ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

September 15, 2010

Ms. Kristina Banovac
Branch Chief, Reactor Decommissioning Branch
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
MailStop: T-7E18
Rockville, Maryland 20852

SUBJECT: PROJECT-SPECIFIC PLAN FOR THE RADIOLOGICAL SURVEY OF PORTIONS OF THE CSX TRANSPORTATION PROPERTY ADJACENT TO INKSTER ROAD, LIVONIA, MICHIGAN
DCN: 2024-PL-01-0

Dear Ms. Banovac,

The Oak Ridge Institute for Science and Education (ORISE) is pleased to provide the enclosed Project-Specific Plan to perform radiological surveys on portions of the CSX Transportation property near Inkster Road in Livonia, Michigan.

Please contact me via my information below or Tim Vitkus at 865.576.5093 with questions and/or comments.

Sincerely,

Wade C. Adams

Wade C. Adams
Health Physicist/Project Manager
IEAV Survey Program

WCA:bf

Enclosure

c: S. Roberts, ORISE
T. Vitkus, ORISE
E. Bailey, ORISE
A. Kirthlink, ORISE
B. Watson, NRC
D. Schmidt, NRC
S. Giebel, NRC
File/2024

Distribution approval and concurrence:	Initials
Technical Management Team Member	TJV

Voice: 865.576.0065 Fax: 865.241.3497 E-Mail: Wade.Adams@orau.org

PROJECT-SPECIFIC PLAN
FOR THE RADIOLOGICAL SURVEY OF PORTIONS OF THE
CSX TRANSPORTATION PROPERTY ADJACENT TO INKSTER ROAD
LIVONIA, MICHIGAN

INTRODUCTION AND SITE HISTORY

The CSX Transportation, Inc. (CSXT) property, that is the subject of this project-specific plan (PSP), is located along Inkster Road in Livonia, Michigan (Figure 1). The CSXT site is adjacent to the southern boundary of the AAR Manufacturing (AAR) property and is north of a Wayne County Public Services Department facility. AAR purchased their property from the Brooks and Perkins Corporation, which had been licensed by the Atomic Energy Commission (AEC) to use radioactive thorium in on-site manufacturing processes. In March 1994, the NRC had informed AAR that radioactive contamination had been detected at the site and requested that AAR perform radiological surveys and remediation activities. A June 12, 1997 letter from the U.S Nuclear Regulatory Commission (NRC) also informed CSXT that radioactive materials, from the AAR site, were believed to be present on the adjacent CSXT property (NRC 1997).

In 1998, CSXT contracted with ARCADIS Geraghty & Miller (ARCADIS) to evaluate the potential radioactive contamination on the CSXT property. ARCADIS performed radiological survey activities consisting of total alpha, beta and gamma count field-screening measurements within the thorium investigation area (Figure 2). A report, documenting the radiological findings and assumptions, was submitted to the NRC on September 13, 2000 (CSXT 2000). The results of the ARCADIS radiological surveys indicated that the average CSXT site thorium "…concentrations do not exceed any guideline concentrations under site use scenario." ARCADIS also performed a dose assessment using RESRAD dose modeling software to simulate dose exposure rates based on the average thorium concentrations determined during the November 1999 radiological investigations (ARCADIS 2000). The ARCADIS conclusion was that the "modeling results demonstrate that neither remedial measures nor restrictions in site usage are required at this site. The total site dose exposure does not exceed the NRC acceptable exposure criteria of 25 mrem/yr."

The NRC's Division of Waste Management and Environmental Protection has requested that the Independent Environmental Assessment and Verfication (IEAV) program of the Oak Ridge Institute for Science and Education (ORISE) perform radiological survey activities at the CSXT site

in Livonia, Michigan. The survey effort will include the CSXT railroad area south of the AAR facility.

OBJECTIVES

The objectives of the radiological survey are to provide independent radiological survey and sampling data for the NRC's use in evaluating concerns with the adequacy of the CSXT radiological surveys and to provide additional radiological data to support future NRC decisions regarding the current radiological status of the CSXT property.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of Timothy Vitkus, Survey Operations Director and Wade Adams, Project Manager. The ORISE cognizant site representative has the authority to make appropriate changes to this survey plan or the survey procedures as deemed necessary, after consultation with the NRC site representative and appropriate IEAV project personnel. Deviations to the survey plan or procedures will be documented in the site logbook.

DOCUMENT REVIEW

ORISE personnel have reviewed the CSXT dose assessment report (ARCADIS 2000) and comments addressing technical issues within the report were submitted via electronic mail to the NRC on May 4, 2010 (ORISE 2010a). Information was evaluated to address NRC concerns on the validity of that CSXT radiological survey procedures and dose modeling assumptions.

CONTAMINANTS OF CONCERN

The contaminants of concern for the CSXT property are natural thorium (Th-232 and Th-228) and Th-230. The adjacent AAR site derived concentration guideline level (DCGL) is 3.7 picocuries per gram (pCi/g) for Th-232. A DCGL for Th-230 has not been established.

PROJECT HEALTH AND SAFETY

ORISE will adhere to all applicable regulatory requirements and participate in required site-specific training. ORISE activities will be performed under the ORISE/IEAV Health and Safety Plan and applicable job hazard analyses (JHAs) within the ORISE/IEAV Survey Procedures Manual (ORISE 2008) and the Oak Ridge Associated Universities (ORAU) Radiation Protection Manual (ORAU 2010) during site activities. CSXT personnel will provide a site-specific safety briefing prior to commencing the survey activities. Additionally, the ORISE personnel will perform a walk down of the project area prior to the survey in order to identify, evaluate, and establish work controls for any additional potential health and safety issues. Should ORISE identify a hazard not covered in the ORISE/IEAV Survey Procedures Manual or ORAU Radiation Protection Manual, work will not be initiated until it is addressed by an appropriate JHA.

PROCEDURES

ORISE personnel will visit the CSXT property to perform visual inspections and independent radiological measurements and sampling. The radiological survey activities will be conducted in accordance with the Survey Procedures and Quality Program Manuals (ORISE 2008 and ORAU 2010b).

DATA QUALITY OBJECTIVES

The ORISE project planning relies on the data quality objectives (DQOs) process to design and implement the radiological survey activities for the CSXT property. The DQO process includes the following seven steps:

Step 1: State the problem
Step 2: Identify the decisions
Step 3: Identify inputs to the decisions
Step 4: Define the study boundaries
Step 5: Develop a decision rule
Step 6: Specify the decision errors
Step 7: Optimize the survey design

The verification DQO steps are as follows:

Step 1, problem: The radiological survey must assess thorium concentrations. The preliminary established action level is Th-232 concentrations greater than the AAR DCGL of 3.7 pCi/g. The problem statement is that there is not sufficient evidence to determine whether or not the area has residual contamination that potentially exceeds the 25 mrem/y dose criterion.

Step 2, decisions: The decisions are:

a. Was the prior survey adequate to demonstrate compliance with the dose criterion?
b. If not, then does the site currently meet the dose criterion?

Step 3, decisions inputs: The decision inputs will include:

a. The ARCADIS RESRAD Modeling Report (ARCADIS 2000).
b. A properly designed and implemented survey that would meet the requirements for a Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) final status survey (FSS) for Class 1 survey units.
c. Gamma scanning and soil sample results.

Step 4, study boundaries: The study boundary is the 38 ft x 1,200 ft corridor (4,200 m^2). Therefore, there will be three Class 1 survey units for surface contamination investigations. Based on field observations, subsurface investigations may be necessary.

Step 5, decision rules: There are two decision rules:

a. The first will be to conduct 100% gamma walkover surface scans using NaI detectors with a preferred scan minimum detectable concentration (MDC) of less than 3.7 pCi/g for Th-232 (37 pCi/g total activity of the decay chain). ORISE will investigate deviations of local background levels, including the potential for subsurface contamination. If gamma activity levels are likely contamination, ORISE will bound the surface area and select for judgmental sampling.
b. Prepare a ranked set sampling (RSS) plan using the mean and standard deviation from previous CSX surveys for determining the appropriate number of samples for estimating the mean concentration of the thorium series plus Th-230. These data

may then be used to determine both dose assessment and, if the DCGL from AAR is used, serve as the FSS data for the statistical test. The RSS will be designed such that the number of samples collected will satisfy the MARSSIM statistical sample number requirements yet will provide a larger sub-population that is first investigated and from which the sample locations are chosen.

Step 6, decision errors: For calculating characterization sample size, ORISE will use Type 1 and Type 2 error inputs of 0.05 for both.

Step 7, survey design optimization: The survey design will be optimized to collect the appropriate data based on the procedures detailed below.

a. As part of the radiological survey, ORISE will perform gamma walkovers to determine whether prior surveys have adequately identified residual hot spots to just a few small areas. Provided that this is the outcome of the 100% gamma scans, then ORISE will proceed with the above Class 1 FSS sampling design. ORISE will include subsurface investigations at the previously identified locations to verify the depth of contamination does not exceed 1.5 feet.
b. If the gamma surveys indicate more wide-spread contamination, then either implement an expanded characterization strategy (approved by the NRC) or suspend work at that point and determine how the property owner will address the contamination.

REFERENCE SYSTEM

Global position system (GPS) coordinates will be used for referencing measurement and sampling locations where possible. The specific reference system used will be determined prior to mobilizing to the site. When GPS capabilities cannot be used, scans and measurement data will be manually recorded and referenced to a prominent site feature.

SURFACE SCANS

Surface scans for gamma radiation will be conducted on up to 100% of all accessible area. Surface scans will be performed using NaI scintillation detectors coupled to a ratemeters or ratemeter-scalers with audible indicators. Detectors will be coupled to GPS systems that enable real-time gamma

count rate and position data capture. Locations of elevated direct radiation, suggesting the presence of residual contamination, will be marked and identified for further investigation.

SOIL SAMPLING

ORISE will collect a sufficient number of soil samples within each survey unit for estimating the mean and determining whether there are areas of the site with Th-232 concentrations in excess of 3.7 pCi/g . The AAR and/or ARCADIS survey data will be used as the planning inputs when determining the number of radiological measurement locations from which soil samples will ultimately be collected (ORISE 2004 and ARCADIS 2000). A RSS approach will be used (EPA 2002). RSS provides a methodology to estimate the mean concentration of a population but does not require the assumption of a normal distribution. The process combines random sampling with the use of professional judgment to select sampling locations. The one-minute static gamma radiation count data collected from a population of random locations provides the measurable field screening method. The count data will then be ranked (high, medium or low) to determine which location is sampled. The following example explains the process:

- The Visual Sampling Plan (VSP) v.6.0, or higher, RSS module is used to determine the necessary number of measurement locations to estimate the mean. The number of measurements will be based on the expected standard deviation and desired confidence level of the estimated mean.
- For this example, assume that the systematic planning process resulted in $n = 6$ soil samples to estimate the mean.
- The next step is to use a replication process on a larger random population from which the locations for soil sampling and laboratory analysis will be selected.
- The replication process is referred to as a cycle, designated as r.
- Each cycle (r) consists of multiple sets; sets are designated as m.
- Each set (m) is comprised of a set size, or field assessment locations. The data from each set are ultimately the values that are ranked, for this example the ranked values are direct gamma counts. The set size should consist of from two to five field assessment locations. For this project a set size will consist of three locations, the gamma count data that are ultimately collected from the three locations associated with each set will be ranked as low, medium, or high. The three ranking categories establish the set size.

- The total number of repetitive cycles (r) is a function of n (6) and m (3)—or simply defined as $n = m \times r$. r for this example would therefore be 2 ($r = 6/3$).
- The number of field assessment locations per cycle, is a function of the set size and is simply m^2. The total number of field assessment locations is then defined as $m^2 \times r$ or in this example $3^2 \times 2 = 18$.
- The 18 locations are then both randomly grouped into cycle/sets and distributed in the survey area. The nomenclature for identifying a specific assessment location is cycle #-set#-arbitrary sequence # (1, 2, or 3). The first location in cycle 1 of set 1 would be designated as 1-1-1. Mapping is color coded (based on cycle ID) using geometric shapes (based on set ID) to visually show the population of assessment locations.
- Specific measurement locations will be generated via a quasi-random approach to prevent spatial clustering of the data over a probable heterogeneous distribution.

Gamma measurements are collected at each of the 18 assessment locations and the data within a given cycle-set are then ranked as exhibiting the lowest, medium, or highest gamma count. A soil sample is then collected in accordance with the following process within each of the 2 cycles: Set 1, lowest gamma radiation location; Set 2 medium location; Set 3 highest location. Additional judgmental samples will be collected from locations of elevated gamma radiation detected by scans or are determined to be suspect locations during the RSS investigations.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data will be returned to the ORISE/IEAV laboratory in Oak Ridge, Tennessee for analysis and interpretation. Sample analyses will be performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2010b). Soil samples will be analyzed by gamma spectroscopy for Th-232 and Th-230. The spectra will also be reviewed for other identifiable photopeaks. At the discretion of the NRC and/or ORISE Project Manager, several soil samples may be selected for isotopic thorium analyses by alpha spectroscopy. Soil sample results will be reported in units of pCi/g. The data generated will be compared with the approved release criteria established for the adjacent AAR site and with the ARCADIS RESRAD Modeling Report (ARCADIS 2000). Results will be presented in a draft report and provided to the NRC for review and comment.

SCHEDULE

1. Field surveys and Sampling: September 20, 2010.
2. Sample analysis: October 15, 2010 (estimated).
3. A draft report documenting the radiological survey results will be submitted to the NRC within three weeks of receipt of sample analysis data. Any sample results that exceed the cleanup goals and would impact site release for unrestricted use will be reported immediately to NRC.
4. A final report will be submitted within three weeks of the receipt of comments from the NRC.

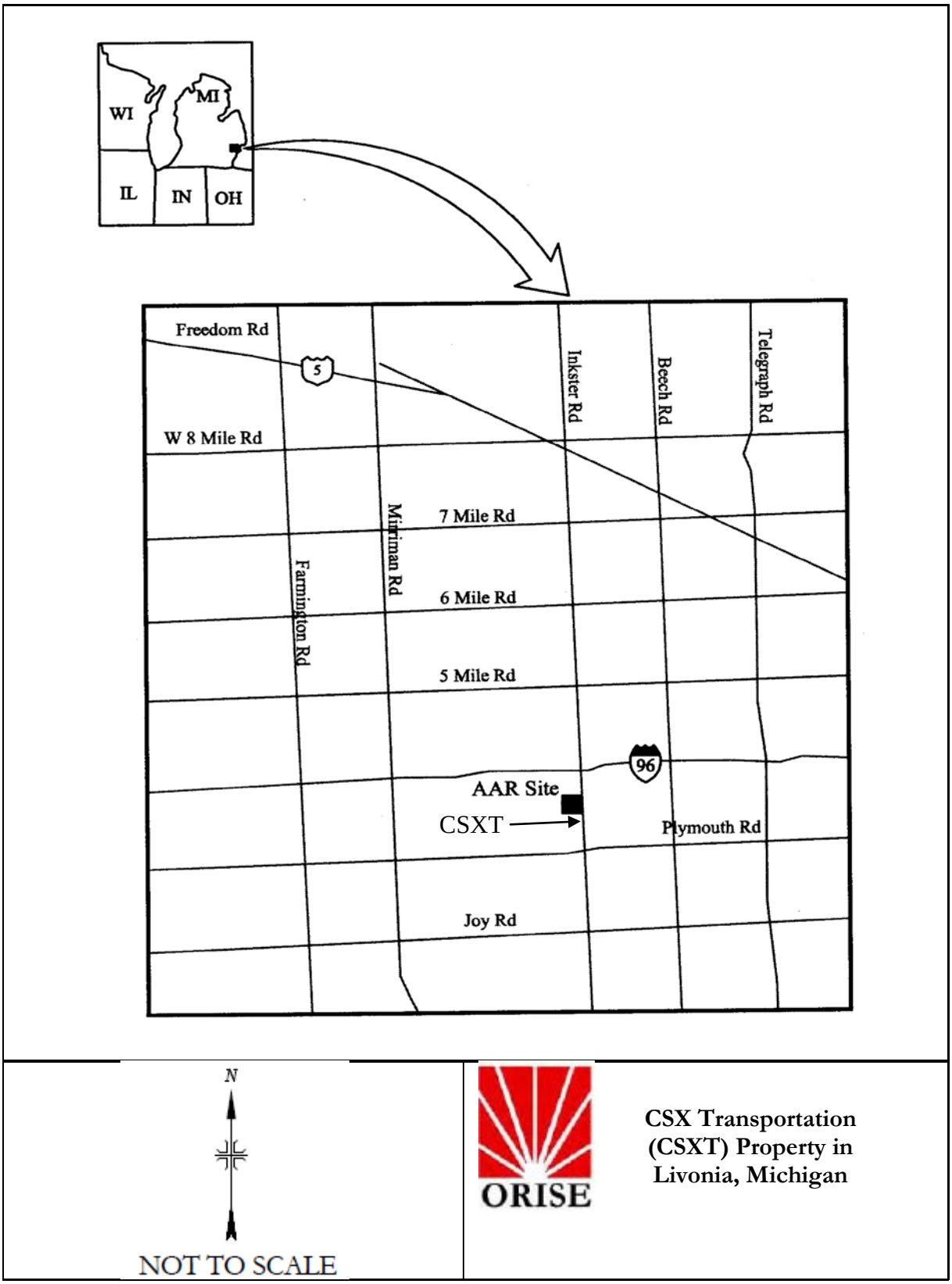
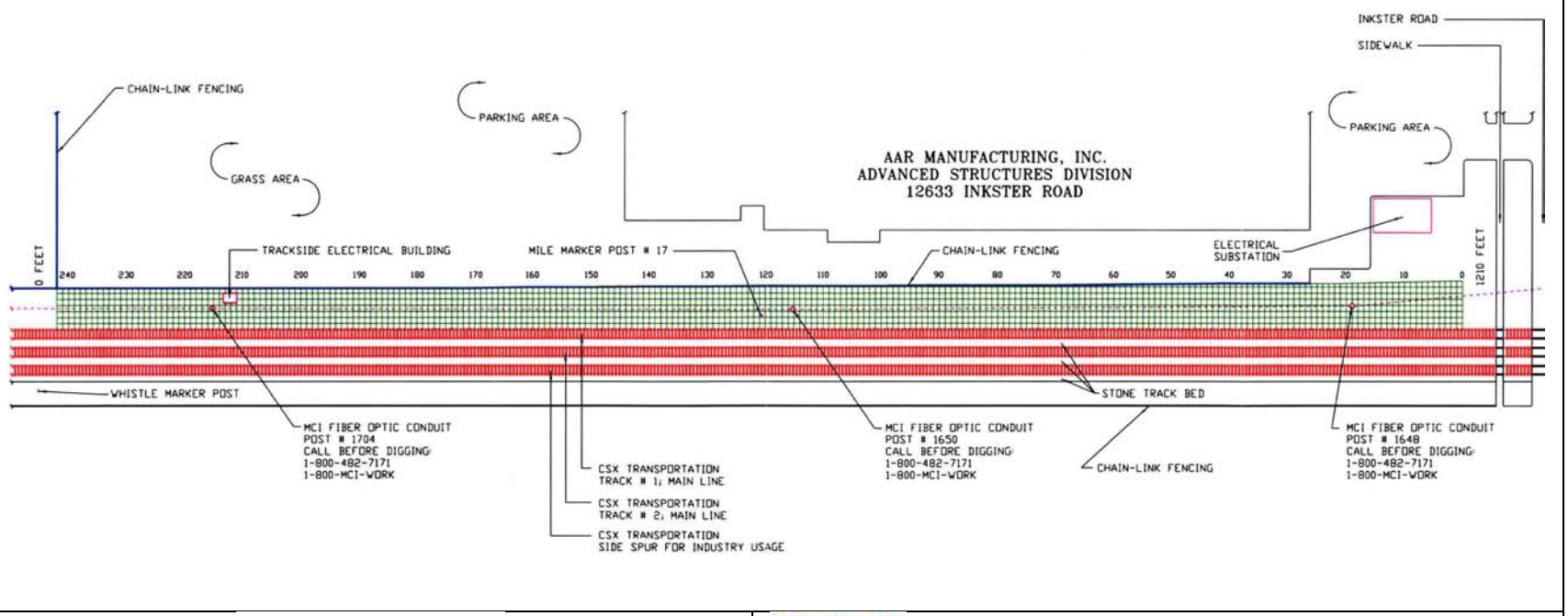


Figure 1: Location of the CSX Transportation Property in Livonia, Michigan



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CSX Transportation (CSXT) Property
Inkster Road Site
Livonia, Michigan
Site Layout Map

Figure provided by ARCADIS Geraghty&Miller

Figure 2: Site Layout Map for the CSX Transportation Property in Livonia, Michigan

REFERENCE

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