

June 18, 2004

PA04072

Mr. Rick Munoz  
US Nuclear Regulatory Commission  
Region IV  
611 Ryan Plaza Drive  
Arlington, TX 76011

Subject: Thorium Remediation Project  
Kaiser Aluminum & Chemical Corporation  
Tulsa, Oklahoma

Dear Mr. Munoz:

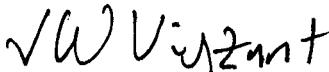
On behalf of Kaiser Aluminum & Chemical Corporation, please find enclosed the following documentation developed in response to your site inspection on June 9<sup>th</sup> and 10<sup>th</sup>, 2004:

1. Technical justification for beta scanning of boots.
2. Memo addressing air sampling concerns.
3. Documentation of bioassay training.

Note that a few revised plans, procedures, and forms have been forwarded under separate cover.

Please call if you have any questions.

Sincerely,  
PENN ENVIRONMENTAL & REMEDIATION, INC.



J.W. Vinzant  
Kaiser Aluminum & Chemical Corporation

JUN 21 2004

Cc: S. Paul Handa  
L. Max Scott, ADA Consultants  
Richard Lewis, RECON  
Charles Beatty, Penn E & R

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

June 15, 2004

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

RE: Qualifications - Beta Scanning of Boots

Dear Mr. Vinzant:

Attached is the technical justification for continuing to beta scan boots. From a practical standpoint the quantity of missed contamination will be diluted to well below the uncontrolled release limit prior to entry into Fulton Creek.

Sincerely,

L. Max Scott, PhD  
Kaiser Radiation Safety Officer

xc: Tulsa file

## Technical Justification for Beta Scanning of Rubber Boots

### Background:

Initially the procedure for persons leaving the remediation area was to wash off their boot at the west entrance to the concrete pad west of the flux building and then proceed into the flux building for beta scanning. During an NRC inspection on May 4-5, 2004, the inspectors suggested that Kaiser (Recon) discontinue beta scanning and commence alpha scanning for personal contamination. Additionally, they felt that there was an opportunity for contamination to be transferred from the boots to the concrete pad and then washed off site. Due to the difficulties of maintaining an alpha detector under field conditions, it was decided to establish a beta scanning station near the flux building to scan boots. Alpha surveying for personal contamination was initiated within the flux building. During an NRC inspection on June 9-10, 2004, the inspector continued to express concern regarding the beta scanning and the possibility of material being washed off site.

### Justification:

The procedure of washing the boot prior to conducting a scan should remove all or most of the contamination. In order to do an alpha survey either the boots would have to be allowed to dry or would have to be dried off. Neither of these appeared to be a reasonable approach.

A beta scan can be effectively conducted on wet boots. The following calculations confirm that the amount of contamination that might remain undetected on a boot transferred to the concrete pad and subsequently washed off-site is a small fraction of the uncontrolled release limit for  $^{232}\text{Th}$  of  $3 \times 10^{-2}$  pCi/ml ( $3 \times 10^{-8}$   $\mu\text{Ci/ml}$ ) of water (Title 10 CFR Part 20 Appendix B Table 2 Column 2). The release limits for  $^{230}\text{Th}$  and  $^{228}\text{Th}$  are factors of 3 and 6 respectively, more than for  $^{232}\text{Th}$  and will not contribute significantly.

### Parameters and Assumptions:

Each atom of  $^{232}\text{T}$  that decays in secular equilibrium with its daughters will result in 3.48 beta emissions (Radiological Health handbook page 110). To be conservative for these calculations it is assumed that there is a 1:1 ratio.

The MDC for the two Ludlum model 3s with model 44-9 probes range from 495 dpm/100  $\text{cm}^2$  to 725 dpm/100  $\text{cm}^2$  (personal communications Tyrone Trent). For the following calculations, it is assumed that no more than 750 dpm/100  $\text{cm}^2$  will go undetected.

It is assumed that each day 10 employees will miss 750 dpm/100  $\text{cm}^2$  for a 6 day work week.

Total sole and heel area of boots 400  $\text{cm}^2$

Rains once every two weeks

Quantity released to Fulton Creek each 2 weeks:

$10 \text{ employees/days} \times 12 \text{ days} \times 750 \text{ dpm}/100 \text{ cm}^2/\text{employee} \times 4 \times 2.22 \text{ dpm/pCi} = 1.62 \times 10^5 \text{ pCi}/12 \text{ days (2 work weeks)}$

Dilution necessary to meet the limit at the outfall from Fulton Creek:

$1.62 \times 10^5 \text{ pCi} \div 3 \times 10^{-2} \text{ pCi/ml} = 5.4 \times 10^6 \text{ ml}$

$5.4 \times 10^6 \text{ ml} \div 28317 \text{ ml/ft}^3 = 191 \text{ ft}^3$

Assuming a water shed of 1 acre, then a rain of 0.053 inches is equivalent to 191 ft<sup>3</sup>. The water shed that drains into Fulton Creek upstream from where the drainage from the concrete pad west of the flux building empties into Fulton Creek is conservatively estimated at 10 acres. Therefore, there appears no practical scenario that can result in a significant fraction of the uncontrolled release limit being tracked onto the concrete from contaminated boots and subsequently released to Fulton Creek.

Based on the above, it appears reasonable that beta scanning of boots will not lead to significant missed contamination which could be washed off site.

As additional assurance, weekly contamination surveys will be conducted of the area between the boot washing station and the flux building.

L. Max Scott  
Kaiser Radiation Safety Officer  
6/11/2004



Remedial Construction Services, L.P.  
Thorium Remediation Project  
7311 E. 41<sup>st</sup> Street  
Tulsa, Oklahoma 74145  
tel 918-828-2419  
fax 918-828-2421  
sales@recon-net.com  
www.recon-net.com

## Addressing Concerns with Air Sampling Program

In agreement with Kaiser Management, data generated from the sampling at the perimeter of the Kaiser property will be disseminated to and tracked by the Recon Health Physics staff on site.

This data will be used in conjunction with:

1. Routine high volume sampling.
2. High volume sampling as needed at Health Physics discretion.
3. Data generated from pDR instrumentation.

This will satisfy all requirements for monitoring and tracking internal exposure for site personnel as set forth in the Recon RHASP and 10CFR20.1204.

In addition, representative background concentrations have been generated to further provide a basis from which to trend airborne concentrations as a result of remediation operations.

Tyrone F. Trent  
Health Physics Technician  
Thorium Remediation Project

### 1.0 Bioassay & Decommissioning Plan Training for RECON

1. The Decommissioning Plan (DP) was prepared to present a description of the planned remediation activities for the Kaiser Aluminum Specialty Products facility located in Tulsa, Oklahoma.
2. The DP was prepared to specifically address the remediation of the affected portions of the 14-acre "Pond Parcel" at the facility. This parcel is divided into three parts--the unaffected former Freshwater Pond area to the west (approximately 4 acres), the affected Retention Pond/Reserve Pond area to the east (approximately 9 acres), and the area containing the Flux Building and paved area (approximately 1 acre). The known affected area covers approximately 10 acres east of the former Freshwater Pond eastern embankment. *Point out these areas on a drawing.*
3. The remediation of the 3.5-acre land area of the facility known as the "former operational area" is addressed in the Decommissioning Plan Addendum (DPA). *Point out this area on a drawing.*
4. The DP was designed to address remediation of thorium dross and contaminated soil known to be present on the site.
5. Kaiser purchased the facility in 1964. Historical operations at the facility included the smelting of scrap magnesium alloy for the production of anodes. Scrap magnesium-thorium alloy was smelted, along with other magnesium materials, to recover the magnesium. Magnesium refining operations continued at the facility until approximately 1985. Aluminum replaced magnesium in smelting and anode manufacture, and the plant continued operating until the 1997-1998 time frame.
6. Extensive site characterization activities have been conducted since 1994 within the 14.0-acre land area of the facility known as the pond parcel. These characterization activities have indicated the presence of residual radioactive material within a 10-acre portion of the pond parcel. The radioactive material identified within this portion of land is a thorium-bearing dross.
7. Thorium-bearing dross was present on land adjacent to current Kaiser property along the east and south fence lines and represented the margins of the material. Kaiser has remediated this land by excavation and storing affected soil within the pond parcel.

Affected soil generated during remediation of the adjacent land is considered as part of the on-site decommissioning.

8. The purpose of this DP and the DPA is to decommission the facility safely and meet the NRC requirements for unrestricted use.
9. The remediation alternative chosen for implementation requires excavating material with a net thorium-232 (Th-232) activity concentration greater than the established DCGL<sub>w</sub> of 3.0 picocuries per gram (pCi/g), based on a dose limit criterion of 25 mrem/yr. Material with Th-232 activity concentrations greater than 31.1 pCi/g will be segregated and disposed off site as either exempt or nonexempt material at a permitted facility. Material with activity concentrations less than 31.1 pCi/g Th-232 will be placed in the pond parcel excavation as backfill. The average Th-232 content of the below-criteria material is estimated to be 7 pCi/g. A layer of clean soil obtained from an off-site source will be placed over the below-criteria fill and graded in a manner to direct drainage away from the site, after which the site will be revegetated.
10. Kaiser has completed some site modification activities prior to undertaking the decommissioning project described in this plan. The most significant modifications related to closure of the Freshwater Pond which included the backfilling of the pond, the construction of an engineered channel to redirect the headwaters of Fulton Creek, and modification of the existing channel north of the Retention Pond.
11. During remediation, the site will be excavated to depths up to 15 to 20 feet and to an average depth estimated at 12 feet across most of the Retention and Reserve ponds. Material with activity concentrations less than 31.1 pCi/g Th-232 will be placed in the excavation as backfill. After the material with activity concentrations less than 31.1 pCi/g Th-232 has been placed, clean off-site soil will be used to complete the backfill of the excavations. The minimum thickness of the clean off-site soil fill layer will be 9.84 feet. The site will be graded and vegetated to minimize soil erosion and promote positive drainage.
12. Once the site is remediated to acceptable levels, it will be cleared through a MARSSIM-directed final status survey. This will be conducted by Penn E & R in stages where certain units will be cleared and backfilled as excavation occurs in other areas.

13. Bioassay is a way to monitor internal exposure of radioactive materials in the body. This is done by monitoring urine and fecal samples and whole body counting. Other ways to monitor exposure is with a dosimeter and by air sampling. At this time it has been determined by the Kaiser RSO that bioassay monitoring is not required.

**REMEDIAL CONSTRUCTION SERVICES, L.P. (RECON)  
THORIUM REMEDIATION PROJECT**

**BIOASSAY, DECOMMISSIONING PLAN & DECOMMISSIONING PLAN ADDENDUM  
TRAINING SIGNATURE PAGE**

Instructions: This form is to be completed by each person working on the subject project work site and returned to the Lead Health Physics Technician (LHPT), Health Physics Technician (HPT) or Health and Safety Supervisor (HSS).

Project: Thorium Remediation Project, Tulsa, OK

I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed \_\_\_\_\_

Print Name \_\_\_\_\_

Company Name \_\_\_\_\_

Date \_\_\_\_\_

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Signed



Print Name

DARNIE JOHNSTON

Company Name

RECON

Date

6-14-04

**REMEDIAL CONSTRUCTION SERVICES, L.P. (RECON)  
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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed Michael Lott

Print Name Michael LOTT

Company Name Recon

Date 6-14-04

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Signed Laurie L. Farris

Print Name Laurie L. Farris

Company Name RECON

Date 06-14-04

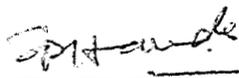
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Signed 

Print Name S. PAUL HANDA

Company Name KAISER ALU.

Date JUNE 11/04

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Signed Julie Lewis

Print Name Julie Lewis

Company Name Recon

Date 6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed 

Print Name Diana L. Brown

Company Name RECON

Date 6/14/04

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Signed Mike Phillips II

Print Name Mike Phillips II

Company Name Recon

Date 6-14-04

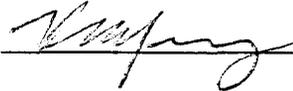
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Signed 

Print Name KEVIN L MURRAY

Company Name SRA

Date 6/14/04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed 

Print Name Daniel Baker

Company Name ASM Engineering

Date 6/14/04

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Signed J. E. Howe

Print Name J. E. HOWE

Company Name Recon

Date 6-12-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed *Bill Keenan*

Print Name *Bill Keenan*

Company Name *Recon*

Date *6-14-04*

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed David B. Weyant

Print Name DAVID B. WEYANT

Company Name PERP E&C, INC.

Date 6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed 

Print Name Jeremy Buchheit

Company Name Relan

Date 6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed Roger Warrior

Print Name Roger Warrior

Company Name Recon

Date 6/14/04

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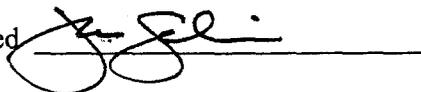
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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed



Print Name

Juan Salinas

Company Name

Recon

Date

6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed Travis Cox

Print Name Travis Cox

Company Name Recon

Date 6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed 

Print Name T. Trent

Company Name EDI

Date 6-14-04

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I have received training on Bioassay, Decommissioning Plan and Decommissioning Plan Addendum.

Signed Billy Nash Jr.

Print Name Billy Nash Jr

Company Name Recon

Date 6-14-04

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Signed 

Print Name RICHARD L LEWIS

Company Name RECON

Date 6/14/04