UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station	)	
Units 1 and 2)	)	

APPLICANT'S ANSWERS TO INTERVENORS R. L. ANTHONY AND FOE FIRST SET OF INTERROGATORIES ON PIPELINE CONTENTIONS

DISCOVERY 10
AUGUST 9, 1983

Interrogatory No. 1

Please disclose all records of negotiations with the following pipelines re the Limerick site: ARCO, Columbia Gas, U.G.I., Transcontinental Gas, Mobil Oil, Texas Eastern, and Philadelphia Electric - Gas Division. ER0L Fig. 2.1-8.

Answer

The only company with which PECo. has had negotiations with is ARCO. A copy of the resulting agreement is available.

(Designated Discovery 10, Item 1).

Participants in Preparation of Answer

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Interrogatory No. 2

What record does PECo. have of the number of ruptures and valve and other failures for the pipelines of these companies and over what time span?

Answer

PECo. has no such records.

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Interrogatory No. 3

Has PECo. secured such records from the Penna. PUC Dept. of Safety and Compliance and/or the U.S. Dept. of Transportation, Pipeline Safety Department? From the companies?

Answer

No

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Interrogatory No. 4

Did PECo. confer with the two agencies above before choosing the Limerick site or subsequently?

Answer

No

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Please submit a record of all contacts with these two agencies relative to Limerick, and record of products transported in the past and at present.

Answer

PECO has no records of contacts with the two agencies listed above regarding the Limerick site.

The products being transported through the subject pipelines are listed in the FSAR Table 2.2-2.

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What contacts has PECo. had with any branch of the NRC or AEC relating to pipelines adjacent to a nuclear power plant and the licensing of other plants?

Answer

None aside from the General Guidance required by Regulatory Guides 1.70 and 1.91.

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Has PECO raised the issue of pipelines next to the Limerick site with NRC, AEC or any U.S. state or local authority?

Answer

PECO has raised the issue of pipelines next to the Limerick site in PSAR Section 2.2 , SARA Section 7.3, and during a site visit with the NRC staff on August 17, 1982.

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Interrogatory No. 8

Has PECo. discussed relocation with any of the above agencies or the companies?

Answer

No.

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Interrogatory No. 9

Has the exact location of the ARCO pipeline up to now been made certain?

Answer

The location of the ARCO pipeline has been determined with sufficient certainty through surveys and input from ARCO for the analysis to be performed.

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Interrogatory No. 10

Could it actually be 200 ft. or 400 ft. closer to the plant than shown on Figure 2.4-12?

Answer

The figure referenced should be 2.4-1 and the pipeline is not 200 ft. or 400 ft. closer than shown.

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Interrogatory No. 11

Is it exposed where it crosses Possum Hollow Run?

Answer

No.

Participants in Preparation of Answer

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Interrogatory No. 12

Did any drilling or excavation on the site or PECo. property strike or uncover the pipe?

Answer

No.

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Interrogatory No. 13

Has it been ruptured by PECo. during the work at Limerick?

Answer

No.

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Interrogatory No. 14

What record is there regarding PECO's search for the pipeline location.

Answer

Documents in response to this interrogatory are Limerick Generating Station Site Plan No. AB-207392-4, Field Survey Notes, Limerick PL Stakes, Control Monuments for Schuylkill Crossing Site, and Christman to Leonard letter dated June 7, 1979. (Designated Discovery 10, Item 14).

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Interrogatory No. 15

Has its relocation been considered with ARCO?

Answer

No. See also response to Interrogatory 1.

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Interrogatory No. 16

At what elevations and what distances from the rupture are these high points?

Answer

The high points of land in question are approximately 1400 feet north and 800 feet south of the point where the APCO pipeline crosses Possum Hollow Run. The respective elevations are 272 feet and 246 feet above mean sea level, while the elevation of Possum Hollow Run at the point of pipeline crossing is approximately 166 feet msl.

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Interrogatory No. 17

The isolation valve north of Limerick is 8 miles. FSAR Table 2.2-2; the valve south is not recorded, only the river crossing valves.

Answer

The river crossing valves serve an isolation purpose. The location of the valve in the ARCO pipeline south of the Schuylkill River is not pertinent to the analysis performed since they are outside the portion of the line which would drain.

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Interrogatory No. 13

Is the high point north at the isolation valve 8 miles away?

Answer

No. The high point to the north used in the analysis is stated in response to Interrogatory 16.

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Interrogatory No. 19

How long will it take manually to reach and turn the valves at the river, and north 3 miles?

Answer

Based upon a telephone conversation with the Area Regional Manager of ARCO Pipeline, crews could be on the scene in 20 to 30 minutes. See telecon record, Walsh to Klein. (Designated Discovery ID, Item 19).

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Interrogatory No. 20

Will gasoline not be draining from both directions, even from the line south of the river as well as north, both sides being higher than the rupture?

Answer

The analysis incorporates the assumption that all of the gasoline in the line between the adjacent high points of land 1400 feet to the north and 600 feet to the south of Possum Hollow Run drains into the creek bed. See letter Walsh to McDaniel, and Calculation Sheet titled "Explosion of Gasoline". (Designated Discovery 10, Item 20).

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Interrogatory No. 21

After the valves are shut will the fuel not continue to "drain from the high points", especially to the north?

Answer

Drainage of gasoline between the adjacent high points of land will continue whether or not the valves close, until all of the gasoline between the high points 1400 feet to the north and 600 feet to the south has drained into the creek bed. See Calculation Sheet titled "Explosion of Gasoline". (Designated Discovery 10, Item 20).

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Interrogatory No. 22

Will the drain "empty the 8 miles of pipe or at least several miles of it?

Answer

No. Only approximately 2,000 feet (0.38 miles) of pipeline will drain under the circumstances of the hypothetical rupture. See Calculation titled "Explosion of Gasoline". (Designated Discovery 10, Item 20).

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Interrogatory No. 23

Is not the capacity of an 8 inch pipe something over 13,700 gallons per mile?

Answer

Yes. The capacity per mile of an 8 inch pipeline is approximately 13,788 gallons of gasoline. See Claculation titled "Explosion of Gasoline". (Designated Discovery 10, Item 20).

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Interrogatory No. 24

Should PECO's estimate of 5,000 gallons of gasoline drainage from the rupture not be revised upward to a more realistic figure of at least 20,000 gallons or even 30,000 gallons or more?

Answer

No. As discussed above, only 2,000 feet of the pipeline is drained, releasing approximately 5,000 gallons of gasoline. See Calculation titled "Explostion of Gasoline". (Designated Discovery 10, Item 20).

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Interrogatory No. 25

Does not the estimate of 5,000 gallons make the calculation of overpressure from the explosion in error by at least 4 or 5 times and possibly 10 times or more?

Answer

The peak reflected overpressures are calculated based on the correct volume of released gasoline (5,000 gallons). See Calculation titled "Explosion of Gasoline". (Designated Discovery 10, Item 20), Calculation titled "Explosion Analysis" (Designated Discovery 10, Item 25), and Walsh to Elias memorandum dated July 23, 1979 (Designated Discovery 10, Item 25).

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Interrogatory No. 26

Will fire from the rupture and explosion not spread and burn for several hours from the 30,000 or more gallons which "can drain from the high points" by gravity without benefit of siphoning.

Answer

No. Only approximately 5,000 gallons of gasoline would be released under the circumstances of the hypothetical rupture. See Calculation titled "Explosion of Gasoline". (Designated Discovery 10. Item 20).

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Interrogatory No. 27

What is the basis for and where are the calculations to substantiate a radiant heat load of 95 Btu per square foot per hour at the reactor enclosure "for a short time"?

Answer

The calculation methodology is provided in API RP521, "Guide for Relief and Depressuring Systems". See Walsh to Elias memorandum dated July 23, 1979 (Designated Discovery 10, Item 25) and Calculation titled "Radiant Heat", (Designated Discovery 10, Item 27).

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Interrogatory No. 28

What specific number of minutes constitutes "a short time"?

Answer

A "short time" was taken to be approximately one hour or less.

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Interrogatory No. 29

Is not the estimate of 30,000 gallons of gasoline, or more, from the rupture (above) a more plausible base for calculations?

Answer

No. Please refer to the responses to Interrogatories 16, 20, 21, 22, 24, and 26.

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Interrogatory No. 30

On such a basis would the radiant heat load on the reactor enclosure not be at least 5 times the load of 85 Btu. and possibly 10 times or more?

Answer

No. The correct number is 5,000 gallons. In addition, radiant heat depends on burning rate, distance to the receptor, and fraction of heat radiated, rather than total amount of fuel combusted. 85 Btu per square foot per hour is the correct value for this hypothetical release of gasoline. See response to NRC Question 311.13. Also see Calculation titled "Radiant Heat" (Designated Discovery 10, Item 27), Walsh to Driski telecon, Walsh to McDaniel letter, and Walsh to Godsey telecon, (Designated Discovery 10, Item 30).

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Interrogatory No. 31

And would not this radiant heat load impact the diesel generator enclosures and the diesel fuel storage equally, and accumulate and generate over several hours?

Answer

Radiant heat impinging on the diesel generator enclosures will gradually warm the surface layer of the material from which these structures are constructed. The diesel fuel storage tanks are buried and would not be subject to radiant heat from a fire. As a matter of perspective, the warming rate of 95 Btu per square foot per hour should be compared to 440 Btu per square foot per hour, which is the human threshold of pain at that exposure rate, or to a rate of 50 to 60 Btu per square foot per hour from the sun at midday under a cloudless sky. See Calculation titled "Radiant Heat", (Designated Discovery 10, Item 27).

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How long would it take to manually close the valves at the Columbia pipeline crossing of the river and at Parkerford and Fegleysville? (FSAR Table 2.2-2)

Answer

The applicant did not determine the period of time required to manually close the Columbia pipeline valves at the river crossing and at Parkerford and Fegleysville. See Walsh to Mohr telecon dated 7/20/83. (Designated Discovery 10, Item 32).

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Interrogatory No. 33

How far would rupturing draw gas from both sides of the rupture before the river crossing valves are closed 5 to 10 miles both north and south?

Answer

The closest manual valves are respectively 0.73 miles south and 4.32 miles north of the Schuylkill River crossing. The compressor stations on either side of the river crossing are at Eagle, 7.5 miles south, and near Easton, 37.6 miles north. It is conceivable that the entire contents of the pipeline between adjacent compressor stations could be released. This is approximately 45 miles of pipeline, or approximately 40 million cubic feet of gas. Gas would flow out of both ends of the rupture for approximately 25 minutes, which is the time it takes to empty the 7.5 mile segment. Gas would then continue to flow at half the original rate from the 37.6 mile segment for another 200 minutes. See Walsh to Mehr telecon dated 7/21/83. (Designated Discovery 10, Item 33).

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Interrogatory No. 34

Would burning then not continue to drain all the contents of the line from the river crossing to the isolation valve one mile southeast of Pegleysville?

Answer

No. See response to Interrogatory 33, above.

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Interrogatory No. 35

Is the capacity of the 20 inch pipe approximately 2.18 cu. ft. per linear foot, or considerably more than 2.1° @ 1,000 psig pressure?

Answer

The volume of gas at any pressure in a one-foot length of 20 inch pipe is 2.182 cubic feet.

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Interrogatory No. 36

At this rate would not approximately 11,500 cu. ft. of gas be contained per mile of pipe as a minimum?

Answer

Yes, at a pressure of 1,000 psig.

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Interrogatory No. 37

And would not a reasonable estimate for 2-1/2 miles of pipe from the river to the Fegleysville valve be approximately 23,600 cu. ft. to drain from the rupture?

Answer

No. The correct volume would be approximately 29,500 cu. ft. for a 2.5 mile pipeline segment.

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Interrogatory No. 38

Is not the FSAR estimate of "70 Btu per sq. ft. per hour for a short time" altogether inadequate?

Answer

The applicant considers the analysis to be adequate for its purpose. See Calculation titled "Radiant Heat", (Designated Discovery 10, Item 27).

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Interrogatory No. 59

How many minutes constitute "a short time"?

Answer

For purposes of the Natural Gas line calculations, "a short time" was taken to be in the order of an hour or less.

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Interrogatory No. 40

Would a reasonable estimate be that a fire fed by at least 23,600 cu. ft. of gas would continue for several hours and generate 10 and even up to 20 times the 70 Btu figure above?

Answer

No. The fire would burn at one rate for 25 minutes, and at half that rate for an additional 200 minutes (see response to Question 33). Radiant heat would impinge on the nearest structures at a rate of 68 (approximately 70) Btu per square foot per hour for 25 minutes, and at a rate of 34 Btu per square foot per hour for the remaining 200 minutes. See Calculation titled "Radiant Heat". (Designated Discovery 10, Item 27).

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Interrogatory No. 41

Would not this heat load be capable of impacting the diesel generator enclosures and the diesel tanks to the flash point of the diesel fuel?

Answer

No. Please refer to the response to Interrogatory 31.

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COMMONWEALTH OF PENNSYLVANIA :

ss.

COUNTY OF PHILADELPHIA :

V. S. Boyer, being first sworn, deposes and states:

That he is Senior Vice President of Philadelphia Electric Company, the Applicant herein; that he has read the foregoing Applicant's Answers to Intervenors R. L. Anthony and FOE First Set of Interrogatories on Pipeline Contentions and knows the contents thereof; and that the statements and matters set forth therein are true and correct to the best of his knowledge, information and belief.

V. S. Boyer
Senior Vice President

Subscribed and sworn to
before me this 5th day
of August, 1983.

Patricia D. Scholl
Notary Public

PATRICIA D. SCHOLL
Notary Public, Philadelphia, Philadelphia Co.
My Commission Expires February 10, 1986