ALPHA Q, INC.

April 21, 2008

Q-6

Todd J. Jackson, CHP
US Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406-1415

Docket No. 04008940
Control No. 136636
License No. STB-1504

Dear Mr. Jackson,

I am writing in regarding the completion of our facility's decommissioning. Based upon your guidance we have put together a proposal for the performance of the final radiological assessment that will be acceptable to the NRC for the free release of our facility located at 87 Upton Road, Colchester, CT 06415-0536.

Proposed Release Limits
We wish to show that residual contamination levels comply with the 25 mrem/yr limit set forth in 10 CFR 20.1402. A DandD analysis was performed to determine the site-specific residual radioactivity level that would result in a 25 mrem/yr maximum annual dose. This analysis, enclosed as Attachment 1, resulted in a maximum derived guideline concentration level (DCGL) of 810 dpm/100 cm^2 for Th-232+C.

Proposed Survey Methodology
The survey will be conducted per NUREG-1575, Multi-Agency Radiation Survey and Site Investigation manual (MARSSIM), U.S. Nuclear Regulatory Commission, August 2000. The facility will be divided into survey units. Concentrations of residual radioactive material in the survey units will be determined by means of:

- Systematic fixed-point measurements on a randomly-oriented grid to calculate the average amount of residual radioactivity over the survey area. Each point will be assessed for beta activity.

- Biased fixed-point measurements of locations based upon the surveyor's judgment such as areas with elevated readings found during the previous assessment. Each point may be evaluated for beta activity, alpha activity, and/or building material sampling with laboratory analysis.

- Based upon the assessment performed in November 2004, no loose radioactivity was identified so no samples for loose activity will be obtained unless necessitated due to remediation efforts.

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The results of these measurements will be statistically analyzed and compared to guidelines per MARSSIM and applicable regulations.

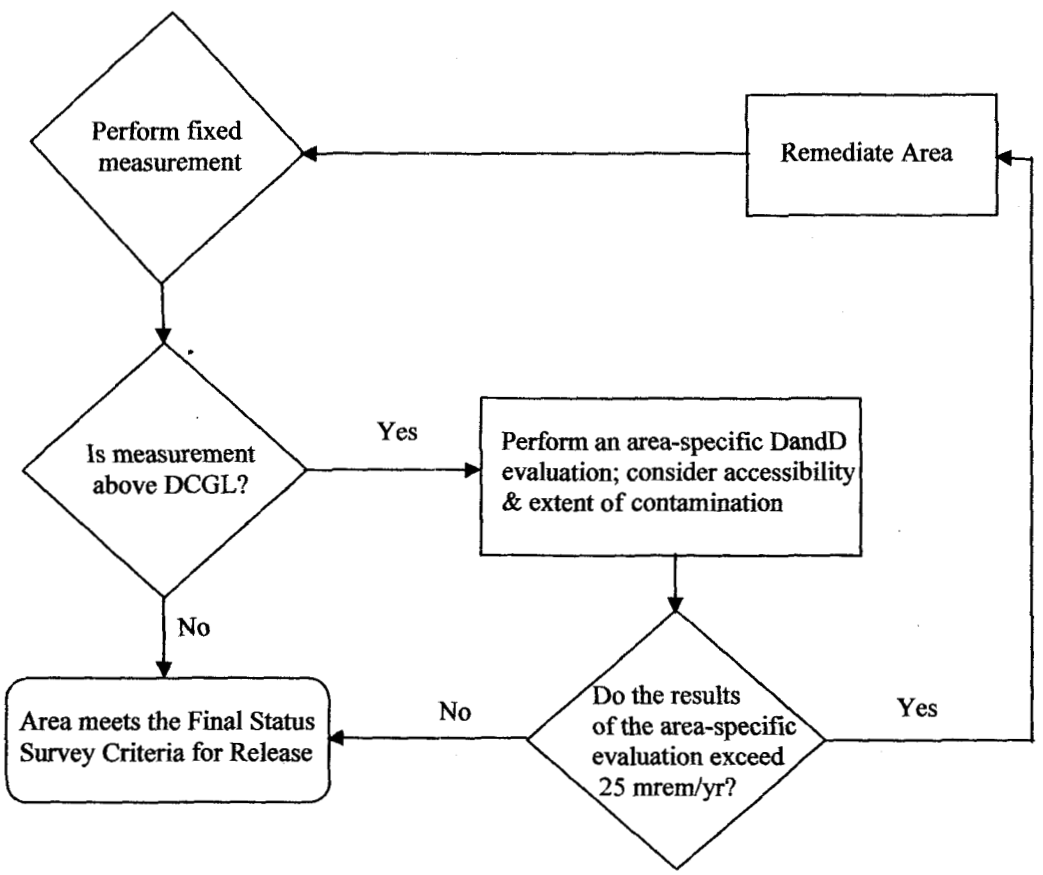


Figure 1: Decision Tree for Final Status Survey

Measurement Frequency

Based upon the type of radioactive material used at the facility and the findings of the previous radiological assessment of the facility, the facility will be considered as Class 3 for the purposes of the final survey. The total surface area of the facility is approximately 28,500 square feet, or 2,648 square meters.

The frequencies of surface activity or concentration measurements are derived from MARSSIM based on expected standard deviation of measurement results. The Wilcoxon Rank Sum (WRS) Test is used in MARSSIM equation 5.1 to calculate the minimum number of samples to be collected from the survey and background units (if the contaminant is present in the background):

$$N = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{3(P_r - 0.5)^2}$$

Where:

N = number of samples required for the background and survey area (N should be optionally increased by 20% as a contingency for non-analyzable samples, etc.). N may be divided between the background and survey areas as N/2 each.
Z = standard normal statistic for α and ß (both specified to be 0.05 for a 95% confidence level) = 1.645
P_r = a probability statistic based on the ratio of the shift () to the standard deviation of the impacted or background area measurements
Δ = the shift, a statistical activity parameter usually set equal to 1/2 of the guideline release limit.

The DCGL is 810 dpm/100 cm^2, which converted to cpm, assuming a 13.2% detection efficiency for Th-232, is 107 cpm. The lower bound of the grey region (LBGR) will be assumed to be 54 cpm (DCGL/2). The standard deviation of the contaminant in the area is ±17 cpm, based on previous survey results.

Therefore:

$$N = \frac{(1.645 + 1.645)^2}{3(.983039 - 0.5)^2} = 15.5 \times 1.2 = 19 \text{ samples}$$

From this calculation we propose obtaining 20 measurements from the affected areas of the facility and 5 background measurements from the reference area. Additional measurements will be taken if necessary due to the detection of any elevated activity.

Types of Measurements
Fixed-point measurements will be performed at locations randomly chosen (systematic) and judgmental (biased). The systematic locations will be chosen per the following section, Grid Point Determination. The judgmental measurement locations will be performed at the area determined to have elevated activity at the time of the initial assessment.

Grid Point Determination
The location of each measurement in the main building will be specified by a square measurement grid which will be overlaid over the reference grid. The spacing, L, of the measurement grid will be determined by the following formula:

L = sqrt (A/n) where A is the area of the survey area and n is the specified number of measurements.

The intersections of the measurement grid (i.e., measurement locations0 will be situated on the reference grid using a random start point, its X and Y coordinates obtained from a random number generator.

Instrumentation
A Ludlum model 2241-2 scaler-ratemeter coupled with a Ludlum 43-68 gas proportional detector will be used to perform surface activity surveys. Based upon previous calibration, it is estimated that the efficiency of this system for Th-232 is 13.2%. This detection equipment will be calibrated and an updated efficiency for Th-232 determined prior to performance of the final survey.

Minimum Detectable Concentration
The Static Minimum Detectable Concentration (MDC) will be calculated using the following equation obtained from NUREG-1757, Vol. 2, Section A.5.1, p. A-10.

$$MDC_{static} = \frac{3 + 4.65\,(B)^{1/2}}{K \times t} \times \frac{100\ cm^2}{100\ cm^2}$$

Where $K = \varepsilon_i \times \varepsilon_s \times A$

t = time interval of the observation
B = background counts in time t
ε_i = instrument efficiency for emitted radiation
ε_s = source efficiency in emissions/disintegration
A = probes sensitive area

Assuming a background of 300 cpm, an instrument efficiency of 13.2%, a source efficacy of 0.521, and a count time of 5 minutes, the MDC works out to be 243 dpm/100 cm^2.

Some floor areas are covered in a layer of paint which will introduce an additional correction factor to this equation. It was determined that the paint in 5 – 7 mils thick and at its maximum thickness would shield 34.55% of the beat radiation from Th-232. Adding this correction factor, the MDC for a 5-mnute count would be 371 dpm/100 cm^2. Counting pained areas for 8 minutes would drop the MDC to 231 dpm/100 cm^2

Based upon these calculations we propose counting areas long enough to ensure the MDC is below 250 dpm/100 cm^2.

I hope that we have appropriately addressed all of the issues necessary to have our final survey procedure approved. If you have any questions, please do not hesitate to contact me.

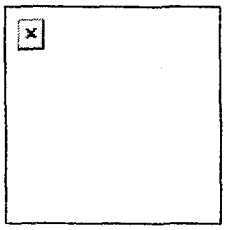
Sincerely,

L. Stephen Prout
President

Enclosure

Attachment 1

DandD Calculation



DandD Building Occupancy Scenario

DandD Version: 2.1.0
Run Date/Time: 4/21/2008 12:35:59 PM
Site Name: Alpha Q
Description: Nureg 1720 used
FileName:C:\Documents and Settings\David\My Documents\Response\Alpha Q\alphaQ1.mcd

Options:

Implicit progeny doses NOT included with explicit parent doses
Nuclide concentrations are distributed among all progeny
Number of simulations: 100
Seed for Random Generation: 8718721
Averages used for behavioral type parameters

External Pathway is ON
Inhalation Pathway is ON
Secondary Ingestion Pathway is ON

Initial Activities:

Nuclide	Area of Contamination (m^2)	Distribution
232Th+C	UNLIMITED	CONSTANT(dpm/100 cm**2)
Justification for concentration: Find value to produce 25 mrem/yr		Value 8.10E+02

Chain Data:

Number of chains: **1**

Chain No. 1: **232Th+C**
Nuclides in chain: **11**

lide	Chain Position	Half Life	First Parent	Fractional Yield	Second Parent	Fractional Yield	Ingestion CEDE Factor (Sv/Bq)	Inhalation CEDE Factor (Sv/Bq)	Surface Dose Rate Factor ((Sv/d)/(Bq/m^2))	15 cm Dose Ra Factor ((Sv/d)/(Bq
h+C	1	5.13E+12								
a	2	2.10E+03	1	1	0	0	3.88E-07	1.29E-06	0.00E+00	0.00E+00
c	Implicit		2	1			5.85E-10	8.33E-08	8.01E-11	2.38E-12
h	3	6.99E+02	2	1	0	0	1.07E-07	9.23E-05	2.03E-13	3.60E-15
a	4	3.66E+00	3	1	0	0	9.89E-08	8.53E-07	8.26E-13	2.26E-14
n	Implicit		4	1			0.00E+00	0.00E+00	3.29E-14	9.52E-16
o	Implicit		4	1			0.00E+00	0.00E+00	1.43E-15	4.21E-17
b	5	4.43E-01	4	1	0	0	1.23E-08	4.56E-08	1.23E-11	3.13E-13
i	Implicit		5	1			2.87E-10	5.83E-09	1.54E-11	4.63E-13
o	Implicit		5	0.6407			0.00E+00	0.00E+00	0.00E+00	0.00E+00
l	Implicit		5	0.3593			0.00E+00	0.00E+00	2.58E-10	8.36E-12

Initial Concentrations:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Nuclide	Surface Concentration (dpm/100 cm**2)
232Th	8.10E+01
228Ra	8.10E+01
228Ac	8.10E+01
228Th	8.10E+01
224Ra	8.10E+01
220Rn	8.10E+01
216Po	8.10E+01
212Pb	8.10E+01
212Bi	8.10E+01
212Po	5.19E+01
208Tl	2.91E+01

Model Parameters:

General Parameters:

Parameter Name	Description	Distribution
To:Time In Building	The time in the building during the occupancy period	CONSTANT(hr/week)
Default value used		Value 4.50E+01
Tto:Occupancy Period	The duration of the occupancy exposure period	CONSTANT(days)
Default value used		Value 3.65E+02
Vo:Breathing Rate	The average volumetric breathing rate during building occupancy for an 8-hour work day	CONSTANT(m**3/hr)
Default value used		Value 1.40E+00
RFo*:Resuspension Factor	Effective resuspension factor during the occupancy period = RFo * Fl	CONSTANT(1/m)
Justification for modification: Per Draft NUREG 1720		Value 1.00E-06
		Default DERIVED(1/m)
GO*:Ingestion Rate	Effective secondary ingestion transfer rate of removable surface activity from building surfaces to the mouth during building occupancy = GO * Fl	DERIVED(m**2/hr)
Default value used		
Tstart:Start Time	The start time of the scenario in days	CONSTANT(days)
Default value used		Value 0.00E+00
Tend:End Time	The ending time of the scenario in days	CONSTANT(days)
Default value used		Value 3.65E+02
dt:Time Step Size	The time step size	CONSTANT(days)
Default value used		Value 3.65E+02
Pstep:Print Step Size	The time steps for the history file. Doses will be written to the history file every n time steps	CONSTANT(none)
Default value used		Value 1.00E+00

AOExt:External Exposure Area	Minimum surface area to which occupant is exposed via external radiation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOInh:Inhalation Exposure Area	Minimum surface area to which occupant is exposed via inhalation during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AOIng:Secondary Ingestion Exposure Area	Minimum surface area to which occupant is exposed via secondary ingestion during occupancy period	CONSTANT(m**2)
Default value used		Value 1.00E+01
AO:Exposure Area	Minimum surface area to which occupant is exposed during the occupancy period	DERIVED(m**2)
Default value used		
Fl:Loose Fraction	Fraction of surface contamination available for resuspension and ingestion	CONSTANT(none)
Default value used		Value 1.00E-01
Rfo:Loose Resuspension Factor	Resuspension factor for loose contamination	CONTINUOUS LOGARITHMIC(1/m)
Default value used		Value Probability 9.12E-06 0.00E+00 1.10E-04 7.67E-01 1.46E-04 9.09E-01 1.62E-04 9.50E-01 1.85E-04 9.90E-01 1.90E-04 1.00E+00
GO:Loose Ingestion Rate	The secondary ingestion transfer rate of loose removable surface activity from building surfaces to the mouth during building occupancy	CONSTANT(m**2/hr)
Default value used		Value 1.10E-04

Correlation Coefficients:

None

Summary Results:

90.00% of the 100 calculated TEDE values are < 2.45E+01 mrem/year . The 95 % Confidence Interval for the 0.9 quantile value of TEDE is 2.45E+01 to 2.45E+01 mrem/year

Detailed Results:

Note: All reported values are the upper bound of the symmetric 95% confidence interval for the 0.9 quantile value

Concentration at Time of Peak Dose:

Nuclide	Surface Concentration (dpm/100 cm**2)
232Th	8.10E+01
228Ra	8.10E+01
228Ac	8.10E+01
228Th	8.10E+01
224Ra	8.10E+01
220Rn	8.10E+01
216Po	8.10E+01
212Pb	8.10E+01
212Bi	8.10E+01
212Po	5.19E+01
208Tl	2.91E+01

Pathway Dose from All Nuclides (mrem)

All Pathways Dose	External	Inhalation	Secondary Ingestion
2.45E+01	2.65E-01	2.38E+01	4.67E-01

Radionuclide Dose through All Active Pathways (mrem)

Nuclide	All Pathways Dose
232Th	1.99E+01
228Ra	1.92E-01

228Ac	1.09E-01
228Th	4.12E+00
224Ra	7.32E-02
220Rn	4.33E-05
216Po	1.88E-06
212Pb	2.25E-02
212Bi	2.06E-02
212Po	0.00E+00
208Tl	1.22E-01
All Nuclides	2.45E+01

Dose from Each Nuclide through Each Active Pathway (mrem)

Nuclide	External	Inhalation	Secondary Ingestion
232Th	6.26E-05	1.96E+01	2.56E-01
228Ra	0.00E+00	5.71E-02	1.35E-01
228Ac	1.05E-01	3.68E-03	2.03E-04
228Th	2.67E-04	4.08E+00	3.72E-02
224Ra	1.09E-03	3.77E-02	3.44E-02
220Rn	4.33E-05	0.00E+00	0.00E+00
216Po	1.88E-06	0.00E+00	0.00E+00
212Pb	1.62E-02	2.02E-03	4.27E-03
212Bi	2.03E-02	2.58E-04	9.97E-05
212Po	0.00E+00	0.00E+00	0.00E+00
208Tl	1.22E-01	0.00E+00	0.00E+00