

Enclosure

Requested External Hazards Calculations (non-proprietary versions):

- **25242-ENV-002, "Natural Gas Pipeline Accidental Release," Revision 2, October 11, 2007**
- **25242-ENV-006, "ALOHA® Analysis for On-site Chemicals Stored at Unit 1," Revision 2, October 28, 2009**
- **25242-ENV-011, "ALOHA® Railroad Calculation," Revision 1, December 29, 2009**
- **25242-ENV-012, "TNT Mass Equivalents for Chemicals Transported by Rail," Revision 1, February 24, 2010**



Calculation Cover Sheet

Subject Natural Gas Pipeline Accidental Release

Discipline Mechanical/Environmental

Project VC Summer Units 2 & 3

Job No. 25242-102

Calc. No. 25242-ENV-002

Sheet 1 of 12

Calculation Status	Preliminary	Confirmed with Preliminary Information	Confirmed	Superseded	Voided
Designation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Computer Program/Type

SCP

Program No.

Version/Release

Operating System

None.

Nuclear Quality Classification

Safety-Related

Augmented Quality

Nonsafety-Related

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This calculation has been reviewed by Bechtel Power Corporation and any proprietary information has been removed. Wherever proprietary information has been removed, brackets have been inserted containing the statement "Proprietary Information Deleted"

002	Calculation sheets updated to comply with Rev.007 of 3DP-G04G-00037	17	Att. C p. 3	SWS	JMS	RJK/DCP	10/11/2007
001	Inclusion of Attachment C and general text revision.	18	18	SWS	HW	BK	3/19/2007
000	Issuance of original calculation.	14	14	SWS	HW	BK	2/28/2007
Rev. No.	Reason for Revision	Total No. of Sheets	Last Sheet No.	By	Checked	Approved/ Accepted	Date
Record of Revisions							

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Calculation Sheet

Subject Natural Gas Pipeline Accidental Release

By Seth Schreiber

Date 9/20/2007

Project VC Summer Units 2 & 3

Job No. 25242-102

Calc. No. 25242-ENV-002

Sheet No. 2 of 12

Sheet Rev. 002

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Subject Natural Gas Pipeline Accidental Release

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Date 9/20/2007

Project VC Summer Units 2 & 3

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A. PURPOSE

The purpose of this calculation is to consider a release of natural gas (NG) from a steel pipeline at the nearby Parr Steam Plant. Two cases were considered in this calculation. Case 1 involves the release of the NG directly into the atmosphere resulting in a vapor cloud. As the gas cloud travels towards the VC Summer nuclear facility it is possible that the cloud concentration could become flammable along its path. Case 2 involves the immediate deflagration of the vapor coming out of the pipe which would create an explosion and ensuing flare. Overpressures were estimated to ensure that there would be no adverse impact to the facility.

Neither NG nor methane reports any values for the IDLH or other health related limits. It is also assumed that any toxic vapor will be destroyed upon combustion. Therefore, no analysis for possible impacts of a toxic cloud needs to be considered in this calculation.

The location selected for this calculation is a point a short distance from the steam plant, as this is the shortest distance to Units 2 and 3 of the nuclear station. Unit 3 is the closer of the two units. Therefore, NG releases originated from this location potentially have higher impact to the units than releases from other locations.

B. REASON FOR CURRENT REVISION

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C. ASSUMPTIONS

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D. INPUT DATA

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E. METHODOLOGY and CALCULATIONS

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Date 9/20/2007

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Subject Natural Gas Pipeline Accidental Release

By Seth Schreiber

Date 9/20/2007

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Subject Natural Gas Pipeline Accidental Release

By Seth Schreiber

Date 9/20/2007

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F. CONCLUSIONS

Unconfined Vapor Cloud

If the unconfined vapor cloud explosion is possible, the peak reflected pressure on Unit 3 produced by the flammable cloud due to the potential break occurring at the 12" pipe was estimated to be less than 1 psi, the minimum peak overpressure that will cause significant damage to a building (RG 1.91 1978). The flammable cloud does not exist at distances beyond 574 ft (175 m) downwind from the pipe break and the ensuing explosion produces a peak incident pressure of 1 psi at a distance of 1,677 ft (511 m) from the pipe break.

Unconfined Vapor Stream

The peak reflected pressure on Unit 3 produced by the flammable stream at the pipe break is also less than 1 psi. The flammable stream produces a peak incident pressure of 1 psi at a distance of 6,284 ft (1,915 m) from the pipe break. This is a very conservative estimate since it considers the entire mass of the 10 minute release, which is the maximum amount of flammable vapor possible. It is unlikely that this would occur due to the dispersion of the gas as it is released.

Overall

The distance from the pipe break to Unit 3 is 6,944 ft (2,116.5 m). No adverse impacts to Unit 3 are expected.

G. REFERENCES

[Proprietary Information Deleted]



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By Seth Schreiber

Date 9/20/2007

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Attachment A – VC Summer Release Rate Calculation

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Attachment B - Shortest Distance from Units 2 and 3 to Pipeline

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Attachment C - Flammable Mass Calculation

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By Seth Schreiber Date 9/20/2007

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Attachment C - Flammable Mass Calculation

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Attachment C - Flammable Mass Calculation

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