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Plant
Hematite, Missouri

April 14, 1960

DOCKETED
USAEC
APR 18 1960
Division of
Licensing & Regulation
Docket Officer

Mr. J. C. Delaney
Licensing Branch
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

SUBJECT: Special Nuclear Material License No. 33

Dear Mr. Delaney:

This letter is a request for an extension of our special nuclear material license No. 33 to include the uranium recovery process discussed herein. We desire to use this process for recovering the uranium content from scrap material of any U^{235} enrichment.

In essence, the recovery process involves:

1. Dissolving the scrap material in nitric acid.
2. Extracting the uranium content from this acid solution.
3. Precipitating the extracted uranium.
4. Filtering the precipitate.

Figure I at the end of this letter shows a plane view of the vessels to be used in the extraction and precipitation operations. Vessel dimensions and vessel separation distances are given on this figure.

Initial dissolving of the scrap material will be done in tanks having safe volumes--conforming to data in Table XIII, p. 21, K 1019, Fifth Revision. Each batch of scrap that is dissolved will be limited to a safe mass of U^{235} as listed in Table XIV, p. 22, K 1019, Fifth Revision. The "scrap" solution that is formed will be poured into the tank system shown in Figure I. Here the uranium content will be extracted, precipitated,

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[illegible]

I. Solid angle calculations

1. Solid angle subtended by tank [illegible] (see Fig. 1).

$$\Omega_x = \frac{2a_x}{\pi x} \sin \theta_x$$ Method [illegible], Appendix 3, K 1019, Fifth Revision

x indicates vessel 1, 2, 3, etc.

(a) By vessel 1:

$$\Omega_1 = \frac{2\,(5)}{(30.5)} \quad \frac{(38)}{\sqrt{(30.5)^2 + (38)^2}} =$$

$$\frac{380}{(30.5)\,(48.74)} = .256 \text{ steradians}$$

(b) By vessel 2:

$$\Omega_2 = .118 \text{ steradians}$$

(c) By vessel 3:

$$\Omega_3 = .176 \text{ steradians}$$

(d) By vessel 4:

$$\Omega_4 = .062 \text{ steradians}$$

(e) By vessel 5:

$$\Omega_5 = .321 \text{ steradians}$$

(f) By vessel 7:

$$\Omega_7 = .358 \text{ steradians}$$

(g) By vessel 8:

$$\Omega_8 = .458 \text{ steradians}$$

[illegible]

[illegible]

[illegible] tank 5:

Ω_{total} = [illegible] steradians

2. Solid angle subtended at tank 2:

Ω_{total} = 1.443 steradians

(NOTE: Method of calculation is the same as in I.1)

3. Solid angle subtended at tank 7:

Ω_{total} = 1.007 steradians

NOTE: Method of calculation is the same as in I. 1 and I. 2 except for drum 8. For drum 8, method A. 4 a, Appendix 3, K 1019, Fifth Revision, is used:

$$\Omega_8 \text{ top} = \frac{a\ b\ \cos\ \theta}{q^2}$$

where a = b = diameter of tank 8

and

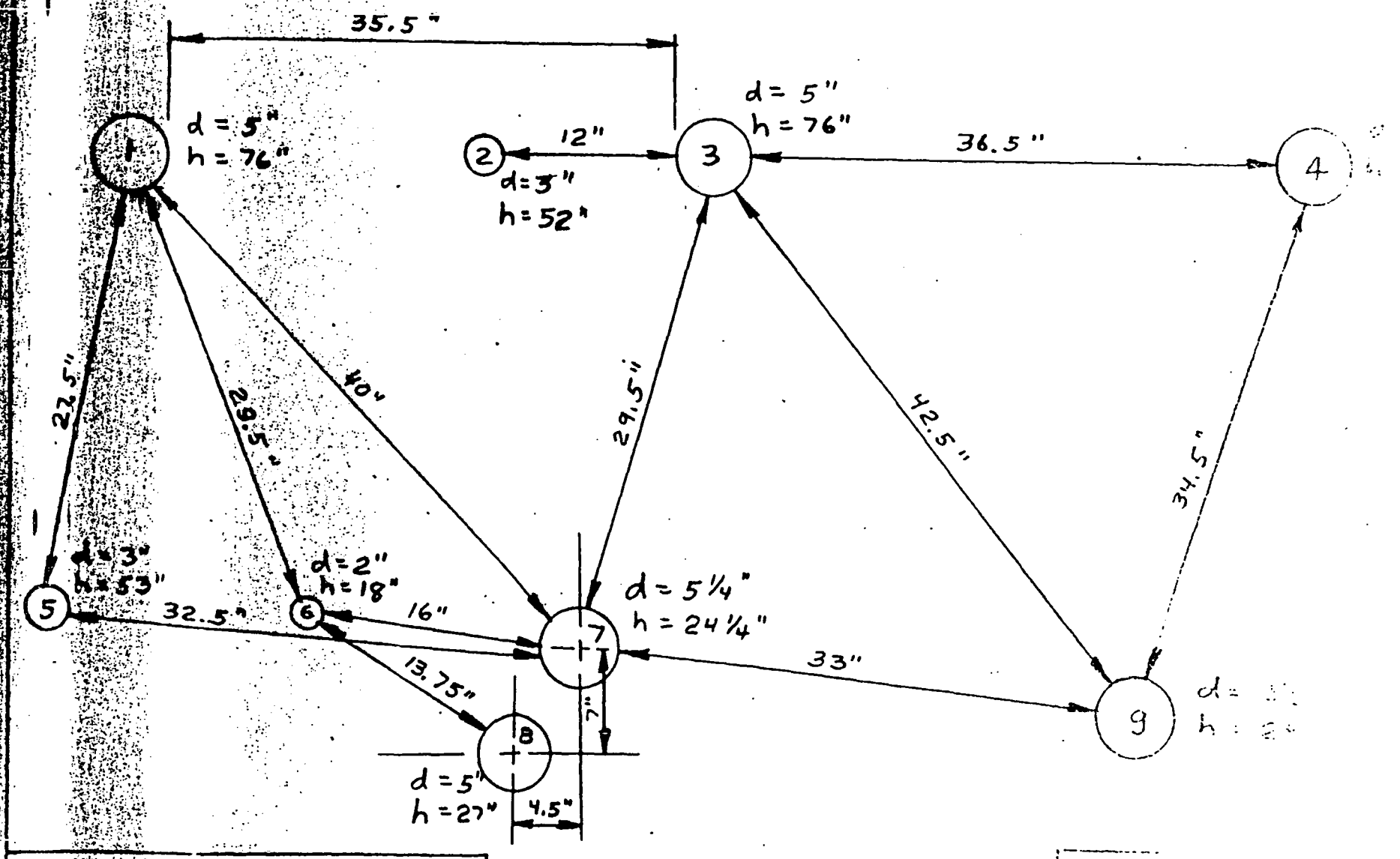
$$\Omega_8 \text{ side} = \frac{a\ b\ \cos\ \theta}{q^2}$$

where a = diameter of tank 8.

b = height of tank 8.

4. Solid angles subtended at the other tanks would be less than those subtended at tanks 2, 6, and 7 because of obvious dimensional and geometric considerations.

FIGURE 1



Nomenclature:
1. d = diameter
2. h = cylinder height