72-17

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

September 27, 1996

Mr. Larry Pittiglio
U. S. Nuclear Regulatory Commission
Division of Waste Management - NMSS
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11555 Rockville Pike
Rockville, Maryland 20852

SUBJECT: REVISED TRIP REPORT—ON-SITE REVIEW AND LIMITED CONFIRMATORY SURVEY OF THE TROJAN NUCLEAR POWER PLANT ISFSI PROJECT, RANIER, OREGON (DOCKET NO. 72-17; RFTA 96-42)

Dear Mr. Pittiglio:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) conducted an on-site review and limited confirmatory survey of the future ISFSI area at the Trojan Nuclear Power Plant. These activities were performed during the period August 19 through 21, 1996 and included a review of the final status survey procedures and documentation, laboratory analytical capabilities, gamma surface scans of the ISFSI area, and the collection of split soil samples. The enclosed revised trip report provides the procedures and results of these activities. Any comments you may have will be incorporated into the final trip report.

Should you have any questions or comments, you may contact me at (423)576-5073 or Eric Abelquist at (423)576-3740.

Sincerely,

Timothy J. Vitkus
Survey Projects Manager
Environmental Survey and Site
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ON-SITE REVIEW AND LIMITED CONFIRMATORY SURVEY OF THE TROJAN NUCLEAR POWER PLANT ISFSI PROJECT RANIER, OREGON

INTRODUCTION

Portland General Electric (PGE) plans to decommission the Trojan Nuclear Plant (TNP) located in Ranier, Oregon. The initial preparations for the decommissioning project will be the construction of an Independent Spent Fuel Storage Installation (ISFSI) within the northeast portion of the Plant Industrial Area (PIA). Within the PIA, the proposed ISFSI will encompass the footprint of the former radwaste storage building as well as other open land areas (Figure 1). Because soils will be inaccessible beneath the ISFSI once it is constructed and radiation levels in the immediate area will be elevated when the spent fuel is stored in the facility, PGE has elected to perform the final status radiological survey of the ISFSI site prior to the facility's construction. In support of these activities, PGE prepared a final status survey plan (PGE 1996) which was submitted to and approved by the U. S. Nuclear Regulatory Commission (NRC). PGE's final status survey plan was prepared in accordance with Draft NUREG/CR-5849 (NRC 1992). The PIA survey area was divided into an affected area—the footprint of the former radwaste building referred to as survey unit RWA—and the remainder classified as an unaffected area, referred to as survey unit TIA (Trojan Industrial Area).

The NRC's, Division of Waste Management requested that the Environmental Survey and Site Assessment Program (ESSAP) perform both an in-process review of PGE's final survey of the ISFSI area as well as a limited confirmatory radiological survey of the area. This report describes the procedures and results of these activities.

OBJECTIVES

The project objectives were to provide independent reviews of the PGE ISFSI survey procedures and documentation, in-process observation of the final status survey performance, and to provide limited independent radiological data for use by the NRC in determining the adequacy and accuracy of PGE's final status survey data.

PROCEDURES AND RESULTS

ESSAP's on-site activities included a review of the PGE final status survey procedures and evaluation and observation of the following: survey instrumentation calibration and use, site preparation, surface scanning, soil sampling, survey documentation, in-house quality assurance (QA) oversight, sample analysis, data management, and personnel qualifications. In addition, the independent confirmatory survey activities included surface scans of the ISFSI area and the collection of split soil samples for confirmatory analysis.

FINAL STATUS SURVEY REVIEW

ESSAP initially reviewed the ISFSI area final survey plan in order to become familiar with the commitments made in the plan relative to procedure implementation during survey performance.

Instrument Calibration and Operational Checkout

Instrumentation used for the final status survey included NE Technology gas proportional detectors for alpha and beta-gamma surface scans, and Eberline SPA-8 NaI scintillation detectors and a Reuter-Stokes RSS-112 pressurized ionization chamber (PIC) for gamma exposure rate measurements. The calibration sources used for the gas proportional detectors were Pu-239 and Tc-99 for alpha and beta, respectively, and were NIST-traceable. Calibrations of the PIC and the NaI scintillation detectors were performed by the manufacturer. The NaI scintillation detectors were calibrated with Cs-137 and the Eberline ESP-2 ratemeter-scalers coupled to the detectors had been electronically adjusted to convert gamma counts per minute to µR/h, based on this calibration. The licensee was validating the conversion factor during the course of the final status survey by performing comparative gamma measurements between the PIC and the NaI scintillation detectors.

Operational checkouts for the instrumentation included background counts and check source measurements three times per day. The acceptable operational parameter used by the licensee was ±10% of the mean.

Site Preparation

A 10 m × 10 m reference grid had been superimposed on a site plan. The grids within the affected survey unit were then installed and labeled alpha-numerically within the area, resulting in a total of nine 100 m^2 grid blocks. The grids within the TIA had not been established at the time of the site visit.

Surface Scans

The licensee performed 100 percent beta-gamma surface scans of each 100 m^2 grid block within the RWA by systematically moving the gas proportional detectors in close contact with the ground surface at a rate of approximately 5 cm per second. The area was then re-scanned. Locations of elevated direct radiation were determined by establishing an alarm set point consistent with the scanning minimum detectable activity.

Because of the contaminants of concern at TNP—Cs-137 and Co-60—ESSAP recommended that the licensee consider replacing beta-gamma surface scans of the soil areas with gamma scans using NaI scintillation detectors. The recommendation was based on the reliability of gamma scans for the detection of these contaminants and the uncertainty of the alarm setting—based on a calibration efficiency factor determined with a standard electroplated source that did not account for soil attenuation of the beta radiation.

Exposure Rate Measurements

PGE performed gamma exposure rate measurements at four locations within each grid block that were spaced equidistance between the center and the grid block corners. Measurements were performed at 1 meter above the surface using a Reuter-Stokes RS-112 pressurized ionization chamber. In addition, one minute integrated counts were also made at 1 meter above the surface with the NaI scintillation detector at each location in order to validate the gamma count rate to µR/h conversion factor.

Soil Sampling

Soil samples were collected within each grid block at four locations corresponding to the exposure rate measurement locations. A template was placed over each location and the soil contained within the template was collected; placed into bags; and labeled with grid location, identification number, sampler(s) name, and date. The depth of sample varied dependent upon bedrock depth but did not exceed 15 centimeters. Samples were then transported to the laboratory under appropriate chain-of-custody.

Survey Documentation

ESSAP reviewed survey documentation for each area that had been completed at the time of the site visit. All data had been recorded on appropriate field forms. The data recorded included a daily record of the instrumentation used and the operational checkout data for each instrument and resolution of any occurrences of instrumentation failure, the area scanned and the surface scan results including investigations of areas where the instrument alarm action level was exceeded, exposure rate measurement data, soil samples collected with corresponding chain-of-custody, and raw soil sample analysis data. The data base that will be used for data management had not been established at the time of the site visit; therefore, ESSAP was unable to review the adequacy and accuracy of the proposed system.

The survey documentation also included records of the in-house quality assurance (QA) oversight. This documentation provided a description of the QA activities performed. These included QA observation of the field survey activities and a comparison to the written procedures. Any nonconformances observed were then documented in a formal memorandum for resolution. ESSAP did note that when areas were resurveyed as a result of a nonconformance, the new data sheets generated were not specifically identified as replacements for the old data.

Personnel Qualifications

ESSAP reviewed the training program used to certify individuals to perform the final status surveys. The program consisted of lectures as well as practicles (i.e., instrumentation set up and use, and mock surveys). The lecture material consisted of presentation of all applicable procedures including survey preparation, field data collection, sample collection, chain-of-custody, survey/sample documentation, instrumentation set up and use. Successful completion of the training was then formally documented.

Sample Preparation and Analysis

The system used for sample analysis is an intrinsic germanium gamma spectrometry system calibrated to a NIST traceable mixed-gamma standard. Calibration procedures also include two-hour background counts and daily energy calibration. The operability parameters of the counting system are documented on control charts and include plots of background, energy resolution, full-width half maximum, and calibration standard activity levels. If any of these parameters fall outside of the ± 3 σ acceptable operating parameters, the system requires recalibration or service as applicable.

Once samples were collected, they are transferred under chain-of-custody to the on-site laboratory for preparation and analysis by gamma spectrometry. Samples are transferred from the original container to pans labeled with the unique sample identification number, dried in an oven for two hours, weighed, and then transferred to 2-liter Marinellis for counting. Samples are counted for two hours. The system includes a computer software library for photopeak identification. The raw data sheets contain the sample identification number, peak search and related information, and identified radionuclides reported in microcuries per gram (μCi/g). The system reports the minimum activity concentration (MDC) for Cs-137, Co-60, and Ce-144. ESSAP recommended that MDCs also be reported—if the following were not identified in the peak search—for U-238, U-235, and other gamma emitting fission or activation products.

Currently, the laboratory QA/QC program does not include participation in an EML cross-check program or duplicate analysis. ESSAP also suggested that the laboratory consider these two options for the laboratory program.

CONFIRMATORY SURVEY OF THE ISFSI AREA

The following provides the procedures and results of the limited confirmatory survey of the ISFSI area.

Surface Scans

ESSAP performed surface scans for gamma radiation over 100 percent of the RWA survey unit and approximately 25 percent of the unaffected TIA survey unit. Surface scans were performed using a NaI scintillation detector coupled to a ratemeter with an audible indicator. Surface scans did not identify any locations of elevated direct radiation.

Soil Sampling

ESSAP obtained five split soil samples from two of the nine RWA grids. Samples were collected by TNP personnel, homogenized in the field, and an approximately 1000 gram aliquot removed for confirmatory analysis.

Sample Analysis

The five split soil samples were analyzed by solid-state gamma spectrometry. The spectra were reviewed for fission and activation products and U-238 and U-235. The radionuclide concentrations in these soil samples are provided in Table 1. Although ESSAP has not collected area specific background data for comparison, concentration levels in these samples do not suggest the presence of contamination.

SUMMARY

The Environmental Survey and Site Assessment Program of the Oak Ridge Institute for Science and Education performed an on-site review and limited confirmatory survey of the ISFSI area at the Trojan Nuclear Plant in Ranier, Oregon. The review consisted of an on-site evaluation and observation, during the period August 17 through 19, 1996, of TNP's final status survey, sampling, and analytical procedures for the ISFSI area. Additionally, a limited confirmatory survey of the ISFSI area was performed that included gamma surface scans and split soil samples for confirmatory analysis.

The results of the on-site review indicated that overall, TNP's survey plan and procedures are adequate for demonstrating the current radiological status of the ISFSI area. The limited-scope confirmatory survey did not identify any areas with elevated direct radiation levels suggestive of residual contamination. Analysis of split samples also did not identify any residual contamination.

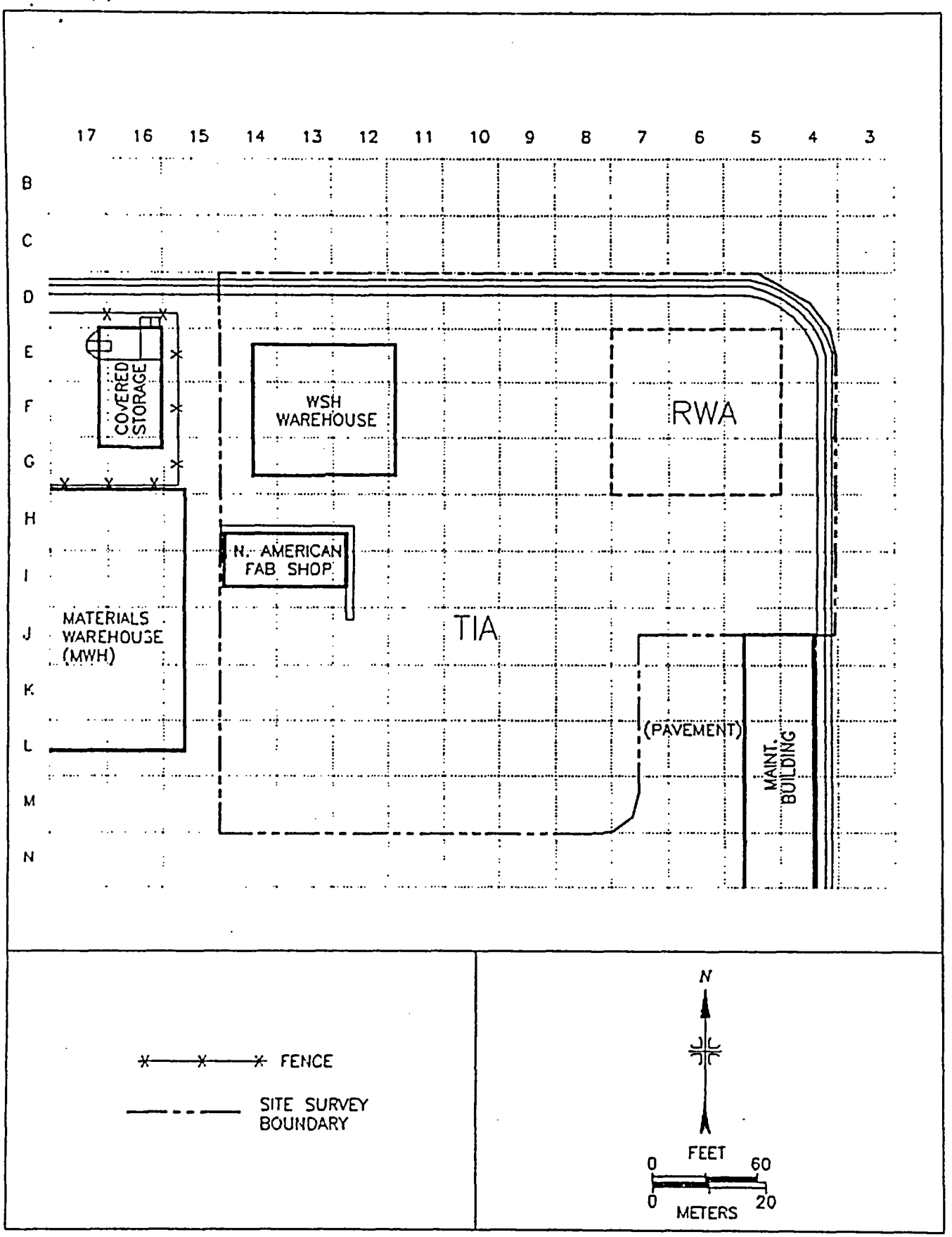

FIGURE 1: Trojan ISFSI Area – Plot Plan

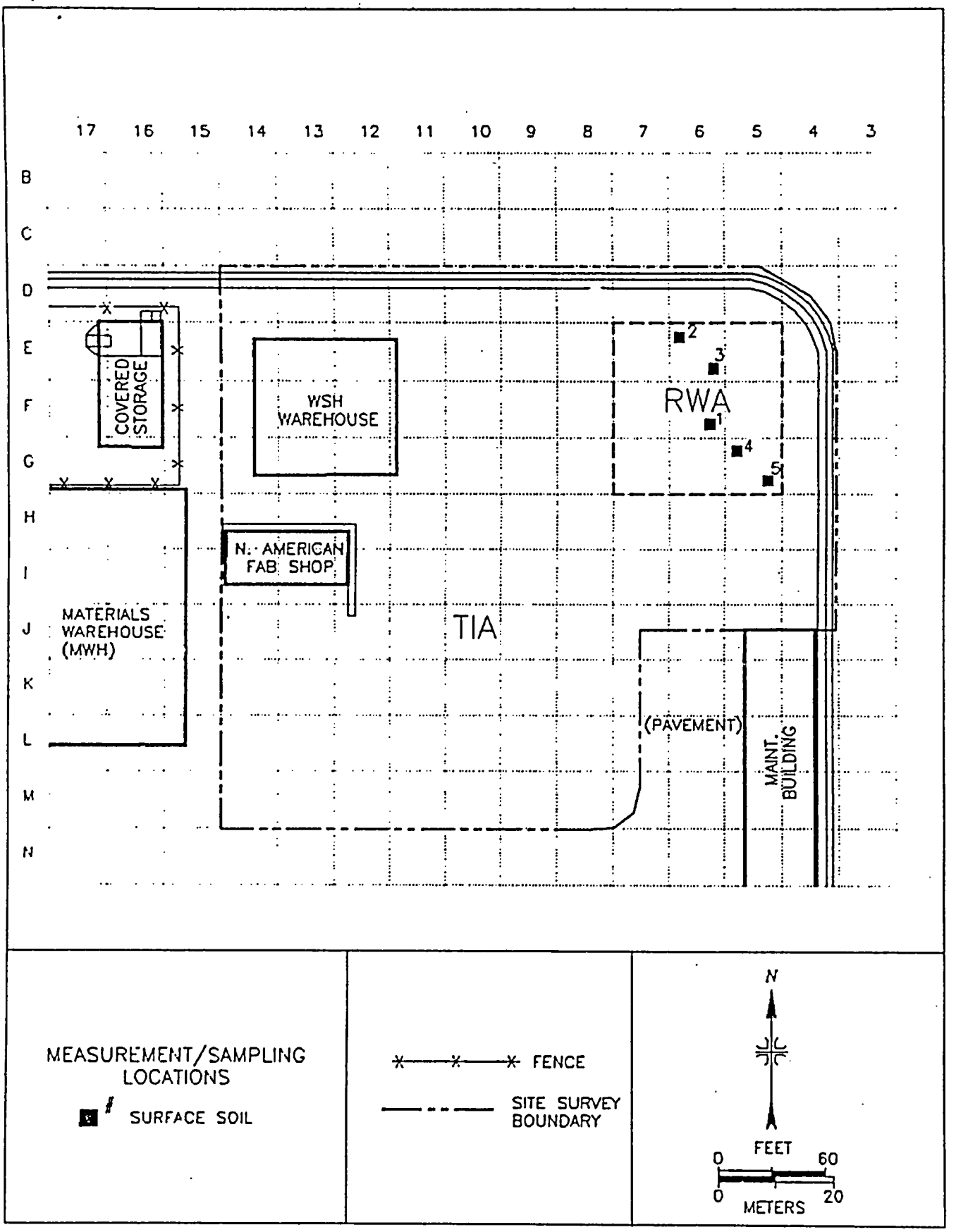

FIGURE 2: Trojan ISFSI Area – Sampling Locations

TABLE 1

RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
TROJAN NUCLEAR PLANT
RANIER, OREGON

Radionuclide Concentration (pCi/g)					
Radionuclide	Sample 1[a]	Sample 2[a]	Sample 3[a]	Sample 4[a]	Sample 5[a]
Co-57	<0.01	<0.01	<0.01	<0.01	<0.02
Co-58	<0.02	<0.02	<0.02	<0.02	<0.03
Co-60	<0.03	<0.03	<0.03	<0.03	<0.04
Cs-134	<0.03	<0.02	<0.03	<0.03	<0.04
Cs-137	<0.02	<0.02	<0.03	<0.02	<0.06 ± 0.02[b]
Eu-152	<0.05	<0.04	<0.05	<0.05	<0.08
Eu-154	<0.09	<0.09	<0.08	<0.10	<0.13
Eu-155	<0.05	<0.05	<0.05	<0.05	<0.07
Mn-54	<0.02	<0.02	<0.02	<0.02	<0.03
U-235	<0.10	<0.09	<0.09	<0.10	<0.15
U-238	0.45 ± 0.21	0.43 ± 0.22	0.35 ± 0.18	0.35 ± 0.26	0.83 ± 0.26
Zn-65	<0.05	<0.05	<0.05	<0.05	<0.08

[a]Refer to Figure 2.
[b]Uncertainties represent the 95% confidence level, based only on counting statistics.

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Co-58	<0.02	<0.02	<0.02	<0.02	<0.03
Co-60	<0.03	<0.03	<0.03	<0.03	<0.04
Cs-134	<0.03	<0.02	<0.03	<0.03	<0.04
Cs-137	<0.02	<0.02	<0.03	<0.02	<0.06 ± 0.02[b]
Eu-152	<0.05	<0.04	<0.05	<0.05	<0.08
Eu-154	<0.09	<0.09	<0.08	<0.10	<0.13
Eu-155	<0.05	<0.05	<0.05	<0.05	<0.07
Mn-54	<0.02	<0.02	<0.02	<0.02	<0.03
U-235	<0.10	<0.09	<0.09	<0.10	<0.15
U-238	0.45 ± 0.21	0.43 ± 0.22	0.35 ± 0.18	0.35 ± 0.26	0.83 ± 0.26
Zn-65	<0.05	<0.05	<0.05	<0.05	<0.08

[a]Refer to Figure 2
[b]Uncertainties represent the 95% confidence level, based only on counting statistics.

REFERENCES

Portland General Electric (PGE). Trojan Nuclear Plant, Final Survey Plan for the ISFSI Site. Ranier Oregon; August 13, 1996.

U. S. Nuclear Regulatory Commission (NRC). Draft NUREG CR/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination. Washington, DC; June 1992.