

December 22, 2009

United States Nuclear Regulatory Commission  
Region IV  
612 East Lamar Blvd  
Arlington, Texas 76011-8064  
Attention: Richard Leonardi

License: 49-04295-01  
Docket: 030-06794

Dear Mr. Leonardi;

In response to your request of 12/21/2009, set forth below are the potential doses to individuals in the P-34 nuclear density gauge area. These dose calculations are based on conservative assumptions.

The Berthold Service tech arrived and climbed the ladder to get access to the gauge. He measured 642 mRem/h with his survey meter immediately below the gauge next to the pipe. This was as close as a person could safely access the gauge. The radiation worker was approximately twice this distance when he attempted to shut the shutter mechanism. The radiation worker read 200 mRem/h, the maximum scale of the survey meter, at a distance approximately one foot away from the source holder. Based on the Berthold technician's reading, we estimate that the FMC radiation worker was at a dose rate area of 160 mRem/h ( $642 \text{ mRem/h} \times \frac{1}{4}$  (inverse square law)) instead of 200 mRem/h. For the below calculations, we are using a more conservative 200 mRem/h dosage for the following calculations unless otherwise stated.

Four Sesqui Production Operators

Assumptions: Each operator was responsible for cleaning the area on his shift. The clean-up took a total of 1.5 hours to complete each day for a total of 52 shifts from 9/3/2009 to 12/17/2009 at a recorded intensity of 0.8 mRem/h in the area.

$$78 \text{ h} \times 0.8 \text{ mRem/h} = 62.4 \text{ mRem}$$
$$\text{Total Dose} = 62.4 \text{ mRem or } 0.000624 \text{ Sv}$$

Mechanic lubricator

Assumptions: The same mechanic responsible for lubricating P-34 pump bearings 1 hour a day for 46 total days from 9/3/2009 to 12/18/2009 at a recorded intensity of 0.8 mRem/h in the area.

$$1 \text{ hour/day} \times 46 \text{ days from } 9/3/2009 \text{ to } 12/18/2009 @ 0.8 \text{ mRem/h} = 36.8 \text{ mRem}$$
$$\text{Total Dose } 36.8 \text{ mRem or } .000368 \text{ Sv}$$

Two Hydroblasting Contractors (North American Industrial Services)

Assumptions: On 9/23 through 9/24/2009 for a total of 8 hours contractors were hydroblasting the pipeline at a distance of 8.5' away from defective source holder.

$$200 \text{ mRem/h} \times 1/(7.5 \text{ ft})^2 \times 8 \text{ hrs} = 28.4 \text{ mRem}$$
$$\text{Total Dose} = 28.4 \text{ mRem or } 0.000284 \text{ Sv}$$

Radiation worker

Assumptions: The radiation worker was assigned along with two electricians to move the DI-P34 nuclear gauge to a new location on the line. Upon ascending the ladder, he read a 200 mRem/h dose rate on the TN 200X survey meter. Meanwhile, the electricians stayed below and received a lesser dose. The second 5 minute period was used to gather data for the electricians installing the conduit and cabling for dose rate calculations and 3 hours of intensity 0.8 mRem/h to install flagging and assist the Berthold technician with removal of the source holder.

5 minutes X 1h/60 min X 200 mRem/h = 16.7 mRem  
5 minutes X 20 mRem/h = 1.7 mRem  
3 hours X 0.8mRem/h = 2.4 mRem  
Total Dose = 20.8 mRem or 0.000208 Sv

Mechanical Contractors (Redi Project Services LLC)

Assumptions: Contractors had their tool box located within the flagged in area and had been gathering tools from the box for a period of 5 days while repairing the dissolver tanks (located outside the area) the contractors spent 1 hour per day in an intensity of 3.6 mRem/hr gathering and putting away tools until the area was flagged off. The total time in area from 12/14/2009 to 12/17/2009 would be 4 hours.

4h X 3.6 mRem/h = 14.4 mRem  
Total Dose = 14.4 mRem or 0.000144 Sv

Two Electricians

Assumptions: Two electricians were assigned to work with the radiation worker to move the gauge. The electricians had initially climbed the ladder to identify the bolt size of the bracket and spray the nuts with a lubricant to free up the nuts. The electricians remained below the pipe at all times. However, we are conservatively using the 200 mRem/h dose rate to approximate their exposure. The additional 1 hour of exposure at 0.8 mRem/h was incurred while they were prepping the job for removal of the gauge from the ground level.

5 Minutes X 1h/60 min X 200 mRem/h = 16.7 mRem  
1 hour X 0.8 mRem/h = 0.8 mRem  
Total Dose = 17.5 mRem or 0.000175 Sv

Two Electricians

Assumptions: Two electricians installed cable and conduit for the meter move to a different location on the dissolver piping outside the area of concern.

10 Minutes X 1h/60 min X 20 mRem/h = 3.3 mRem dose  
Additional area exposure on ground floor 0.8 mRem/h X 5 hrs = 4 mRem  
Additional gauge calibrations on ground floor 1.0 mRem/h X 8 hrs = 8 mRem

Total dose 15.3 mRem or 0.0000153 Sv

Radiation Safety Officer

Assumptions: The radiation safety officer was notified as soon as the radiation worker observed the anomaly on the survey meter. The radiation safety officer investigated the reported defective source holder, installed flagging to cordon off the area to less than a 2 mRem/h intensity, took photographs, gathered dose rate information, and later assisted the Berthold technician in repair of the source holder.

3 Hours X 0.8 mRem/h = 2.4 mRem  
Total Dose = 2.4 mRem or 0.0000024 Sv

I trust that this is responsive to your request dated 12/21/2009. Please contact me if you need any additional information.



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