

Office Memorandum • UNITED STATES GOVERNMENT

TO : Leo Graup, Chief,
Property Management Branch

FROM : M. S. Weinstein *MSW*
Industrial Hygiene Branch, HASL

SUBJECT: SURVEY AT HAIST PROPERTY

SYMBOL: HSH:MSW

DATE: September 29, 1958

This¹ property was purchased during MED operation and used as a dumping ground for refinery residues generated by Linde Air Products during their period of participation in the refinery operations program. It² consists of 10 acres in addition to a perpetual easement right to a strip of land, 10 feet wide and 3600 feet long. The area is located in North Tonawanda, New York near the Niagara River. Because of the growth of adjacent industries, this particular piece of property has appreciated in value.

During its tenure as responsible property management office, Oak Ridge Operations determined that disposal of this property with residue still thereon was a wise move from an economic standpoint for the following reasons¹:

1. These materials could well be abandoned from a uranium economy standpoint.
2. The cost of removing the residues exceeded the probable sale value of the property.

Since the health and safety aspects of such a course of action were in doubt, OROO requested that this office conduct a survey of this property to evaluate these matters and present findings. A survey was conducted on October 21, 1957 to evaluate soil and water contamination in the area and direct radiation emanating from the storage piles.

As responsibility for this property passed to NYOO effective July 1, 1958, a report of our findings is presented for your use.

Method of Study

Creek³ water was sampled and analyzed for soluble uranium in 1955. At the time of our survey, October 21, 1957, runoff streams were completely dried out so that the earlier data could not be confirmed.

Soil samples of the surface (0" - 3") and subsurface (3" - 6" and 6" - 12") were obtained by conventional soil sampling techniques. Each sample was analyzed for uranium and radium content.

An evaluation of the direct radiation emanating from the storage piles was made with a Lucky Strike (AEC-SGM-49A) survey meter.

Waste Disposal Data^{2,4}

The material dumped on the Haist property during 1944-1946, is comprised essentially of low grade western ore tailings. Inventory figures available from book records indicate a breakdown of materials as follows:

1. P-78 Iron Cake - The material was a by-product of western ore processing during 1944-46. Total material on property was about 1,879,000 lbs (dry) containing 0.88% by weight of uranium as U_3O_8 .
2. L-19 Sludges (U.O.C.) - 1943 western ore tailings from Moore filters. 1,332,000 lbs (dry) of this material, containing 1.23% of uranium as U_3O_8 , was segregated in small piles throughout the area.
3. L-19 Tailings - Moore sludge from western ores. 12,860,000 lbs (dry) of this material containing 0.52% uranium as U_3O_8 covered the greater portion of Haist Area.
4. Pilot Plant Sludges - Western sludge and miscellaneous residues produced during early experimental work and production by Linde Air Products Research Group. Total material on property was about 268,000 lbs (dry) containing 1.16% uranium as U_3O_8 .

Assuming the material contained about 50% moisture and weighed approximately 75 lbs per cubic foot, book records would indicate a total of 16,340,000 lbs of residues containing 87,200 lbs of uranium and occupying a volume of 430,000 cubic feet. This mass of residue, containing presumably 0.535% uranium (dry basis), was spread out over roughly 300,000 feet² to a depth of 1 to 5 feet.

Results

TABLE I

SOIL SAMPLE RESULTS

Average Weight Percent (Dry Basis)

<u>Material</u>	<u>Uranium</u>		<u>Radium</u>
	<u>Reported in Inventory</u>	<u>HASL Analysis</u>	<u>HASL Analysis ($\times 10^{-8}$)</u>
P-78 Iron Cake	0.745	0.096	2.30
L-19 Sludges (U.O.C.)	1.04	0.246	2.45
L-19 Tailings	0.44	0.084	1.63
Pilot Plant Sludges	0.98	0.545	0.50
Average	0.535	0.175	1.60

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TABLE II

SAMPLE RESULTS OF CREEK WATER
AT HAIST PROPERTY (1955)

<u>Description of Sample</u>	<u>Uranium Conc.</u> <u>(mg/l)</u>
East run-off stream directly adjacent to property	100
West run-off stream immediately inside property	0.5
Half way between creek and east branch Niagara River	0.5
Creek water at junction of Niagara Blvd.	0.005
Junction of creek and east branch of Niagara River	0.002
Junction of two run-off streams emanating from Haist property	1.0

TABLE III

RADIATION SURVEY RESULTS

<u>Material</u>	<u>($\beta + \gamma$) Radiation Levels - mr/hr</u>		
	<u>Bore Hole</u>	<u>Surface</u>	<u>3' level</u>
P-78 Iron Cake	0.07-0.15	0.09	0.05-0.08
L-19 Sludges (U.O.C.)	0.12-0.50	0.05-0.18	0.04-0.07
L-19 Tailings	0.07-0.14	0.07-0.09	0.07-0.08
Pilot Plant Sludges	0.45	0.12	0.07
Overall Range	0.07-0.50	0.05-0.18	0.04-0.08

Discussion

Results of analyses of materials deposited on the Haist property are shown in Figure 1. Table I is a compilation of averages of these results, together with the best available book record values. The differences in results are significant and indicate a relatively large reduction in insoluble uranium content due to weathering. As an average, the wastes contain on a dry basis, 0.175% uranium and 1.6×10^{-8} % radium. On the basis of these results, the residues may be considered to be raw source materials.

Table II contains results of uranium analyses of creek water samples, taken in 1955 at the Haist property. As no additional wastes have been dumped since 1946, these results probably represent maximum concentrations at present. CFR Title 10 Part 20^b specifies maximum permissible concentrations of radioisotopes in water, above natural background, for unrestricted areas. For uranium this concentration is 7×10^{-6} uc/ml or 10.4 mg/liter. The highest sample obtained was 9.6 MPC at the east run-off directly adjacent to the property. Uranium concentrations fell off rapidly to 0.1 MPC at the junction of run-off streams emanating from the property and thence to 0.0002 MPC at the junction of the creek and east Niagara River. This data presents strong evidence of negligible pollution of river waters due

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to uranium run-off from the Haist property. Radium compounds normally found in wastes of this nature are extremely insoluble. Although no measurements of radium concentration are available, the probability of significant quantities in the run-off may be discounted. However, additional creek water samples should be taken and analyzed for soluble radium for confirmation. ✓

Results of the radiation survey are listed in Table III. According to CFR Title 10 Part 20⁶, permissible levels of radiation in unrestricted areas are those resulting in a dose not exceeding 100 millirems in any seven consecutive days or 0.6 mrem/hr. The data clearly indicates insignificant direct radiation emanating from the storage piles. ✓

Although no air sample data is available, reasonable inferences may be drawn as to the likelihood of an airborne hazard. Part 20 specifies maximum permissible concentrations of radioisotopes in air, above natural background for unrestricted areas. For uranium and radium, these concentrations are 1.7×10^{-12} and 8×10^{-13} uc/ml respectively. Dust loadings at the property are probably similar to those encountered in industrial-district air (7) or $1 \text{ mg}/\text{M}^3$, and would contain 1.75 and 1.6×10^{-7} ug/ M^3 of uranium and radium respectively. These are equivalent to 1.18×10^{-12} uc of uranium and 1.6×10^{-13} uc of radium per ml of air. Assuming extremely dry climatological conditions, dust concentrations as high as 10 grams/ M^3 can occur during a dust storm. These would contain 1.18×10^{-6} uc of uranium and 1.6×10^{-9} uc of radium per ml of air. The probability of this occurrence is remote; the duration limited. It is evident that there is probably no significant airborne contamination at the site under normal conditions. ✓

Conclusion

1. Wastes contain uranium and radium, probably in concentrations of 0.175% and $1.6 \times 10^{-8}\%$, on a dry basis, respectively.
2. There is negligible pollution of river wastes due to uranium run-off from the property. The probability of significant radium run-off may be discounted; this should be confirmed by radium analysis of additional creek water samples. ✓
3. Direct radiation emanating from the storage piles is insignificant.
4. Under normal conditions, airborne contamination at the site is insignificant. ✓

From a health and safety viewpoint, the disposal of the property with residue thereon appears to present no significant problems.

Enclosure:
Figure 1

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References

1. Memorandum, Sapirie to Eisenbud, 2/26/57, re "Haist Property in North Tonawanda"
2. Memorandum, F. W. Malone to F. R. Dowling, 5/29/56.
3. Memorandum, Harris to Malone, 2/10/55, re "Sample Results of Creek Water at Haist Property"
4. Drawing, Hooker Electro Chemical Company, "Approximate Distribution of Tailings on the Haist Property"
5. Code of Federal Regulations - Title 10 - Atomic Energy, Part 40 - 40.2
6. Code of Federal Regulations - Title 10 - Atomic Energy, Part 20
7. Industrial Dust - Drinker and Hatch - 2nd Edition - 1954