

**LETTER REPORT—INDEPENDENT
VERIFICATION OF THE HIGH FLUX
BEAM REACTOR
DECOMMISSIONING PROJECT FAN
HOUSE, BUILDING 704
BROOKHAVEN NATIONAL
LABORATORY
UPTON, NEW YORK**

P.C. Weaver

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Oak Ridge Institute for Science and Education

October 22, 2010

Ms. Terri Kneitel
U.S. Department of Energy
Brookhaven Site Office
53 Bell Ave., Building 464
Upton, NY 11973

DOE CONTRACT NO. DE-AC05-06OR23100

**SUBJECT: LETTER REPORT—INDEPENDENT VERIFICATION OF THE HIGH
FLUX BEAM REACTOR DECOMMISSIONING PROJECT FAN HOUSE,
BUILDING 704 BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK
DCN: 5098-LR-01-0**

Dear Ms. Kneitel:

Oak Ridge Institute for Science and Education (ORISE) personnel visited the Brookhaven National Laboratory (BNL) on August 17 through August 23, 2010 to perform visual inspections and conduct independent measurement and sampling of the “Outside Areas” at the High Flux Beam Reactor (HFBR) decommissioning project. During this visit, ORISE was also able to evaluate Fan House, Building 704 survey units (SUs) 4 and 5, which are part of the Underground Utilities portion of the HFBR decommissioning project.

ORISE performed limited alpha plus beta scans of the remaining Fan House foundation lower walls and remaining pedestals while collecting static measurements. Scans were performed using gas proportional detectors coupled to ratemeter-scalers with audible output and encompassed an area of approximately 1 square meter around the static measurement location. Alpha plus beta scans ranged from 120 to 460 cpm.

Twenty smears for gross alpha and beta activity and tritium were collected at judgmentally selected locations on the walls and pedestals of the Fan House foundation. Attention was given to joints, cracks, and penetrations when determining each sample location. Removable concentrations ranged from -0.43 to 1.73 dpm/100 cm² for alpha and -3.64 to 7.80 dpm/100 cm² for beta. Tritium results for smears ranged from -1.9 to 9.0 pCi/g.

On the concrete pad, 100% of accessible area was scanned using a large area alpha plus beta gas proportional detector coupled to a ratemeter-scaler. Gross scan count rates ranged from 800 to 1500 cpm using the large area detector. Three concrete samples were collected from the pad primarily for tritium analysis. Tritium concentrations in concrete samples ranged from 53.3 to 127.5 pCi/g. Gamma spectroscopy results of radionuclide concentrations in concrete samples ranged from 0.02 to 0.11 pCi/g for Cs-137 and 0.19 to 0.22 pCi/g for Ra-226.

High density scans for gamma radiation levels were performed in accessible areas in each SU, Fan House foundation walls and floor, and concrete pad. NaI scintillation detectors coupled to ratemeter-scalers with audible output and a global positioning system (GPS) were used to enable

real-time gamma count rate and position data capture to provide quantitative gamma radiation levels. Gross gamma radiation levels for surface soil generally ranged from 3,000 to 7,000 cpm and on the concrete pad surfaces, between 2,000 to 4,000 cpm. However, gamma scans identified two hot spots measuring 8,000 and 16,000 cpm in the soil near the base of the Fan House walls. ORISE notified BNL about the hot spots and both locations were remediated. The walls of the Fan House foundation gamma radiation level ranged from 3,000 to 5,000 cpm.

Twelve random systematic soil samples were obtained in SUs 4 and 5, and 2 judgmental soil samples were collected from the remediated hot spot locations identified in SU 5. Cs-137 concentration in random systematic soil samples ranged from 0.02 to 0.17 pCi/g in SU 4 and 0.01 to 0.06 pCi/g in SU 5. Ra-226 ranged from 0.22 to 0.58 pCi/g in SU 4 and 0.21 to 0.31 pCi/g in SU 5. Judgmental soil concentrations were 0.16 and 0.37 pCi/g for Cs-137 and 0.22 and 0.24 pCi/g for Ra-226.

Sr-90 analytical results were not available at the time of this report but will be reported as they become available. Historically at BNL, Sr-90 has usually been identified in the presence of significant levels of Cs-137. All values were below the site cleanup goals of 23 pCi/g for Cs-137 and 5 pCi/g for Ra-226.

A full verification survey report will follow at the completion of the underground utilities project. Please contact me at 865.576.5321 or Evan Harpenau at 865.241.8793 should you have any questions.

Sincerely,





Phyllis C. Weaver
Health Physics Project Manager
Independent Environmental Assessment
and Verification

PCW:km

Enclosure:

c:

S. Roberts, ORISE
T. Vitkus, ORISE
E. Harpenau, ORISE
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