50-267

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

February 28, 1996

Mr. David Fauver
Division of Waste Management - NMSS
U.S. Nuclear Regulatory Commission
Two White Flint North T-8F37
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: CONFIRMATORY SURVEY ACTIVITIES PLAN FOR THE FORT ST. VRAIN NUCLEAR STATION, PUBLIC SERVICE COMPANY OF COLORADO, PLATTEVILLE, COLORADO (DOCKET NO. 50-267, RFTA NO. 96-5)

Dear Mr. Fauver:

Enclosed is the confirmatory survey activities plan for the Fort St. Vrain Nuclear Station in Platteville, Colorado. The confirmatory survey activities plan dated January 17, 1996 was implemented, without any revisions, on January 22 through 25, 1996. The Environmental Survey and Site Assessment Program (ESSAP) acknowledges that you had reviewed the survey plan dated January 17, 1996 and had no comments.

If you have any questions, please direct them to me at (423) 576-3740 or W. L. (Jack) Beck at (423) 576-5031.

Sincerely,

Eric W. Abelquist

Eric W. Abelquist
Health Physicist/Project Leader
Environmental Survey and
Site Assessment Program

EA:saj

Enclosure

cc: L. Carson, NRC/Region IV
R. Uleck, NRC/NMSS/TWFN 7F27
D. Tiktinsky, NRC/NMSS/TWFN 8A23
W. Beck, ORISE/ESSAP
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CONFIRMATORY SURVEY ACTIVITIES PLAN
FOR THE
FORT ST. VRAIN NUCLEAR STATION
PUBLIC SERVICE COMPANY OF COLORADO
PLATTEVILLE, COLORADO

INTRODUCTION

Public Service Company of Colorado (PSC) operated a 330 MWe High Temperature Gas Cooled Reactor (HTGR) from July 1979 until August 1989. The plant, designated as the Fort St. Vrain Nuclear Station (FSV), was authorized for construction on September 17, 1968 when the U.S. Nuclear Regulatory Commission (NRC) issued a provisional construction permit. Construction was completed in December 1973 and a facility operating license, Docket No. 50-267, License No. DPR–34, was granted on December 21, 1973. Initial fuel loading commenced on December 26, 1973 and initial criticality was achieved January 31, 1974. After a prolonged period of startup testing, low-power operation and plant modifications, the plant was committed for commercial operation on July 1, 1979. Full power was achieved November 6, 1981 (PSC 1995a).

In the nuclear steam supply system for FSV, heat was produced by fission in the HTGR utilizing a uranium-thorium fuel cycle. Graphite was used for the moderator, core structure, and reflector. High temperature helium was used as the primary coolant to produce superheated and reheated steam at a temperature of 1,000°F to match conventional thermal station conditions. The entire nuclear steam supply system, including the reactor core, graphite moderator and reflector, steam generators and helium circulators, was contained within a Prestressed Concrete Reactor Vessel (PCRV).

During the operational period, FSV operated for approximately 890 effective full-power days. FSV was shut down on August 18, 1989, the PSC Board of Directors reviewed and confirmed the Executive Management decision that FSV would not be restarted, and that PSC would pursue

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Prepared by the Environmental Survey and Site Assessment Program, Energy/Environment Systems Division, Oak Ridge Institute for Science and Education, under interagency agreement (NRC FIN No. A-9076) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy.

decommissioning of FSV. The decision to permanently shut down and decommission FSV was based on related technical and financial considerations. Problems were identified with the control rod drive assemblies and the steam generator steam ring headers that presented significant technical obstacles which could be overcome, but at significant cost in dollars and time to PSC. In addition, due to the uniqueness of the HTGR fuel cycle, the cost to purchase new fuel was prohibitive. This, in conjunction with low plant availability and correspondingly high operating costs, made continued operation of FSV imprudent.

PSC's objective is the dismantlement and decommissioning of FSV to release all site areas for unrestricted use. To accomplish this, a portion of the PCRV structure and the radioactive balance-of-plant equipment which exceed the limits for unrestricted use will be decontaminated or removed as described in the Fort St. Vrain Decommissioning Plan. In May, 1991 the NRC granted a 10 CFR 50 Possession Only License. On November 23, 1992, the NRC issued the Order to Authorize Decommissioning of Fort St. Vrain and Amendment No. 85 to Possession Only License No. DPR-34 (PSC 1995b).

The FSV facility will be largely left intact following decommissioning. Dismantlement of structures will be confined to the PCRV, and portions of the Reactor Building, Turbine Building, and Liquid Waste System. Removal will be for purposes of removing contaminated structures and to provide paths for removal of contaminated piping and equipment.

Following defueling, the PCRV contained the majority of the remaining radioactive material inventory. Portions of the PCRV concrete are activated due to direct irradiation from the reactor core, and will be removed prior to final survey and disposed of as radioactive waste at a licensed radioactive waste disposal facility. Thus, the radioactive source term at FSV is primarily a result of neutron activation of both metallic and concrete components of the PCRV and neutron activation of impurities contained in graphite components of the PCRV. These activation products include beta-gamma emitters such as Co-60, Eu-152, and Eu-154, and low-energy beta and x-ray emitters such as H-3, C-14, and Fe-55. It should be noted that H-3 and Fe-55 are the largest contributors to the total radionuclide inventory (PSC 1995a).

To date, seventeen balance-of-plant systems have been identified as being contaminated in excess of the limits for unrestricted use. All piping and equipment contaminated in excess of the limits for unrestricted use will be decontaminated and left in place, decontaminated and free-released, or dismantled and removed from the facility and disposed of as radioactive waste at a licensed radioactive waste disposal facility.

FSV's final survey will include all pertinent structures, surfaces, systems and components, concentrating on those previously identified as contaminated or potentially contaminated during the dismantlement/decommissioning phases. The final survey will include:

- Sampling outside the restricted area of PSC property, soil, pavement, water, and liquid effluent ditch and pond sediment for radioisotopic analysis and measurement of gamma exposure rate,
- Sampling inside the restricted area of PSC property, soil, basin sediment, pavement and water for radioisotopic analysis and measurement of gamma exposure rate,
- Radiological surveys of the PCRV and Reactor Building, and
- Radiological surveys of the Turbine Building, Radwaste Compactor Building, New Fuel Storage Building, Radiochemistry Laboratory, Helium Transfer and Storage System, and Liquid Radwaste System.

At the request of the NRC Division of Waste Management, Headquarters Office, the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) will provide technical assistance in support of the NRC's inspection of the decommissioning program activities at the Fort St. Vrain site in Platteville, Colorado. This technical assistance will include independent confirmatory survey activities and record reviews as directed by NRC staff in accordance with the NRC inspection plan.

SITE DESCRIPTION

The FSV facility is located approximately 56 kilometers (35 miles) north of Denver and 5.6 kilometers (3.5 miles) northwest of the town of Platteville, in Weld County, Colorado. The site is located in an agricultural area with gently rolling hills. Grade elevation at the plant is 1,460 meters (4,790 feet) above sea level. The site consists of 6995 hectares owned by PSC, identified as the Owner-Controlled Area, of which approximately one square mile was designated as the exclusion area during plant operation.

The station is located approximately two miles south of the confluence of the South Platte River and the St. Vrain Creek. Neither of these two streams are considered navigable. Cooling for the plant is provided by mechanical draft cooling towers. Make-up to the cooling towers is obtained from the two streams, and is supplemented by shallow well water. Nineteen shallow wells are located on the site. The licensee also owns surface water rights in four irrigation ditches which traverse portions of the site.

The major structures within the Restricted Area include the Reactor Building which contains the PCRV, Turbine Building, Radwaste Compactor Building, New Fuel Storage Building, Technical Support Building which contains the Radiochemistry Laboratory, Mechanical Draft Cooling Towers, Warehouse and Construction Workshops, Evaporation Ponds, and the Electrical Switchyard. The ground surface covering within the Restricted Area is composed primarily of gravel and vegetation, with smaller portions devoted to concrete or asphalt roadways and laydown areas.

OBJECTIVES

The objectives for this technical assistance are to provide NRC inspection support, including independent contractor record reviews and confirmatory survey data for use by the NRC in evaluating the adequacy and accuracy of the licensee's procedures and final status survey results.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of William L. (Jack) Beck, Program Director and Eric Abelquist, Project Leader with ESSAP. The cognizant site supervisor has the authority to make appropriate changes to the survey procedures as deemed necessary. After consultation with the NRC site representative, the scope of the survey may be altered based on findings as the survey progresses.

DOCUMENT REVIEW

ESSAP will review the licensee's final status survey documentation for selected survey packages during the on-site visit. Review of additional documentation will be dependent upon findings as the surveys progress. Documents will be reviewed for adequacy, accuracy, completeness, and consistency with commitments made in the final survey plan for site release. Data will be reviewed for appropriateness of calculations and interpretations relative to the guidelines.

PIPING SURVEY INSTRUMENTATION REVIEW

ESSAP has reviewed the licensee's technical basis documents for piping survey instrumentation and has provided comments to the NRC (Westinghouse 1995; ORISE 1996). ESSAP will evaluate the licensee's proposed piping survey instrumentation program. Documents and data—including survey data sheets, efficiency and detection sensitivity determinations, and others—will be reviewed for adequacy, accuracy, appropriateness of calculations, interpretations relative to the guidelines, completeness, and consistency.

PROCEDURES

A survey team from ESSAP will perform independent visual inspections, surface scanning and measurements of building surfaces and structures and plant systems associated with the FSV final survey. Field survey activities will be conducted in accordance with the applicable sections of the

ESSAP Survey Procedures and Quality Assurance Manuals. Specific procedures are listed on pages 8 and 9 of this plan. The following procedures apply to survey units selected for independent confirmatory activities.

SURVEY PROCEDURES

The following survey procedures are applicable to indoor building surfaces and structures and plant systems.

Reference System

The reference systems established by FSV will be used by ESSAP for referencing surface scans and measurements.

Surface Scans

Surface scans for beta and gamma activity will be performed over 100% of floor and lower wall surfaces and up to 50% of equipment surfaces within each building surface and structure survey unit. Surface scans for alpha activity may be performed in areas and systems identified as alpha-affected. Additional scans will be performed over portions of upper wall, ceiling, and plant system surfaces as well as locations, such as drains and ductwork, where material may have settled or accumulated. Locations of elevated direct radiation identified by scans will be marked for further investigation. Scans will be performed using gas proportional, GM, ZnS, and/or NaI scintillation detectors coupled to ratemeters or ratemeter-scalers with audible indicators.

Surface Activity Measurements

Field comparisons of ESSAP and FSV surface activity measurements will be performed at NRC-selected locations within building surface and structure survey units. Beta measurements will be performed using 126 cm^2 gas proportional detectors coupled to ratemeter-scalers and the data

reported in guideline units—net disintegrations per minute per 100 square centimeters (dpm/100 cm^2). Background surface activity measurements will be selected from an appropriate on-site reference location and used to correct the surface activity measurements at selected side-by-side locations described above.

Miscellaneous Sampling

Miscellaneous samples may be collected from cracks, ledges, piping, ducts, and drains, where material may have accumulated and from any locations of elevated direct radiation identified by surface scans.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data will be returned to ORISE's ESSAP laboratory in Oak Ridge, Tennessee for analysis and interpretation. Direct measurements for surface activity will be converted to units of (dpm/100 cm^2). Soil and any miscellaneous samples will be analyzed by gamma spectrometry. The radionuclides of interest are Co-60 and Cs-137; however, spectra will be reviewed for other identifiable photopeaks. Gamma spectrometry data will be reported in pCi/g. The data generated will be compared with the licensee's documentation. Results will be presented in a report and provided to the NRC; it is anticipated that the report will be used as an addendum to the NRC inspection report.

TENTATIVE SCHEDULE

Document Review	December 1995
Confirmatory Survey Activities	January 22 to 25, 1996
Draft Report	30 days from receipt of necessary licensee survey data—i.e., side-by-side surface activity measurements

LIST OF CURRENT PROCEDURES

Applicable procedures from ORISE/ESSAP Survey Procedures Manual (Revision 9; April 30, 1995) include:

Section 5.0 Instrument Calibration and Operational Check-Out
- 5.1 General Information
- 5.2 Electronic Calibration of Ratemeters
- 5.3 Gamma Scintillation Detector Check-Out and Cross-Calibration
- 5.4 Alpha Scintillation Detector Check-Out and Cross-Calibration
- 5.5 GM Detector Calibration and Check-Out
- 5.6 Proportional Detector Calibration and Check-Out
- 5.10 Floor Monitor Check-Out
- 5.13 Field Measuring Tape Calibration

Section 6.0 Site Preparation
- 6.2 Reference Grid System

Section 7.0 Scanning and Measurement Techniques
- 7.1 Surface Scanning
- 7.3 Alpha Radiation Measurement
- 7.4 Beta Radiation Measurement

Section 8.0 Sampling Procedure
- 8.7 Determination of Removable Activity
- 8.8 Miscellaneous Sampling
- 8.9 Sample Identification and Labeling

Section 9.0 Integrated Survey Procedures
- 9.2 General Survey Approaches and Strategies

Section 10.0 Health and Safety Control of Cross-Contamination

Section 11.0 Quality Assurance and Quality Control

Applicable procedures from the ORISE/ESSAP Quality Assurance Manual (Revision 7; January 31, 1995) include:

Section 5	Training and Certification
Section 6	Equipment and Instrumentation
Section 7	Quality Control
Section 8	Sample Chain-of-Custody
Section 9	Data Management
Section 10	Data Review and Validation
Section 11	Records Handling and Storage

REFERENCES

Oak Ridge Institute for Science and Education (ORISE 1996). Comments on Fort St. Vrain Technical Basis Documents for Piping Survey Instrumentation. Oak Ridge, TN; January 1996.

Public Service Company of Colorado (PSC 1995a). Final Survey Plan for Site Release (revision 1). Fort St. Vrain Nuclear Station Decommissioning Project. May 25, 1995.

Public Service Company of Colorado (PSC 1995b). Final Survey Report for Release of Repower Area. Fort St. Vrain Nuclear Station Decommissioning Project. March 2, 1995.

Westinghouse Electric Corporation (Westinghouse 1995). Fort St. Vrain Technical Basis Documents for Piping Survey Instrumentation. Pittsburgh, PA; November 1995.

ATTACHMENT A

SPENDING PLAN	PERFORMANCE PERIOD	
	From	To
Name of Laboratory: Oak Ridge Institute for Science and Education	Jan-96	Mar-96
	RFTA	Est. Project Cost
Title of Project: #609 Fort St. Vrain - Phase III	TBD	$16,900.00
	NRC Fin Number	ORISE Number
TAC Number:	A9076	1286.02

COST ELEMENTS	Oct-95	Nov-95	Dec-95	Jan-96
Direct Costs	$0.00	$0.00	$0.00	$9,990.00
Indirect Costs- (G&A, DOE Factor)	$0.00	$0.00	$0.00	$3,220.00
Total Estimate Costs	$0.00	$0.00	$0.00	$13,210.00
Project Completion	0.00%	0.00%	0.00%	78.17%
COST ELEMENTS	**Feb-96**	Mar-96	Apr-96	May-96
Direct Costs	$2,390.00	$400.00	$0.00	$0.00
Indirect Costs- (G&A, DOE Factor)	$770.00	$130.00	$0.00	$0.00
Total Estimate Costs	$3,160.00	$530.00	$0.00	$0.00
Project Completion	96.86%	100.00%	100.00%	100.00%
COST ELEMENTS	Jun-96	Jul-96	Aug-96	Sep-96
Direct Costs	$0.00	$0.00	$0.00	$0.00
Indirect Costs- (G&A, DOE Factor)	$0.00	$0.00	$0.00	$0.00
Total Estimate Costs	$0.00	$0.00	$0.00	$0.00
Project Completion	100.00%	100.00%	100.00%	100.00%

ACTIVITY INFORMATION	Hours	Estimated Cost
Site Visit	0.0	$0.00
Document Review	4.0	$400.00
Presurvey	28.0	$2,000.00
Travel- Labor	34.0	$2,900.00
Travel- Other Expenses		$5,100.00
Survey Activities	44.0	$3,300.00
Report Preparation	40.0	$3,200.00
Sample Analysis	0.0	$0.00
Other	0.0	$0.00
Total	150.0	$16,900.00