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Public Service
Company of Colorado

April 28, 1997
Fort St. Vrain
P-97029

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

ATTN: Mr. John W. Hickey, Chief
Decommissioning and
Regulatory Issues Branch

Docket No. 50-267

SUBJECT: **Confirmatory Radiation Survey of Liquid Effluent Pathway, Response to NRC Comment**

REFERENCES:
1. NRC Letter, Pittiglio to Fuller, dated April 23, 1997 (G-97039)
2. PSCo Letter, Borst to Weber, dated September 11, 1996 (P-96068)

Dear Mr. Hickey:

This letter provides Public Service Company of Colorado's (PSCo) response to NRC comments in Reference 1, regarding the proposed Sampling and Survey Plan for the Fort St. Vrain Effluent Pathway, previously submitted via Reference 2. This response documents that Fort St. Vrain's liquid effluent discharge pathway areas are acceptable for release for unrestricted use.

As part of the NRC's review of the Reference 2 submittal, the Oak Ridge Institute for Science and Education (ORISE) performed confirmatory surveys of the liquid effluent discharge pathway areas at Fort St. Vrain. As indicated in the referenced letter, ORISE identified one sample with residual activity that exceeds site guideline values. This sample, near location flag number 157, included activity where the sum of the fractions of nuclide concentrations to guideline values was 1.9. In accordance with guidance in Draft NUREG/CR-5849 and in the Reference 2 proposed plan for final radiation survey of the effluent pathway, samples whose sum of fractions exceeds 1.0 require evaluation to determine whether average contamination levels in the 100 $m^2$ area surrounding the elevated sample exceed the guideline values.

As described in the attached report, the weighted mean sum of fractions for the 100 $m^2$ investigation area was determined to be 0.23. This value is much less than 1.0 and demonstrates that levels of residual activity in the areas examined in ORISE's confirmatory survey are acceptable for unrestricted use.

Based on the information provided in the attached report, PSCo requests NRC approval of the proposed Sampling and Survey Plan for the Effluent Pathway as submitted in Reference 2, and as implemented during the final survey. At this time, PSCo would also like to re-state our position that the entire Fort St. Vrain facility satisfies the criteria for unrestricted release, and we respectfully request that Facility Operating License (Possession Only), Number DPR-34, be terminated.

If you have any questions regarding this information, please contact Mr. M. H. Holmes at (303) 571-7633.

Sincerely,

Frederick J. Borst

Frederick J. Borst
Decommissioning Program Director

FJB/SWC

Attachment

cc: Regional Administrator, Region IV

Mr. Robert M. Quillin, Director
Radiation Control Division
Colorado Department of Public Health and Environment

# EVALUATION OF AVERAGE ACTIVITY

# IN 100 $M^2$ AREA AROUND FLAG 157

# IN GROUP E EFFLUENT DISCHARGE PATHWAY AREA

Attachment to P-97029

April 1997

**Evaluation of Average Activity**
**In 100 $m^2$ Area Around Flag 157**
**In Group E Effluent Discharge Pathway Area**

## Introduction

This report describes the acceptability of the area surrounding the elevated sample identified in the ORISE confirmatory survey. The report combines the sample results from the NRC's independent contractor with the sample results in the adjacent 100 $m^2$ investigation area obtained by SEG to demonstrate compliance with Fort St. Vrain unconditional release criteria. The averaging criteria contained in the final survey plan and procedures was used and is consistent with the method contained in Draft NUREG/CR-5849.

Confirmatory surveys were performed by Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) of the Fort St. Vrain Effluent Discharge Pathway on March 31 and April 1, 1997. One sample collected and analyzed by ORISE showed activities in excess of the guideline value. The sum of the nuclide concentration-to-guideline values for the sample collected near flag 157 along the Goose Quill ditch banks was 1.9. The nuclide activities for the elevated ORISE sample are shown in Table 1 below.

**Table 1**
**ORISE Reported Values**

| Sample | Radionuclide Concentrations (pCi/g) | | Concentration-to-Guideline Ratio |
|---|---|---|---|
| | Co-60 | Cs-137 | |
| Section D, Flag 157 | 8.8 $\pm$ 0.3 | 6.3 $\pm$ 0.3 | 1.9 |

## Investigation Sampling

SEG collected investigation samples from each ORISE sampling location on April 2, 1997. The SEG samples were archived so that if any ORISE sample showed elevated results the average concentration within the surrounding 100 $m^2$ area could be determined in accordance with FSV procedures and protocols. A SEG surface sample was collected from the soil surrounding the ORISE location, effectively widening the hole. A 100 $m^2$ grid was established around the ORISE sample location and eight additional surface samples were obtained in accordance with Fort St. Vrain final survey procedures. A SEG subsurface soil sample (6 to 12 inches below the surface) was collected from the ORISE sample location. SEG samples labeled as Flag #156 correspond to the ORISE sample labeled as Flag #157 (the selection of the nearest flag marker was subjective). Figure 1 shows the investigation sample location.

**Sample Preparation and Counting**

Once the sample was identified as elevated by ORISE, the corresponding SEG investigation samples were prepared for counting by drying, sieving and placing each sample in a marinelli container. Each sample was then counted for 1 hour on the Canberra $Q^2$ gamma spectroscopy system in accordance with SEG procedure REDS-INST-238, *Operation of the Canberra $Q^2$ LLWA Gamma Spectroscopy System with Collimated Counter Array.* The analysis library was prepared to include all gamma emitting nuclides of concern at FSV and verified using DOE-TIC-11026, *Radioactive Decay Data Tables,* D. C. Kocher, 1981.

Based on the sample densities (range of 0.903 to 1.26 g/cm$^3$) a calibration efficiency for a 1.15 g.cm$^3$ solid matrix was used to quantify the results.

A list of approximate, representative MDAs for this sample analysis is as follows:

| Nuclide | MDA (pCi/g) |
|---|---|
| Cs-137 | 0.0311 |
| Co-60 | 0.0320 |
| Eu-155 | 0.130 |
| Eu-152 | 0.191 |

**Results**

The results are shown in Table 2 along with the original ORISE sample data. The "sum of the fractions", SOF was determined for each sample by summing the ratio of the observed nuclide concentration to the nuclide concentration guideline value equating to 10 mrem TEDE. Guideline values were obtained from FSV-FRS-TBD-209, *Final Survey Requirements for the Liquid Effluent Pathway*. The data were evaluated using procedure FSV-SC-FRS-I-110, *Final Survey Data Analysis*. At flag #156/157 the SEG sample surrounding the ORISE hole was identified as #2 within the investigation area; the samples represent the same 11.11 $m^2$ area. The original ORISE sample result and SEG investigation sample (sample #2) result were compared, and the higher result was used for calculation of the area weighted mean.

The elevated area was determined using the samples whose SOF exceeded 1.0 assuming each sample represented 11.11 $m^2$ area (1/9 of the 100 $m^2$ averaging area). The factor by which any single sample could exceed the guideline value by, F, was calculated using the following equation:

$$F = \sqrt{\frac{100m^2}{A}}$$

where A is the elevated area of samples exceeding SOF of 1.0.

The elevated area (area exceeding the guideline value) was determined to be confined to one grid representing 11.11 $m^2$. The maximum value by which any sample could exceed the release criteria is therefore 3.0. The weighted mean SOF from the 100 $m^2$ investigation area, determined in accordance with the procedure, is 0.23.

**Table 2**
**Investigation Sample Results at ORISE Sample Location**

| Sample | | Density ($g/cm^3$) | Co-60[1] (pCi/g) | Cs-137 (pCi/g) | Eu-152 (pCi/g) | Eu-155 (pCi/g) | Sample SOF | 100 $m^2$ Weighted Mean SOF (surface samples) |
|---|---|---|---|---|---|---|---|---|
| Flag #156/157 | | | | | | | | |
| | SEG 1 | 1.045 | | | | | 0.00 | |
| | ORISE | | 8.8000 | 6.3000 | | | 1.91 | |
| | SEG 2[2] | 0.903 | 5.7750 | 4.1850 | 1.1040 | 0.5286 | 1.40 | (not used) |
| | SEG 3 | 0.991 | 0.7151 | 0.7655 | | 0.3081 | 0.17 | |
| | SEG 4 | 0.924 | | | | | 0.00 | |
| | SEG 5 | 1.000 | | | | | 0.00 | |
| | SEG 6 | 1.021 | | | | | 0.00 | |
| | SEG 7 | 0.899 | | | | | 0.00 | |
| | SEG 8 | 1.085 | | | | | 0.00 | |
| | SEG 9 | 1.181 | | 0.0421 | | | 0.00 | |
| | | | | | | | | 0.23 |
| sub-surface | SEG 10 | 1.043 | 0.4919 | 0.3702 | | | 0.11 | |
| Concentration Guideline | | | 5.58 | 18.7 | 13.2 | 439 | | |

(1) Blank entries indicate no activity above the MDA.
(2) SEG sample surrounding the ORISE location. The ORISE result was used for weighted mean calculations.

## Conclusion

The elevated area (area exceeding the guideline value) was determined to be confined to one grid representing 11.11 $m^2$. No individual sample exceeded the guideline value by a factor of 3.0.

The weighted mean "sum of fractions", SOF for the 100 $m^2$ area surrounding the location identified by ORISE was determined to be less than 1.0. The weighted mean SOF for Flag 156/157 was 0.23 equating to 2.3 mrem Total Effective Dose Equivalent.

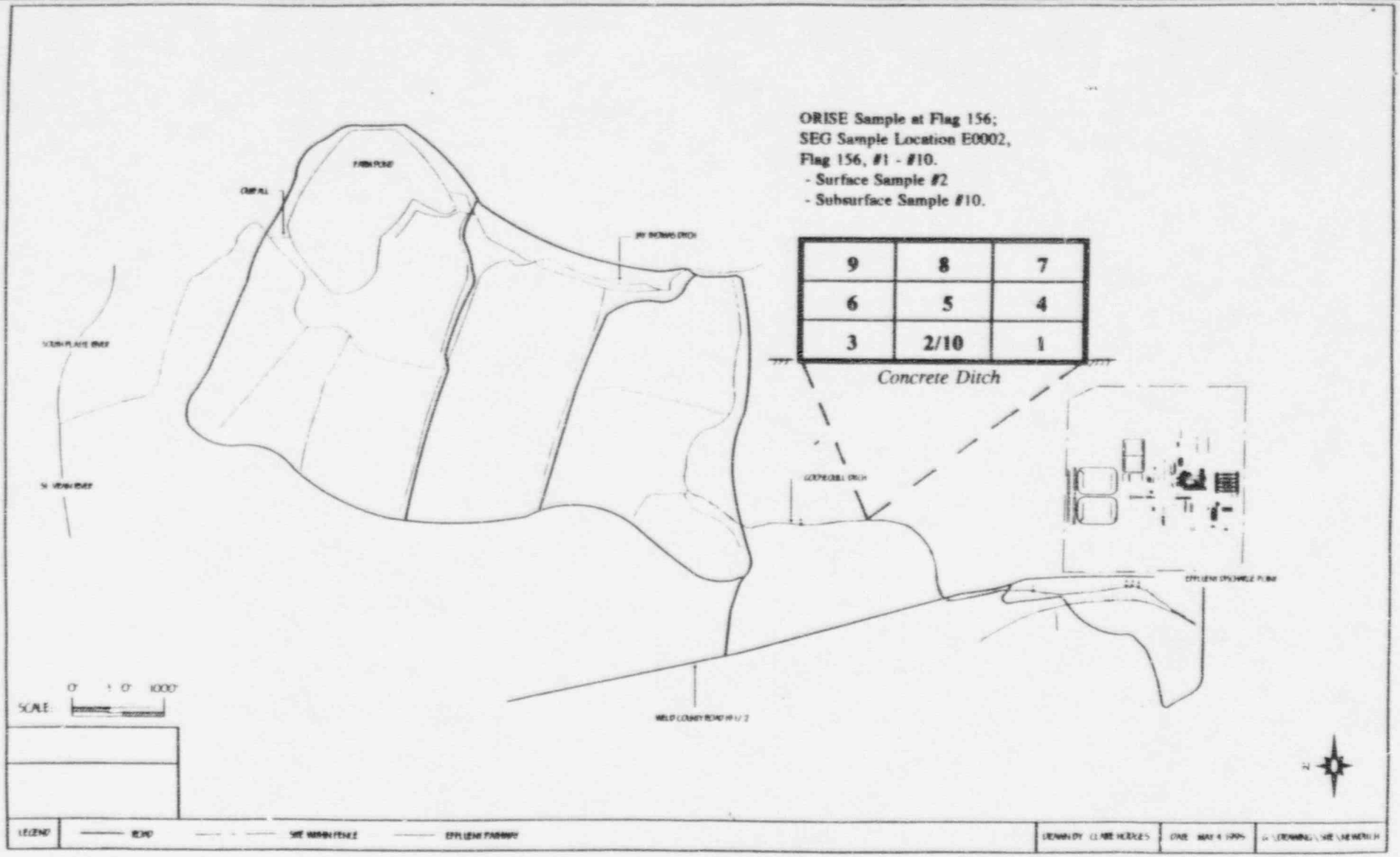
ORISE Sample at Flag 156;
SEG Sample Location E0002,
Flag 156, #1 - #10.
- Surface Sample #2
- Subsurface Sample #10.
9
8
7
6
5
4
3
2/10
1
Concrete Ditch
SCALE:
LEGEND

**Figure 1**