βackγroυnd Explorer

An open-source toolkit for modeling backgrounds from radioactive sources
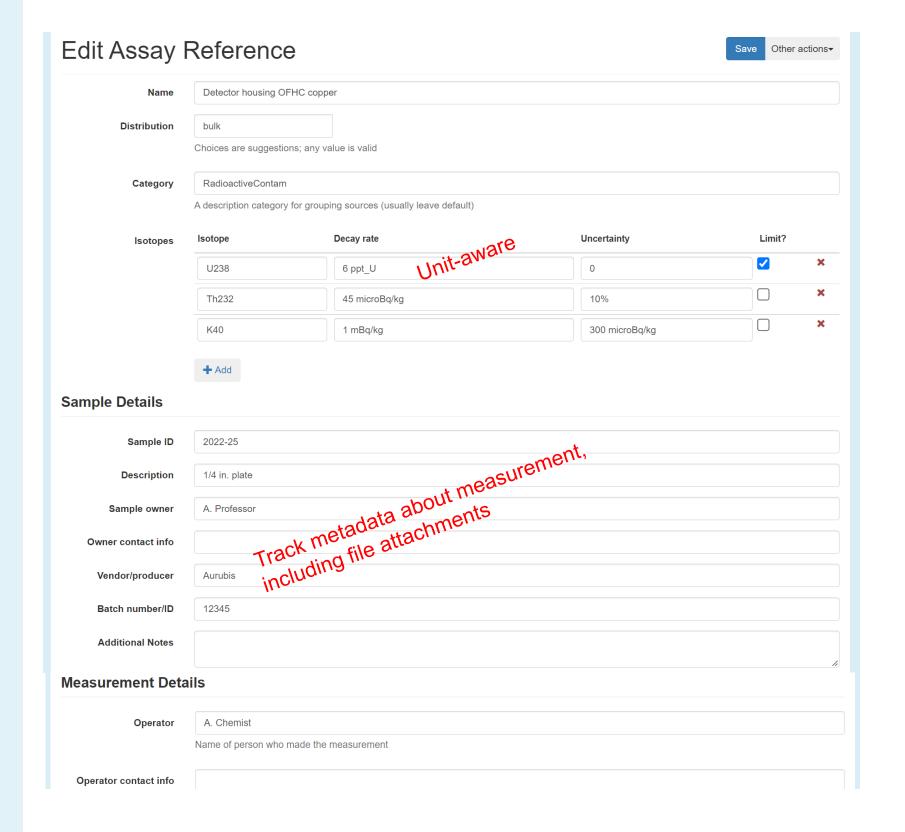
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https://github.com/bloer/bgexplorer-demo

Background Explorer was originally designed to handle the 300+ components and 800+ simulation datasets needed to construct the background model for the SuperCDMS dark matter experiment. It has been adapted to be a general-purpose tool that anyone can use. The software is written in python, with a MongoDB backend and Flask providing a user-friendly web interface that allows models to be constructed with minimal programming expertise.

Inputs

+ Record concentration of radioactive isotopes in materials around detector
+ Helpful tools to model cosmogenic activation and radon daughter deposition on surfaces from an exposure time

Unit-aware
Track metadata about measurement, including file attachments

+ Record components to be tracked and simulated
+ Allows arbitrarily deep nested assemblies and multiple placements of common parts (e.g., screws, resistors, etc.)
+ Each component has one or more radiation sources associated

Multiple radioactivity sources automatically normalized by correct physical values (e.g., mass, volume, surface area)

+ Upload radiation transport simulation outputs as JSON data
+ Map spectrum in detector from radiation sources at different locations
+ Each component associated with multiple datasets
+ Multiple components can point to the same dataset

Outputs

+ Exportable bill of materials summarizing components and associated radioactivity

HPGE Detector Bill Of Materials

+ Detail views for each component, assay, etc. with abundant cross-links

+ Summarize backgrounds by different contribution with expandable tables

Evaluated Rate Tables

+ Click a cell to draw the associated spectrum

+ Fractional contribution from nested assemblies in pie charts
+ Interactively filter different elements to drill-down to details

Interactive Charts

filter-out

For additional information, contact:

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