



Texas Department of Health

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April 14, 2000

Ms. Tracy Kime
Source Containment and Devices Branch
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Document Control Desk
P1-37
Washington, D. C. 20555

Dear Ms. Kime:

Enclosed is the custom device sheet TX1111D101S for The Dow Chemical Company Models Polyethylene 2 and Polyethylene 4 high pressure separators. This device sheet has been issued to describe the gauging applications in the high pressure separators used in the manufacture of polyethylene. We would appreciate you distributing copies of this sheet to the other State Programs and NRC Regions, as appropriate.

Thank you for your cooperation and efforts.

Sincerely,

Floyd R. Hamiter, Project Leader
Advanced Technology Licensing
Division of Licensing, Registration
and Standards
Bureau of Radiation Control

Enclosure

NM5502
public

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: TX1111D101S

DATE: April 12, 2000

PAGE 1 OF 4

DEVICE TYPE: Source Housing - High Pressure Separator

MODEL: Polyethylene 2 and Polyethylene 4

MANUFACTURER/DISTRIBUTOR: The Dow Chemical Company (manufacturer)
2301 North Brazosport Boulevard
Freeport, TX 77541

C.E. In-Val-Co (distributor)
P.O. Box 556
Tulsa, OK 74101

SEALED SOURCE MODEL DESIGNATION: 3M Model 4P6E
3M Model 4F6P
3M Model 4F6S

<u>ISOTOPE:</u>	Cs-137	<u>MAXIMUM ACTIVITY:</u>	360 mCi
	Cs-137		1.0 Ci
	Cs-137		1.5 Ci

LEAK TEST FREQUENCY: 36 months

PRINCIPAL USE: Gamma Gauges (D)

CUSTOM DEVICE: X YES NO

CUSTOM USER: The Dow Chemical Company
2301 North Brazosport Boulevard
Freeport, TX 77541

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DEVICE TYPE: Source Housing - High Pressure Separator

DESCRIPTION: There are two high-pressure separators in each polyethylene process string. Each of these separators has several Cs-137 sources installed inside the vessel to assist in measuring levels, densities and interfaces within the vessel. The construction of the two high-pressure separators is identical in each process string and varies slightly from Polyethylene 2 to Polyethylene 4.

In the case of Polyethylene 2, the source tube has a 1.0 Ci strip source in the lower portion of the source tube with a 300 mCi point source about one foot above the strip source. Steel rods are used to separate the sources and insure the positioning of the sources within the source tube. The detector is located outside the vessel.

In the case of Polyethylene 4, the source tube has a series of four 360 mCi sources in the lower portion of the source tube with a 1.5 Ci point source above these sources. Steel rods are used to separate the source and insure the positioning of the sources within the source tube. The level detector is located outside the vessel.

In each design, the source tube is installed inside a source well that extends the full length of the separator vessel. The source tube is positioned from the top of the well by cable. The separator wall, a high-quality welded steel, is about 6.5 inches thick. The vessel has an internal diameter of 3.5 feet and is approximately 20 feet tall. The source well is 1 ¼ inch schedule 80 steel pipe that runs the length of the separator six inches from the centerline of the separator. The sources are housed inside a ¾ inch tube that is positioned inside the source well. A ⅝ inch thick steam jacket wraps the separator with a 1 ½ inch thick insulation barrier outside that.

Each high pressure separator is located inside a concrete blast wall building, which provides a security barrier.

LABELING: A brass tag provides a Dow identification number that references the type(s), size(s) and number of sources located in the vessel. This tag is attached to the source well. Another label displaying the source manufacturer and the serial numbers of the sources is also attached. Access to each vessel is gained through locked doors which are posted with "CAUTION - RADIOACTIVE MATERIAL" signs.

DIAGRAM: See Attachments.

CONDITIONS OF NORMAL USE: Operating at a temperature of 200° C and a pressure of 3500 psig, the high pressure separator is designed for extended periods of use with a minimum of maintenance and care. The sources are protected from the environment inside the vessel by virtue of being inside the source well.

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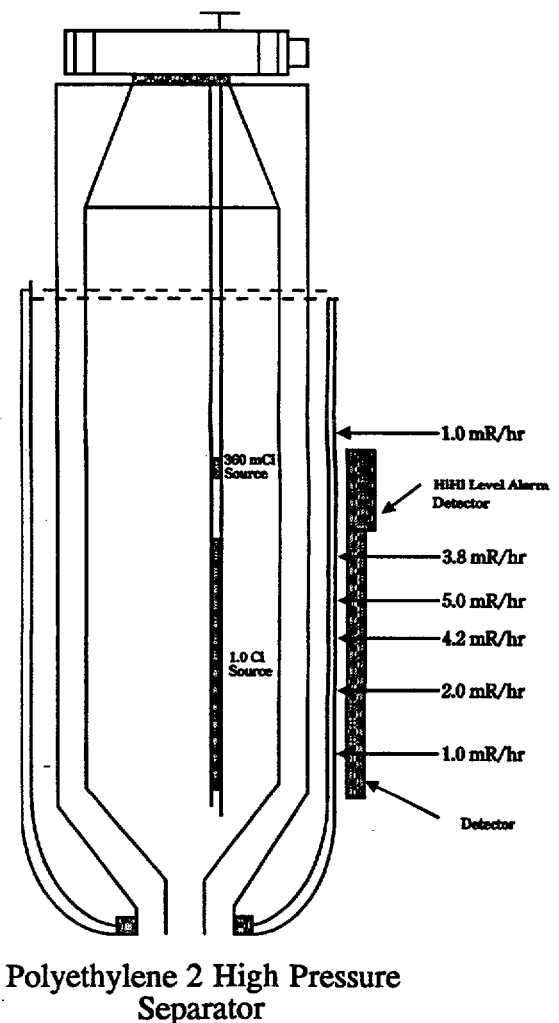
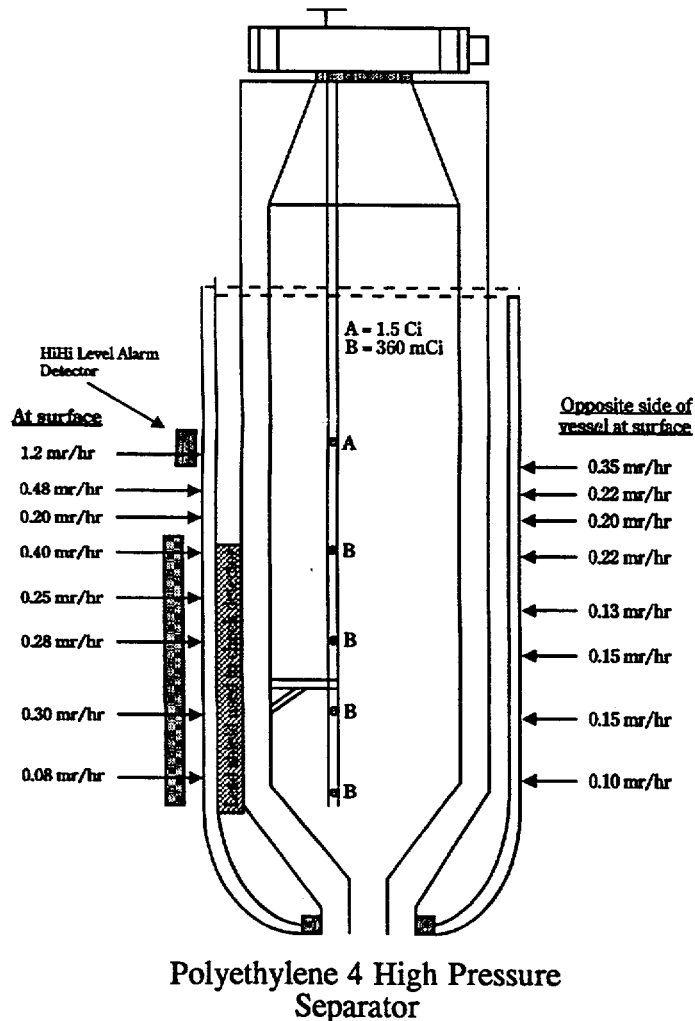
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DEVICE TYPE: Source Housing - High Pressure Separator

CONDITIONS OF NORMAL USE (Cont'd): Because these device are used in a highly volatile process, there is always a potential for explosion. Each vessel is placed inside a a concrete blast barrier building which is designed to reduce the effects of a blast. Each sealed source has an ANSI classification of 77C53346 or better. This would indicate that the source would survive this potential explosion and subsequent fire.

PROTOTYPE TESTING: This device design has been in operation for over 30 years. There are no prototypes.

EXTERNAL RADIATION LEVELS: The drawings below provide an indication of radiation fields around the two different designs. The surveys were performed using a Ludlum Model 3 with a side-window GM-tube.



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DEVICE TYPE: Source Housing - High Pressure Separator

QUALITY ASSURANCE AND CONTROL: These are custom devices constructed to specific requirements.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- These devices are required to run continuously for two year periods between routine maintenance. Because of this schedule and the fact that the sources are in an isolated environment, an extended leak test interval of 36 months is granted.
- During routine maintenance of the high pressure separators, the sealed sources must be removed from the source well and placed in a shielded position away from the separator.

SAFETY ANALYSIS SUMMARY: This device was found to provide a safe method of making density, level and interface measurements during normal operations. The Radiation Safety Officer has control over maintenance operations and repair crews are provided specific training for these devices.

REFERENCES:

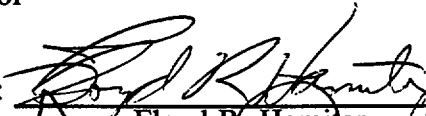
The following supporting documents for The Dow Chemical Company are hereby incorporated by reference and are made a part of this registry document.

- a letter dated May 17, 1999, and
- a letter dated December 21, 1999 with all associated drawings, documents and procedures.

ISSUING AGENCY: Texas Department of Health
Bureau of Radiation Control

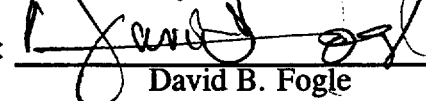
Date: April 12, 1999

Reviewer:


Floyd R. Hamiter

Date: April 12, 1999

Concurrence:


David B. Fogle

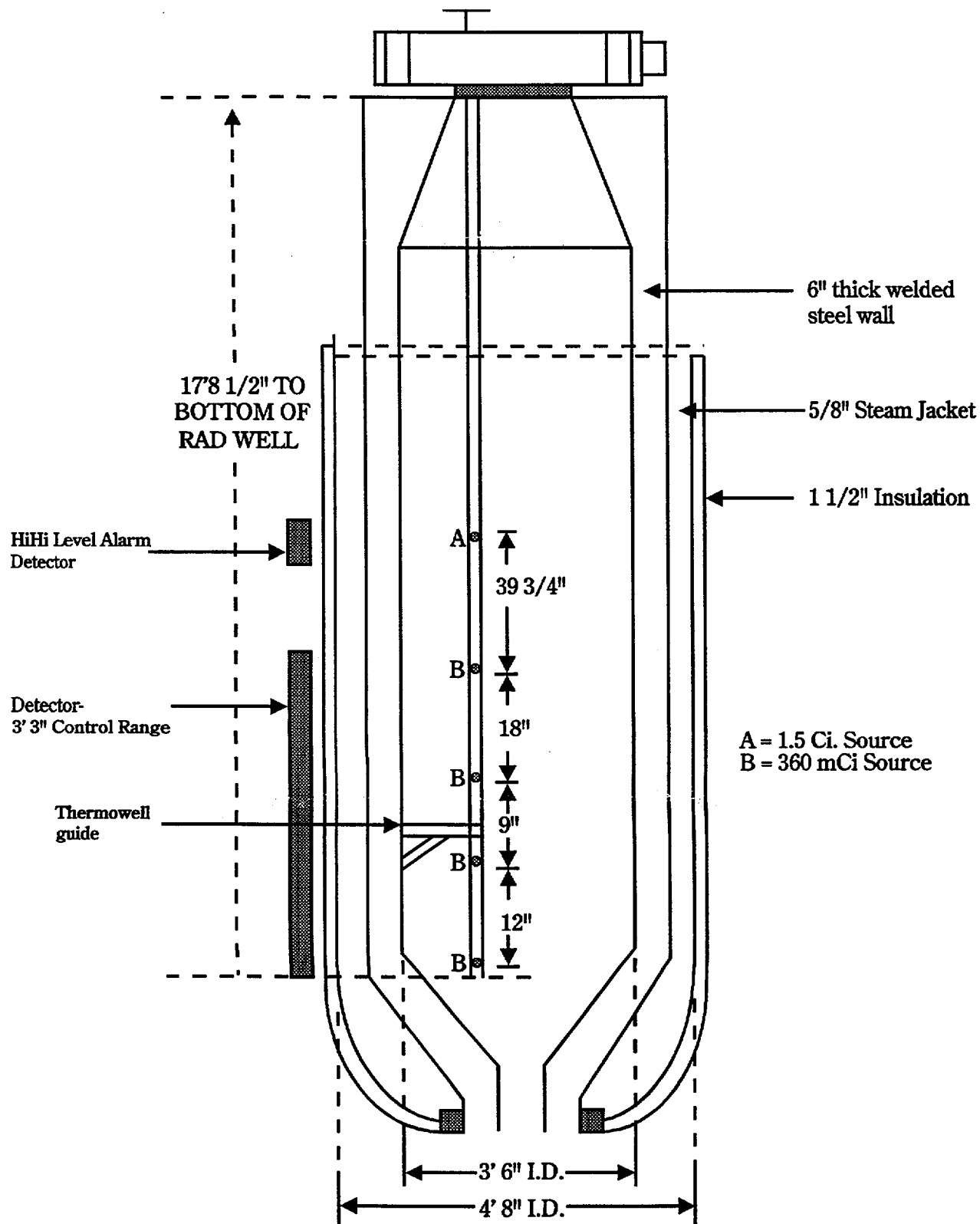
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ATTACHMENT 1



A = 1.5 Ci. Source
B = 360 mCi Source

Polyethylene 4 High Pressure Separator

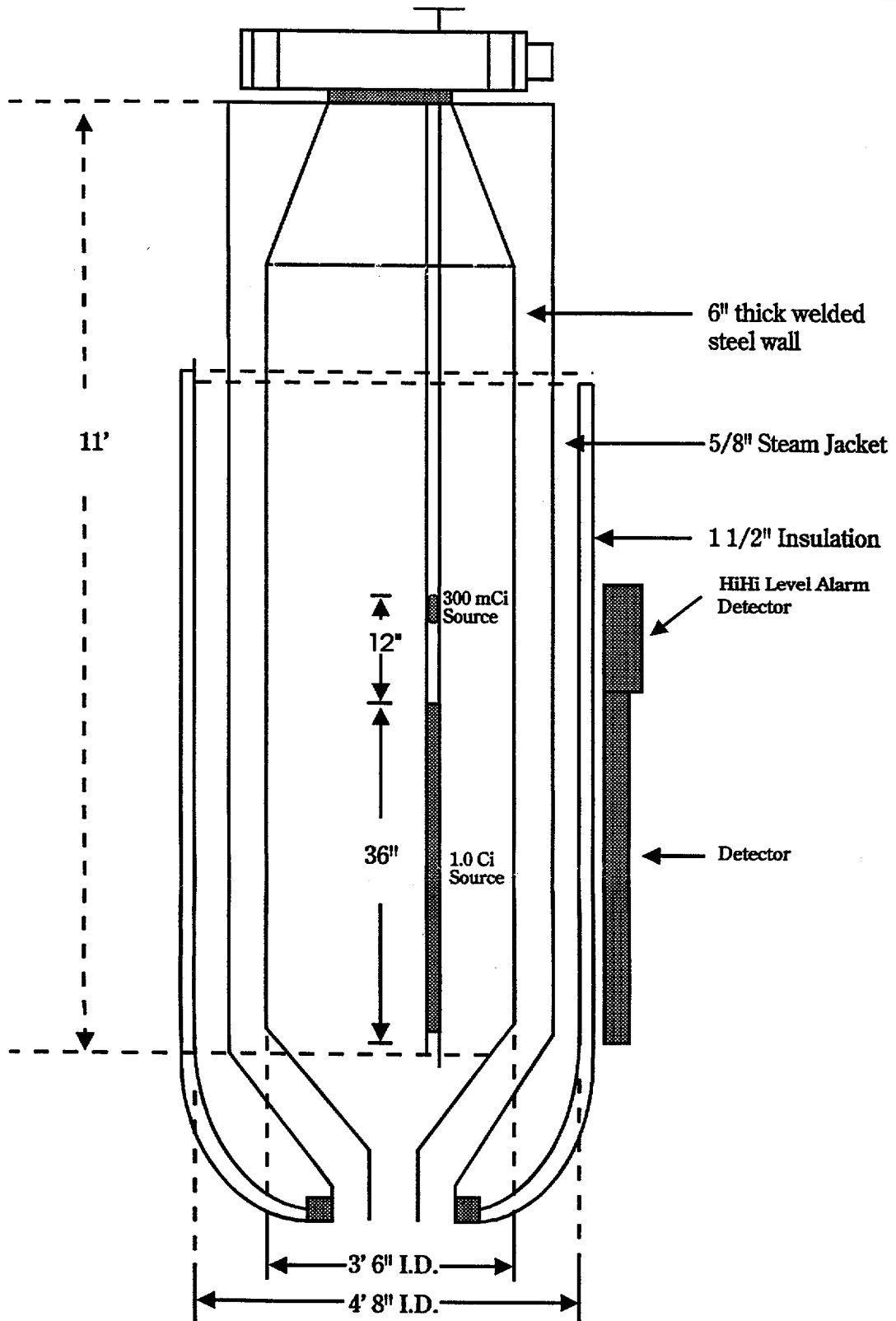
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ATTACHMENT 2



Polyethylene 2 High Pressure Separator