

MARTIN COMPANY

Baltimore
Maryland
21203

January 31, 1967

Refer to: ACC-535
CWK:845

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. W. H. Ray
Irradiated Fuels Branch

Subject: Proposed Amendment to Byproduct License
No. 19-1398-29 - Additional Information

Reference: (a) Martin letter to A. Aikens from C. W. Keller
dated November 11, 1966 (ACC-517)

Gentlemen:

We are pleased to supply additional information which will permit you to continue your review of our recent application which requests reduced surveillance of our Quehanna Pennsylvania facilities at the time of the completion of clean-up activities.

I. Possession Limit

We have established a possession limit for the Quehanna facilities of 1 curie Strontium-90 and associated fission products. We have performed an analysis using existing conditions and valid assumptions and have determined that the best estimated value is 200 mc Strontium-90 remaining after completion of clean-up of the facilities. We have attached a summary of our analysis which supports our proposed possession limit.

II. Instrument Calibration and Check Sources

We will not maintain any inventory of instrument check sources at the Quehanna facilities after close down of the facilities. Such sources which will be used during our periodic inspections will be supplied from off site.

DUPLICATED
FOR DIV. OF COMPLIANCE

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A DIVISION OF
MARTIN
MARIETTA

Mr. W. H. Ray
Irradiated Fuels

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III Decontamination and Restoration Criteria

We request that Section II Part B Item 10 of our referenced application (Reference a) be changed to read:

"10. The Cell-4 exhaust ventilation line will not be sealed off at the filter housing located behind the Cell-4 annex wall. A new absolute filter will be installed at this point thus permitting the system to equalize to pressure changes caused by changes in atmospheric conditions."

Thank you for your usual excellent cooperation in finalizing this proposed amendment to Byproduct License 19-1398-29.

Very truly yours,

Martin Company
MARTIN-MARIETTA CORP.
Baltimore, Maryland

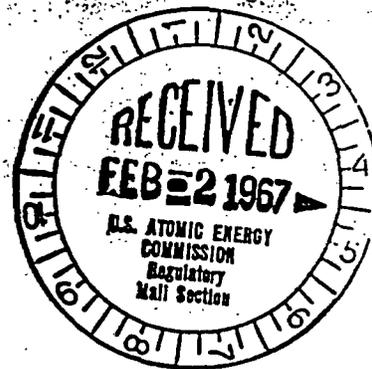


C. W. Keller, Nuclear
Accountability & Licensing
Representative

/plm



RESIDUAL RADIOACTIVITY ESTIMATE
FOR
QUEHANNA FACILITY
AFTER CLEANUP IS COMPLETED



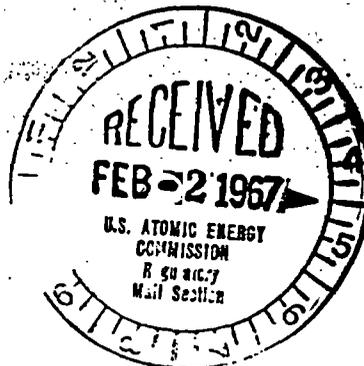
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**Residual Radioactivity Estimate for Guehanus
Facility after Cleanup is Completed**

Assumptions:

1. **Surface Radiation Readings** - The relationship of disintegrations per minute to mr/hr was determined by experiment to be:
 $1 \text{ mr/hr} = 20,000 \text{ dpm} = 9,000 \text{ uc Sr}^{90}\text{-Y}^{90}$
2. Radiation readings were made with a CS-40A NUCOR survey meter at contact where possible. The window thickness was 60 mg/cm^2 . The diameter of the window was 3.5 in. The end window area - 9.6 sq. in. The radiation resulting in the meter reading was assumed to come only through the area of the end window. The number of end window areas per sq. ft. is 15.
3. In general the lower third of the cells were the most contaminated. These areas were decontaminated to less than 100 mr/hr with some localized hot spots to 1000 mr/hr. The upper two-thirds of the cell were generally less than 20 mr/hr. In the calculations it is assumed that the entire cell surfaces is 100 mrad/hr and the isolation area surfaces emanate 10 mr/hr.
4. The ventilation ducting is assumed to be 1000 mr/hr, although no radiation is detectable from the ducting where it is exposed in the Fan room (approx. 50% of it).
5. In liquid systems - processing and drain - the relationship between survey measurements and uc of Sr-90-Y⁹⁰ is approximately 1.0 mr/hr per 10^{-2} uc/ml in a 100 ml sample contained in a polyethylene bottle. The LL drain system solution analysis is $5 \times 10^{-5} \text{ uc/ml}$. 1100 gallons of solution is estimated to be required to decontaminate to the release values ($1 \times 10^{-7} \text{ uc/ml}$). In calculation it is assumed that all 1100 gallons will analyze to $5 \times 10^{-5} \text{ uc/ml}$.
6. The Process Liquid System is estimated to be clean if another 200 liters of solution were added. It is assumed that all the 200 liters would average what the last analysis indicated. That was 10^{-2} uc/ml .
7. In the calculations for the drybox, it is assumed that the box surfaces will emanate 250 mr/hr over each area that is equivalent to the instrument end window.

	Total Activity	MC
Cell 1		5.4
Cell 1 Iso.		1.2
Cell 2		0.4
Cell 2 Iso.		1.1
Cell 3		8.1
Cell 3 Iso.		1.1
Cell 4		9.1
Cell 4 Iso.		1.2
Cell 5		6.4
Cell 5 Iso.		0.9
Cell 8		8.8
Ventilation Cell		101.8
Ventilation Box		10.0
Liquid Sub.		2.2
Facility Area		0.6
Dry Box		14.8
Downcomer-SOTS		9.3
		<u>191.5</u> - 200 mc



Basic Formula

$$\left(\frac{\text{mc/hr}}{\text{Instrument Area}}\right) \times (15 \text{ Inst Areas/ft}^2) \times (\text{total sq. ft.}) \times$$
$$\frac{(0.009 \text{ uc/mc/hr}) - \text{mc Sr-90}}{1000 \text{ uc/mc}} = \text{mc Sr-90}$$

Sample Calculations

Cell 4

Dimensions - 12' x 8' x 12' high

Total Area - 2(12x8) + 2(8x12) + 2(12x12) = 672 sq. ft.

Thus

$$100 \times 15 \times 672 \times 9 \times 10^{-6} = 9.1 \text{ mc Sr-90}$$

Cell 4 Isolation Room

Dimensions - 12' x 13' x 12' high

Total Area - 2(12x13) + 2(12x12) + 2(13x12) = 912 sq. ft.

Thus

$$10 \times 15 \times 912 \times 9 \times 10^{-6} = 1.2 \text{ mc Sr-90}$$

Dry Box

Dimensions - 9' x 11' x 6' high

Total Area - 2(9x11) + 2(9x6) + 2(11x6) = 438 sq. ft.

Thus

$$250 \times 15 \times 438 \times 9 \times 10^{-6} = 14.8 \text{ mc Sr-90}$$

SOTS and Downcomer

Dimensions SOTS - 20' x 7' x 4'

Downcomer - 4' x 4' x 10'

Area SOTS - 2(20x7) + 2(20x4) + 2(7x4) = 496 sq. ft.

Downcomer - 2(4x4) + 2(4x10) + 2(4x10) = 192 sq. ft.

Total Area - = 688 sq. ft.

Thus

$$100 \times 15 \times 688 \times 9 \times 10^{-6} = 8.3 \text{ mc}$$

Cell Ventilation System

Diameter of duct - 12"

Length of Duct/cell - 20'

Area/linear ft. - 3.14 sq. ft.

Ducts/cell - 2 (normal and auxiliary)

Total Area - 6 cells x 2 ducts/cell x 20' duct x 3.14 sq. ft.

= 754 sq. ft. of ducting

Thus $1000 \times 15 \times 754 \times 9 \times 10^{-6} = 101.8 \text{ mc Sr-90}$

Process Liquid Level System

uc/ml x volume of cleaning solution

10^{-2} uc/ml x 200 liters (2×10^5 ml) = 2000 uc

