



Public Service

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Company of Colorado

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May 30, 1995  
Fort St. Vrain  
P-95062

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

ATTN: Mr. Michael F. Weber, Chief  
Decommissioning and  
Regulatory Issues Branch

Docket No. 50-267

SUBJECT: Response to NRC Comments Regarding the Final Survey  
Report for the Fort St. Vrain Repower Area

REFERENCES: 1. PSCo Letter, Fisher to Austin, dated March 2,  
1995 (P-95019)  
2. NRC Letter, Pittiglio to Crawford, dated March  
14, 1995 (G-95052)

Dear Mr. Weber:

Public Service Company of Colorado (PSCo) submitted the Final Survey Report for the Fort St. Vrain (FSV) Repower Area in Reference 1. The Nuclear Regulatory Commission (NRC) returned comments on this report to PSCo in Reference 2. PSCo's responses to the NRC comments on the Final Survey Report for the FSV Repower Area are included in the Attachment to this letter.

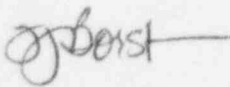
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P-95062  
May 30, 1995  
Page 2

If you have any questions regarding this information, please contact Mr. M. H. Holmes at (303) 620-1701.

Sincerely,

Mary J. Fisher by   
Mary J. Fisher  
Decommissioning Program Director

MJF/JRJ

Attachment

cc: w/attachment

Regional Administrator, Region IV

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

ATTACHMENT TO PSCo LETTER P-95062

RESPONSE TO NRC COMMENTS ON THE FINAL SURVEY REPORT  
FOR THE FORT ST. VRAIN REPOWER AREA

MAY 30, 1995

**NRC Comment #1**  
(Page 9, first paragraph)

The decommissioning plan states that the dose from radionuclides in soil will be estimated using the methods in NUREG/CR-5512, Vol. 1, "Residual Radioactive Contamination from Decommissioning," October 1994.

- a. NUREG/CR-5512 should be referenced in the discussion of guideline values for radionuclides in soil.
- b. Also, what are the decommissioning limits for groundwater?

**PSCo Response:**

- a. Future reports will reference NUREG/CR-5512, Volume 1, or similar methodology such as that contained in the RESRAD modeling program, as the basis for the guideline values for radionuclides in soil and groundwater.
- b. Decommissioning limits for soil and groundwater at FSV corresponding to an annual total effective dose equivalent of 10 mrem are presently not defined, however a site-specific model is being developed.

**NRC Comment #2**  
(Page 9, Table 3-3)

Table 3-3 indicates that the NaI detectors were calibrated to Cs-137. Were the NaI detectors also cross-calibrated to pressurized ion chambers to account for the energy dependence of the NaI detectors?

**PSCo Response:**

An initial comparison of the response characteristics of the NaI(Tl) and the pressurized ion chamber was conducted prior to final survey of the repower area and indicated that the NaI(Tl) over-responds. At the time of preparation of the Final Survey Report for the Repower Area, correction factors were not used to compensate for the energy dependence of the NaI(Tl) detectors. Exposure rate measurements for final survey of the repower area were not corrected since the methodology for correction was not thoroughly documented and the NaI(Tl) measurements would result in a conservative estimate of the true exposure rate.

**NRC Comment #3**  
(Page 11, Table 3-4)

- a. Please clarify the distinction between the "background" and "final survey" rows in Table 3-4.
- b. Also, what background values were actually used to determine net results, and calculate the critical level and MDA?

**PSCo Response:**

- a. The Background row in Table 3-4 contains the nominal parameters which were applicable to the measurements collected as a part of the Background Determination. The background count rate indicated in this row is the observed count rate when Background Determination measurements were collected with the detector shield in place. The background count rate for this type of measurement is composed of the instrument noise, the local area exposure rate and the detected fraction of the gamma component from the material being measured. This shielded count rate is subtracted from the unshielded count rate, and the difference is used to define the reference material background value (beta activity contribution) for the material being evaluated.

The Final Survey row in Table 3-4 contains the nominal parameters which were applicable to the measurements collected as a part of the Final Survey. The background count rate indicated in this row is composed of the observed count rate when measurements are collected at the final survey location with the detector shield in place (composed of instrument noise, local area exposure rate, the detected fraction of the gamma component from the material being surveyed), in addition to the reference material background value (beta activity contribution) for the material being surveyed.

- b. For Background Determination measurements, the background count rate used for calculation of the net results, the critical level and the MDA is composed of the instrument noise, the local area exposure rate and the detected fraction of the gamma component from the material being surveyed.

For Final Survey measurements, the background count rate used for calculation of the net results, the critical level and the MDA is composed of the observed count rate when measurements are collected at the final survey location with the detector shield in place (composed of instrument noise, local area exposure rate, the detected fraction of the gamma component from the material being surveyed), in addition to the reference material background value (beta activity contribution) for the material being surveyed.

**NRC Comment #4**  
(Page 18, paragraph 2)

The report discusses the method for selecting and classifying survey units for surfaces and structures, and open land areas. However, the location and description of the survey units are not included. The actual survey units selected should be described, in figures and tables in a way that allows the survey units to be identified and located.

**PSCo Response:**

The repower area was divided into two basic survey categories: surfaces and structures, and open land. Surfaces and structure survey units included: a valve pit slightly north of the area center; miscellaneous metal surfaces including a power box, 3 light poles and 2 valve riser locations; miscellaneous concrete surfaces which include 1 concrete pad on the south side of the evaporative cooler building, 1 concrete pad and a piece of concrete in the southeast corner of the area, and concrete bases supporting the light poles; a concrete slab within the former security isolation zone which extends along the entire south side of the repower area; external (above ground) surfaces of monitoring wells; and the external surface of the evaporative cooler building, which makes up a small portion of the area boundary on the west side and includes the sheet metal exterior walls and concrete foundation. The balance of the repower area was designated as a single open land survey unit. An approximate location of each may be found in Figure 1-2 of the Repower Final Survey Report.

The methods of identifying survey units *within the context of the final report* is being evaluated. For purposes of this response, a description of these survey units are summarized in Table 1, Repower Area Survey Unit Summary.

**Table 1**  
**Repower Area Survey Unit Summary**

Survey Unit Name & Description	Location Code	Survey Unit Type	Classification
Valve Pit - Approximately 6' square and 4' in depth. Located slightly north of center. Contains a discharge isolation valve for the Turbine Building Demineralizer Room Sump.	0002A0QS01	Surface and Structure	Unaffected
Miscellaneous Metal Surfaces - 1 power box located near the south perimeter; 3 light poles located near the west, east and north perimeters; 2 valve risers, 1 located immediately east of the Evaporative Cooler Building and 1 located near the southwest perimeter fence; 4 monitoring well covers, 3 located inside the Repower Area, and 1 located near Septic Tank Field 1; covers for 3 septic tanks, and 1 fire hydrant shed located near the southwest perimeter fence. <sup>1</sup>	0002A0QS01 0002AIQS01 (The second location code corresponds to investigation measurements included in the final report)	Surface and Structure	Unaffected
Concrete Slab at Security Fence - Approximately 140 meters by 7 meters. Located immediately inside of the Repower Area south perimeter fence.	0002A0AF01	Surface and Structure	Unaffected
Miscellaneous Concrete Surfaces - 1 concrete pad located at the south side of the Evaporative Cooler Building, 1 concrete pad and a piece of concrete rubble located in the southeast corner, and the concrete bases of three light poles.	0002A0AF01 0002A1AF01 (The second location code corresponds to the resurvey measurements included in the final report)	Surface and Structure	Unaffected
Evaporative Cooler Building - East and South Exterior Walls below 2 meters. Steel siding with surface area of approximately 30 square meters. The building houses equipment used to cool and humidify makeup ventilation.	0002A0QW01	Surface and Structure	Unaffected
Evaporative Cooler Building - East and South Exterior Foundation Walls. Poured concrete with surface area of approximately 12 square meters. The building houses equipment used to cool and humidify makeup ventilation.	0002A0AW02	Surface and Structure	Unaffected

<sup>1</sup> When feasible, survey units are generally composed of contiguous surfaces. For instances where it is not feasible, the included materials are of similar composition and potential for contamination.

**Table 1 (Cont.)**  
**Repower Area Survey Unit Summary**

Survey Unit Name & Description	Location Code	Survey Unit Type	Classification
Surface Soil - Samples collected from the 0 - 6" region. Uniformly distributed at 20 meter intervals.	0002F0UL01 - 0002F0UL35	Open Land	Unaffected
Subsurface Soil - Samples collected from each of the 3 septic fields at depths to 48". 2 septic fields are located along the north perimeter. 1 septic field is located immediately outside of the fence at the northeast perimeter of the Repower Area.	0002F0VL01 - 0002F0VL12	Open Land	Unaffected
Septic Tanks -Water and sediment samples collected from each of the 3 septic tanks. 1 septic tank is located immediately inside of the fence along the northeast perimeter of the Repower Area; 1 septic tank is located outside of the north perimeter fence adjacent to the New Fuel Storage Building; and 1 septic tank is located immediately outside of the fence at the northeast perimeter of the Repower Area.	0002F0WH04- 0002F0WH09	Open Land	Unaffected
Groundwater Monitoring Wells - Water samples collected from four wells. 3 wells inside, 1 well outside of the Repower Area.	0002F0WH01- 0002F0WH03; 0002F0WH10	Open Land	Unaffected

**NRC Comment #5**  
(Page 23, paragraph 2)

- a. Are the daily efficiency values for the gas-flow proportional detectors evaluated, for example by control chart analysis, to determine the acceptability of instrument response?
- b. Why are the daily efficiency values used as opposed to the average efficiency determined at the time of calibration?

**PSCo Response:**

- a. Daily efficiency values for the gas-flow proportional detectors are compared to the range of acceptability which is determined at the time of calibration. The acceptance criteria prescribed by procedure is  $\pm 10\%$  of the efficiency value determined at the time of calibration. The daily efficiency values are not, however, plotted on a control chart.
- b. Daily efficiency values are determined prior to and following surveys performed on any given day. The efficiency determined at the time of survey is considered to be more representative of the various parameters which may affect the detector response, such as environmental conditions, detector integrity, etc. Use of the daily efficiency value is considered an enhancement to the minimum requirements presented in standard guidance documents, such as ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration".

**NRC Comment #6**  
(Page 25, paragraph 2)

- a. What are the action levels for QC measurements?
- b. How are replicate measurements evaluated to determine acceptability?

**PSCo Response:**

- a. The action levels for the QC measurements are the same action levels and release criteria (GLV) which were applicable to the initial set of final survey measurements being verified.
- b. QC measurements results are compared to the action levels and GLV which were applicable to the initial set of final survey measurements. If the QC measurement results do not exceed applicable action levels and GLV, the results are considered acceptable and are supportive of the conclusions of the final survey. In the event that QC measurement results *do* exceed applicable action levels or GLV, an investigation of the inconsistency is performed which may include additional measurements.

**NRC Comment #7**  
(Page 27, paragraph 1)

Please describe how the investigation measurements can be identified in the Appendix A results tables.

**PSCo Response:**

For the final survey of the repower area, the sixth alpha-numeric character in the sample location code identifies whether the data is from the original final survey (O), a QC survey (Q), an investigation survey (I), a resurvey (number > 0) or a characterization survey (C).

In future reports, this explanation will be provided with the Appendix A Tables.

**NRC Comment #8**  
(Page 29, paragraph 4)

What criteria were used to determine that the verification measurements support the conclusions of the final survey?

**PSCo Response:**

QC measurements results are compared to the action levels and GLV which were applicable to the initial set of final survey measurements. If the QC measurement results do not exceed applicable action levels and GLV, the results are considered acceptable and are supportive of the conclusions of the final survey. In the event that QC measurement results *do* exceed applicable action levels or GLV, an investigation of the inconsistency is performed which may include additional measurements.

**NRC Comment #9**  
(Page 30, paragraph 2)

- a. How were background values for the investigation survey adjusted?
- b. If an adjustment was determined to be necessary for the investigation survey, why was an adjustment not necessary for the original survey results?

**PSCo Response:**

- a. The review of the initial measurement results from the Miscellaneous Concrete Surfaces identified that the data set was negatively skewed. The data set contained no positive values. It was determined that a resurvey of the survey unit using an alternate surface within the survey unit for the local area shielded background measurement was appropriate.

The investigation consisted of the following:

- 1. An evaluation of the surfaces included within the survey unit in question was performed to ensure that dissimilar construction materials had not been included in the measurement set.
- 2. An evaluation of the applied material reference background value was performed.
- 3. A review of the data analysis process was performed to verify the absence of calculational errors.
- 4. A review of the results of removable activity measurements within the survey unit in question. No removable activity in excess of the MDA was identified.
- 5. A comparison was made of the initial measurement results without inclusion of the local area background component (shielded measurement), to 25% of the GLV. It was concluded that even without correction for local area background, no individual measurement result from the survey unit in question could have exceeded 25% of the GLV.
- 6. Survey instructions were written for a resurvey of the survey unit. An alternate surface within the survey unit was selected for shielded background measurements. The survey unit was resurveyed and the net measurement results were determined using the shielded background count rate from the alternate surface.

The procedures for final survey currently require that all of the pre and post-survey shielded background measurements be collected at one specific location within the survey unit. To identify a more representative shielded background value, this procedural requirement is being revised to call for the collection of pre and post-survey shielded background measurements from more than one location within the survey unit. The average of these measurements will be assigned as the local area background component and used when converting final survey gross measurement results to proper reporting units.

- b. In this instance, a resurvey of the survey unit was performed and the original survey results were excluded from consideration as final survey data. For similar instances, it may be appropriate to collect a sufficient number of investigation measurements, and include the results of all measurements in the statistical evaluation and data reporting.

**NRC Comment #10**  
(Page 31, Figure 4-1)

Figure 4-1, and a number of other figures summarizing survey results, show "GLV" as corresponding to 1250 dpm/100 cm<sup>2</sup>. However, "GLV" is previously defined as the guideline value which is 5000 dpm/100 cm<sup>2</sup>. The figures should be corrected to clarify that the line on the figures is 25% of the guideline values.

**PSCo Response:**

Future reports will indicate that 1250 dpm/100 cm<sup>2</sup> corresponds to 25% of the GLV for measurement results from unaffected survey units.

**NRC Comment #11**  
(Page 34, paragraph 1)

Why is graphical presentation of the removable results not meaningful, while the graphical presentation of the total surface activity results shown in Figures 4-1, 4-3, 4-5, and 4-6, in which all of the results are also below the MDA, is considered meaningful?

**PSCo Response:**

In determining the format for graphical presentation of survey data, the primary objectives included presentation of the data in comparison to the GLV (or a percentage of the GLV which represented the action level for reclassification), the critical level and the MDA. For total surface activity, the MDA was in the range of 48% to 63% of the action level for reclassification and the critical level in the range of 23% to 30% of the same action level. As demonstrated, the measurement results can also be presented in a graph for visual comparison to the critical level, MDA and 25% of the GLV.

However, for removable surface activity, the critical level and MDA are significantly lower such that when presented on the same scale with 25% of the GLV, the lines representing critical level and MDA are nearly indistinguishable from the 0 baseline. Similarly, since the measurement results were less than MDA, this also applies to the presentation of measurement results. This could be improved by removing the 25% of the GLV reference line and significantly reducing the y-axis scale, however, the graphical presentation would not achieve the primary objectives previously stated.

**NRC Comment #12**  
(Page 35, paragraph 1)

Why were exposure rate measurements only conducted in 3 of 5 survey units? Also, Table 4-4 reports results for 4 survey units, as opposed to 3. Please clarify.

**PSCo Response:**

This was a typographical error. Exposure rate measurements were collected in 4 of 6 survey units. As prescribed by procedure, exposure rate measurements were not obtained in the remaining two survey units due to physical constraints which prevented obtaining measurements at a distance of 1 meter from the surfaces.

### NRC Comment #13

(Page 39, Table 4-6)

The results in Table 4-6 are misleading. The text indicates that there were no results above background, but Table 4-6 shows positive results for H-3. Please clarify.

#### PSCo Response:

Table 4-6 presents tritium sample activity without comparison to the MDA. The mean and maximum tritium activity in the septic tank inlet water, 0.22 and 0.41 pCi/ml, respectively. The MDA for the septic tank analyses was 0.71 pCi/ml as indicated in Appendix B, Table B-9. The mean and maximum values for the monitoring well samples were 0.66 and 0.89 pCi/ml, respectively. The MDA for the monitoring well analyses was 1.72 pCi/ml as indicated in Appendix B, Table B-8. In all samples, tritium activity was well below the MDA, and in a majority less than the critical level.

Appendix C, Table C-3 indicates tritium activity in 4 off-site groundwater samples in the range of 0.28 to 0.89 pCi/ml, with a mean of 0.61 pCi/ml, all of which were below the MDA of 1.72 pCi/ml for these analyses.

The FSV Final Survey Report for the Repower Area states in the Executive Summary section, "All surface activity measurements were less than 25% of the guideline values for release for unrestricted use; all exposure rate measurements were less than 5  $\mu$ R/hr above background; and soil, sediment and liquid radionuclide concentrations were equivalent to environmental background concentrations." However, this same text was not repeated in the discussion prior to Table 4-6.

Additionally, Figures 4-11 and 4-12 indicate that the solid or dark bars in the graphs represent *net* activity. This is an error. The bars represent *sample* activity, which as discussed above, are below the MDA's for the analyses and the MDA's achieved for analysis of offsite groundwater samples.

**NRC Comment #14**  
(Appendix A, B, and C)

A description of the table column headings should be included to allow the various table entries to be understood.

- a. For example, how is the "Sample Location Code" to be interpreted? What are "File Numbers", "Download Sample Numbers", etc..
- b. Also, the listing of the results, MDA's, and Critical levels for Cs-137 in the Appendix B soil sample results tables is confusing, as is the reporting of positive H-3 results in the water sample results tables. Please clarify.

**PSCo Response:**

- a. The Sample Location Code used for the final survey of the repower area was a 10 digit alpha-numeric character string as follows:

Digits 1-4	=	Survey Package Number (e.g., 0001, 0002)
Digit 5	=	Classification Code (unaffected or affected, also suspect or non-suspect affected for structures and surfaces)
Digit 6	=	Survey(0); QC(Q); Investigation(I); Resurvey(1, 2, etc); or Characterization Survey(C)
Digit 7	=	Material Code (e.g., concrete, steel)
Digits 8-10	=	Surface Code (e.g., floor, wall)

The columns labeled "File Number" or "RC Sample Number" indicate the number assigned to the computer database file containing the measurement results.

The columns labeled "Download Sample Number" identify the individual measurement results within each of the computer database files.

The final survey report for the remainder of the facility will include a mechanism for interpreting the location code.

- b. Appendix B contains the open land exposure rate measurement results and the radionuclide analysis of soil and water. Soil and water samples were not analyzed for gross gamma activity, rather each sample was analyzed for principal gamma emitters by gamma spectroscopy. Since Cs-137 is typically identified in soil, primarily due to radioactive fallout, this nuclide was chosen for comparison and presentation purposes. As indicated in the report text, none of the samples identified the presence of licensed radioactive material. Had other nuclides been identified, excluding naturally-occurring nuclides, this data would have been presented. See the response to comment #13 for tritium.