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Contract Number AT-33-1-GEN-53

MOUND LABORATORY
Operated By
MONSANTO CHEMICAL COMPANY

COMPLETION REPORT

FOR

DISPOSAL OF UNIT III

1601 W. FIRST STREET

DAYTON, OHIO

REPORT NO. 1 OF STEERING COMMITTEE OF UNITS III AND IV

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Date: October 31, 1949

Prepared By: F. L. Halbach
F. L. Halbach
Chairman, Steering Committee

Approved By: M. M. Haring
M. M. Haring
Laboratory Director

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COMPLETION REPORT FOR DISPOSAL OF MONSANTO UNIT III

THE PROBLEM

After Monsanto Chemical Company moved its operations in the last months of 1948 and the first two months of 1949 to Mound Laboratory, Miamisburg, Ohio, Monsanto and the Dayton Area Office of the Atomic Energy Commission were confronted with the problem of the disposal of the original laboratories at 1601 W. First Street, Dayton, Ohio, hereafter designated Monsanto Unit III, and at Runnymeade Road and Dixon Avenue, designated Monsanto Unit IV.

A Planning Committee, set up to plan for appropriate disposal of these units, at a meeting on February 25, 1949 established a Steering Committee as follows:

"A general Steering Committee will be established to care for the whole job of disposal. It primary function (and sole duty temporarily) will be to coordinate all phases of the disposal program." (From Planning Committee Report MIM C.F. No. 49-2-63, see TAB A.)

The Steering Committee was later temporarily inactivated. At a second meeting of the Planning Committee in April, 1949, it was agreed to proceed with work of disposal of both units under Engineering Division supervision (same as original Steering Committee) with a full time Engineer-in-charge to be obtained, if possible, from Scioto project personnel and a full time Health Supervisor to be loaned from Atomic Energy personnel at Oak Ridge, Tennessee. The work of the Steering Committee for Unit III was defined to coordinate and organize all phases of the disposal program,

including decontamination and dismantling as required, to permit return of the property to its original owners. Thus, only the physical aspects of the project came under Steering Committee supervision. Termination of service contracts, negotiations pertinent to the return of Unit III, handling of scrap sales, and decision as to decontamination levels were the work of others.

Thus, the problem under discussion in this report may be defined as the decontamination and partial dismantling of Unit III, within the fence line, to permit return of the property to its original owners, the Dayton Board of Education. (Note the absence of definition of decontamination levels.)

This report then summarizes the disposal work at Unit III as carried out under the supervision of the Steering Committee.

FACTORS AFFECTING THE PROBLEM AND THEIR SUBSEQUENT TREATMENT

1. History of Unit III to December, 1948

For a brief history of Unit III, see TAB B wherein are listed excerpts from the "Historical Report, Dayton Project" - Document Number M-286.

2. Transfer of Radioactive Property

To date there has been no definition of maximum contamination levels for return of buildings, grounds, drives, walks, and similar property (as is presented by this problem) to their original owner.

The only information furnished relative to contamination levels for equipment and material entering commercial channels is defined in a letter to the Dayton Area Manager (see TAB C). It is questionable whether this ruling is applicable in the case of buildings, grounds, etc. as are presented by the problem at Unit III.

Additional information and several questions directly pertaining to the problem are presented in a letter to the Chief, Applied Biophysics Branch, Division of Biology and Medicine (see TAB D).

3. Preliminary Work in Connection with Disposal Program

Reference is made to TAB A covering the initial report of the Planning Committee. Meanwhile, the work of the Steering Committee was postponed to allow major laboratory and building property and material items not of a fixed nature to be decontaminated and transferred to Mound Laboratory under Evaluation Committee supervision. Surveys of manpower required and preliminary estimates of time and money were prepared. Informal meetings between Monsanto and Atomic Energy Commission personnel were held. Finally, at the second meeting of the Planning Committee, in April, 1949 it was agreed:

a. To proceed at once with active phase of program.

b. Work to be done under Engineering Division (reactivated Steering Committee) with a full time Engineer-in-charge obtained, if possible, from Scioto project and a full time Health Supervisor, loaned from the Atomic Energy Commission.

c. Work to be concentrated at Unit III to permit return of this property to the Board of Education as soon as possible; work at Unit IV to be started with a token force to clean up after preliminary work there by others.

It should be pointed out that in early discussion meetings the following procedures had been discussed as possible methods for disposal of Unit III:

a. Remove all property items and materials not necessary for building operations, and allow residual activity to decay (a process that might require more than five years, and necessitates a guard force and maintenance during this period).

b. Purchase of original buildings; followed by complete dismantling and restoration of grounds.

c. Decontamination and partially dismantling to limits, if possible, satisfactory for return of buildings and grounds to the Board of Education.

As previously mentioned, Method (c) was selected as the procedure to be followed. On that basis the Steering Committee proceeded with organization of the disposal program for both Units III and IV.

4. Dismantling Project History May through October, 1949

A summary of the work in connection with Unit III is given in TAB E. Additional information pertinent to this part of the report is given as follows:

TAB F - Work Orders for the Dismantling of Units III and IV

TAB G - Tentative Levels for Proceeding with Work at Unit III

TAB H - Change House, Clothing, and Health Procedures - Unit III

TAB I - Survey of General Outside Area - Unit III

TAB J - Report on Dismantling Units III and IV

TAB K - Meeting of Planning Committee, July 23, 1949

TAB L - Final Survey - Unit III

TAB M - Supplement to Final Survey - Unit III (Monsanto)

5. Health Phases of the Disposal and Decontamination Project at Unit III

a. Preliminary and final surveys have already been discussed under Dismantling Project History and TABS I, L, and M.

b. Air samples were taken during all stages of the project, and were counted at Unit III to maintain closest control possible over operations and thus, maintain strict adherence to establish maximum permissible limits for air levels, and protect working personnel from excessive contamination. A breakdown of these tests is given in TAB N. It is significant that:

1. Eighty-four and three tenths per cent of all samples were less than 3,000 d./min./m.^{3}, the maximum limit for which no respiratory protection is required.

2. Ninety-seven and seven tenths per cent of all samples were less than 25,000 d./min./m.^{3}, the maximum permissible limit for which respirators can be used.

3. Only seven times was it necessary to cease work in any areas due to excessive contamination. In such cases, men were transferred to work in less contaminated areas.

These results clearly indicate the care with which this project was carried out. Personnel in many cases wore respirators for their own protection when air contamination might be expected, even though tests later indicated such protection was unnecessary.

c. Urine samples were collected twice weekly. The summary of results of these checks is given in TAB O. The most significant feature disclosed by this summary is that not one man had a count over 12 c./min./50 ml. during the work of decontaminating and partially dismantling Unit III. In

view of the fact that in excess of 12,000 man-hours were expended on the project, and that the nature of the work indicated we could expect considerable difficulty from contamination, this record becomes highly important. Since the major portion of contamination has been removed during this project, it is quite unlikely that any work in the future in the nature of alterations or repairs would present any serious difficulty from the contamination standpoint.

6. Safety Record

No major or lost time accidents occurred during this work at Unit III. Minor injuries were treated on the spot by personnel of the Health Division, and injured employees were sent to Mound Laboratory Medical Section for checkup and further treatment, if necessary. Medical Section maintained thorough follow-up on all such minor injuries. Precautions were taken to prevent contamination of any open cuts or wounds, and personnel so affected were transferred to clean work.

7. Property Items

All property items were handled in accord with established procedures and with regard for contamination levels (see TABS C and G). This phase of the work was handled in close collaboration with the Evaluation Committee, likewise established by the Planning Committee on February 25, 1949, whose partial duty was to pass on disposal of all contaminated equipment and apparatus. As some members of this committee would likely be active in negotiations with the Board of Education, concerning ultimate return of Unit III, it was very essential that they be consulted regularly, particularly in connection with items that were parts of building or

or building equipment, and which might help effect a better settlement with the Board of Education.

At the termination of the Steering Committee's work in connection with this project, the Planning Committee and Business Division were advised that our work was completed, and that property was ready for termination of service contracts, subsequent draining of lines, and any other matters deemed necessary by the Planning Committee at this state of the project.

CONCLUSIONS

1. Monsanto Unit III within the property lines has been decontaminated as closely as possible to the tentative levels established as a basis for this project, and as defined to be the function of the Steering Committee.

2. All property and material items, other than those building items which are required for return of this property to the Board of Education, or are not economical to salvage, have been disposed of in accordance with existing regulations for property transfer, contamination levels, usefulness, and salvage value.

3. The high percentage of low air levels of contamination during the work at Unit III, plus the fact that in over 12,000 man-hours, not one man became "hot," based on urine counts, is highly significant. As most of the contamination has now been removed, it is unlikely that any future alterations, repairs, or dismantling will present any serious contamination problems.

4. Decontamination to levels lower than the tentative ones used as a basis for this project would be uneconomical, if not impossible. Based on our experience, the cost of working toward lower levels would be very high, recontamination would be difficult to eliminate, and extensive dismantling and alteration would be required.

5. Decontamination levels twice the tentative ones used on this job would enable work to be carried out far more economically. On many occasions more time was expended in lowering levels from 10,000 d./min./100 cm.^{2} to 5,000 d./min./100 cm.^{2} than from levels of the order of 100,000 d./min./100 cm.^{2} to 10,000 d./min./100 cm.^{2} In addition, the problem of recontamination is lessened. Whether such a level would materially enhance the health hazard for future alterations is certainly debatable.

6. Experience on this project indicates that maximum permissible limits set for air contamination could possibly be raised for similar projects or work. Careful health supervision naturally must be maintained.

7. Evaluation of some decontamination methods is desirable, particularly in view of project success with wet methods of laying dusts as a means of keeping air levels down, and use of acids for some types of surface decontamination.

8. If levels used as basis for this job are acceptable, this method of disposal is more economical than other methods originally discussed.

STEERING COMMITTEE OPINION

In view of the health records and surveys (see TABS L, M, N, and O), it is the opinion of the Steering Committee that the major portion of contamination has been removed from Unit III, and it is very unlikely that any

future dismantling, repair, or alteration work will present any serious problem from the contamination standpoint. Consequently, we feel that Monsanto Unit III can now be returned to the Dayton Board of Education with the provision that Monsanto be notified prior to any major changes within the next three years in the remaining buildings or sewer and service lines, so that necessary health surveys and measures can be taken prior to undertaking such work.

RECOMMENDATION

Definite contamination levels for work or projects of this type should be established.

TAB A

REPORT OF THE COMMITTEE TO PLAN FOR THE DISPOSAL OF UNITS III AND IV

A committee was appointed to plan for appropriate disposal of Units III and IV whenever these activities may begin. The committee consisted of:

J. J. Burbage	-	Assistant Laboratory Director
J. E. Bradley	-	Section Chief, Decontamination and Survey
M. M. Haring (Chairman)	-	Laboratory Director
J. J. Spicka	-	Business Manager
R. A. Staniforth	-	Division Director, Research and Development
N. Varley	-	Deputy Area Manager
J. R. Wiesler	-	Division Engineer

The committee met in the conference room of Mound Laboratory at 9:00 A.M., February 25, 1949.

Certain facts were first established.

1. Among these were the tolerances set for moving contaminated equipment, etc. Dr. Failla ruled a year or more ago that no piece of equipment may be declared surplus or otherwise sent into the channels of industry unless it shows a direct reading on an alpha meter of less than two divisions, i.e., six disintegrations per minute per square centimeter. Of course the wipe test must be zero. In addition we had set, last summer, a suitable tolerance for moving equipment from Units III and IV to Mound Laboratory. This is 100 disintegrations per minute per square centimeter, with a zero wipe test.

2. A discussion of the present status of Units III and IV confirmed the following. Most of Unit III is fairly "clean" and can be decontaminated on surfaces fairly readily. However, extensive disturbance of floors, walls or plumbing will undoubtedly stir up much "hot" dust which is presently in cracks, etc. Incidentally such disturbance would be very costly. The Quonset hut is quite hot, on the interior, and so are one or two laboratories in the main building. Almost all of Unit IV is very "hot." Decontamination would be almost impossible. In any case the Atomic Energy Commission has ruled that it be dismantled completely.

3. There is a great deal of valuable material at both sites that can certainly be salvaged. There is also a great deal of material the cost of salvage of which would greatly outweigh the recoverable value. To accomplish the task of disposal as economically as possible, these and several other factors must be carefully balanced.

4. Whoever accomplishes the task of wrecking and/or restoration must be adequately protected for the job. In most cases this will mean special clothing, gloves, masks, and often ventilated hoods. He and his surroundings must be fully monitored during the whole task.

5. It is most important, from the standpoint of public and industrial relations, that neighbors and workmen, other than our own, do not have their suspicions aroused concerning the unusual hazards of the operations. This means that the special protection mentioned in (4) must not be apparent to them.

6. Whoever does the wrecking and restoration must have an intimate knowledge of both sites so that hazards, both present and future, are

minimized. We are the only ones who really know or should be fully acquainted with these facts.

7. In view of the foregoing facts, the committee was unanimous that our own staff must restore Unit III and wreck the interior of Unit IV. A subcontractor, e.g., Maxon Construction Company, can then, in all probability, safely wreck the outside of Unit IV.

8. We are severely limited in our own forces to accomplish this work. However, we have presently at Units III and IV about thirty-six guards, most of whom cannot be absorbed into the Mound Laboratory staff. Many of these men have considerable "handy-man" talent and, under suitable tutelage from our Engineering Department, could do much of the work. Those selected would, of course, be reclassified as general mechanics, drivers, etc. This would extend their possible period of employment by Monsanto, but there is no escaping the necessity of additional personnel during the period of disposal. These guards, being cleared, would be very valuable in meeting this need. Last fall, when discussing personnel requirements, it was pointed out that at least twenty men would be required for the purpose.

9. We have very extensive storage facilities at Scioto Laboratory which would be ideal to care for valuable contaminated equipment during a few years of "cooling off." Such equipment could be "cocoonized," covered with a strippable plastic, or left "as is" depending on its nature and the degree of contamination.

10. There is adequate storage in the hidden back corners of Mound Laboratory to pile up contaminated material destined for destruction. None should be shipped to Oak Ridge. It is hoped that our contaminated

burnable waste incinerator will be a reality by next Christmas. When this occurs, all such material can be permanently disposed of.

11. Unit IV is not to be touched, according to W. J. Williams, until it is certain the "T" Building will do what is expected of it. This does not appear to be possible before June, 1949. It is desirable to return Unit III to the Dayton School Board as soon as possible. Therefore, it is quite possible we should start on Unit III rather than Unit IV.

12. Spraying of interiors with a plastic to fasten down activity is an attractive possibility, if one can get at the activity. However, most of it is hidden and will dust out at each step. In addition, the cost would be extreme. An estimate of $11,000 to so treat the interior of Unit IV was made last summer. Mr. Wiesler says this figure is far too low. The committee considers spraying a useful additional precaution but no substitute for standard procedures.

In view of the foregoing, certain procedures applicable to both Units III and IV were set up.

1. All things not contaminated and immediately useful to us should be moved to Mound Laboratory. They will have to be put into one of Maxon's construction warehouses until they can be sorted, inventoried, and permanently stored. Presently we are overwhelmed in this matter, the best estimate being six months to clear up the situation as of the moment.

2. All telephones must be carefully surveyed. If "clean" they can be returned to the Telephone Company. If "hot," as the majority are, they will be decontaminated to zero wipe test and exchanged for "cold" telephones in low risk areas at Mound Laboratory wherever possible. In this fashion

the number of instruments we will be forced to buy will be kept to a minimum.

3. A committee has been appointed whose duty it will be to pass on all contaminated apparatus or equipment presently at Units III and IV. It is most important that the amount of scrapped items be kept to a minimum. To this end, this committee will determine the following points:

a. Possibility of economical decontamination. Such items will be put in stores at Mound Laboratory or declared surplus property.

b. Possibility of using certain equipment in "hot" areas at Mound Laboratory with little further treatment.

c. Advisability of storing in warehouses at Scioto Laboratory to "cool off." The committee will also determine whether such items are to be "cocoonized," coated with a strippable plastic or left "as is."

d. Exactly what apparatus and equipment should go to the scrap pile at Mound Laboratory.

This evaluation committee is as follows:

J. J. Burbage (for Unit IV) - Assistant Laboratory Director

M. M. Haring (general referee) - Laboratory Director

R. A. Miller (or J. E. Bradley) - Section Chief, Health Instruments.

R. D. Shiffer (or F.L. Halbach) - Plant Engineer.

J. J. Spicka (chairman) - Business Manager

R. A. Staniforth (for Unit III) - Division Director, Research and Development

4. As the evaluation committee proceeds through the various rooms and buildings, our engineering, health, and business personnel will proceed to act on its findings.

5. A general steering committee will be established to care for the whole job of disposal. Its primary function (and temporarily sole duty) will be to coordinate all phases of the disposal program and see that things are carried through. The committee will submit reports at bi-weekly intervals to management. The committee is as follows:

L. E. Byriel	- Area Office Supervisor
F. L. Halbach (chairman) (or R. D. Shiffer)	- Chief Design Engineer
J. E. Bradley (or R. A. Miller)	- Section Chief, Survey and Decontamination

6. Both steering and evaluation committees should avail themselves of the services and advice of W. D. Woods, Legal Advisor to the Director, whenever any question pertaining to the contract or other legal matter arises. If further help from any of the division is indicated, they should approach the division director concerned.

The tentative specific programs for Units III and IV are as follows:

UNIT III

1. Dispose of all cold mechanical, plumbing, heating, and lighting equipment as the forthcoming agreement with the Dayton School Board may indicate.

2. Sell the tropical huts, "as is where is."

3. Remove and scrap all duct work, except that used to heat the third floor.

4. Remove and scrap all benches, hoods, and temporary partitions except those on the third floor.

5. Remove air conditioning units from the attic.

6. Vacuum clean and spray the attic.

7. Remove all contaminated mechanical, electrical, and plumbing equipment for disposal as recommended by the evaluation committee.

8. Tear out the whole interior of the Quonset hut.

9. Survey the interior of the shell of the Quonset hut. If cold it can be sold "as is where is" or disposed of as agreed on with the School Board. If hot it should be sprayed with plastic and left.

10. Clean cut, i.e., sweep, all rooms.

11. Survey all rooms, decontaminate where indicated, and resurvey to establish the fact of decontamination.

12. Fence and guard houses should be left.

13. Return property to the School Board with the agreement that no major changes in walls, floors, or sewer lines be made within five years without seeking our aid in survey, etc.

14. Any of the items above may be modified if survey indicates they are necessary or unnecessary.

UNIT IV

1. Dispose of all cold mechanical, plumbing, heating, and lighting equipment by warehousing at Mound Laboratory or declaring surplus property.

2. Remove all contaminated mechanical, electrical, and plumbing equipment for disposal as recommended by the evaluation committee.

3. Spray interior as indicated by survey.

4. Tear out all rooms, partitions, etc., built in any hot operating area. Tear out ceiling, wall, and floor linings in the same areas. This will be a particularly hazardous operation. Spraying may be resorted to where indicated, but is not expected to be of much use owing to the spongy porous nature of much of the material to be removed. Ventilated hoods and special clothing may have to be worn throughout.

5. All hot wreckage material should be sorted into burnable and non-burnable categories and hauled to the scrap piles at Mound Laboratory. The trucks used for this service will probably have to be considered expendable since their decontamination may prove to be impossible.

6. Sweep out all loose dirt.

7. Spray interior of shell wherever indicated by survey.

8. Hand over the shell of the building and surrounding small structures to Maxon for razing as arranged by the Atomic Energy Commission.

9. Material from razing should be put on the scrap piles at Mound Laboratory.

/s/ M. M. Haring
Laboratory Director

MMH:ek
2/28/49

TAB B

FACTORS AFFECTING THE PROBLEM

HISTORY OF UNIT III

"Early in the summer of 1943 it became obvious that someone had to produce large quantities of polonium. This was undertaken by Monsanto at Dayton. ... Dr. Thomas became Project Director; Dr. Hochwalt, Assistant Project Director; and Dr. Lum, Laboratory Director. ... Meanwhile, Thomas, Hochwalt, and Lum had determined that the old Bonebrake Seminary at First Street and Euclid Avenue, later known as the Green Normal School, and at that time a somewhat bettered warehouse belonging to the Dayton School Board was available on a rental basis and could be made serviceable. It came into the hands of the Project on October 15, 1943 at which time a guard was mounted. All activities were transferred to it October 25, 1943. See plot plan, Unit III Area, September, 1943, and also photograph, Unit III, Structure Prior to Occupancy, September, 1943. ... Work immediately was started to place the building in condition to be used for laboratory purposes. This site was identified as Unit III. Beneficial occupancy was made about November 1, 1943. Considerable remodeling was required to place the building in usable condition. ... In addition two guard houses, a small chemical storage shed, and a fence were erected. The third floor of the main building was renovated and necessary changes made to provide services. ...

In November, 1944, a wooden warehouse building was erected at Unit III. ...

Early in 1945 it was decided to construct several temporary buildings on the land leased from the Board of Education: Offices and Cafeteria; Physic

Laboratory and Locker Rooms; Laundry and Glass Blowing Shop; Machine Shop; and Power Plant. ... A new main guard house was erected near the southeast corner of the property. A cyclone fence was erected following the boundary of the property. ...

Considerable difficulty was experienced in the proper operation of balances and electronic equipment, so a very definite need for an air conditioned building became evident the early part of 1946. This building was numbered "C." Beneficial occupancy was made in October. Space for stockroom and warehousing was constantly becoming inadequate. Accordingly, two portable aluminum buildings 20' wide by 54' long were placed on the premises of Unit III. ...

On December 4, 1946 work was started to erect on the Unit III Site, a Stransteel Quonset Hut, 40' by 100' to carry on [redacted] production. This building is designated as "L," and a portion of it allocated for much needed office space. Construction of Building "L" also necessitated changes in fence line, moving of guard house, "K" and erection of four additional tropical hut buildings to house machinery, mainterance supplies, and miscellaneous material. ...

See plot plan, Unit III Area, October, 1947.

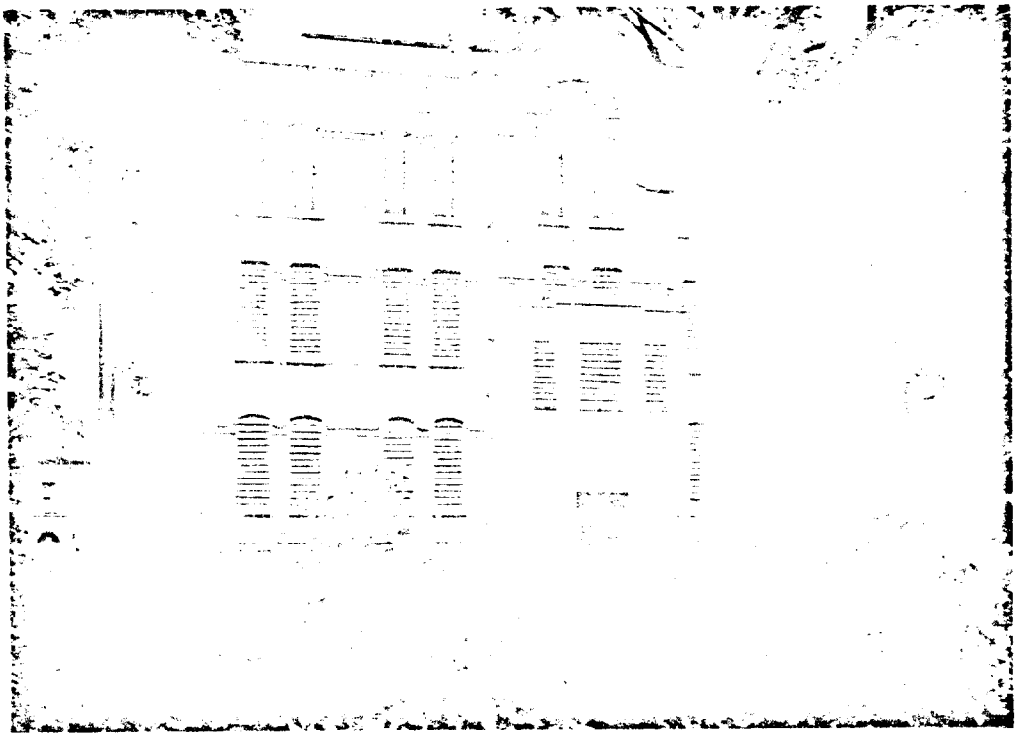
See photograph, Unit III Area, October, 1947.

The research activities of the Dayton project divided themselves early into general research and development research. In the first stages development research was greatly stressed. ... (Note: Both phases of this research were carried out at Unit III.)

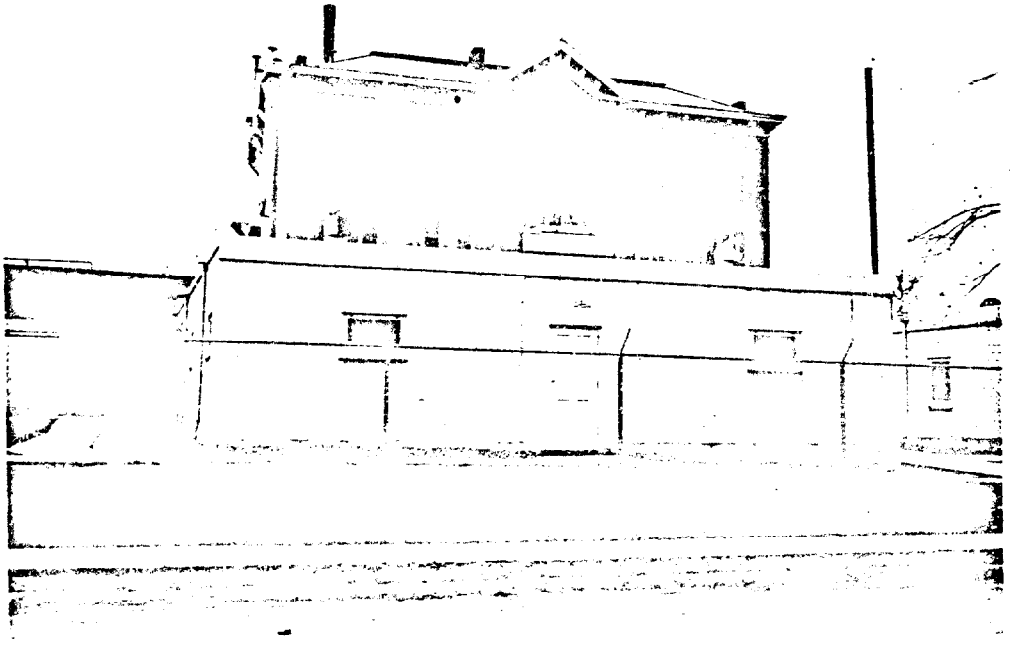
, formerly made at Los Alamos, were brought under Monsanto direction with original planning started in June, 1946, and actual making beginning in July, 1947, in the Quonset Hut at Unit III. ...

Every laboratory working with radioactivity has the problem of protecting the workers against the health hazards arising from various radiations. The Dayton Project was no exception. Besides polonium alphas, betas, and gammas from RaE and also from silver and iron, - which occur as impurities in bismuth, - and neutrons were considered. ... Despite all efforts, contamination persisted at a higher level than desired."

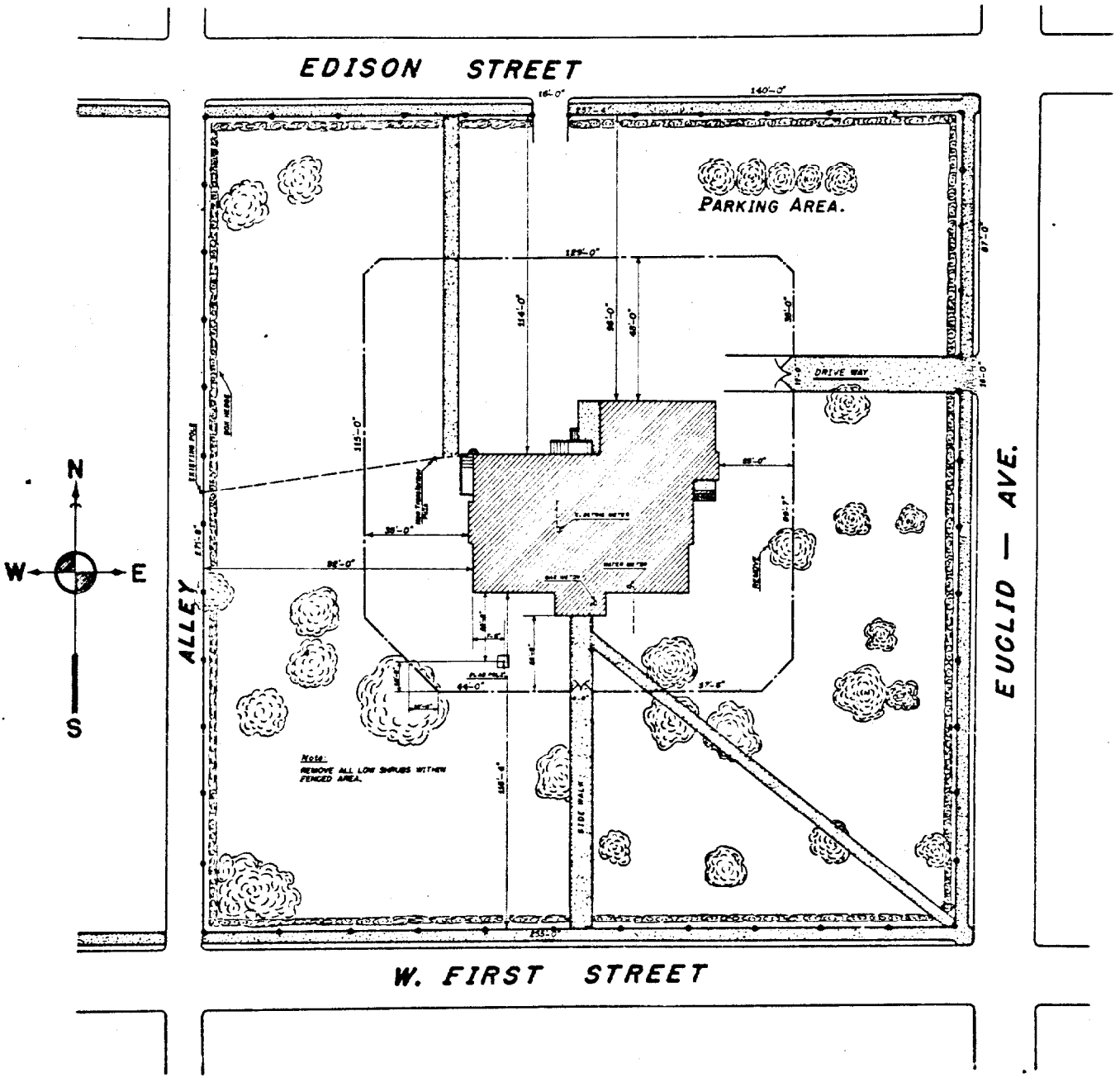
Note: It is this so-called contamination (in our case entirely alpha) which makes this disposal of Unit III a rather complex, difficult, potentially hazardous, and expensive problem.



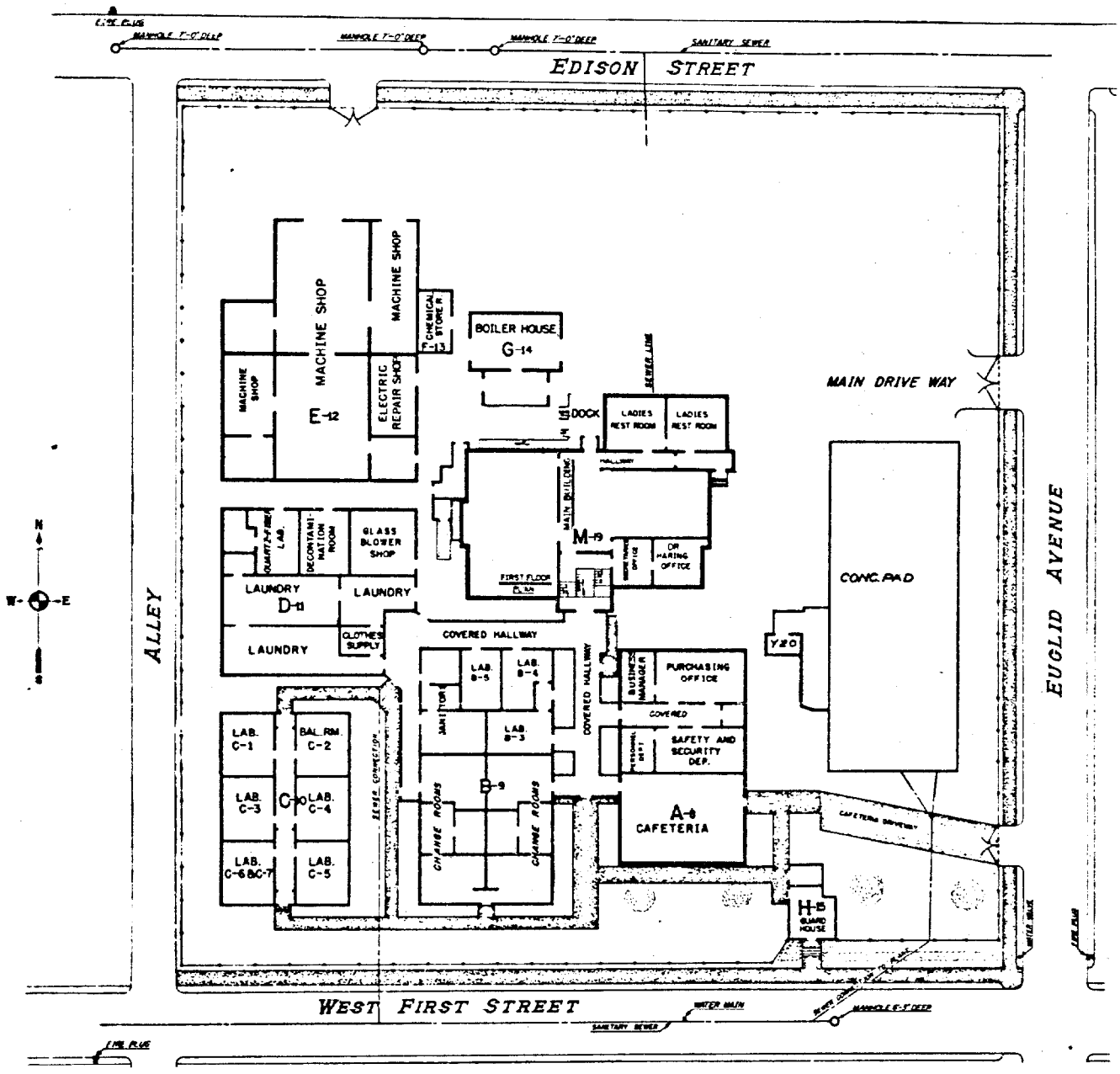
47248 UNIT 3 STRUCTURE PRIOR TO OCCUPANCY SEPTEMBER 1943



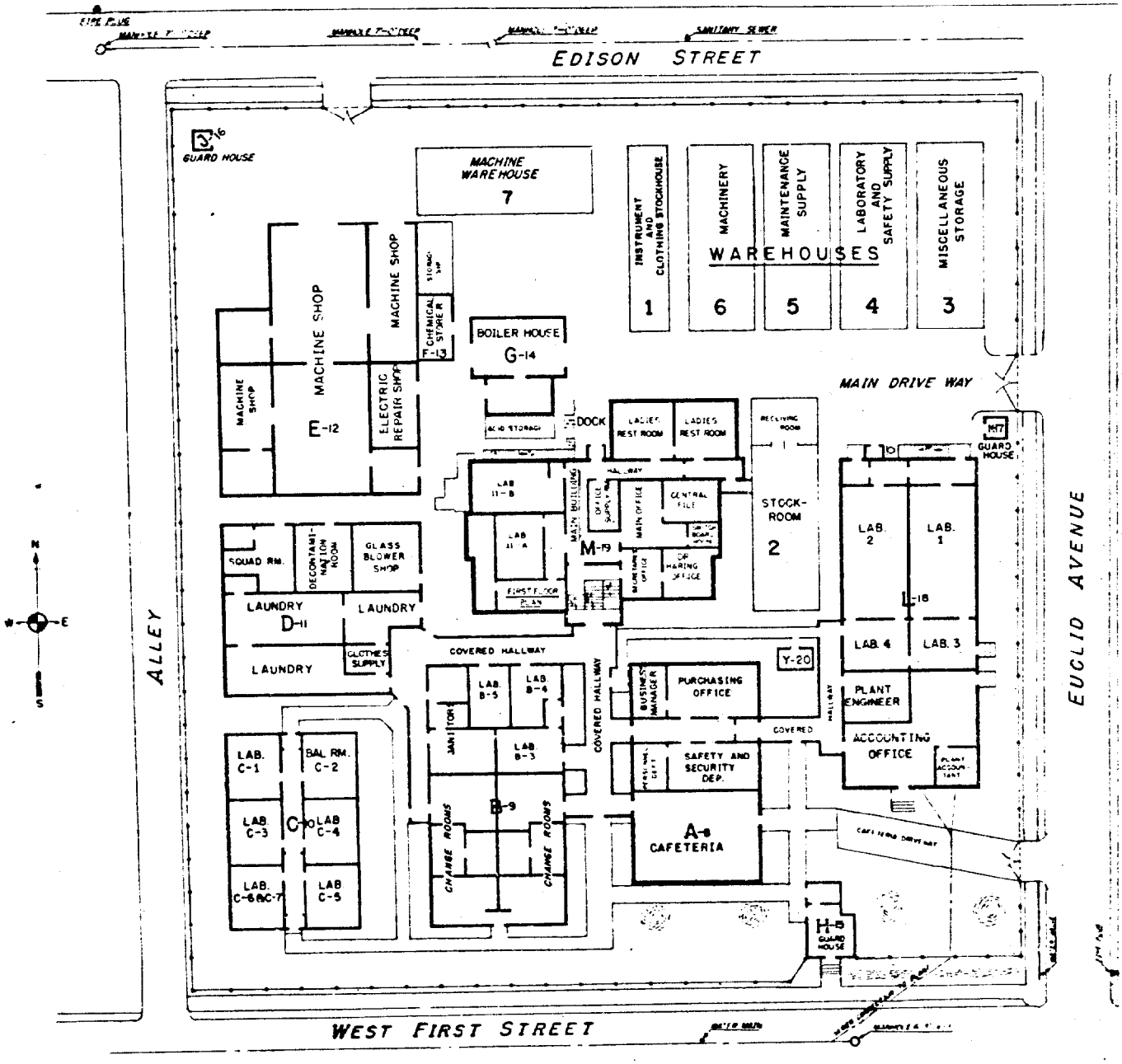
47247 UNIT 3 AREA OCTOBER 1947



PLOT PLAN UNIT 3 PRIOR TO OCCUPANCY SEPTEMBER 1943



PLOT PLAN UNIT 3 AREA OCTOBER 1949



PLOT PLAN UNIT 3 AREA OCTOBER 1947

TAB C

UNITED STATES
ATOMIC ENERGY COMMISSION

EIDMW-3

Oak Ridge, Tennessee
February 10, 1947

United States Atomic Energy Commission
Dayton Area
Dayton, Ohio

Attention: Colonel R. J. Kasper, Area Engineer

Subject: RETENTION OF RADIOACTIVE PROPERTY AND SALVAGE MATERIAL

1. It is essential that action be taken to prevent radioactive material from entering commercial channels. You will establish necessary procedures to insure that it is impossible for materials of this type to lose their identity or to enter commercial channels through sales or transfer of surplus property, salvage, and scrap.

2. Material which gives greater than two times background on the instrument Victoreen 263, or greater than two divisions on the most sensitive scale of the Zueto will be considered sufficiently contaminated to justify withholding them from commercial channels until policies and procedures governing the disposition can be formulated.

3. In the event the instruments referred to in Paragraph 2 are not available, they may be obtained by submission of AEC Form 500 to the Instrument Production Section, Research Division, in accordance with District Circular Letter (Research Control 47-1) dated 27 August 1946.

4. The present procedures now governing the transfer of property and material between installations of the Atomic Energy Commission is not affected by this directive.

ATOMIC ENERGY COMMISSION

/s/ P. F. Kromer, Jr.
Colonel Corps of Engineers
Deputy Manager, Field Operations

TAB D

June 30, 1949

Dr. Lauriston S. Taylor, Chief
Applied Biophysics Branch, Div. of Biol. & Med.
Joe Deal
Applied Biophysics Branch, Div. of Biol. & Med.
VISIT TO DAYTON

REFER TO SYMBOL: BM:LJD

On Friday, June 24, 1949, Dr. Stoeckle and I spent the day at the Dayton Area. Since they have moved to Mound Laboratory, they now have the problem of the disposing of the old plant which consisted of two sites in the city of Dayton, one of them known as "Runneymeade Playhouse" and the other, the old School House. The disposal of Runneymeade Playhouse will not pose the same difficulties since the Monsanto Health Division will be in complete charge of the operation, which consists of tearing the building down and storing it. I do not mean to imply that this will be an easy job. However, it will be under control.

The main problem at present is the disposal of the School House. Since the building does not belong to the Government but to the Dayton city school system and the School Board is looking forward to having it returned in the future, this poses a rather knotty problem. The Manager at Dayton has decided that he will make as thorough a clean-up as possible of the building without going into major construction or destruction with the idea of having a thorough survey at the completion of the clean-up. His staff will prepare a staff paper based on their findings. Mr. Dunbar felt that he had two possible choices. This was one and the other was not to do anything but write a staff paper making recommendations.

They have arbitrarily set as the limit of decontamination 5,000 disintegrations per minute as read on a Victoreen alpha survey meter. This corresponds, roughly, to 50 disintegrations per minute per square centimeter of area. In addition, a piece of filter paper wiped over the area will not show any contamination. Because of the inaccessibility of a number of places in the school building and because of the fact that pipes and electrical conduits, etc., are contaminated and can not be surveyed, they are faced with a number of questions. Some of these are:

1. Will they be able to decontaminate and renovate the building, then return it to the School Board on a calculated risk basis.

2. What are the implications if they should return the building on a calculated risk plan.

3. Is their level of decontamination satisfactory.

4. Should they lease the building for several more years and allow the activity to decay.

5. Should they buy the building and tear it down.

We discussed a number of these possibilities without really trying to come to any general agreement, since anything we would have decided would have been premature. There was some talk of turning the building over to the School Board with the provision that any major repair work would have to be supervised by the Monsanto health people. This did not seem very practical to me since once you lose control of the building you have no way of actually being certain that they don't do some work by ignorance on the part of the man doing the work or a slip-up in procedures or maybe the people would just not be willing to bother to wait on somebody to come from Miamisburg to make a survey.

One of the major considerations that was facing the health physics people at the time we were there was that they will not be able to decontaminate the roof. It was my opinion that since they had already made the decision to do the best clean-up they could, that this would be a problem for them to decide themselves rather than waiting to get an indication from some higher authority as to whether their 5,000 level is adequate. However, it would be of great assistance if they could get some indication on the general acceptance or rejection of their decontamination level. This is a rather arbitrary figure and was calculated independently by two groups there. The assumptions behind this figure are: (1) that they would accept in their new plant anything that contained as many as 10,000 disintegrations per minute provided that none of the contamination would wipe off; and (2) 5,000 disintegrations per minute is roughly either 10 or 100 times the level set for returning stuff to commercial channels. This latter figure is one I am not familiar with but I do know that before the AEC took over from the Manhattan District, there were some sad experiences due to releasing contaminated materials through the sale of surplus property. Because of this, an extremely low figure was set for the release of scrap on the open market. I am not sure about the history of this figure nor am I sure of what it is. However, it is a figure that can be dug out of the files.

In general, the situation does not seem impossible nor critical. The staff at Dayton, with the help of Mr. Hayden from Dr. Holland's office, seem to be feeling their way along and meeting each situation as it arises. I would recommend that we make an effort to consider this decontamination figure and then wait for the staff study that Mr. Dunbar will prepare.

TAB E

DISPOSAL OF UNIT III

The Engineer-in-charge was obtained from Monsanto design force on the Scioto Laboratory Project, and reported for duty on May 2, 1949, which date marks the beginning of the disposal program at both Units III and IV.

Work orders were assigned to the various jobs involved in dismantling Units III and IV (see TAB F).

Personnel were obtained on temporary transfer basis due to reduction in force in Security and Business Divisions. Other personnel were obtained as required on temporary loan from Engineering, Business, Operations, and Health Divisions.

The Health Supervisor, on temporary loan from the Atomic Energy Commission, Oak Ridge, Tennessee, reported for duty on May 23, 1949.

Work was started simultaneously at Unit III, and at Mound Laboratory, in connection with preparation of a storage site for contaminated wastes.

Due to the feeling that contamination levels established for property transfer to commercial channels were not applicable to this problem, tentative levels were established for work at Unit III (see TAB G). It was pretty well agreed that decontamination to levels mentioned in TAB C would be uneconomical, if not impossible to achieve.

Change house, clothing, and health procedures were established for Unit III to safeguard personnel, minimize possibility of high urine counts, and lessen tendency for recontamination (see TAB H).

The following maximum permissible limits for air levels and necessary protection required were established:

0- 3,000 d./min./m.^{3}	-	no protection required
3,000-25,000 d./min./m.^{3}	-	respirators required
25,000-50,000 d./min./m.^{3}	-	assault masks required
Over-50,000 d./min./m.^{3}	-	work ceases in such areas until levels drop

The same maximum limit of 12 c./min./50 ml. for urine samples as is used at Mound Laboratory was used on this project.

In connection with health surveys, it was pointed out early that accurate and thorough readings in remote and less accessible spots were not possible, and that it was likely under normal conditions for some levels higher than the levels set, to go undetected until later surveys, and possibly undetected at all. This was corroborated when the final survey was made.

Warehouses used during construction of Mound Laboratory were turned over for our use for:

1. Temporary storage of clean equipment and materials.
2. Temporary storage of contaminated equipment and materials.

Definition as given in TAB C was used to differentiate between clean and contaminated equipment. Items contaminated in excess of 5,000 d./min./100 cm.^{2} were decontaminated and/or packaged in a manner compatible with type, size, and shape of equipment.

Contaminated scrap materials were separated into combustible and non-combustible categories, and stored separately at the contaminated storage site so that combustible material could later be used in incinerator program. All

such material was handled in accordance with levels established in TAB G.

Decontamination methods in many cases had to be decided on the spot, and were dependent on contamination level, type of material, shape, and location. It was agreed that for purposes of this project the most drastic methods could be used on any object compatible with restoration.

Only one truck was available for handling contaminated equipment. Rather than contaminate a second truck, it was found necessary in the last weeks of the project to work six days on the hauling end of the job.

The six tropical huts at Unit III were dismantled, since they were too contaminated for public sale. Later they were again set up on the contaminated storage site to house scrap materials too bulky to package. Also, the Quonset hut, being too contaminated for public sale, was later dismantled and transferred to the contaminated storage site for erection and storage of additional materials.

Personnel were mostly reclassified as general mechanics (later maintenance mechanics, 2nd class) so that any type of job on the project could be assigned to any man, making necessary allowance for individual's physical condition and capabilities.

A preliminary survey of the general outside area was made in June (see TAB I). Already recontamination was becoming a problem.

The Engineer-in-charge originally procured for the job left Monsanto in June. The final report prepared by him is reproduced as TAB J. The assistant engineer took over project supervision and additional personnel were procured from the Operations Division to provide supervision at both units.

A preliminary survey of building roofs, exterior vertical surfaces, and Quonset hut exterior was made in early July. Summary of survey showed the following:

Roofs of Buildings

69 Areas	0- 5,000 d./min./100 cm.^{2}
15 Areas	5,000-50,000 d./min./100 cm.^{2}
1 Area	Over-50,000 d./min./100 cm.^{2}

Quonset Hut Exterior

12 Areas	0- 2,800 d./min./100 cm.^{2}
1 Area	Over-50,000 d./min./100 cm.^{2}

(Off scale area in this case can be decontaminated. However, level is in excess of that permitted for sale to public.)

Exterior Vertical Surfaces

44 Areas	0- 5,000 d./min./100 cm.^{2}
8 Areas	5,000-50,000 d./min./100 cm.^{2}
2 Areas	Over-50,000 d./min./100 cm.^{2}

A third meeting of the Planning Committee was held on July 23, 1949 to reach an agreement on questions brought about by work at Unit III, pertaining to acceptable levels for return of Unit III to the Board of Education, and to treatment of asphalt floors, roofs, Quonset hut, building exterior vertical surfaces, and ground area, including walks and drives. Decisions are listed in Progress Report for the period July 16-31, and shown at TAB K.

The "C" Building air conditioning unit was dismantled and transferred to Fairchild Engine and Airplane Company, Oak Ridge, Tennessee. The main building air conditioning unit was transferred to Mound Laboratory, since no

other project showed any interest in this item. The 100 H.P. boiler was transferred to the U. S. Engineers, Louisville District Office.

We had been advised by decontamination personnel that there was no satisfactory method of decontaminating concrete surfaces. However, during work at Unit III, it was found possible to do a satisfactory decontamination job quickly and easily on unpainted concrete surfaces, with cleansers and nitric and hydrochloric acids. Use of a concrete floor machine such as that which the Tennant Company manufactures was not very satisfactory due to unevenness of concrete surfaces.

Practically every type of decontamination procedure was used at one time or another on the project. Floor sanders, hand sanders, paint removers, acid washes, detergents, actual removal of contaminated parts were all among the methods employed. Wet methods of laying dusts proved very successful in keeping air levels down. Painting of contaminated laboratory furniture, hoods, and other equipment of a similar nature proved a very satisfactory method of fixing contamination and enabled dismantling to proceed with decreased likelihood of raising air levels. Use of vacuum cleaners and portable fans during dismantling operations, likewise, helped maintain low air levels. Painting was not recognized as a means of decontamination for this work.

Due to success with decontamination of concrete and maintenance of low air levels by use of wet methods of laying dusts, the request was made that we carry out some field experimental work on these methods and evaluate the results obtained. This work was not, however, to conflict with the main disposal project. If results merit it, a separate report will be issued later in this regard.

From Unit III the following property, materials, and scrap were transferred to Mound Laboratory:

100 loads - All types of contaminated scrap

35 loads - Property items and usable materials to Warehouses 10 and 13

In addition, the six tropical huts, a Quonset hut, and two small guard houses were transferred to Mound Laboratory. Likewise, approximately thirty loads of unsalvageable clean scrap were transferred to the Dayton dumping grounds.

Clean salvageable metal scrap, and surplus lockers and cabinets were set aside for sale on "as is-where is" basis. Most wood scrap was eventually found to be too contaminated for sale, and was transferred accordingly to the Mound Laboratory storage site.

The Health Supervisor left the project at the end of September. His final survey was issued in a report to the Chief, Biology and Medicine Division, Oak Ridge, Tennessee (see TAB L). This report lists twelve areas not completed at the end of September. Final survey on these twelve areas was made by personnel from Monsanto Health Division and is given in supplement to final survey (see TAB M). Work outside the fence line was not included in this disposal program, for very obvious reasons. Surveys of drain and sewer lines are not feasible; all such lines, however, were water flushed copiously during dismantling operations.

The work at Unit III under this committee was completed in October. At this time the Business Division was advised accordingly so that they could proceed with termination of service contracts and other phases of the program coming under their supervision.

TAB F

May 3, 1949

WORK ORDERS FOR THE DISMANTLING OF UNITS III AND IV

The following Work Order numbers have been assigned to the various jobs comprising the work required for the dismantling of Units III and IV:

42-130-3 - All time and material required for the dismantling of Unit III should be charged to this Work Order number.

42-131-3 - All time and material required for the dismantling of Unit IV should be charged to this Work Order number.

42-132-1 - All labor and material for the construction of the areas at Mound Laboratory for the storage of dismantled materials and equipment from either Units III or IV should be charged to this number.

The time and labor charged to these Work Orders should include those of salaried and supervisory personnel as well as hourly personnel used in the actual dismantling or construction.

/s/ J. R. Wiesler

JRW/ras

TAB G

Mr. Herman Holsopple May 5, 1949

DISMANTLING OF UNIT III

The following points were agreed upon as a tentative basis from the health standpoint for procedure with work at Unit III.

1. Any piece of equipment or structural material or surface that cannot be reduced to a zero wipe is to be removed.

2. For our purpose any object is considered clean that shows a direct reading of 500 d./min./100 cm.^{2} or less.

3. Any loose or easily removable piece of equipment or structural part that shows a direct reading greater than 500 d./min./100 cm.^{2} is to be removed for storage in contaminated warehouse or consigned to waste storage site.

4. Our primary objective is to reduce our contaminated areas to a level of 5,000 d./min./100 cm.^{2} or less.

In some spots it will be definitely impossible to attain this level. Such cases are to be considered individually.

5. After the work has progressed to a point defined by Items 1 through 4, a second meeting will be held to discuss any irregularities and their subsequent treatment.

Meeting was attended by K. A. Dunbar, D. H. Naimark, E. A. Langdon, representing Atomic Energy Commission; J. E. Bradley and F. L. Halbach, representing Monsanto Chemical Company.

/s/ F. L. Halbach

TAB H

UNIT III - CHANGE HOUSE, CLOTHING, AND HEALTH PROCEDURES

REGULAR EMPLOYEES

1. The only clean area will be the covered hallway to the main building and the clothing supply room as well as the clean locker room and hallway to it from the east entrance.

2. Entrance will be by the West First Street entrance, to the clothing supply room, hence to the clean locker room via the clean area.

3. Personal clothing will be left in lockers and clean protective clothing worn to the hot locker room to pick up shoes. Paper slippers will be provided.

4. Protective clothing will consist ofcoveralls, underwear, hat, socks, and shoes as well as gloves, respirators, etc. as required for special jobs. Each day should be started with clean protective clothing. Work clothing, including shoes, will be left in the "dirty" side of the locker room.

5. Eating - A clean place for lunch will be provided in the Cafeteria. No one will be allowed in the Cafeteria or out the gate while wearing protective clothing. Lunches should be left in the Cafeteria, at the time of reporting for work.

6. Drinking Water - A drinking fountain will be provided in the clean cafeteria area and one in the basement for use while work clothing is being worn.

7. Smoking - There will be no smoking while wearing work clothing except in the "dirty" side of the locker room, after washing and checking the hands. Every effort should be made to prevent contact of the hands with the contaminated clothing.

8. Samples - Urine samples should be submitted each Monday and Wednesday. They should be collected at the time of reporting for work in the Change House near the first street entrance. Containers will be available there. Samples may be placed in the box provided in the Guard House. If for any reason a sample cannot be collected at that time, every precaution should be taken to prevent contamination of the sample at the time it is collected.

9. Exceptions - Truck drivers who will not be admitted to Unit V while wearing white clothes will wear colored clothes and cover them with laboratory coats while in this area.

/s/ R. Hayden

TAB I

SURVEY OF GENERAL OUTSIDE AREA - UNIT III

The following survey was made to determine extent of contamination of grounds, drives, walks, etc. at Unit III. Survey was made by J. Bruce on June 23, 1949, using alpha meter. From the readings shown one can readily see the possibilities of recontamination.

Location	Reading
Immediately back of main building	42,300 d./min./100 cm.^{2}
Entrance to Warehouse No. 3	900 d./min./100 cm.^{2}
Left side Euclid Avenue Gate	21,150 d./min./100 cm.^{2}
Gutter outside same gate	>84,600 d./min./100 cm.^{2}
Right side same gate	>84,600 d./min./100 cm.^{2}
In front of same gate	>84,600 d./min./100 cm.^{2}
Gutter by curb, Euclid Avenue	21,150 d./min./100 cm.^{2}
Middle of street	5,500 d./min./100 cm.^{2}
Sidewalk, same area	>84,600 d./min./100 cm.^{2}
Sidewalk, side guard house	>84,600 d./min./100 cm.^{2}
North end of Quonset hut (walk)	>84,600 d./min./100 cm.^{2}
Sidewalk, by temporary Carpenter Shop	7,420 d./min./100 cm.^{2}
Handrail, main gate	44,000 d./min./100 cm.^{2}
Sidewalk, north entrance to Marlite Room	>84,600 d./min./100 cm.^{2}
Sidewalk, west entrance to Marlite Room	>84,600 d./min./100 cm.^{2}
Walk between main building and laundry	83,000 d./min./100 cm.^{2}
Walk outside laundry double doors	42,300 d./min./100 cm.^{2}
Walk in front of decontamination room	82,000 d./min./100 cm.^{2}

Location	Reading
Walk in front of "C" Building	4,500 d./min./100 cm.^{2}
Walk in front of E-2 door	13,000 d./min./100 cm.^{2}
Walk between boiler room and acid storage rooms	22,000 d./min./100 cm.^{2}
Walk in front of boiler room	45,000 d./min./100 cm.^{2}

TAB J

Mr. F. L. Halbach June 24, 1949

REPORT ON DISMANTLING UNITS III AND IV

Attached herewith is a report of activities to date covering the dismantling of Units III and IV, together with copy of Organization Chart and Change House procedure.

Actual dismantling of contaminated laboratories and definite procedures pertaining thereto started May 23, 1949, at which time Mr. Robert Hayden of A.E.C. arrived to supervise monitoring activity levels. During this period five contaminated laboratories and the laundry area have been dismantled and decontamination progressed to such a point that we believe it is feasible to reach the tentative levels set up by the Steering Committee with the organization as presently set up. A very rough estimate of $1.10/cu. ft. is made for cost of labor, material, and equipment in laboratories requiring complete dismantling with possible completion date of October 1, 1949. If factual cost data substantiate these estimates it appears more feasible to continue with immediate dismantling of Unit III and decontamination although an increase to 10,000 alpha d./min./100 $cm.^2$ is recommended as more easily obtained.

The cooperation of all departments as well as the men assigned to the work has been excellent.

I believe the group is well organized and can do the work required although I would recommend that an early official decision be made as to the acceptability of the levels now being used.

/s/ Herman L. Holsopple

HLH/ras

REPORT ON DISMANTLING UNITS III AND IV

(May 1 through June 24, 1949)

WORK OUTLINE

The scope of work set up by the Steering Committee under the direction of Messrs. Halbach and Bradley consisted of the following:

1. Prepare a contaminated storage area south of Warehouse No. 7 at Unit V using dismantled warehouses from Unit III for storage of loose contaminated scrap. This work was completed in May.

2. Dismantle laboratory equipment and decontaminate Unit III in the entirety for return of permanent buildings to the School Board. Maximum permissible limits tentatively set to date are a maximum of 5,000 alpha d./min./100 sq. cm. direct reading and zero wipe. Zero wipe is defined as no detectable reading on a sample using an alpha meter. Contaminated equipment over 500 alpha d./min./100 $cm.^2$ having salvage value is packaged or painted to hold contamination during transportation and removed to Warehouse No. 10 to permit decay of activity for ultimate disposal by sale or transfer. Scrap lumber and material is either painted to fix contamination or boxed for removal to contaminated scrap yard.

3. Dismantle laboratory equipment and decontaminate Unit IV in entirety to permit ultimate wrecking of buildings by outside contractor. Disposition of equipment is as above under Item 2.

METHODS

Experience previously gained by a group of workmen wrecking equipment at Unit IV without adequate dust control and frequent air sampling indicated

that careful technique of dust control would be required for successful dismantling.

Tests were made using frequent wetting, vacuum cleaners, and spray painting both with and without ventilation.

To date air levels requiring use of respirators only, have been maintained by careful cleaning, with vacuum cleaner, spray painting of exposed surfaces and continued operation of exhaust system. Dismantling of benches and hoods is done as carefully as possible with under surfaces cleaned and painted as above.

This entire operation requires skill and experience correlated to air samples.

Harrell and Rose were assigned to ripping out laboratory equipment and developed the techniques that have so far proven successful.

General dismantling procedure is as follows:

1. Room survey by Health Group is made with installations coded as follows:

   a. White - clean may remain.

   b. Yellow - contaminated - no wipe, may be removed to storage or scrap.

   c. Red - contaminated with wipe, to be painted before removal.

2. Electrician assigned to work kills all services to installations marked for removal excepting exhaust and lights.

3. Gas, air, and water supply shut off as required.

4. Dismantling group vacuum cleans entire room.

5. Painters spray paint all installations marked in RED.

6. Dismantlers proceed to remove painted items, vacuum cleaning under surfaces.

7. After all equipment and contaminated installations are removed a resurvey is made of walls and ceilings with areas marked with readings showing over permissible levels.

8. Removal of contaminated surfaces by washing, sanding, or grinding as required is done by the decontamination group with concurrent checking by Health Surveyor.

Evidence to date indicates very shallow penetration of contamination in plaster, asphalt tile, and concrete. Direct washing will not decontaminate surfaces to direct readings required in most cases.

PERSONNEL

Initial personnel as of May 1, 1949 consisted of nine men formerly on the Guard Force who were working a six-day week and were to be terminated. Four of these men were not permitted to do heavy lifting and as the work progressed this force was increased to a total of 21 men as shown on attached Organization Chart.

On May 23, 1949 all personnel went on a five-day work schedule with a general change of classification and approximate increase of 15 per cent. In general, the job moral was good through the change and remains good.

While no rigid boundaries are fixed it became evident that considerable job training for the various operations was required and a fairly successful attempt has been made to define specialized jobs at Unit III.

1. Harrell and Rose each head a group of two men each to carry through dismantling procedures. Their resourcefulness and initiative in orderly procedure and dust control has been responsible for low air levels to date.

2. Pebley heads a group of two for decontamination work which includes all surface removal necessary to reach required limits. He has shown considerable interest and ability in developing methods.

3. Staley and Linville, being limited to light work, have been assigned to all painting both in the laboratories for dust control and in the painting shop where necessary additional painting is done preparatory to hauling contaminated material to the scrap yard.

4. Takacs and Klotzbach are carpenters assigned to work principally on crating and boxing for both Units III and IV. A power saw has been set up at Unit III for using scrap lumber as available and it is believed that such custom-made boxes are more economical and satisfactory than to attempt to purchase containers to specifications.

5. Watren, electrician, and Smith, pipefitter, handle all respective services and clear the laboratories as required at Unit III and IV prior to dismantling.

6. Clothing requirements have required the full time of one man to date with Buford assigned to sorting, checking, and handling.

7. Trucking facilities and driver are furnished by Transportation with Long assigned to assist the driver. One two-ton stake truck to date has been sufficient to handle the output with an average of approximately 1 1/2 loads per day.

8. Work at Unit IV to date has consisted of cleaning up and painting with Chrisman, Kent, and Miller handling and painting items for transportation.

9. Care of grounds at Unit IV is handled by Howe and Walker.

HEALTH

Surveying and monitoring air samples is under the supervision of Mr. R. Hayden who set up ccunting equipment at both Units III and IV for current checks of air samples.

Maximum permissible limits established to date are as follows:

3,000 alpha d./min. per cu. meter - no protection required

3,000-25,000 alpha d./min. per cu. meter - use respirators

25,000-50,000 alpha d./min. per cu. meter - use assault masks

Over 50,000 alpha d./min. per cu. meter - workmen are removed

With methods outlined previously the job to date has continued with use of respirators only. For painting with Amercoat assault masks have been used.

A urine count of 12 alpha counts per minute per 50 milliliter is used for the maximum permissible level of individuals working in the nominal high risk areas. To date at Unit III no counts above this have been detected. With close supervision by the Health Group and careful training of the personnel in methods established the above tolerances have not proven to be an undue hardship and should be met with present procedures. It is not believed that increased allowable air counts would materially expedite the work as experience has shown that the least relaxation of care will throw the sample to two and three times the tolerances set by the Health Group.

A Change House procedure has been set up as outlined by the Health Group which provides for a clean area locker room and low risk area covering all plant areas adjacent to laboratories being dismantled.

Laboratories being dismantled are classified as high risk requiring additional clothing.

Smoking is permitted in the low risk change room and eating in the clean area only.

Very good compliance has been obtained from the personnel to date.

Urine samples are collected Monday and Wednesday with reports forwarded to the Health Supervisor.

COSTS

No cost figures are available from which a reliable estimate can be made at this time. The June cost figures should provide some reasonable data as during this month operations have been fairly uniform. It is evident that as allowable levels are lowered, the difficulty and cost rapidly increases. Practically, the lower limit is probably that found in the so-called clean contiguous areas such as the yards and ground from which recontamination occurs.

As a statement of opinion only, it is believed that a tolerance of 10,000 alpha d./min./100 cm.^{2} would greatly facilitate decontamination as surrounding yard and walk areas have direct readings ranging to 85,000 alpha d./min./100 cm.^{2}

A unit cost estimate may be made with the following assumptions:

Total volume of laboratories contaminated	70,000 cu. ft.
Volume of contaminated laboratories dismantled and decontaminated to date	14,000 cu. ft.
Man-hours expended to date	3,000
Direct labor at $2.00 per hour	$6,000
Material and equipment charges	$6,000
	$12,000
Overhead 50 per cent labor	3,000
15 per cent material	900
Unit Cost $1.10/cu. ft.	$15,900

On the above basis it is estimated that with the present organization and considering increased efficiency with experience gained, Unit III would be completed approximately October 1, 1949 at a cost of approximately $100,000.00 including $20,000.00 for miscellaneous areas to be decontaminated which were not included in the laboratories volumes shown.

A second alternative to the above is to remove only equipment known to be highly contaminated and of indefinite levels which should reduce the above estimate by 20 per cent of labor and material cost (decontamination group) and by the $20,000.00 item or to $64,000.00. Assuming two years required for decay of activity estimated at 125,000 d./min., with approximately $30,000 expense for guard services, it appears to present about equal cost. With immediate dismantling, however, the plant can be placed in use and hazards eliminated.

A third alternative to close the plant as is with only removal of saleable items presents the possibility of continued expense for an unknown

period, but probably from five to ten years guard service and maintenance again in this case would probably be greater than the cost of immediate removal.

Similar reasoning applied to Unit IV indicates the advisability of removing the highly contaminated equipment within the building but to date no estimate can be given as to the difficulty of decontaminating the structural surfaces to a level sufficiently low to permit access to private contractor.

TAB K

REPORT OF STEERING COMMITTEE FOR DISPOSAL OF UNITS III AND IV

PERIOD - JULY 16-31, 1949

GENERAL

At a meeting of the Planning Committee, on July 23, 1949, attended by M. M. Haring, Chairman, J. E. Bradley, K. A. Dunbar, F. L. Halbach, E. A. Langdon, J. R. Wiesler, and W. D. Woods, the following conclusions were reached:

1. No official decision can at present be given on an over-all acceptable level for return of Unit III to the Board of Education. Tentative levels previously established will be met as closely as possible, and a final completion report with health surveys attested by Health Supervisor issued when work is finished. This report will serve as a guide in deciding final status insofar as return to the Board of Education goes.

2. No definite levels were fixed for work at Unit IV; however, it was agreed that levels higher than those set for work at Unit III could be used, with actual limits determined by field conditions and judgment of Steering Committee, Engineer-in-charge, and Health Supervisor. (Up to 50,000 d./min./100 cm.^{2} direct reading with zero wipe.)

3. Asphalt Tile Floors - As survey shows wood flooring under the asphalt tile will range from 0-20,000 d./min./100 cm.^{2}, it will not be necessary to remove top floor.

4. Roofs - No other treatment is required for roof areas other than possible use of asphalt paint over spots excessively contaminated, inasmuch as repairs to such areas would not be very extensive, if at all.

5. Quonset Hut - As the Quonset hut will be too contaminated to sell to the public, it was decided to dismantle and move the building to Mound Laboratory.

6. Building Vertical Exterior Surfaces - No treatment of any brick, stone, cement block, or other similar outside surface is required other than possible coating of excessively contaminated spots with clear lacquer.

7. Grounds, Walks, and Drives - Grounds will be scraped as needed or treated in some equivalent manner. Walks will be painted with concrete paint as required.

8. On completion of the dismantling work at Unit III, the buildings and fence gates are to be padlocked. After this time no guard or watchman service will be provided.

TAB L

Harry Stoeckle, M.D., Chief, Biology and Medicine Division, Oak Ridge, Tennessee
R. E. Hayden

October 3, 1949

FINAL SURVEY - UNIT III

The final survey represents the most accurate of all surveys made of cleaned areas. An estimated fifty per cent of the total floor area was covered. An estimated ten per cent of the vertical surfaces and less accessible horizontal surfaces was covered.

The objective of the cleaning process was to leave all areas with no detectable wipe and a direct reading of less than 5,000 alpha d./min./100 $cm.^2$ as measured with various alpha meters available. A wipe in this case represents the rubbing of about 40 square inches of surface with a 4.25 cm. disk of number 1 Whatman filter paper held with two fingers. The abbreviation N.D. (not detectable) indicates that no observable reading is obtained on an alpha meter with a sensitivity of from 250 to 500 disintegrations per dimension. This would probably result in the detection of about 500 d./min. over the area of the filter disk involved. Efforts to evaluate these wipes in a parallel plate chamber were hopelessly unsuccessful due to false readings caused by chemical ionization from the reagents used to clean the surfaces and due to protruding fibres producing false counts due to arcing.

As spots not conforming to the limits set were found, they were reduced where possible until they did conform. In a few cases it seemed impractical to expend the effort needed to make them conform. In these cases, the readings are tabulated.

The first column of the table indicates a reading recorded, in most cases, before cleaning started. The blanks indicate that no readings

were recorded. Readings reported as greater than (>) indicated that they were higher than could be read on the meters available at the time. A higher reading in the final survey does not necessarily indicate an increase in activity but only the use of an instrument with a higher range.

The high spot on the floor of Room 25B is one which was missed in a previous survey due to its small area $\sim$ 100 cm.^{2} The adjacent floor had been replaced. Since there was no wipe on the spot, it was considered impractical to remove and replace the floor.

The high spots in the roof were not cleaned because it appeared impractical. Also, previous readings indicate that the activity is eroded away much faster than could be expected from decay alone. This should be even more rapid during the fall rainy season. The roof drains were not cleaned because they represent an accumulation point for activity as it is eroded from the roof and would become "hot" again. Also, it is obvious that they are equally "hot" inside where measurements cannot be taken and where they could not be cleaned. Also, replacement drains would accumulate activity in like manner. The rectangular pit in the laundry could not be cleaned. It is to be filled with concrete. The five sq. ft. area under the concrete ledge in the north side of the Marlite Room could not be cleaned with acid. It is not accessible to any grinding tool. It was not considered of sufficient importance to necessitate removal with pneumatic drills. It has been covered with clear shellac so there is no detectable reading.

The following areas have not been cleaned: (as of 9/30/49.)

1. Quonset Slab - Work is in progress and is about 70 per cent complete. The paint is being ground off the north end and it is anticipated that the nitric acid will complete the decontamination.

2. Warehouse 3, Asphalt Slab - This is moderately contaminated due to traffic. It is anticipated that the nitric acid will reduce it to less than 5,000 d./min./100 cm.^{2}

3. Stockroom Hot Mix Slab - Efforts to clean this with nitric acid were unsuccessful. It is in the process of being torn up. It is expected to be complete on September 30, 1949. It will be trucked loose to "hot" waste storage at Unit V. Several negative wipes indicate that all loose activity has been removed.

4. Fire Escape - This is in the process of being sanded and is about 80 per cent complete.

5. Steel Loading Platform and Adjacent Concrete Steps and Slab - The platform has not been cleaned since it is in use. The adjacent areas have not been cleaned since they would become recontaminated in cleaning the platform. This represents an estimated one-man day.

6. Locker Rooms and Adjacent Hallway - These are being cleaned and are an estimated 50 per cent complete. They should be complete on October 3, 1949.

7. Concrete Driveway and Remaining Walks - These can probably be cleaned with nitric acid when it no longer is necessary to use them. The wood walks may be removed. The areas involved are small.

8. Garage - Surplus scrap for sale is stored in this building so it must be removed before a survey can be made. The area was originally

"cool" so no major decontamination problems are anticipated.

9. Cafeteria - This is in use as an office, counting room and lunch room. It was originally "cool" and should show only a few "hot" spots where people have stepped off the protective paper walkways.

10. Guard House - The floor is covered but "hot" spots are anticipated. The wood floor should be easily cleaned by sanding.

11. Grounds Inside the Fence - It is most likely that a layer of dirt will need to be removed in the most active areas.

12. Areas Outside the Fence - The sidewalk and street gutters are "hot" for considerable distances, particularly on Euclid Avenue and Edison Street.

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
"C" Building					
Vestibule N. maximum	15,000		4600	N.D.	9/13
Vestibule to C_1 door			0-3300	N.D.	9/13
C_1 to partition, one spot max.			3000	N.D.	9/13
C_1 to partition, all other parts			<500	N.D.	9/13
Partition to S. exit door			<500	N.D.	9/13
S Vestibule			<500	N.D.	9/13
Concrete S threshold			0-3000	N.D.	9/13
All hallway walls			<500	N.D.	9/13
Office floor			<500	N.D.	9/13
Office walls and ceiling			<500	N.D.	9/13
C-5 floor			<500	N.D.	9/13
C-5 walls and ceiling			<500	N.D.	9/13
C-4 floor N room			<500	N.D.	9/13
C-4 floor spot near center drain			800	N.D.	9/13
C-4 N room walls, shelves, ceiling, and cabinets			<-500	N.D.	9/13
C-4S room floor			<500	N.D.	9/13
C-4 S room floor spot near N door			700	N.D.	9/13
C-4 walls, benches, cabinets, and sink			<500	N.D.	9/13
C-3 floor			<500	N.D.	9/13
C-3 walls, benches, and ceiling			<500	N.D.	9/13
C-3 sink			1500	N.D.	9/13

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
C-2 floor			<500	N.D.	9/15
C-2 walls, ceiling, cabinets, and sink			<500	N.D.	9/15
C-1 SE room, spot - floor	90,000	10,000	1800	N.D.	9/15
C-1 SE room, spot - floor			4500	N.D.	9/15
C-1 SE room, spot - floor			4000	N.D.	9/15
C-1 SE room, spot - floor			4800	N.D.	9/15
C-1 SE room, remaining floor	10,000		1500	N.D.	9/15
C-1 W room, main floor	>90,000	25,000	~3000	N.D.	9/15
C-1 W room, spots			4500	N.D.	9/15
C-1 E room, floor	50,000	5,000	<500	N.D.	9/15
C-1 E room, floor - spot			1500	N.D.	9/15
C-1 E room, floor - spot near door			4800	N.D.	9/15
C-1 E room, wall and ceiling			<500	N.D.	9/15
C-1, W room, walls and ceiling			<500	N.D.	9/15
C-1, SE room, walls and ceiling			<500	N.D.	9/15
C-1, hoods, benches, etc.	>90,000		Removed		
"B" Building					
Covered walkway SE end	15,000		1500	N.D.	9/15
Covered walkway, corner area	20,000		600	N.D.	9/15
Covered walkway, W end	30,000		1500	N.D.	9/15
Covered walkway, NW corner	30,000		1500	N.D.	9/15
Covered walkway, SW end	15,000		500	N.D.	9/15

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Room B-1	900		900	N.D.	9/15
Spur to Cafeteria	10,000		<5000	N.D.	9/15
B-2 hallway	10,000		600	N.D.	9/15
B-2 floor, maximum	40,000		<500	N.D.	9/15
B-2 walls, ceiling, and fixtures	<500		<500	N.D.	9/15
B-3 floor, walls, and ceiling	<500		<500	N.D.	9/15
B-4, floor, maximum	35,000		<500	N.D.	9/15
B-4, sink, fixtures, wall, etc.	<500		<500	N.D.	9/15
B-5 floor	>86,000		1500	N.D.	9/15
B-5 walls, ceiling, etc.	~50,000		<500	N.D.	9/15
B-6 floor	10,000		<1500	N.D.	9/15
B-6 walls, fixtures, etc.	<-500		<500	N.D.	9/15
B-6 shower room floor	<500		<500	N.D.	9/15
B-7 floor, maximum	7500		<500	N.D.	9/15
B-8 floor	8000		<500	N.D.	9/15
B-8 shower section	<500		<500	N.D.	9/15
B-9 W side	8000		<500	N.D.	9/20
B-9 E side	8000		<500	N.D.	9/20
B-9 shower room	<500		<500	N.D.	9/20
Laundry Building					
Floor S side	~30,000		<5000	N.D.	9/20
Floor N side W end	>64,000		<5000	N.D.	9/20

Location	Preliminary Readings Direct	Wipe	Final Readings Direct	Wipe	Date 1949
Floor N side E end	~20,000		2800	N.D.	9/20
Floor, soap room	~10,000		<500	N.D.	9/20
Walls, pipes, and fixtures	~ 8000		1200	N.D.	9/20
Glass Blowing Room					
Floor S center, spot	> 64,000		<500	N.D.	9/22
Floor, several spots	6000-18,000		<500	N.D.	9/22
Walls, ceiling, fixtures, etc.	<500		<500	N.D.	9/22
Quartz Fibre Room					
Floor, W room, center spot	40,000		5000	N.D.	9/22
Floor, E room	<500		<500	N.D.	9/22
Walls, ceiling, and fixtures			<500	N.D.	9/22
Decontamination Room					
Walls	10,000		<600	N.D.	9/23
Heater	8000-30,000		<500	N.D.	9/23
Hood, sinks, etc.	10,000		Removed	N.D.	9/23
Floor	15,000		3000	N.D.	9/23
Main Building					
Floor, attic	10,000		<500	N.D.	9/22
Stairs, attic, maximum	15,000		1000	N.D.	9/22
Room 38 - floor	6000		<500	N.D.	9/22
Walls, ceiling	<500		<500	N.D.	9/22

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Fixtures, bench, spot	12,000		5000	N.D.	9/22
Fixtures - all other	< 500		< 500	N.D.	9/22
Room 43					
Floor, maximum	> 90,000		< 500	N.D.	9/22
Walls, ceiling, fixtures	~ 600		~ 600	N.D.	9/22
Rest room floor	20,000		< 500	N.D.	9/22
Walls, ceiling, fixtures	< 500		< 500	N.D.	9/22
Room 41 - floor - spots	50,000		< 500	N.D.	9/22
Window sills	8,000		3000	N.D.	9/22
Walls, ceiling and fixtures	< 500		< 500	N.D.	9/22
Room 40 - floor	15,000		< 500	N.D.	9/22
Walls, ceiling, and fixtures	< 500		< 500	N.D.	9/22
Concrete drain	12,000		< 500	N.D.	9/22
Room 40 - floor	30,000		< 500	N.D.	9/22
Walls, ceiling, and fixtures	< 500		< 500	N.D.	9/22
Window sills	< 500		< 500	N.D.	9/22
First Aid Room					
Floor at entrance	10,000		< 500	N.D.	9/22
All other parts	< 500		< 500	N.D.	9/22
Room 32 - floor maximum	50,000		< 500	N.D.	9/22
Walls, fixtures, etc.	< 500		< 500	N.D.	9/22
Hood	> 60,000		Removed		
Sink	> 60,000		Removed		

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Room 33 - floor	20,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 34 - floor	20,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 35 - floor	20,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 36 - floor - spots	25,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 37 - floor	15,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 45 - floor - spots	35,000		<500	N.D.	9/22
All other parts	<500		<500	N.D.	9/22
Room 44 - floor	20,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
3rd Floor Halls - floors	~20,000		<500	N.D.	9/22
3rd Floor Halls - walls, etc.	<500		<500	N.D.	9/22
Stairs between 3rd and 2nd floors	20,000		<700	N.D.	9/22
Stair rails	10,000		<500	N.D.	9/22
2nd floor hall	30,000		<500	N.D.	9/22
Rooms 21B and 21C - hoods	>90,000		Removed	N.D.	9/22
Rooms 21B and 21C - floor	50,000		~1000	N.D.	9/22
Window sills	20,000		5000	N.D.	9/22
Fluorescent lights	10,000		<500	N.D.	9/22

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Benches	~50,000		Removed		
Lead vault	50,000		Removed		
Steam pipes	10,000		<1000	N.D.	9/22
Room 23 - floor - spots	15,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 24 - floor	35,000		~1500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Room 25B - floor	>50,000		<5000	N.D.	9/22
Light fixtures	15,000		1000	N.D.	9/22
Window sills	50,000		5000	N.D.	9/22
Radiators	50,000		5000	N.D.	9/22
Dry boxes, sinks, benches	>90,000		Removed	N.D.	9/22
Floor - spot	>90,000		50,000	N.D.	9/22 Cannot be cleaned
Room 27 - floor ~100 cm.^{2}	15,000		<500	N.D.	9/22
All other parts	<500		<500	N.D.	9/22
Room 28 - floor	50,000		<1000	N.D.	9/22
Benches	>50,000		Removed		
Stairs between 1st and 2nd floor	25,000		<500	N.D.	9/22
Window sills, hall	15,000		<500	N.D.	9/22
Stairs - spots - maximum	25,000		5000	N.D.	9/22
Stair rails	15,000		<500	N.D.	9/22

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Room 11A and 11B - floor					
Window sills	50,000		<1000	N.D.	9/22
Light fixtures	8000		<1000	N.D.	9/22
Pipes	8000		<1000	N.D.	9/22
Hoods	>60,000		Removed	N.D.	9/22
Benches	>60,000		Removed	N.D.	9/22
Sinks	>60,000		Removed	N.D.	9/22
Room 10C - all parts	<500		<500	N.D.	9/22
Room 15A - floor	10,000		<500	N.D.	9/22
Walls and fixtures	<1000		<1000	N.D.	9/22
Radiators	10,000		5000	N.D.	9/22
Window sills	15,000		3000	N.D.	9/22
Locker room - hot side floor	18,000		Inc.	Survey	Not cleaned
Locker room - cold side floor	11,000		Inc.	Survey	Not cleaned
Walls and fixtures	<500		Inc.	Survey	Not cleaned
Vestibule - floor	15,000		Inc.	Survey	Not cleaned
Window sills	6000		Inc.	Survey	Not cleaned
Fluorescent fixtures	6000		Inc.	Survey	Not cleaned
Hall - 1st floor					
Radiator	5000		5000	N.D.	9/22
Walls and fixtures	<500		<500	N.D.	9/22
Stairs 1st floor to basement	10,000		<3000	N.D.	9/22

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Room 28 W room					
Hoods	15,000		Removed		
Floor	10,000		<500	N.D.	9/22
Duct ends	<500		<500	N.D.	9/22
Fixtures, walls, etc.	<500		<500	N.D.	9/22
Room 28 E side - floor	10,000		<500	N.D.	9/22
Hoods	50,000		Removed		
Walls, fixtures, etc.	15,000		<1000	N.D.	9/22
Room 28 S side - floor	15,000		<500	N.D.	9/22
Bench	50,000		<500	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Window sills	10,000		<500	N.D.	9/22
Assay room - bench	1200		1200	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Floor	10,000		1000	N.D.	9/22
Gas valve room - floor	8000		<5000	N.D.	9/27
Walls, fixtures, etc.	500		<500	N.D.	9/22
Janitors Supply room - floor	10,000		<3000	N.D.	9/22
Water softeners room - floor	30,000		<1000	N.D.	9/22
Walls, fixtures, switch boxes	10,000		<3000	N.D.	9/22
Water softener	500		<500	N.D.	9/22
Carpenter shop - floor	10,000		<3000	N.D.	9/22
Walls, fixtures, etc.	500		<500	N.D.	9/22

Location	Preliminary Readings Direct	Wipe	Final Readings Direct	Wipe	Date 1949
Sink	8000		<5000	N.D.	9/22
Window sill	6000		5000	N.D.	9/22
Plumbing shop - floor	10,000		<3000	N.D.	9/22
Walls, fixtures, etc.	<500		<500	N.D.	9/22
Window sill	14,000		<5000	N.D.	9/22
Marlite rooms					
S side - floor	>70,000		Removed		
S side - walls	>70,000		Removed		
S side - dry boxes, hoods, etc.	>70,000		Removed		
S side - fixtures and ducts	50,000		Removed		
S side - floor after tile removed	30,000		<5000	N.D.	9/29
N side - floor asphalt	>70,000		Removed		
N side - floor concrete	50,000		<5000	N.D.	9/29
N side - walls	50,000		Removed		
N side - window sills	13,000		<5000	N.D.	9/29
N side - pipes	10,000		<5000	N.D.	9/29
Hoods and benches	>70,000		Removed		
Concrete ledge	>70,000		<5000	N.D.	9/29
5 sq. ft. area under ledge	>70,000		64,000	N.D.	9/29
Machine Shop					
SE office - floor	10,000		<500	N.D.	9/23
SE office - walls and fixtures	<500		<500	N.D.	9/23
SE office - floor spot	10,000		2000	N.D.	9/23

Location	Preliminary Readings Direct	Wipe	Final Readings Direct	Wipe	Date 1949
Large room - S end	8000		<500	N.D.	9/23
Walls, fixtures, large room	<500		<500	N.D.	9/23
Electrical Shop	8000		<1500	N.D.	9/23
Electrical Shop - walls and fixtures	<500		<500	N.D.	9/23
W room - floor	6000		<500	N.D.	9/23
W room - walls and fixtures	<500		<500	N.D.	9/23
SW office - floor	<500		<500	N.D.	9/23
SW office - walls and fixtures	<500		<500	N.D.	9/23
Warehouse 3 slab - doorway	10,000		Inc.		
Warehouse 3 slab - S center	6000		Inc.		
Warehouse 3 slab - SE corner	3200		Inc.		
Warehouse 3 slab - E center	5200		Inc.		
Warehouse 3 slab - center	4500		Inc.		
Warehouse 3 slab - W center	3000		Inc.		
Warehouse 3 slab - NW end	2500		Inc.		
Warehouse 3 slab - NE end	1500		Inc.		
Warehouse 3 slab - N center	2500		Inc.		
Concrete driveway - W end	6400		Inc.		
Concrete driveway - center	12,000		Inc.		
Concrete driveway - E end	6000		Inc.		
Stockroom slab - N end	15,000		Removed	N.D.	9/30
Stockroom slab - center	30,000		Removed	N.D.	9/30
Stockroom slab - S end	64,000		Removed	N.D.	9/30

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Asphalt walk - N end	12,000		Removed	N.D.	9/30
Asphalt walk - center	24,000		Removed	N.D.	9/30
Asphalt walk - S end	50,000		Removed	N.D.	9/30
East steps	25,000		Inc.		9/30
N side steel platform	64,000		Inc.		9/30
Boiler room - E door	64,000		Inc.	N.D.	9/30
Boiler room - center	9000		Inc.	N.D.	9/30
Boiler room - W door	6000		Inc.	N.D.	9/30
Boiler room - N side door	15,000		Inc.	N.D.	9/30
Boiler room - S side door	6000		Inc.	N.D.	9/30
Boiler room - N side walkway	54,000		Inc.	N.D.	9/30
Roof					
"C" Building, NW corner	6000		1500	N.D.	9/20
"C" Building, NE corner	3000		1000	N.D.	9/20
"C" Building, N center	3000		1000	N.D.	9/20
"C" Building, W center	1000		900	N.D.	9/20
"C" Building, SE corner	600		500	N.D.	9/20
"C" Building, SW corner	600		500	N.D.	9/20
"C" Building, center	1000		900	N.D.	9/20
"A" Building, NE corner			600	N.D.	9/20
"A" Building, SE corner	<500		<500	N.D.	9/20
"A" Building, SW corner	<500		<500	N.D.	9/20
"A" Building, NW corner			900	N.D.	9/20

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Covered Walkway, N end	10,000		6000	N.D.	9/20
Covered Walkway, S end	<500		<500	N.D.	9/20
"B" Building, NE corner			6000	N.D.	9/20
"B" Building, NW corner	12,000		6000	N.D.	9/20
"B" Building Roof, SE corner	600	N.D. (7/13)	<500	N.D.	9/19
"B" Building Roof, SW corner	5000	N.D. (7/13)	<500	N.D.	9/19
"B" Building Roof, center	12,000		900	N.D.	9/19
"B" Building Roof Drain, NW corner			46,000	N.D.	9/19
"B" Building Roof Drain, N side			25,000	N.D.	9/19
Pipe tunnel roof	45,000		500-35,000	N.D.	9/19
Main Building Roof, NW corner	18,000		6000	N.D.	9/19
Main Building Roof, NE corner			2500	N.D.	9/19
Main Building Roof, SE corner			2500	N.D.	9/19
Main Building Roof, SW corner			7000	N.D.	9/19
Main Building Roof, center			6000	N.D.	9/19
Main Building Roof, near trap door			2000	N.D.	9/19
Machine Shop Roof, SE			<500	N.D.	7/13
Machine Shop Roof, SE side center			<500	N.D.	7/13
Pipe tunnel roof			<500	N.D.	7/13
Machine Shop Roof, SE corner			6000	N.D.	7/13
Machine Shop Roof, N side center			6000	N.D.	7/13
Machine Shop Roof, NW corner			<500	N.D.	7/13
Pipe tunnel roof, N end			<500	N.D.	7/13

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Garage roof, NW corner			<500	N.D.	7/13
Garage roof, NE corner			<500	N.D.	7/13
Garage roof, center			<500	N.D.	7/13
Garage roof, SW corner			<500	N.D.	7/13
Garage roof, W side center			<500	N.D.	7/13
Acid room roof, NE corner			3500	N.D.	7/13
Acid room roof, NW corner			1200	N.D.	7/13
Acid room roof, SW corner			1200	N.D.	7/13
Acid room roof, SE corner			2000	N.D.	7/13
Boiler room roof, SW corner			<500	N.D.	7/13
Boiler room roof, SE corner			<500	N.D.	7/13
Boiler room roof, NE corner			<500	N.D.	7/13
Boiler room roof, NW corner			<500	N.D.	7/13
Base of stack			1400	N.D.	7/13
Vault roof center			<500	N.D.	7/13
Laundry roof - SE corner	9000	N.D.	3600	N.D.	7/13
Laundry roof - NE corner	6000	N.D.	900	N.D.	7/13
Laundry roof - NW corner	3000	N.D.	600	N.D.	7/13
Laundry roof - SW corner	4000	N.D.	500	N.D.	7/13
Laundry roof - center	12,000	N.D.	5000	N.D.	7/13
Laundry roof, E side drain	>50,000	N.D.	32,000	N.D.	7/13
Laundry roof, N side outer	5000	N.D.	4000	N.D.	7/13
Laundry Rectangular pit	>64,000	N.D.	>72,000	N.D.	7/13

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Laundry, W side center	13,000	N.D.	1800	N.D.	7/13
Laundry, S side center	6000	N.D.	<5000	N.D.	7/13
Grounds					
Road in back of main building	42,300		7000	N.D.	9/22
Entrance to Warehouse 3	900		9000	N.D.	9/22
L side of No. 3 gate	21,000		4000	N.D.	9/22
Gutter outside No. 3 gate, L side	>85,000		198,000	N.D.	9/22
R side of No. 3 gate	>85,000		50,000	N.D.	9/22
Front of No. 3 gate	>85,000		28,000	N.D.	9/22
Gutter outside of No. 3 gate, R side	21,000		248,000	N.D.	9/22
Middle of street in front of No. 3 gate	5500		600	N.D.	9/22
Sidewalk in front of No. 3 gate	>85,000		50,000	800	9/22
Sidewalk to guard house by No. 3 gate	>85,000		182,000	N.D.	9/22
Sidewalk by coal bin	7400		<5000	N.D.	9/22
Handrail outside main gate	44,000		< 500	N.D.	9/22
Sidewalk at N entrance to Marlite	>85,000		<5000	N.D.	9/29
Sidewalk at W entrance to Marlite	>85,000		900	N.D.	9/22
Doorway to compressor room	83,000		5000	N.D.	9/29
Front of laundry - double doors	42,000		1000	N.D.	9/22
Sidewalk by decontamination room	82,000		<5000	N.D.	9/29
Sidewalk in front of "C" Building	4500		<500	N.D.	9/22

Location	Preliminary Readings Direct	Wipe	Final Readings Direct	Wipe	Date 1949
Sidewalk in front of E-2	13,000		<5000	N.D.	9/29
Between furnace and acid rooms	22,000		<5000	N.D.	9/29
Front of furnace room	45,000		<5000	N.D.	9/29
Quonset slab N half	>5,000,000	Yes	Inc.	Yes	9/29
Quonset slab S half	~50,000	Yes	Inc.	Yes	9/29
Warehouse No. 3 slab S center	18,000		Inc.	Inc.	9/29
Warehouse No. 3 slab SE corner	1300		Inc.	Inc.	9/29
Warehouse No. 3 slab SW corner	3300		Inc.	Inc.	9/29
Warehouse No. 3 slab, center	5000		Inc.	Inc.	9/29
Warehouse No. 3 N half	1200		Inc.	Inc.	9/29
Stockroom hot mix slab N end	30,000		Removed		Could not be cleaned
Stockroom hot mix slab, center	30,000		Removed		Could not be cleaned
Stockroom hot mix slab, S end	20,000		Removed		Could not be cleaned
Fire escape	50,000		<5000	N.D.	9/30
Guard House			Inc.		
Cellar Stairs	60,000		Inc.		
Cafeteria	<500		Inc.		
Steel loading platform	>64,000		Inc.		

Inc. - Incomplete

R. E. Hayden

TAB M

SUPPLEMENT TO FINAL SURVEY OF UNIT III

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Warehouse No. 3, Asphalt Slab South center, one spot	68,000	2500	15,000	N.D.	10/27
Southeast corner, one spot			10,000	N.D.	10/27
All other (south end)			<4000	N.D.	10/27
All north end			<2000	N.D.	10/27
Stockroom Hot Mix Slab			Removed		
Fire Escape, First flight	85,000		<5000	N.D.	10/18
Second flight	50,000		<5000	N.D.	10/18
Third flight	20,000		<5000	N.D.	10/18
Steel Loading Platform	>144,000	5000			
Platform			500-2000	N.D.	10/19
Steps and handrail			1000	N.D.	10/19
Brace supporting No. 2 step			10,000	N.D.	10/19
Locker rooms and adjacent hallway					
West change room, Floor	20,000	1000	<500	N.D.	10/12
Fixtures	10,000	1000	<500	N.D.	10/12
Ceiling	<500	N.D.	<500	N.D.	10/12
Walls (spots)	10,000		<500	N.D.	10/12
East change room, Floor	20,000		<500	N.D.	10/28
Window sills	10,000		<500	N.D.	10/28
Walls			<500	N.D.	10/28
Ceiling			<500	N.D.	10/28
Fixtures			<500	N.D.	10/28
Hallway			<500	N.D.	10/28

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Concrete Drive and Walls, Drive (1 small strip north side)			7000	N.D.	10/28
Other			500	N.D.	10/28
Walks			500	N.D.	10/28
Garage, West end, one spot			2800	N.D.	10/25
All other			<500	N.D.	10/25
Cafeteria, Spots on floor					
East doorway	144,000		<500	N.D.	10/13
North of door	75,000		<500	N.D.	10/13
South side of room	5000-15,000		<500	N.D.	10/13
Southwest corner	20,000		<500	N.D.	10/13
Center of room	5000		<500	N.D.	10/13
West doorway	70,000		<500	N.D.	10/13
Shelves	15,000		<500	N.D.	10/13
All other			<500	N.D.	10/13
Guard House, Four spots on floor	10,000		<500	N.D.	10/28
All other			<500	N.D.	10/28
Quonset vault			<2000	N.D.	10/31
Boiler house, Floor (large room)	10,000-15,000	500	<500	N.D.	10/13
Floor (small room)	5000-50,000	2000	<1000	N.D.	10/13
Walls			<500	N.D.	10/13
Main Building Basement steps	5000-50,000		500-5000	N.D.	10/18

Location	Preliminary Readings Direct	Preliminary Readings Wipe	Final Readings Direct	Final Readings Wipe	Date 1949
Concrete slab (drum storage) 2 spots	20,000		10,000	N.D.	10/19
All other	<5000		<500	N.D.	10/19
Grounds, Rear of Main Building			<5000	N.D.	10/27
Behind Quonset slab			<3000	N.D.	10/27
All other			<500	N.D.	10/27

Quonset Slab Survey
10/28/49

332 readings < 5,000 d./min./100 cm.^{2}

83 readings 5,000-10,000 d./min./100 cm.^{2}

56 readings 10,000-20,000 d./min./100 cm.^{2}

42 readings 20,000-50,000 d./min./100 cm.^{2}

33 readings >50,000 d./min./100 cm.^{2}

Of these 33 readings > 50,000 d./min./100 cm.^{2} the highest reading was 1,402,500 d./min./100 cm.^{2} with four readings > 1,000,000 d./min./100 cm.^{2} There were no detectable wipes in any of these spots.

Since decontamination can proceed no further and this slab shows no wipe test and is very well constructed, we strongly recommend painting. If this does not meet approval, the only recourse is to have Maxon break up and remove this slab. This, however, is undesirable because considerable amounts of contamination may be spread by concrete dust.

Note: All readings are d./min./100 cm.^{2}

TAB N

AIR SAMPLES AT UNIT III IN d./min./m.^{3}

	0 to 1,000	1,000 to 3,000	3,000 to 10,000	10,000 to 25,000	25,000 to 50,000	Over 50,000	TOTAL
May and June	101	26	21	3	0	3	154
July	115	25	14	4	4	3	165
August	136	36	28	5	3	1	209
September	51	12	5	0	0	0	68
October	———	———	———	———	———	———	———
TOTAL	403	99	68	12	7	7	596
Per Cent of Total	67.7	16.6	11.4	2.0	1.2	1.2	100.0

Note: Most of the work requiring air sampling was completed by mid-September which accounts for the small number of samples in that month. No samples were taken during October.

TAB Q

SUMMARY OF URINE SAMPLE AT UNIT III IN c./min./50 ml.

	0	1	2	3	4	5	6	7	8	TOTAL
May and June	54	12	10	10	1	1	0	0	0	88
July	47	18	10	3	1	2	2	0	0	83
August	48	13	4	2	2	3	0	0	1	73
September through 19, 1949	22	10	8	2	1	3	2	0	0	48
October	—	—	—	—	—	—	—	—	—	—
TOTAL	171	53	32	17	5	9	4	0	1	292

Note: No tabulation for insufficient samples, or after September 19, 1949.

Six samples were initially over 12 c./min./50 ml., but rechecks proved them to be in error.

No samples were over 8 c./min./50 ml.

The most significant factor revealed by this summary is the fact that not one man became "hot" while working on this project even though in excess of 12,000 man-hours were put in on this disposal program at Unit III.

FLH/rca