abc Laboratories

Analytical Bio-Chemistry Laboratories, Inc.

Celebrating four decades of product development expertise

October 13, 2011

Dr. Peter Lee
United States Nuclear Regulatory Commission
Division of Nuclear Materials Safety
U.S. NRC Region III
2443 Warrenville Road, Suite 210
Lisle, Illinois 60532-4352

SUBJECT: Request for partial site release of sanitary ponds

Dear Dr. Lee:

ABC Laboratories has previously submitted a request for the unrestricted release of the two sanitary ponds that were closed in 1986 and a response to commission requests for additional information. ML 101550106 and ML 112760775 initialize this request and provide additional information, respectively. I have now also considered the combined data with regard to the concentration of radiocarbon in these former ponds, and have calculated a representative concentration as well as mean and confidence intervals per NUREG 5849.

Based on consideration of both sets of data combined, I am requesting that the two ponds as described in ML 112760775 be released without restriction based on the screening level of 12 pCi/g in NUREG 1757. As shown in the attached analysis, this area has a representative concentration of less than 0.94 pCi/g, and less than 11.7 pCi/g when conservatively considering the arithmetic mean and confidence intervals.

I am requestin that this be done as Amendment 43 to the ABC Laboratories license – 24-13365-01. Following that amendment, our 10.CFR.30.36 records will reflect that the area of the sanitary ponds is unrestricted.

Please let me know if you have any questions.

Best Regards,

Bradly D. Keck, PhD, CHP
Radiation Safety Officer
Analytical Bio-Chemistry Laboratories, Inc.

Cc: Mike LaFranzo, USNRC
Scott Ward, ABC

RECEIVED OCT 1 7 2011

Calculation of Representative concentration based on combined data sets

Pond volume and volume of sediment layer

Volume of ponds in partial site release - The two ponds together comprise an area of 0.07 acres and a depth, on average of 10 feet. Hence the total volume encompassed is 0.07 acres x 43,560 ft^2/acre x 10 ft = 30,492 ft^3 or 1,129 yd^3 (See Figures 1 and 3.)

The area containing radiocarbon contamination is measured and modeled as a 12 inch layer lying 11 feet bpgs in the north pond, and having a volume of 48.4 cubic yards. (2007 samples do not composite this layer, so overestimate radiocarbon concentration.) This comprises 4.3% of the overall site release requested. All other areas in the partial site release are free of contamination.

The representative concentration is estimated as the mean of the

The specific density of clay is 1.6 at nominal moisture content (of course this varies with season and rainfall).

Mean concentration of the sediment layer

Sediment layer values from 2011 and data from 2007 sampled from the north pond sediment layer.

Sample ID	Value (pCi/g)
2011	
NL1B-MAR11	25.4
NL2B-MAR11	-0.348
NL3B-MAR11	-0.872
2007	
B-1	28.6
B-2	74.0
B-3	0
B-6	25.9

The mean of this combined data (NUREG 5849, Eq. 8-11) is 21.8 pCi/g for the north pond sediment layer only.

Since the concentration of the sediment layer is 21.8 and this comprises only 4.3% of the total volume, the representative concentration is calculated as 21.8 pCi/g x 0.043 = 0.94 pCi/g.

1/3 bdc

Attachment 1. (October 13, 2011)

Mean values and confidence intervals based on arithmetic mean of all data in the ponds volume.

All data sampled from the ponds volume are shown in the table below.

Sample	Result
2011	
NL1A-MAR11	0.179
NL1B-MAR11	25.4
NL1C-MAR11	-1.47
NL2A-MAR11	-0.815
NL2B-MAR11	-0.348
NL2C-MAR11	0.0149
NL3A-MAR11	-0.523
NL3B-MAR11	-0.872
NL3C-MAR11	-0.89
SL1A-MAR11	-0.248
SL1B-MAR11	-0.843
SL1C-MAR11	-0.554
SL2A-MAR11	-0.513
SL2B-MAR11	1.24
SL2C-MAR11	0.03
SL3A-MAR11	0.835
SL3B-MAR11	0.404
SL3C-MAR11	-0.188
2007	
B-1	28.6
B-2	74.0
B-3	0
B-6	25.9
B-7	0
B-8	0
B-9	0

Using calculations from NUREG 5849 (Eqn's 8-11, -12 and -13), a mean, standard deviation, t-value, 95% confidence interval and upper limit at 95% confidence are calculated (or from table) and shown in the table below.

Table 2. Calculated parameters from sanitary pond datasets[+].

(n)	Mean pCi/g	Standard Deviation	$t_{95\%}$	μ +/– $t_{95\%}$ $s_x/(n)^{0.5}$	95% upper limit pCi/g
25	5.97	16.7	1.711	5.97 +/- 5.73	11.7

[+] From NUREG 5849, Appendix B-1.

213 tdk

Attachment 1. (October 13, 2011)

2007 Sampling Method

In the 2007 event, the sampling was neither representative nor composited. There was a geoprobe involved for sampling, but a great deal of water was reported, and no intact, evaluable cores were taken. The intent was to sample the darker organic-rich, sediment layer, but the effort was not to get a representative, homogenized sample even over the small sample volume. As a result, these samples are skewed to the sediment content (i.e., higher concentration that the entire contents of the soil as it sits). (As a result of this, core samples for chemical analyses were dug from trenches, however, the carbon-14 analyses were done using cored samples in spite of the known heterogeneity and sampling problems.) Also, there is no attempt in the 2007 samples to sample from above or below the sediment layer, so no evaluation of migration is possible from these data. Consequently, the inclusion of the 2007 data with the 2011 data that were composited to represent the areas they sample necessarily imparts a positive bias to the result and thus forms an inherently conservative estimate of mean concentration.

Conclusions

1. The conservatively derived representative concentration of 0.94 pCi/g is the best estimate of entire ponds volume, as it accounts for the functional elements of the ponds.
2. The arithmetic mean and confidence interval provide an additional means of estimating the average concentration, and – since it oversamples the contaminated layer relative to its volume, is also inherently conservative. Use of confidence intervals provides an additional measure of conservatism.
3. All measures whether representative, mean or the upper bound of the confidence interval are less than 12 pCi/g.

3/3bdK