to standardize the data and support reliable comparisons across time and equipment. A custom plotting tool was developed to generate scatter plots for each location, visualizing dose rate and background radiation trends over time and calculating average values. Additional features include dynamic grouping of entries and interactive display updates.

Results: The tool enabled the submission and visualization of 11 years' worth of radiation survey data. Scatter plots display historical data and average values, allowing staff to compare current readings to trends and identify anomalies or gradual changes. The system improved data integrity, reduced transcription errors, and enhanced accessibility. Integration with QATrack+ streamlined QA workflows and supported compliance tracking.

Conclusion: This project improved QA workflows by replacing static records with a centralized, interactive survey tool—enhancing efficiency, accuracy, and long-term usability in clinical radiation safety monitoring.

CONTACT

Tamara Palamar
tpalamar@student.ubc.ca

Raxa Sankreacha
raxa.sankreacha@thp.ca

INTRODUCTION

Background

- 6 LINACs, 2 CT Sims, 1 Brachytherapy Afterloader housed in shielded rooms/bunkers
- Radiation survey outside the room/bunker has to be conducted following equipment installation, removal, major equipment/environment changes, and periodically to ensure the integrity of the room
- Historically, data has been collected with Excel spreadsheets

What was the goal?

- Move the spreadsheet to the online collection
- Make it user-friendly and standardized
- Create a tool to display historical radiation data points
- Integrate the form into the department intranet page

METHODS & MATERIALS

- Developed a web-based radiation survey tool for LINAC, CT, and brachytherapy units
- Front-end implemented using HTML and JavaScript for data entry and visualization
- Integrated with QATrack+ for centralized data storage and QA workflow integration
- Designed survey form with predefined and user-defined measurement locations
- Incorporated an interactive diagram to map measurement points spatially
- Developed a custom plotting tool to generate scatter plots of dose rate and background radiation
- Enabled trend analysis and calculation of average values over time

RESULTS

1. Online Data Submission Form

- Fields for entering collection details, survey instrument, and machine information
- Interactive floor plan displaying measurement locations
- Dynamic data table with entry for standard and custom measurement locations, and selectable units with automatic conversion to standardized units

2. Front Page

- Stores, displays, and enables downloading of submitted surveys
- Redirects users to the new survey submission form and plotting tool

3. Custom Plotting Tool

- Groups data by treatment unit, machine serial number, beam energy mode (LINACs), and measurement location
- Visualizes dose rate and background radiation trends over time and calculates average values

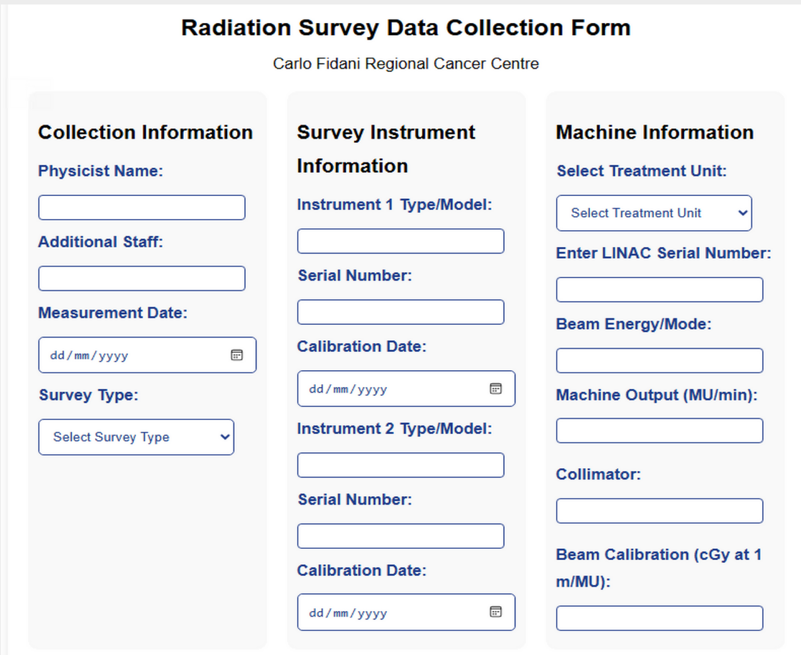

Figure 1: Initial section of the Radiation Survey data submission form, designed for entry of collection information, survey instrument details, and machine-specific parameters

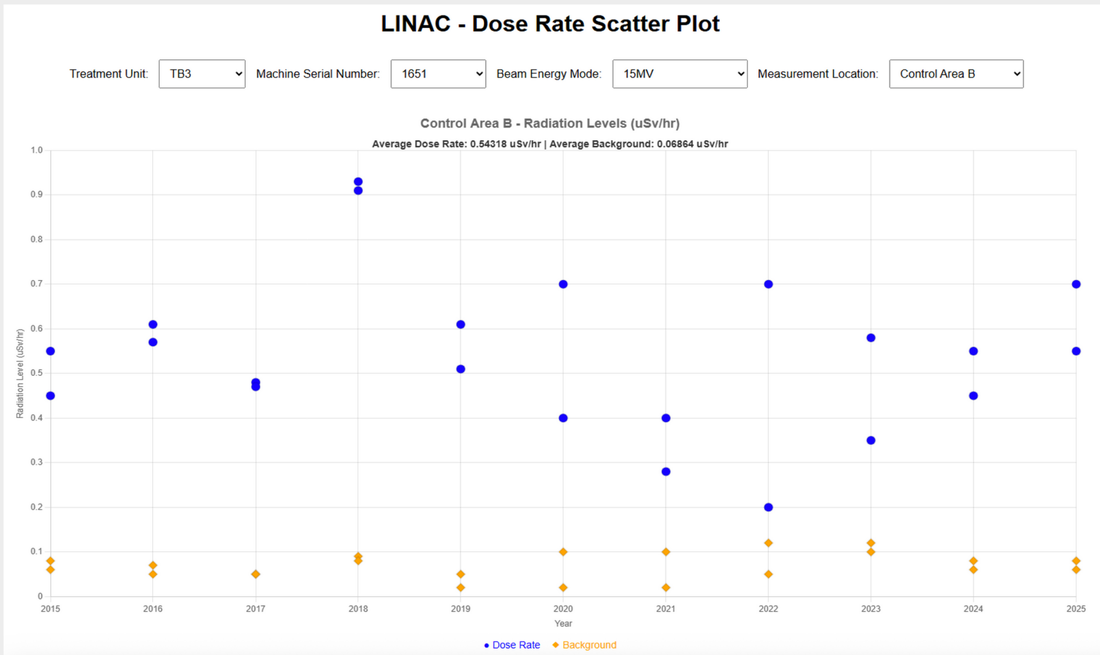

Figure 2: Example scatter plot illustrating radiation survey measurements for a selected linear accelerator, beam energy mode, and measurement location. Dose rate measurements (blue) and corresponding background radiation levels (orange) are displayed as a function of survey year, enabling visual comparison of trends over time.

DISCUSSION & CONCLUSIONS

Achievements

- Integrated the form into the department intranet page
- Submitted and visualized 11 years of radiation survey data
- Integrated with QATrack+ to streamline QA workflows

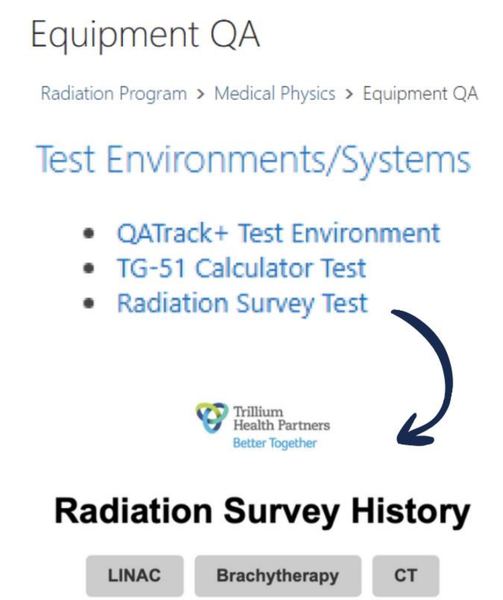

Figure 3: The department intranet page showing the Radiation Survey link and the front page of the Radiation Survey interface

Future Improvements

- More interactive elements
- Faster processing time
- Ability to add additional units for new machines

© Poster Template by Genigraphics® 1.800.790.4001 www.genigraphics.com