



Public Service®

August 1, 1991
Fort St. Vrain
Unit No. 1
P-91239

Public Service
Company of Colorado
P.O. Box 840
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A. Clegg Crawford
Vice President
Nuclear Operations

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

Attention: Dr. Seymour H. Weiss, Director
Non-Power Reactor, Decommissioning
and Environmental Project Directorate

Docket No. 50-267

SUBJECT: Natural Gas Collection Pipelines in the Vicinity of
Fort St. Vrain - Contains Proprietary Information
(Attachment 1)

REFERENCES: Attached

Dear Dr. Weiss:

The purpose of this letter is to document the results of analyses of a postulated rupture of the 6 inch natural gas collection pipeline, at its closest point of approach to the Fort St. Vrain (FSV) Reactor Building, assuming this 6 inch line is open to the 16 inch line. This is principally an historical analysis which is applicable to the period during which the plant was operated with the 6 inch line open to the 16 inch line. At present the 6 inch manual isolation valve which isolates the 6 inch line from the 16 inch line is required to be closed, and is only permitted to be opened for short-term maintenance and surveillance activities with the 6 inch valve continuously manned by an operator who has been instructed to promptly close the valve in the event a pipeline rupture is observed or suspected (Reference 1). Since the analyses documented by this submittal address a hypothetical historical pipeline rupture, and are not applicable to the existing valve configuration, these analyses are being submitted for the NRC's information. Public Service Company of Colorado (PSC) is not requesting that the NRC respond to this submittal.

With the 6 inch isolation valve open, PSC calculated that a complete rupture of the 6 inch line at its nearest point of approach to the Reactor Building could result in a backflow of 37.1 million scfd from the 16 inch line out the rupture at sonic velocity, conservatively assuming the 16 inch line maintains a constant pressure of 250 psig (Reference 2). The analyses of the effects of this steady state release were completed by Westinghouse Electric Corporation (Westinghouse), and the results are contained in Attachment 1.

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The analyses and information described in this letter demonstrate that nuclear safety at the Reactor Building would not have been jeopardized in the past, during the historical operation of the reactor plant, in the event of a rupture of the nearest 6 inch or 4 inch natural gas collection pipeline, even with the 6 inch line open to the 16 inch line. Even so, PSC plans to install the redundant 6 inch check valves described in Reference 3. These check valves will close in the event of a large collection pipeline rupture in the vicinity of FSV, and limit the backflow from the 16 inch line to the rupture. PSC will have the redundant check valves installed once permission is granted by the NRC, as discussed in Reference 3.

The DEGADIS code, version 2.1, was used to model dispersion of the natural gas plume released from a postulated rupture of the 6 inch line at a point 1340 ft. from the Reactor Building. This code is described in Reference 4, as well as in Attachment 1 to this letter. None of the assumptions used in the previous dispersion analyses of this postulated rupture, identified in References 2, 4 and 5, were changed except for the steady state flow, which was increased from 12 million scfd to 39 million scfd. The 39 million scfd steady state flow rate accounts for a 37.1 million scfd backflow from the 16 inch line and an approximately 2 million scfd flow from wells connected to the FSV natural gas collection piping system whose redundant automatic isolation features are assumed to fail. The volume of gas released in the initial pipeline depressurization (from 250 psig to atmospheric pressure) is unchanged from that previously analyzed in References 2, 4 and 5. As was done in previous analyses of the six inch line break, the steady state flow rate was conservatively superimposed upon the flow rate produced by the initial depressurization.

The dispersion analysis determined the greatest horizontal distance from the rupture location to a point on the ground directly below the portion of the plume at the lower flammability limit (LFL) was 238 ft. This portion of the plume is located 253 ft. above the ground. The greatest horizontal distance from the rupture location to a point directly below the portion of the plume at 1/2 LFL concentration was 476 ft. This portion of the plume was 312 ft. above the ground.

As in the previous analyses, it was hypothesized that the gas in the unconfined natural gas vapor cloud detonates, though PSC does not consider such a detonation to be credible (Reference 6). Westinghouse estimated the mass of natural gas in a flammable concentration (2,896 lbs) using the same methodology used in Reference 4, and determined the overpressure effects of the postulated detonation using the TNT equivalent energy method. Assuming that 2,896 lbs of natural gas detonated at the nearest point of approach of the LFL to the Reactor Building (1340 ft. - 238 ft. = 1102 ft. from the Reactor Building), the overpressure at the Reactor Building was calculated to be 0.2 psi. As discussed in Reference 6, overpressures of this magnitude will have no effect on the Reactor Building structural integrity.

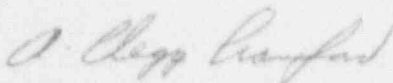
Documentation supporting the analyses described above are included in Attachment 1. Some of the information in Attachment 1 is considered to be proprietary by Westinghouse, under the criteria set forth in 10 CFR 2.790. Attachment 2 is the non-proprietary version of this information. In accordance with the requirements of 10 CFR 2.790, the following documents are submitted with this letter:

- One copy of an Application for Withholding Proprietary Information from Public Disclosure, Attachment 3.
- One copy of the Proprietary Information Notice, Attachment 4.
- One copy of the Copyright Notice, Attachment 5.
- One copy of an Original Affidavit, Attachment 6.

Only the postulated rupture of the 6 inch line closest to the Reactor Building has been analyzed. Flow rates used in previous analyses of a postulated rupture of the 4 inch line at its closest point of approach to the Reactor Building would not change if the 6 inch manual isolation valve were assumed to be open. As noted in References 1 and 2, backflow from the 16 inch line to a postulated rupture of the 4 inch line could reach 10.6 million scfd with the 6 inch manual isolation valve fully open, versus 10.1 million scfd with the 6 inch manual isolation valve closed. The previous analyses assumed a constant flow of 12 million scfd out of the 4 inch line break, which would accommodate the 10.6 million scfd backflow from the 16 inch line plus natural gas from FSV Well No. 11, the only well that could feed the other end of a double ended pipe rupture. Thus, the 12 million scfd flow rate used in the analyses of the postulated rupture of the 4 inch line (References 4 and 5) is conservative whether the 6 inch manual isolation valve is closed or open. Therefore, postulated rupture of the 4 inch line was not re-analyzed.

Should you have any questions concerning this submittal, please contact Mr. M. H. Holmes at (303) 480-6960.

Very truly yours,



A. Clegg Crawford
Vice President
Nuclear Operations

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Attachments

P-91239
Page 4
August 1, 1991

cc: Regional Administrator, Region IV

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References

1. NRC Letter, Erickson to Crawford, dated May 21, 1991
(G-91106)
2. PSC Letter, Crawford to Weiss, dated March 27, 1991
(P-91111)
3. PSC Letter, Crawford to Weiss, dated June 19, 1991
(P-91211)
4. PSC Letter, Crawford to Ruffin, dated July 2, 1991
(P-91202)
5. PSC Letter, Crawford to Weiss, dated April 23, 1991
(P-91139)
6. PSC Letter, Crawford to Weiss, dated May 3, 1991
(P-91152)