Kaiser Aluminum

Corporate Environmental Affairs

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April 29, 2005

Dr. D. Blair Spitzberg
Fuel Cycle and Decommissioning Branch
Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-4005

Subject: NRC Inspection Report 040-02377/05-001, March 28, 2005
License No. STB-472 (terminated)

Dear Dr. Spitzberg:

This letter is in response to the deviation identified in the subject inspection report:

"Kaiser failed to effectively implement certain aspects of their corrective action program as required by Section 13.6, Corrective Action of the DP, and Procedure KAI-11, Procedure to Investigate and Rectify to Investigate and Rectify Items of Nonconformance ."

Kaiser is committed to safety and effectively clean up the Tulsa Thorium site. We have diligently pursued corrective action when a nonconformance is identified by Kaiser, Kaiser's contractors or NRC. Kaiser has implemented measures to enhance the site corrective action program suggested by NRC at the February 10, 2005 exit briefing. Recon employees have been received training concerning procedure KAI-11 (see attachment 1) and have been encouraged to report nonconformance . A suggestion box has been placed, as NRC suggested, at the entry to the site.

Specific responses to site deviations listed on Page 12 of the subject NRC report follow below:

(1) "Final status survey areas that were found to be above release criteria.".

During an NRC inspection on January 19 and 20, 2005 a small area of elevated meter readings was found in FSSFOA-001. Soon after the discovery, and before backfilling, the elevated area was cleaned up. Until the February 10, 2005 exit briefing Kaiser was not aware that NRC interpreted this event as a deviation. Subsequent to the February 10, 2005 exit briefing Kaiser performed a corrective action investigation in accordance with KAI-11. See Attachment 2.

9141 Interline Avenue, Suite 1A Baton Rouge, LA 70809-1957

(2) "Air monitor No. 8833 was found to be not operating".

Kaiser assumes this is a reference to a portable high volume air sampler. These samplers are required to be operated when the contractor is handling material with concentrations expected to exceed 200 pCi/g thorium-232 plus thorium 228. When handling lower concentration materials, operation of these samplers is not required. The vast majority of material handled at the Tulsa site is well below the 200 pCi/g criterion, so these samplers do not operate full time. A nonconformance was identified by the site RSO in September, 2004. Effective corrective action was implemented. See Attachment 3. Kaiser is not aware of any nonconformance concerning operation of these air samplers since issuance of the September, 2004 corrective action.

(3) "An air sample that was collected on June 11, 2004 was above the respective action level limit."

This issue seems to be related to NRC comments made during the September 15, 2004 inspection exit briefing. Several work place samples had initially exceeded to 0.3 DAC criterion due to suspected radon interference. Subsequent reading confirmed radon interference in the initial result. The 0.3 DAC criterion was not exceeded by site-related constituents. NRC said they were familiar with this phenomenon, but wanted Kaiser to develop a more formal approach to dealing with radon interference. This issue was identified by NRC as a follow-up item, not a deviation. Kaiser developed a more formal procedure that continues to be implemented. See Attachment 4. Kaiser views this change as an enhancement of procedures, not a nonconformance with existing procedures at the time.

Kaiser believes the corrective action program implemented under procedure KAI-11 is an important tool for assuring that the Tulsa project is completed safely and effectively. We believe the site corrective action program is currently effectively implemented and we appreciate NRC's constructive comments that strengthen this program.

If you have any questions or comments concerning this letter please call me at 225-231-5116.

Sincerely,

Bill Vinzant

J. W. Vinzant
Manager, Corporate Environmental Affairs

JWV/shh

Cc: Mr. John T. Buckley – US Nuclear Regulatory Commission
US Nuclear Regulatory Commission
Mr. Douglas Wilson – City of Tulsa
Mr. George Brozowski – USEPA Region VI
Ms. Pamela L. Bishop – State of Oklahoma
Ms. Kelly Hunter Burch – State of Oklahoma
Mr. Scott Van Loo – City of Tulsa

Ms. Roberta Fowlkes – CCF Associates
Mr. Paul Handa – Tulsa
Dr. Max Scott – ADA Consultants
Mr. Danny Brown – Recon
Mr. David Tourdot – Penn E&R
File – Tulsa – 3.12.10 – NRC inspection results

TO INVESTIGATE & RECTIFY ITEMS OF NON CONFORMANCE.
TULSA REMEDIATION PROJECT ON FEB/16/2005 AT 12:30 pm.
BY. PAUL HANDA SITE ADMINISTRATOR. KAISER.

	NAME	COMPANY
1	Greg Morgan	Shonka
2	SONNY Porter	Recon
3	Marcel Tourdot	Penn E&R
4	Johnnie Lowe	RECON
5	CLINT THORNBRUGH	RECON
6	Tyrone Trent	EDi
7	DAVID WEYANL	PENNE&R
8	Ignacio Garcia	Recon
9	Bud Doerflinger	RECON
10	Michael LOTT	RECON
11	Kyle Coleman	Recon
12	Clifford Coyle	Recon
13	Roger WARRIOR	Recon
14	Jeffrey W. Medina	Recon
15	Diane Brown	RECON
16	Jeremy Buchheit	Recon H&S
17	DONNIE JOHNSTON	RECON
18	Bo FARRIS	Recon
19	J NOWAN	Recon
20	Travis Cox	Recon
21	BiLLy Nash Jr	Recon
22	J. ROVESSA	RECON

S P Handa
Feb/16/05

Procedure to Investigate and Rectify Items of Nonconformance
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma

1.0 Purpose

To establish a formal procedure to investigate and rectify items of nonconformance.

2.0 Definitions

Minor Nonconformance Item - any deviation from established policies, remediation plans, safety work permits or established health physics practices which do not have a serious impact on health and safety or the completion of remediation activity.

Major Nonconformance Item - any deviation from established policies, remediation plans, safety work permits or established health physics practices which could have a serious and immediate impact on health and safety or the completion of a remediation activity.

3.0 Notification of Items of Nonconformance

Any person that discovers an item of nonconformance shall report such to the Kaiser Aluminum & Chemical Corporation (Kaiser) Site Administrator (SA) or Kaiser Project Manager (PM).

4.0 Investigation of Items of Nonconformance

4.1 <u>Minor Item</u>

- The Kaiser SA or designee will review the item of nonconformance with the person who brings it to his attention.
- The Kaiser SA will establish the fact that the item is in fact an item of nonconformance. If it is determined that there was not an item of nonconformance, the Kaiser SA shall document such by recording in a daily log or other suitable fashion.
- If the Kaiser SA determines the item of nonconformance could be major, he shall follow the steps listed in Section 5.1 of this procedure.

4.2 Major Item

- The Kaiser SA shall immediately notify the Kaiser PM and advise him that a potential major item of nonconformance has been identified.

- The Kaiser PM will review the item with the Kaiser SA and if he agrees, the following steps will be taken. If the Kaiser PM determines that the item of nonconformance is not major, it will be treated as a minor item of nonconformance. The Kaiser PM or his designee will undertake corrective actions as listed below.

5.0 Corrective Actions

5.1 Minor Item

The Kaiser SA will undertake corrective actions as follows:

- Conduct a review of the circumstances that led to the item of nonconformance.
- Identify the root cause of the item of nonconformance, if feasible.
- Take actions to correct the item of nonconformance.
- Document actions.

5.2 Major Item

The Kaiser PM or his designee will undertake corrective actions as follows:

(1) Conduct a complete review of the circumstances that led to the item of nonconformance. In conducting a review of the circumstances, consider the following:

- Interviews with individuals who are either directly or indirectly involved in the item of nonconformance, including management personnel and those responsible for training or procedure development/guidance.

- Tours and observations of the area where the nonconformance occurred. During the tour, individuals should look for items that may have contributed to the item of nonconformance as well as those items that may result in future items of nonconformance.

- Review of programs, procedures, audits, and records that relate directly or indirectly to the item of nonconformance. The program should be reviewed to ensure that its overall objectives and requirements are clearly stated and implemented. Procedures should be reviewed to determine whether they are complete, logical, understandable, and meet their objectives. Records should be reviewed to determine whether there is sufficient documentation of necessary tasks to provide an auditable record and to determine whether similar items of nonconformance have occurred previously. Particular attention should be paid to training and qualification records of individuals involved with the item of nonconformance.

(2) Identify the root cause of the item of nonconformance, if feasible.

(3) Take prompt and comprehensive corrective action that will address the immediate concerns and prevent recurrence of the item of nonconformance.

(4) Document findings.

The decision to stop work will be evaluated on a case-specific basis by the Kaiser PM and/or SA. Kaiser's PM will notify the Nuclear Regulatory Commission by telephone in the event that a nonconformance cannot be corrected.

Readily correctable, non-recurring nonconformance items may be immediately corrected without following the steps discussed above at the direction of the RSO, Assistant RSO or SA, at their discretion, as long as there is no impact on health and safety or on the completion of remedial activity.

ATTACHMENT 2

ADA CONSULTANTS
L. MAX SCOTT, PhD
Certified Health Physicist
1348 Chippenham Drive
Baton Rouge, Louisiana 70808
225 767-5519

April 17, 2005

Mr. J. W. (Bill) Vinzant
Kaiser Aluminum and Chemical Corporation
9141 Interline Ave., Suite 1A
Baton Rouge, LA 70809

RE: Investigation of Procedure Deviations

Dear Mr. Vinzant:

Attached is a replacement for a letter that was misdated. The letter dated 2/12/05 should have been dated 2/19/05.

Sincerely,

L. Max Scott, Ph.D.

xc: Tulsa file

ADA CONSULTANTS
L. MAX SCOTT, PhD
Certified Health Physicist
1348 Chippenham Drive
Baton Rouge, Louisiana 70808
225 767-5519

February 19, 2005

Mr. J. W. (Bill) Vinzant
Kaiser Aluminum and Chemical Corporation
9141 Interline Ave., Suite 1A
Baton Rouge, LA 70809

RE: Investigation of Procedure Deviations

Dear Mr. Vinzant:

The follow is to fulfill the requirements of Kaiser Procedure KAI-11. On January 19-20, 2005 inspectors from the US Nuclear Regulatory Commissions identified two procedure violations as follows:

Deviation: During loading of the rail cars the potential exists for contaminated material to be spilled outside of the radiation control area.

Root Cause of the Deviation: Inadequate planning

Corrective Action(s): Prior to loading of rail cars the radiation control area is extended to cover the area where a spill might occur. This area is lined with plastic sheeting to facilitate recover if a spill occur.

Deviation: Elevated area of contamination in KAISER-FSSFOA-001

Root Cause of the Deviation: Failure to anticipate shifting of soil in the survey unit and failure to recognize the importance of detector/contamination geometry.

Corrective Action(s): The Penn E&R radiological technician has noted the problem and will anticipate similar circumstances during future surveys.

Sincerely,

L. Max Scott, Ph.D.

xc: Tulsa file

David B. Weyant
Data Manager/ Health Physics Supervisor
Penn E & R, Inc.
359 Northgate Drive
Warrendale, Pa 15086
724-799-0071

Via e-mail

February 15, 2005

Mr. Max Scott
ADA Consultants
1348 Chippenham Drive
Baton Rouge, Louisiana 70808
225-767-5519

RE: **Root Cause** for the elevated area in KAISER-FSSFOA-001 being missed.

During the final status survey 3 elevated areas were discovered along the Western segment of the Unit. The technician failed to mark the precise location of the areas and give specific instructions to the RECON decontamination team as where to excavate.

RECON Health Physics Technician and Penn E & R's Health Physics Supervisor surveyed the area to relocate the 3 elevated areas. Three elevated areas were discovered and removed; however, there still remained one of the original found elevated areas that were not rediscovered. Because of the area being along the side wall near the grassy surface, gravity had caused a small portion of the wall to collapse covering up the approximately 23,000 cpm (10pCi/gram) material. Only a small fraction of the impacted soil emulated through the soil shielding (14,000 cpm); thus, giving less than 4,000 ncpm (An acceptable value). Because of the close vicinity of the walls and the geometry of the area, unless the NaI crystal was turned perpendicular to the wall's face the $DCGL_{scan}$ threshold would not be exceeded.

Later when the NRC was performing split samples, two areas were outlined by the original technician who found the elevated areas. Soil had to be pulled away from the missed elevated area to get a true reading. Approximately 5 gallons of soil were removed to decontaminate to less than 4.1 pCi/gram. An additional 9 gallons of soil was excavated to verify no additional soil remained above the $DCGL_{W}$. The post decontaminated soil sample of this area was measured by Outreach lab as 2.32 pCi/gram.

ATTACHMENT 3

ADA CONSULTANTS
L. MAX SCOTT, PhD
Certified Health Physicist
1348 Chippenham Drive
Baton Rouge, Louisiana 70808
225 767-5519

September 20, 2004

Mr. J. W. (Bill) Vinzant
Kaiser Aluminum and Chemical Corporation
9141 Interline Ave., Suite 1A
Baton Rouge, LA 70809

RE: Notification of a deviation from procedures

Dear Mr. Vinzant:

On September 8, 2004, I received a telephone call from Dan Baker, Assistant Radiation Safety Officer, informing me that on September 3, 2004, he had determined that operations had been conducted with material thought to be at concentrations equal to or greater than 200 pCi/g Th-232 plus Th-228. Both the Kaiser Decommissioning Plan and the RECON Radiation Health and Safety Plan specify that continuous air sampling shall be conducted under those conditions. Mr. Baker informed the equipment operator and the RECON health physics technician. Operations ceased because air sampling equipment was not available. On September 7, 2004, Mr. Baker again noticed operations involving material thought to exceed 200 pCi/g Th-232 plus Th-228. After the telephone call of September 8, 2004, I immediately informed you of the fact. A teleconference meeting was held on September 9, 2004, to review the facts and to determine if a deviation had taken place. Based on the information provide to me I determined that a deviation of procedures did occur.

The causes of the deviation were failure to communicate the requirements to the appropriate persons and failure to plan for the need of air sampling equipment.

Root Cause of the deviation: Misunderstanding of the requirements of the air-sampling program by the remediation contractor.

Corrective Action(s): The Kaiser Project Manager has issued a letter outlining the steps to be taken whenever a condition is discovered which dictates a change in operating procedures or requirements. RECON has purchased three high volume air samplers.

This letter fulfills the requirements of KAI-11.

Sincerely,

L. Max Scott

L. Max Scott, Ph.D.

xc: Paul Handa
Tulsa file

ATTACHMENT 4, Tulsa 5.12.04

ADA CONSULTANTS
L. MAX SCOTT, PhD
Certified Health Physicist
1348 Chippenham Drive
Baton Rouge, Louisiana 70808
225 767-5519

October 13, 2004

Mr. J. W. (Bill) Vinzant
Kaiser Aluminum and Chemical Corporation
9141 Interline Ave. Suite 1A
Baton Rouge, LA 70809

RE: On-site Air Sampling Program

Dear Mr. Vinzant:

Attached is the write-up of the details of the on-site air sampling program. I believe that it addresses all of the air sampling concerns raised by the Nuclear Regulatory Commission Inspectors.

Sincerely,

L. Max Scott

L. Max Scott, Ph.D.

xc: Tulsa file

On-Site Air Sampling

Purpose:

To bring together in one document the steps used to evaluate air sampling results and the underlying rational.

Derived Air Concentration (DAC):

The weighted DAC for ^{232} Th, ^{228} Th, and ^{230} Th is 2×10^{-12}. Derived as follows
Activity ratio of 1:1:3.5
DAC ^{232} Th - 5×10^{-13} uCi/ml
DAC ^{228} Th - 4×10^{-12} uCi/ml
DAC ^{230} Th - 3×10^{-12} uCi/ml

Weighted DAC = $1/(((1/5.5) \times (5 \times 10^{-13}$ uCi/ml$)) + ((1/5.5) \times (4 \times 10^{-12}$ uCi/ml$)) + ((3.5/5.5) \times (3 \times 10^{-12}$ uCi/ml$))) = 2.73 \times 10^{-12}$ uCi/ml. round down to 2×10^{-12}.

There are 7 alpha emitters in the Thorium-232 decay chain - ^{232} Th, ^{228} Th, ^{224} Ra, ^{220} Rn, ^{216} Po, ^{212} Bi, and ^{212} Po.
In the derivation of the DAC and the evaluation of air sampling results no credit is taken for the contribution of ^{224} Ra or ^{220} Rn. Rn-220 and its daughters have short half-lives and will have essentially decayed away before the evaluation of air sampling is completed.
Due to the long half-life of ^{226} Ra (first daughter of ^{230} Th) this decay chain is not in equilibrium and for all practical purposes the only alpha emitter is ^{230} Th.

Collection of Air Samples:

Air samples are collected by two methods:

- Conventional hi-volume air samplers with the collection of particulate on a filter paper
- DataRAM pDR-1000 which measures weight per volume of respirable air particulate

Evaluation of Air Samples:

Conventional Air Sampling

Correction for Radon

Radon-222 is present in essentially all environments, and its daughters are collected on the filter paper. Since the radionuclides of concern at the Tulsa site include ^{232} Th in equlibrium with its daughters, ^{220} Rn and its daughters may be present in the environment, and if present wil be collected on the filter paper. For the initial evaluation of air concentrations, no correction is made for ^{220} Rn daughters. Where elevated air concentrations are observed (.30 DAC or greater), sampling filters will be held until all of the radon daughters have decayed and then recounted. This count shall be considered the final result. Because the ^{222}Rn daughters have short halflives (controling half-life 26.8 minutes of ^{214}Pb), the comparison of results of a recount of a filter paper separated by 30 minutes to 2 hours lapse time is a good indicator of ^{222}Rn daughter contribution. Table 1 is to be used to estimate and correct for the ^{222}Rn daughter contribution. An example of its use is also shown.

Table 1
Fraction of Original Activity remaining vs Percent ^{222}Rn

	Percent ^{222}Rn									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Lapse Time min.	Reduction Factor									
30	0.98	0.96	0.95	0.93	0.91	0.89	0.87	0.86	0.84	0.82
60	0.95	0.9	0.85	0.8	0.76	0.71	0.66	0.61	0.56	0.51
90	0.93	0.85	0.78	0.72	0.64	0.57	0.5	0.42	0.35	0.28
120	0.91	0.83	0.74	0.66	0.57	0.48	0.4	0.31	0.23	0.14

Table values derived as follows: For each fraction of ^{222}Rn, i.e., 10% ^{222}Rn and 90% thorium, the fraction of the original count remaining after the selected lapse time was calculated assuming the decay of the ^{222}Rn daughters and no decay of the thorium.

Example of use:

Initial count 540 cpm
Re-count after 60 minutes 325 cpm
$325 \div 540 = .60$
On the 60 minute lapsed time line find the table value equal to or just greater than ratio of the 2 counts (.60). Note that this is under the 80% column. This Indicates that 80% of the alpha activity was due to ^{222}Rn daughters. Thus, 325 x.2 = 65 cpm are attributed to thorium. Use this value to calculate percent of DAC in the usual manner. Correction for ^{220}Rn daughters is more difficult because of the 10.6 hour controlling half-life of ^{212}Pb. If the air sample result corrected for ^{222}Rn daughters exceeds .3 DAC the area shall be posted. The filter paper will be recounted after 48 hours to determine if the ^{220}Rn daughters contributed to the count. If the recount results in a calculated DAC less than .3, the posting shall be removed.

Background

No correction will be made for trace concentrations of uranium and thorium particulate in ambient air.

DataRAM pDR-1000

The pDR-1000 collect 1 minute samples and analzed for weight by volume of air particulate equal to or less than 10 micron in diameter (respirable particulate). If one knows the weight by volume and the specific activity of the particulate then the radionuclide air concentration or fraction of the DAC can be derived. Table 2 list the percent of DAC as a function of weight by volume and specific activity.

Table 2
DAC as a Function of Weight by Volume and Specific Activity

Estimated Concentration of Exposure Material pCi/g Th-232

	pCi/g 20	pCi/g 40	pCi/g 60	pCi/g 80	pCi/g 100	pCi/g 120	pCi/g 140	pCi/g 160	pCi/g 180	pCi/g 200
mg/ cu m	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC	% of DAC
0.1	0.55	1.1	1.65	2.2	2.75	3.3	3.85	4.4	4.95	5.5
0.2	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11
0.3	1.65	3.3	4.95	6.6	8.25	9.9	11.55	13.2	14.85	16.5
0.4	2.2	4.4	6.6	8.8	11	13.2	15.4	17.6	19.8	22
0.5	2.75	5.5	8.25	11	13.75	16.5	19.25	22	24.75	27.5
0.6	3.3	6.6	9.9	13.2	16.5	19.8	23.1	26.4	29.7	33
0.7	3.85	7.7	11.55	15.4	19.25	23.1	26.95	30.8	34.65	38.5
0.8	4.4	8.8	13.2	17.6	22	26.4	30.8	35.2	39.6	44
0.9	4.95	9.9	14.85	19.8	24.75	29.7	34.65	39.6	44.55	49.5
1	5.5	11	16.5	22	27.5	33	38.5	44	49.5	55
2	11	22	33	44	55	66	77	88	99	110
3	16.5	33	49.5	66	82.5	99	115.5	132	148.5	165
4	22	44	66	88	110	132	154	176	198	220
5	27.5	55	82.5	110	137.5	165	192.5	220	247.5	275
6	33	66	99	132	165	198	231	264	297	330
7	38.5	77	115.5	154	192.5	231	269.5	308	346.5	385
8	44	88	132	176	220	264	308	352	396	440
9	49.5	99	148.5	198	247.5	297	346.5	396	445.5	495
10	55	110	165	220	275	330	385	440	495	550

NOTE: Thorium concentration shall be determined by taking at least 3 measurments at surface contact with a microR meter. Select the most representative reading and multiply by .3 to obtain pCi/g Th-232. (35 uR ~ 10 pCi/g Th-232 Dan Baker)

Example of use:
Sample an operation for 60 minutes with a resulting average concentration of .73 mg/m^3 (always round up to next table value). Estimated concentration of exposure material 110 pCi/g (always round up to next table value). Table value under .8 mg/m^3 and 120 pCi/g 26.4 % of DAC.

L. Max Scott
10/13/2004