TA 48

Satterfield

LOS ALAMOS SCIENTIFIC LABORATORY
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LOS ALAMOS, NEW MEXICO 87544

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OFFICE MEMORANDUM

04-0151

TO : Harry F. Schulte, Chrmn. Effluent Scope Committee DATE: August 4, 1971

8/4/1971

FROM : J. E. Sattizahn, CNC-11

SUBJECT: Effluents from TA-48

SYMBOL : CNC-11

In response to your request of 12 April 1971, we are hereby presenting estimates of the amounts of major materials of concern which enter the environment, and the routes by which they enter it from TA-48. These estimates are primarily based upon our operations for the calendar year of 1970, and as such may be slightly atypical for some items such as HF, $HClO_4$, and fission product effluent for this reason: A significant amount of this group's effort is devoted to the NTS testing programs, and labor disputes forced a four-month suspension to the weapons test program, in addition to the fact that no Rover reactor test was held during 1970. Consequently calendar year 1970 usages of HF and $HClO_4$ will be increased by the factor 12/8 to arrive at a prediction for a future typical year for the purpose of this report. The radioactive effluents derived from the weapons program will be increased by the same factor, and radioactive effluents expected to be derived from Rover samples during a future typical year will be estimated from the Pewee I run of 1969.

Group CNC-11 at this time carries out its operations almost exclusively at TA-48, Bldg. RC-1. The limited work performed by us at other sites such as Omega, Pajarito, LAMPF, etc. and trailers presently located at TA-48 or Kirtland AFB results in no significant release of critical materials.

1. Effluent Routes.

Waste materials may leave Bldg. RC-1 by ventilation stacks, a sanitary sewer line, storm sewer lines, an acid waste line, tank truck or special burial and by Dempster Dumpsters.

The ventilation stacks number nine and consist of the following:

a) Three large, tall stacks which exhaust the chemical fume hoods of the building. Tow of these are located at the south end of RC-1, one of which carries the exhaust from the hoods of the Core-Processing Wing, and the other carries the exhaust of all other hoods in the east and west banks of the southern half of the main body of RC-1 as well as those of the "Old Disolving Room". The third large stack is located at the north end of RC-1 and exhausts hoods from the east and west banks of the northern half of the main body of RC-1 plus the hoods from the Alpha Facility.

b) One smaller diameter, tall stack that carries filtered exhaust from the Alpha Facility glove boxes, and is adjacent to the large stack

at the north end of RC-1 as described in a) above.

c) A medium-sized stack on the northwest end of RC-1 which carries exhaust from the Hot Cell Addition. This exhaust originates at the cold corridor where manipulator operators stand, it passes through an office and setup rooms and then passes to the interior of the hot cells and then to the stack.

d) Three medium-sized stacks carrying exhaust from combustion boilers, one at an east-central location, one at a southeastern location and one at a northwestern location of RC-1.

e) A short, medium-sized stack centrally located on RC-1 to carry exhaust from a welding and degreasing booth in the basement.

The sanitary sewer line leaves TA-48 near the center of the building on the east side and runs eastward to a tile field a few hundred yards away.

Storm sewer lines dump drainage rain water just outside the eastern perimeter fence onto the ground.

An acid waste line conducts chemically neutralized liquid waste from TA-48 southeasterly approximately one-half mile to TA-50, the Liquid Disposal Site.

Two holding tanks, one in the basement of the Core Processing Wing and one in the basement of the Hot Cell Wing, are available for holding high level radioactive liquid wastes for later transfer to TA-50 or to the contaminated dump. These are used infrequently.

Solid material leaves TA-48 in Dempster Dumpsters, either contaminated or non-contaminated for the appropriate solid waste dumps.

These routes are all marked on the attached sketch of TA-48.

II. Treatment Facilities on Effluent Routes.

1. Ventilation Stacks

The three large, tall stacks as described in Ia of this memo are all fed by lines which contain water spray systems. These wash-down systems were installed as safety measures to eliminate buildup of explosive perchlorates, but also serve to wash entrained solids or liquids from the air stream or to flush out solids or liquids that have condensed onto the ducts into the acid waste line.

The exhaust from all glove boxes is filtered as it leaves the boxes and before it enters the feeder line and also again just ahead of the stack fan described in Ib.

The exhaust air for the contaminated side of the hot cells passes through a filter before entering the stack described in Ic.

The effluent from the acid waste line is chemically neutralized with sodium hydroxide before leaving TA-48.

III. Monitoring of Effluents.

A 24 hour, 7 days per week sampling system is in operation on the feed lines to the stacks discussed under Ia), b) and c) above. The sample is obtained by drawing a measured portion of the exhaust air from the stack feeder lines through a collection filter. Ten such filter stations are sampled each week, and the samples are counted for alphas and betas by H-1. Results are reported as microcuries of alphas and betas leaving each of the four main stacks per week and was the basis for estimation of effluent to the atmosphere.

The major radioactive effluent stream from TA-48, the acid waste line, is treated at TA-50 and monitored there before entering the biosphere.

The other routes available for material leaving this site are not routinely monitored. However, the waste boxes going into the contaminated Dempster Dumpsters are commonly checked by health monitors, and whenever the holding tanks for liquid waste are emptied or when material is buried or sent to recovery, health monitors are in attendance. No records are kept of these operations.

The blanks which were attached to your original memo have been filled out and are attached hereto. However in addition it seems to be convenient and somewhat more nearly complete to present a compilation of all materials of concern that leave TA-48 and the routes they take as in Table I.

The radioactive effluent figures deserve some explanation as to how they were estimated. In general, the major sources of radioactivity entering TA-48 are: NTS postshot samples, NRDS posttest samples and bombarded or purchased samples associated with research and development programs. For the purpose of this survey upper limits will be favored in all estimates. It is first assumed that the NTS schedule will provide 25 kilograms of debris or 5×10^{18} fissions per year, including debris from two one-point tests, which enter TA-48. Approximately one-half of this (2.5×10^{18} fissions) will find its way into the holding tank under the Core Processing Wing and will be removed as solid waste for the contaminated dump once per year at an average age of six months. Approximately 5 kg or 10^{18} fissions per year will be discarded as not useful due to dilution with low grade material at an age of about two weeks. Approximately 5 kg or 10^{18} fissions per year will be dissolved for analysis, of which about three-quarters will be expended to the acid waste line (50 percent), and solid contaminated waste (50 percent). The other one-quarter of the solution plus the remaining untouched 2.5 kg (5×10^{17} fissions) are saved for possible future study. Consequently the disposition of NTS debris is:

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Source	Solid Waste	Liquid Waste	Saved
Solid Fines (6 mos old)	12.5 kg (2.5×10^{18} Fiss)	-	-
Low-Grade Solid (2 wks old)	5. kg ($1. \times 10^{18}$ Fiss)	-	-
Extra Solid Mtl.	-	-	2.5 kg 5×10^{17} F
Dissolved Mtl. (3 wks old)	1.9 kg ($4. \times 10^{17}$ Fiss)	1.9 kg (4×10^{17} F)	1.2 kg 2×10^{17} F
Total 25 kg	19.4 kg	1.9 kg	3.7 kg

The future Rover test program is difficult to assess, however it will be assumed that the equivalent of one Pewee reactor per year will be tested. CNC-11 receives a large number of fuel elements, but for the most part these are nondestructively tested and returned to Wing 9 of the CMR Bldg. without contributing any radioactivity to our effluent streams. Small parts of elements, equivalent to approximately 10^{21} fissions at an age of about one month, are dissolved in a nearly closed environment, and whatever radioactivity is released to the atmosphere is best evaluated by examination of sampling records of the pertinent stack during the last time the Pewee I elements were dissolved, February through April, 1969. Of the dissolved elements, only a small fraction, approximately 10^{15} fissions, are actually analyzed and find their way into the acid waste line. The rest, and essentially all of the 10^{21} fissions, is buried by H-1 at an age of about 6 months. Disposition of Rover debris then may be outlined as:

Source	Solid Waste	Liquid Waste	Returned to CMR Bldg.
~40 elements (4×10^{22} Fiss)	-	-	39 els. (3.9×10^{22} Fiss)
Dissolved mtl. 1 el. (10^{21} Fiss)	1 el. (10^{21} Fiss) at +6 mos	10^{15} Fiss at +1 mo.	-

It should be pointed out that plans are underway to construct a new exhaust system to be installed at the Alpha Facility of this building. It will handle exhaust from the existing hoods and from proposed dissolving-hood-boxes. The line will be complete with water-spray system, caustic scrubber, Hepa filters and a new 12,000 CFM fan and a new 75 foot stack. This system will contribute no radioactivity to the biosphere and will eliminate what we are presently exhausting through the system to be replaced.

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We feel that this is a reasonably complete evaluation of the effluent streams from this facility, but if you, in your studies of many other facilities, find that we have overlooked anything; or if you have any questions concerning our estimates, please let us know.

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