Kaiser Aluminum
Corporate Environmental Affairs

June 7, 2005

U.S. Nuclear Regulatory Commission
Washington, DC 20555
Attn: Document Control Desk

Subject: Revised Technical Document
Prepared in Response to NRC Inspection Report 040-02377/04-03
Follow-Up Item 040-02377/0403-01
Thorium Remediation Project
Tulsa, Oklahoma Facility
Kaiser Aluminum & Chemical Corporation

Dear Sir or Madam:

Enclosed please find one copy of the following revised technical document for the Kaiser Aluminum & Chemical Corporation (Kaiser) Thorium Remediation Project in Tulsa, Oklahoma:

1.	Kaiser Aluminum and Chemical Company, Tulsa Oklahoma Facility Decommissioning, Memorandum, Re.: Flux Building Reclassification	April 29, 2005 May 25, 2005 (Rev.1) June 7, 2005 (Rev. 2)

The Flux Building Reclassification Memorandum documents the downgrade of the Flux Building classification based on operational history and new characterization data, in accordance with the Decommissioning Plan (DP). The initial classification of the building was impacted Class 1 for the entire building. The revised classification includes Class 2 and Class 3 areas (graded approach). The memorandum also includes the planned final status survey protocol to address both the MARSSIM DQO process and the application of USNRC FC 83-23 clearance criteria approved for the site to the Flux Building. The clearance criteria are included since the Flux Building will be deconstructed in order to complete remediation of the pond parcel.

The Flux Building Reclassification Memorandum was originally submitted to the NRC under a cover letter dated May 5, 2005. The memorandum was revised on May 25, 2005 based on verbal comments received by Kaiser from Mr. John Buckley of the NRC. Specifically, the May 5, 2005 submittal did not include Tables 1, 2, and 4, which were referenced in the memorandum. In addition, two sections of the DP (Sections 14.7.3 and 14.7.4) were inadvertently mis-referenced

IE07

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in the memorandum as a result of the automatic formatting function of the word processing software. During a June 7, 2005 teleconference call, NRC provided Kaiser with technical comments on the revised memorandum submittal. The enclosed June 7, 2005 version of the memorandum addresses NRC's technical comments regarding the survey unit/classification scheme for the Flux Building as well as data evaluation methodologies.

If you should have any questions concerning the revised enclosure, please do not hesitate to call me at (225) 231-5116.

Sincerely,

J.W. (Bill) Vinzant
Manager, Corporate Environmental Affairs

Enclosures

cc: Mr. John T. Buckley, NRC
Mr. D. Blair Spitzberg, NRC Region IV
Ms. Pamela L. Bishop, State of Oklahoma, Department of Environmental Quality
Ms. Kelly Hunter Burch, State of Oklahoma, Office of Attorney General
Mr. Scott Van Loo, City of Tulsa
Ms. Roberta Fowlkes, CCF Associates
Mr. S. Paul Handa, Kaiser
Mr. Ronald F. Doumont, Penn E&R
Dr. L. Max Scott, ADA Consultants
Ms.Diana Brown, RECON
Mr. Danny Brown, RECON
Mr. Alvin G. Gutterman, Morgan, Lewis & Bockius LLP
Mr. David Weyant, Penn E&R

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Kaiser Aluminum and Chemical Company
Tulsa Oklahoma Facility Decommissioning
Memorandum
April 29, 2005
May 25, 2005 (Rev. 1)
June 7, 2005 (Rev. 2)

Re.: Flux Building Reclassification

BACKGROUND / INITIAL CLASSIFICATION

As per the Decommissioning Plan Addendum, Rev. 5/03 (DPA) Section 14.4, the Flux Building was initially classified as impacted, Class 1:

"The impacted land areas and structure (Flux Building) located within the former operational area of the facility were depicted as Class 1 for purposes of classification and survey."

The initial classification of the building was based on the use of an area of the floor against the North wall to store historical core samples taken during various stages of characterization of the site. Part of the noted floor area is now the dress-out area for entry into the impacted pond parcel of the site. Additional floor area along the North wall was also used to store samples. Also, an office and restroom area attached to the primary building (Flux Building Annex) was used to store and count samples in the past. The remainder of the building has not been impacted by site operations currently or throughout the history of the building. Measurements have been taken inside the building to confirm the absence of surface contamination.

Section 14 of the Decommissioning Plan (DP) includes the following guidance for changes to initial classification:

"14.7.3 Classification Downgrades

Any area classification may be downgraded (e.g., from Class 1 to Class 2) by the Data Manager based on the receipt of additional survey or measurement information that justifies the lower classification provided that the approval of the Kaiser RSO and the NRC is obtained.

14.7.4 Documentation of Classification Changes

All changes to the initial area classifications will be documented and included in the final soil remediation documentation."

Recently, a series of static counts and smear samples were taken on the bottom 2 meters of the north wall to assess the total and removable contamination respectively. The north wall has the highest potential for contamination based on the proximity to the radiologically controlled area in the north-west corner of the building. Eighteen random start, equal-distant sample points were located on the wall in accordance with the guidance of MARSSIM. The individual survey point results are presented in attached Tables 1 and 2. The results of the 18 gross alpha measurements are summarized in the following table. (Gross alpha contamination refers to the measurement of alpha on the concrete surface

without subtraction of any naturally occurring alpha activity in concrete. Ambient alpha background is subtracted from each measurement as presented in the attached **Tables 1 and 2.)**

Table 3 - Flux Building North Wall – Alpha Surface Contamination

	Total Contamination ($dpm/100cm^2$)	Removable Contamination ($dpm/100cm^2$)
Average	24.4	-0.444
Standard Deviation	19.8	0.448
MDC	70.7	4.06

In addition to the absence of contamination in the Flux Building, the final disposition of the Flux Building is not a "permanent structure" but rather demolition of the building is necessary to remediate impacted (soil) material beneath the building. This memo documents the proposed classification downgrade of the majority of the Flux Building. Also the planned final status surveys/clearance surveys associated with the revised classification and the planned disposition of the building are presented.

Section 14.3 of the Decommissioning Plan, Rev. 5/03 (DP) includes the following guidance applicable to structure surveys:

"Debris is subdivided into two categories: 1) removable debris that can be easily removed from an excavation and 2) permanent structures such as the concrete spillway contained beneath Characterization Grids 1-4 (ALRP). Removable debris will be segregated from soil to the extent practical by visual inspection. Debris buried within the dross and soil mixture will be evaluated in accordance with NRC Fuel Cycle Policy and Guidance Directive FC 83-23 to determine whether they are potential candidates for clearance surveys considering such factors as volumetric contamination and accessibility of surfaces for survey. Clearance surveys may be performed if large, nonporous, solid debris with only surface contamination are uncovered during residue excavation. In this case, clearance surveys for total and loose alpha will be performed on the debris to ensure that released items are released in accordance with NRC Fuel Cycle Policy and Guidance Directive FC 83-23. Otherwise, debris material will be packaged to meet the applicable disposal facility waste acceptance criteria. Permanent structures will be surveyed for unrestricted release in accordance with the guidance provided in the May 2002 DPA for structural surface surveys."

The distinction between permanent and removable structures is important in regards to the fate of the Flux Building as remediation of the impacted pond parcel continues. In order to remediate potentially impacted soil beneath the Flux Building, the Flux Building will be deconstructed. Therefore, the Flux Building walls and roof are considered "removable" (versus permanent per DP guidance) and clearance surveys should apply. Likewise the floor/footer of the building will be removed in large pieces similar to the procedure used to clear concrete from the former operational area survey units, prior to remediation of soil beneath. Removable structures are evaluated for clearance from site in accordance with FC 83-23 and the established clearance criteria for the site:

- Average total alpha contamination < 230 $dpm/100cm^2$
- Maximum total alpha contamination < 700 $dpm/100cm^2$
- Removable alpha contamination < 50 $dpm/100cm^2$

RECLASSFICATION / PLANNED SURVEY

Based on the information presented the following reclassification (classification downgrade) of the Flux Building is recommended:

- Floor and lower (below 2-meter) walls of the North-West corner of the Flux Building interior currently a radiologically controlled area (RCA) – Impacted Class 1
- Floor out 2 meters from the North wall and the and lower (below 2-meter) North wall of the Flux Building interior (outside of the current RCA) – Impacted Class 1
- Floor surface and lower walls outside of the RCA and the additional North Wall Class 1 survey unit – Impacted Class 2
- Upper walls (above 2-meter) and ceiling – Impacted Class 3
- Exterior Building – Impacted Class 3
- Flux Building Annex – Impacted Class 1

MARRSIM Survey Area Classification Scheme

Class	Definition	Survey Unit Size
Structure Surfaces		
1	Areas known or expected to have radionuclide concentrations above the $DCGL_W$	Up to 100 m^2 of floor area
2	Areas known or expected to have radionuclide concentrations above normal background concentrations but that are not expected to be above the $DCGL_W$	100 to 1,000 m^2
3	Areas that are not expected to have radionuclide concentrations detectable above normal background concentrations	No limit

Based on the MARRSIM classification the following survey units are delineated for the Flux Building:

Survey Units

Survey Unit	Description	Class	Floor Area (m^2)	Total Area (m^2)
1	North-West Corner Floor and Lower Walls (current radiologically controlled area)	1	50	80
2	North Wall Lower Surfaces and Adjacent Floor (out 2-meters from wall)	1	39	78
3	Remaining Floor Surface	2	803	803

4	East, South and West Wall Lower Walls (below 2 meters)	2	0	195
5	Walls Uppers (above 2 meters) and Ceiling Surface	3	0	1,391
6	Exterior Building Surfaces	3	0	1,670
7	Flux Building Annex Interior Lower Surfaces*	1	35	84
8	Flux Building Annex Interior Upper Surfaces*	2	0	60

*Total surface area may increase due to interior division walls.

The surfaces of the building will be surveyed in accordance with the final status survey plan (MARSSIM based document). In addition, the site clearance criteria (FC 83-23 based) will also be used to implement final surveys so that the building can be deconstructed and released from the site if the results of the final survey are below the unrestricted release criteria of FC 83-23 established for the site. Since the revised decommissioning plan will include new dose based, structural surface acceptance criteria at values greater than the FC 83-23 based clearance criteria for the site, the FC 83-23 criteria will be used in conjunction with the MARSSIM protocols established in the final status survey plan to systematically survey the Flux Building. Specifically, the percent scan coverage, scan MDC calculation and the minimum number of sample points will be calculated for each survey unit in accordance with the final status survey plan (MARSSIM) using the more restrictive of the FC 83-23 acceptance criteria.

An example final status survey protocol is provided for Survey Unit 2 (North Wall Lower Surfaces and Adjacent Floor) based on the characterization survey results and assuming the FC 83-23 total contamination criteria of 230 dpm/100cm^2 is limiting is provided below:

- DCGL value – 230 dpm/100cm^2
- Lower Bound Gray Region (DCGL/2) – 115 dpm/100cm2
- Delta (DCGL – LBGR) – 115 dpm/100cm^2
- Sigma (standard deviation of the recent 18 total alpha contamination measurements taken on the north wall, Table 1) – 19.8 dpm/100cm^2
- Relative Shift (delta/sigma) – 115/19.8 = 5.8
- Minimum Number of Sample Points (N/2) based on a relative shift of 5.8 and Type I and Type II error rates of 5% - 9
- Alpha scan MDC – 330 dpm/100cm^2 (See attached Table 4)
- Recalculated N/2 based on scan MDC – 9 (See attached Table 4)

The resulting final status survey protocol for Survey Unit 2 (a Class 1 survey unit) is:

- Survey bottom 100% of wall surface.
- Generate random start point.
- Locate 14 equal-distant sample points (safety factor of 1.5 used to increase number of samples). The additional samples ensure an adequate number samples if the Sign Test (no background consideration) is used as the final statistical test.

- Take static counts to determine total alpha contamination at each of the 14 sample points. Use background and static count times that result in an MDC value < 25% of the acceptance criteria (230 dpm/100cm^2) or 57 dpm/100cm^2.
- Take swipe (smear) samples at each of the sample points. Count the smears for removable alpha contamination. Ensure background and count times that result in a MDC value of 25% of the acceptance criteria (50 dpm/100cm^2) or 12.5 dpm/100cm^2.
- Perform Wilcoxon Rank Sum test on results if a suitable background reference area is available to provide N/2 samples of background alpha activity. If a reference area is not available and a sufficient number of data points are available, the Sign Test may be used.

Reference areas for taking background measurements of alpha activity will be established in non-impacted areas for each type of structural surface material surveyed. For example, measurements of total contamination on non-impacted cinderblock surfaces and poured concrete surfaces have been made at neighboring properties. Additional structural surface materials may be encountered. If a sufficient reference area cannot be located, the Sign Test (no consideration of background) will be used as the final statistical test.

The survey protocol presented for Survey Unit 2 will be repeated for each of the other Flux Building survey units. The minimum number of sample points will be the same for each survey unit and the % scan coverage will change in accordance with the survey unit classification as follows:

Scan Coverage Requirements

Survey Unit Classification	Scan Coverage
Class 1	100 percent
Class 2	10 to 100 percent (10 to 50% for upper walls and ceilings) Systematic and Judgmental
Class 3	Judgmental

Kaiser Aluminum and Chemical Company
Tulsa Oklahoma Facility Decommissioning
Memorandum
April 29, 2005
May 25, 2005 (Rev. 1)
June 7, 2005 (Rev. 2)

Re.: Flux Building Reclassification

Prepared By: _____
Andrew J. Lombardo, CHP

Date: 6/7/05

Kaiser Aluminum and Chemical Company
Tulsa Oklahoma Facility Decommissioning
Memorandum
April 29, 2005
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June 7, 2005 (Rev. 2)

Re.: Flux Building Reclassification

Approved By: L Max Scott
Dr. L. Max Scott, CHP RSO

Date: 6/7/05

Table 1 - Flux Building North Wall Total Contamination

Date of Survey:	3/23/2005	Type of Radiation:	Alpha
Instrument Serial #:	193686	Calibration Due Date:	5/4/2005
Detector Serial #:	PR190485	Calibration Due Date:	5/4/2005
E_s (Surface Efficiency):	0.25	E_i (Instrument Efficiency):	0.1778
BKG Counts:	4	BKG Count Time (min):	5
Active Area of Detector Probe (cm^2):	126	MDC ($dpm/100cm^2$):	70.7

Contact Location Number	Survey Location	Survey Point Count Time (min)	Gross Counts (cts)	Gross Count Rate (cpm)	Net Count Rate (cpm)	Total Contamination ($dpm/100cm^2$)	95% CL Uncertainty ($dpm/100cm^2$)
1	1	2	4	2	1	21	38
2	2	2	4	2	1	21	38
3	3	2	3	2	1	12	33
4	4	2	3	2	1	12	33
5	5	2	0	0	-1	-14	14
6	6	2	3	2	1	12	33
7	7	2	3	2	1	12	33
8	8	2	6	3	2	39	45
9	9	2	7	4	3	48	48
10	10	2	4	2	1	21	38
11	11	2	9	5	4	66	54
12	12	2	4	2	1	21	38
13	13	2	5	3	2	30	42
14	14	2	5	3	2	30	42
15	15	2	2	1	0	4	28
16	16	2	7	4	3	48	48
17	17	2	2	1	0	4	28
18	18	2	7	4	3	48	48

Comments:

Average: 24.4

Stdev.: 19.8

Prepared By: DBW, ECJ	Date: 3/23/2005
Reviewed By: N/A	Date: N/A

Table 2 - Flux Building North Wall Removable Contamination Results

Flux Bld Clearance N.Wall

Date of Survey:	3/30/2005	Type of Radiation:	Alpha
Instrument Serial #:	121870	Calibration Due Date:	3/31/2004
Detector Serial #:	PR126405	Calibration Due Date:	3/31/2005
E_s (Surface Efficiency):	1	E_i (Insturment Efficiency):	0.3502
BKG Counts:	8	BKG Count Time (min):	30
Active Area of Detector Probe (cm^2):	100	MDC (dpm/100cm^2):	4.06

swipe taken on 3-23-05 Swipe Sample	Survey Point Count Time (min)	Gross Counts (cts)	Gross Count Rate (cpm)	Net Count Rate (cpm)	Total Contamination (dpm/100cm^2)	95% CL Uncertainty (dpm/100cm^2)
1	5	0	0.00	-0.27	-0.76	0.53
2	5	0	0.00	-0.27	-0.76	0.53
3	5	0	0.00	-0.27	-0.76	0.53
4	5	1	0.20	-0.07	-0.19	1.24
5	5	0	0.00	-0.27	-0.76	0.53
6	5	1	0.20	-0.07	-0.19	1.24
7	5	0	0.00	-0.27	-0.76	0.53
8	5	2	0.40	0.13	0.38	1.67
9	5	0	0.00	-0.27	-0.76	0.53
10	5	0	0.00	-0.27	-0.76	0.53
11	5	1	0.20	-0.07	-0.19	1.24
12	5	0	0.00	-0.27	-0.76	0.53
13	5	1	0.20	-0.07	-0.19	1.24
14	5	2	0.40	0.13	0.38	1.67
15	5	2	0.40	0.13	0.38	1.67
16	5	0	0.00	-0.27	-0.76	0.53
17	5	0	0.00	-0.27	-0.76	0.53
18	5	0	0.00	-0.27	-0.76	0.53

Comments:

Average: -0.444

Stdev.: 0.448

Prepared By: David B. Weyant	Date: 3/31/2005
Reviewed By: N/A	Date: N/A

Table 4 - Flux Building Alpha Scan MDC

Instrument Serial Number:	193686	Cal. Due:	5/4/2005
Detector Serial Number:	PR190485	Cal. Due:	5/4/2005
Radiation Detected:	Alpha		

Probability of observing 2 or more counts:

$$P(n \geq 2) = 1 - \left(1 + \frac{(GE+B)d}{60v}\right)\left(e^{-\frac{(GE+B)d}{60v}}\right)$$

Probability of observing a single count:

$$P(n \geq 1) = 1 - e^{\frac{-GEd}{60v}}$$

	D Date	G Activity (dpm)	d Detector Width (cm)	E Instrument Efficiency (cpd)	v Scan Speed (cm/s)	B Background Countrate (cpm)	P Probability (-)	AF Area Factor (-)	N/2 Number of Samples
1	3/23/2005	330	11.7	0.1778	3.90	N/A	0.95	1.43	1
2	3/23/2005	490	11.7	0.1778	5.85	N/A	0.95	2.13	2
3	3/23/2005	980	11.7	0.1778	11.70	N/A	0.95	4.26	4
4	3/23/2005	1960	11.7	0.1778	23.40	N/A	0.95	8.52	8
5		3000					#DIV/0!	13.04	12
6							#DIV/0!		

Comments:	
Prepared By:	Date:
Reviewed By:	Date:

Notes:

1.) Instrument Efficiency is the 4π instrument efficiency.