



Nuclear Safety Enforcement Activities with links to Software

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Designated by the Secretary of Energy with the investigation and enforcement functions as codified in:

Atomic Energy Act Authorities	Title 10 C.F.R.
Section 234A - Nuclear Safety	Part 820 – Procedural Rules for DOE Nuclear Activities Part 830 – Nuclear Safety Management Part 835 – Occupational Radiation Protection Part 708 – DOE Contractor Employee Protection Program
Section 234B - Information Security	Part 824 - Classified Information Security Procedural Rules Part 1016 – Safeguarding of Restricted Data Part 1017 - Identification and Protection of UCNI Part 1045 - Nuclear Classification and Declassification Applicable DOE directives
Section 234C - Worker Safety and Health	Part 851 - Worker Safety and Health Program (contains procedural rules and program requirements) Part 850 – Chronic Beryllium Disease Prevention Program

<https://www.energy.gov/ea/information-center/enforcement-infocenter>

Recent Cases with Links to Software

Contractor	Issue	Outcome
Mission Support Alliance	Inadequacies in the implementation of software quality assurance (SQA)	Enforcement Letter <i>November 2018</i>
CH2M Hill Plateau Remediation Company	Spread of Contamination at the Plutonium Finishing Plant (PFP) Demolition Site	Preliminary Notice of Violation <i>April 2019</i>
Fluor Idaho, LLC	Drum Over-pressurization Event at the Idaho Cleanup Project	Preliminary Notice of Violation <i>November 2020</i>
Fluor-BWXT Portsmouth	Radiation Protection Program Weaknesses	Preliminary Notice of Violation <i>January 2021</i>
UT-Battelle, LLC	Fuel Element Failure at the High Flux Isotope Reactor	Consent Order <i>March 2021</i>



Inadequacies in SQA Implementation

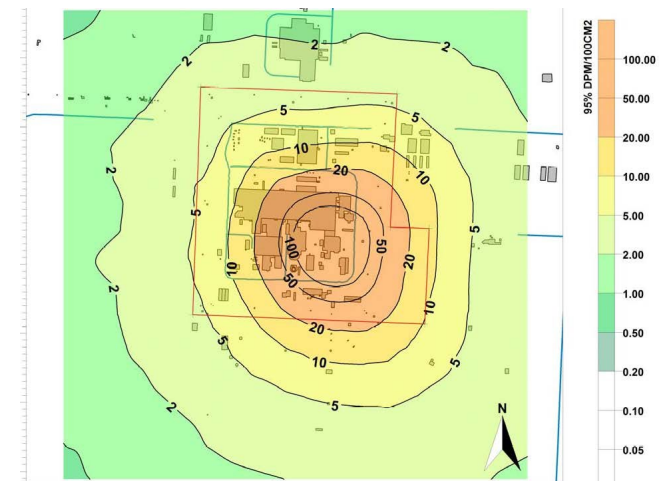
- **Contractor - Site**
 - Mission Support Alliance (MSA)
 - Hanford Site, Richland, Washington
- **Reason for Enforcement Interest**
 - DOE oversight was necessary to identify that MSA had not adequately developed and implemented an SQA program as required by the DOE approved quality assurance program.
- **Linkage to Software**
 - Programmatic failure in the area of SQA. Significant omissions and inadequacies were found by DOE in:
 - Procedures,
 - Implementation, and
 - Training.





Spread of Contamination at the Plutonium Finishing Plant Demolition Site

- **Contractor - Site**
 - CH2M Hill Plateau Remediation Company
 - Hanford Site, Richland, Washington
- **Reason for Enforcement Interest**
 - Spread of radiological contamination outside of the established radiological boundary of the PFP.
 - Radiological intakes to 11 employees, resulting in committed effective doses of up to 13 millirem.
 - Contamination of administrative buildings and privately owned vehicles.
- **Linkage to Software**
 - Used software to model dispersion of contamination during demolition.
 - Contamination was a factor of two times what was modeled.
 - Airborne radioactivity was greater than ten times higher than modeled.





Drum Over-pressurization Event at the Idaho Cleanup Project

- **Contractor - Site**
 - Fluor Idaho, LLC
 - Idaho Cleanup Project, Idaho Falls, Idaho
- **Reason for Enforcement Interest**
 - Four drums over-pressurized, ejecting their lids and releasing radioactive material into an uncontaminated work area normally occupied by workers during the day.
- **Linkage to Software**
 - Continuous air monitors alarmed during the onset of the event but stopped alarming after entering a trouble (i.e., “poor curve fit”) mode, and were not alarming upon emergency worker entry into the airlock.
 - Implemented a technical safety requirement by using software to process and display the thermal imaging information but did not adequately control this software as required by their procedures for safety software.



Fuel Element Failure at the High Flux Isotope Reactor

- **Contractor - Site**

- UT-Battelle, LLC
 - Sub Contractor – BWXT Nuclear Operations Group
- Oak Ridge National Laboratory, Oak Ridge, Tennessee

- **Reason for Enforcement Interest**

- Deformation of several fuel plates in the outer fuel element during reactor operation resulting in a release of fission products to the coolant.

- **Linkage to Software**

- Subcontractor used a computer numerical control (CNC) machine in the manufacture of the outer side plate.
- Subcontractor used a coordinate measuring machine (CMM) in the inspection of the outer side plate.



Radiation Protection Program Weaknesses

- **Contractor - Site**
 - Flour-BWXT Portsmouth LLC
 - Portsmouth Site, Piketon, Ohio
- **Reason for Enforcement Interest**
 - Internal exposure monitoring had not been performed for 193 radiological workers.
 - Incorrectly reported radiological environmental data from 2011-2018.





Radiation Protection Program Weaknesses

Areas of Violation

- **Work processes**
 - Software quality assurance program was inadequately implemented
- **Personnel training and qualification**
 - Software quality assurance
- **Quality improvement**
 - Identified problems were not corrected
- **Documents and records**
 - Required software quality assurance records were not generated or maintained





Common Areas of Weakness

- Identification of Safety Software
- Procedural Compliance
- Training
- Quality Improvement
 - Identification of quality problems
 - Missing/Incomplete causal factors
 - Inadequate corrective actions





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Questions ?