

H-DIVISION PROGRESS REPORT

April 21, 1962 - May 20, 1962

Thomas L. Shipman, M.D., Leader

I. GROUP H-1, HEALTH PHYSICS (Dean D. Meyer, Leader)

During a routine radiation survey of the Physics Building an interesting source of radiation was found. This was not a health hazard, but might be of interest to personnel constructing low background counters, and has been brought to the attention of the electronics group (P-1).

While surveying a work bench, the monitor found radiation levels of 1 mr/hr; the source was traced to two transistors. Another survey of the Supply and Property stock room turned up three more radioactive transistors. H-4 examined the transistors and believes the material is krypton-85. An H-1 health physicist has seen information about testing transistors at the factory, and reports that they are tested for container leakage by using krypton-85 under high pressure. Evidently the five transistors found were not rejected during inspection at the factory.

Two members of H-1 attended the American Industrial Hygiene Association annual meeting in Washington, D. C. One of the men presented a paper, "Study of Diffusion and Mixing of Tritium Gas in Air" at the meeting.

Three members of the health physics group at Rocky Flats visited Los Alamos to discuss mutual health problems. During the visit we were able to compare calibration of neutron survey instruments and neutron sources.

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Mr. Maruyama of Japan visited the Laboratory on May 15th. Unclassified health problems associated with plutonium were discussed.

The respirator cleaning program has been completely transferred from the contaminated laundry building, which has been returned to Supply and Property. The new area in CMR Building has proved to be very satisfactory for this work. During the month we processed 209 respirators.

The surface dose rate from high 240 content plutonium was measured in the extrapolation chamber. The surface dose was 1.9 rad/hr through 13 mil polyvinylchloride and 6 mg/cm² of paper. Standard low 240 content plutonium gives 1.2 rad/hr under the same conditions.

During the decontamination of equipment at Ten Site, RaLa contamination was spread around the cell area and two men had contaminated clothing. The dosage as recorded by pocket dosimeters was not high (240 mr). We do not believe that the men involved were overexposed; urine specimens have been collected and will be assayed. No evidence of beta burns has been noted at this time.

II. GROUP H-3, SAFETY (Roy Reidar, Leader)

<u>A. Accident Record</u>	<u>1/1/62 to 5/1/62</u>	<u>1961</u>
Manhours Worked	2,333,684	6,460,919
Number of Disabling Injuries	5	16
Number of Days Lost	144	18,233
Frequency (Accidents/1,000,000 Manhours)	2.1	2.5
Severity (Days Lost/1,000,000 Manhours)	62	2,822

B. Industrial Accident Experience

On May 16, 1962, ██████████ SD-1, received a disabling injury when he caught his finger between a chuck wrench and tool holder on a lathe. This resulted in the loss of the distal phalange of the index finger of the right hand.

C. Fires

There were no Laboratory fires during this report period.

D. Motor Vehicle Accidents

Miles Driven	577,340	1,706,232
Number of Accidents	8	20
Rate (Accidents/1,000,000 Miles)	14	12
Total Cost	\$737.00	\$1261.00
Accident Cost per 100,000 Miles	\$128.00	\$74.00

There was one Government vehicle accident involving a Laboratory driver during April. This occurred when a vehicle struck a concrete slab while detouring around some construction.

E. General

1. Mr. Kendall and Mr. Allan of the A. D. Little Company submitted a report of their visit to Los Alamos and the Rover Project at the Nevada Test Site. The report made recommendations concerning safety of our liquid hydrogen operation at both locations. It has been circulated and is receiving careful study by interested personnel. The A. D. Little Company holds a safety consultant contract with the Los Alamos Scientific Laboratory for liquid hydrogen operations.

2. Weapons testing and the Rover operation have been receiving safety surveillance. There has been a safety engineer present at the Nevada Test Site covering the Rover operation in 400 Area and the weapons testing in the Yucca Area almost con-

tinuously since the first of the year. There has been a safety engineer in residence in the Pacific since the build up of the Weapons Testing Operation in early March.

3. Mr. L. G. Matthews, Safety Consultant to the Los Alamos Scientific Laboratory for Compressed Gas Operations, surveyed our installations here and at the Nevada Test Site. His recommendations were submitted to Mr. Reider.

4. To reduce the possibility of fire damage to expensive and hard-to-replace equipment, the Department of Supply and Property has been asked to stock only fire-retardant treated tarpaulins. Tarps are frequently used to provide weather protection to equipment which may be temporarily used or stored out of doors.

5. Health and Safety Newsletter No. 62-3, on "Noise" was published. The newsletter was prepared by Group H-5.

6. The following films were shown during this report period:

- a) "ABC of Hand Tools" was shown once.
- b) "Drill Press Safety" was shown once.
- c) "Safety in the Chemical Laboratory" was shown five times.
- d) "Chain Reaction" was shown twice.
- e) "How to Avoid Muscle Strain" was shown three times.
- f) "People Are the Puzzle" was shown once.
- g) "It's the Little Things That Count" was shown once.

III. GROUP H-4, BIOLOGICAL RESEARCH (Wright H. Langham, Leader)

A. A New Method for Recording Chromatograms

Chromatography is a particularly valuable technique in investigations now in progress of the organic chemistry of nucleotides.

Paper chromatography is being used extensively, and research is being conducted on application of the relatively new technique of thin-layer chromatography (TLC) to this field. Determination of the position of the spots (which are invisible in ordinary light) on the chromatograms can be made by viewing with either transmitted or reflected short wavelength ultraviolet light (usually 254 m μ). Nucleotides and their derivatives absorb strongly in this region, and their presence causes quenching of the natural fluorescence of the paper or thin-layer chromatogram. Permanent records of paper chromatograms can be made by photographic contact printing in ultraviolet light. However, thin-layer chromatograms (consisting of layers of adsorbent ca. 0.25-mm thick on glass plates) cannot be satisfactorily recorded in this manner owing to the fragility of the layer and the opaqueness of glass to ultraviolet light.

A previously undescribed method was, therefore, developed which provides easily obtainable permanent records of excellent quality. The chromatogram, under illumination of ultraviolet light, is photographed with a view camera employing a filter (which allows passage of the visible fluorescent light but does not pass the reflected ultraviolet) and a Polaroid 4 x 5 Land Film Packet (Type 55 P/N, Positive/Negative). The advantages of this novel procedure include its rapidity, simplicity, ease of filing the reduced size photographs, possibility of enlarged copies when desired, better resolution (i.e., very weak spots may be visible on the photograph which are not discernible visually), and decreased exposure of personnel to ultraviolet radiation.

IV. GROUP H-5, INDUSTRIAL HYGIENE (Harry F. Schulte, Leader)

A. Evaluation and Control Work

Methyl Alcohol

Three air samples were collected in Group SP-3 during the operation of a ditto machine in a small room at SM-30. All three samples indicated an air concentration of 200 ppm, which is equivalent to the maximum permissible concentration for this material. A more detailed study of this will be continued during the next report period.

Various Toxic Materials

Air sampling was carried out for a wide variety of materials during this period. These included: beryllium at six locations, carbon tetrachloride in J-11, TNT at various parts of S Site, diphenyl at TA-46, mercury in CMR Building and enriched uranium at Shop 15. All of these samples showed air concentrations below acceptable levels.

Noise

Three noise surveys were made during this period. The survey made in the new graphite shop showed that the noise has been reduced below the hazardous level. In Building 200 at S Site, the noise level at the oxid machine was found to be below the hazardous level. In the Maintenance Section in the basement of the new Sigma Building the over-all noise level ranged from 87 to 90 decibels, and higher figures were obtained during welding and buffing operations. Pending improvements in this area, recommendations were made for audiometric tests on the operators and the use of personal protective devices.

Fallout

Analyses of air samples and milk samples have continued dur-

ing the month. There has been no increase in the gross beta count on fallout, which continues very low, and we have been unable to detect the presence of any iodine in the milk samples.

Respirators

The test bench for Scott Air Pak maintenance work has been completed and has been approved by Group H-3 for high pressure work. A number of regulators have already been tested and repaired. Twelve men were fitted with masks and respirators during this period. The maintenance program by Group H-1 appears to be working very well.

Ventilation

Checks of hoods have been made in areas of CMR Building, 7A-22 and at S Site. Recommendations for necessary or improved ventilation have been made in several areas of the Laboratory.

B. Research and Development

1. A multiple air sampling system has been designed and fabricated for use by Group H-7 on their research project in Delta Building. This has been completed and is ready for installation.
2. Tests are continuing in an attempt to develop an efficient perchloric acid hood for use in the Laboratory Section and also for an efficient scrubber to be operated in conjunction with the hood. During the month, tests have been run with perchloric acid at various flow rates and also with hydrochloric and sulfuric acids.
3. A second series of tests for the evaluation of silver nitrate impregnated filter papers was completed and confirmed the previous results of extremely low efficiency.

4. A continuing series of improvements on the plutonium urine assay procedure are under study. Preliminary runs on parallel samples using the ion exchange technique, in place of the TTA extraction method, have been carried out. Such tests will be continued using metabolized plutonium. The use of boric acid to aid in the dissolution of the lanthanum fluoride precipitation is being studied. Further work is being done to determine whether moderate quantities of sulfate interfere with various steps in the procedures. If they do not, the application of the method to tissue samples will be greatly facilitated.

5. Analytical results on 75 sets of autopsy samples have been compiled and tabulated. Calculations on the body burdens of exposed individuals have been tabulated, using the data and method of Group H-1.

C. Miscellaneous

Investigations have been made of the use of diborane in Group CMB-3, epoxy resins in the Sherwood areas, and niobium pentachloride in Group CMB-3. Industrial hygiene surveys have been made in Group N-3 and in the new Building 129 at Pajarito Site. Recommendations have been made where appropriate. Investigations and surveillances continued in areas of limited egress.

Three safety talks were given during the month on hoods at Eng-2, on Scott Air Pak operations at W-1, and on toxic materials at CMB-7. A paper on, "Current Problems and New Developments in Respiratory Protection" was presented before the annual meeting of the American Industrial Hygiene Association in Washington, D. C.

V. GROUP H-6. RADIOLOGICAL PHYSICS (Harvey I. Isaacs, Leader)

A. Special Problems Section (S. Shlaer)

1. General

a. E. Bemis presented a talk on the Phermex machine and some problems associated with measurement of the radiation from it at a T-Division Saorgasbord seminar.

2. Work in Progress

a. Further checks on the Victoreen Radocon have been made. A simple pulsing circuit was devised which simulates the pulses which part of the Radocon circuit would receive in radiation from the Phermex machine. The integrating circuit worked properly with pulses having time constants ranging from 0.1 sec to 1.0 sec. It is felt that the effective time constant of the chamber and electrometer tube portion of the instrument will lie in this time range. If so, the Radocon will probably be usable at Phermex. Further checks of long term stability have been made. The Phermex machine has not been available this past month to finish the investigation of the Radocon.

b. Considerable work was done, in conjunction with the H-6 Weather Section, in drawing up a group of predicted fallout patterns at the request of the Civil Defense Study Panel of the President's Scientific Advisory Committee.

c. Measurements in the previous period of the NaI(Tl) crystal response to fluorescent x-rays and gamma-rays from isotopes over an energy range of 6.4 to 1280 Kev had shown inconsistencies. The points appeared to be on two distinct curves separated by about 3 to 5 percent. A lead collimator, 1 inch thick, containing an 0.2 inch diameter hole, had been placed over the crystal when measurements were made with the fluorescent x-rays and two of the

isotope sources, because of their relatively high intensity. No collimator was used with the remaining isotope sources since their intensity was relatively low. The points obtained with the collimator lay on the upper response curve, and those obtained without the collimator lay on the lower curve. When the hole in the collimator was located over different portions of the crystal, the response of the crystal changed by as much as 14 percent. The intensity of the x-ray sources was reduced so that measurements could be made without collimation. The points from both the fluorescent x-rays and the isotope gamma rays now appear to fall on the same curve.

d. Jim Lawrence of H-1 and Eliery Storm of H-6 have measured the energy spectrum emitted by four different discs of Pu. They have attempted to calculate the relative intensity of each of the lines in terms of roentgens. The following results were obtained with one of the discs.

	<u>Energy</u>	<u>Percent of Total Dose</u>
	L lines (20 Kev)	69.0
	26.4	2.5
	60	11.3
(U K x-rays)	98	11.3
	208	5.5
	332	0.4

Because of the low intensity of the Pu discs, only surface dose measurements with an extrapolation chamber have been made in the past to estimate the dose rate and calibrate films. An attempt will be made to simulate the Pu source using fluorescent x-rays (below 100 Kev) of appropriate energy and intensity. If successful, the simulated source can be used to calibrate films and other survey instruments used to monitor Pu radiation.

e. The group of decoder cards which order the punching of the Z number on the IBM punch through relays, were found to be unsatisfactory in their relay function. They have been returned to the manufacturer for repair.

f. The new glass wedges for the densitometer were received and installed in the machine. The transport mechanism for the wedges functions quite well and in one respect is superior to the spur gear mechanism used to rotate the Eastman Kodak circular wedge. The latter had considerable oscillation at the nulls because of the inertia of the wedge and the ease of feedback through the gears. The present linear wedges are driven by screws and cannot feed back the inertia forces. The wedges were calibrated by means of the small filters made of the same neutral tint glass which had been used previously, to determine the density per mm. of thickness of this melt of glass. It was found that the wedges had the specified slope within a few tenths of one percent in the dense regions, that is when the combined density of the two wedges was between 6 and 3. However, in the thin regions when the combined density was between 3 and 1 the slope was a little higher than specified. This deviation is being investigated quantitatively more thoroughly, after which its effect will be evaluated in terms of introduced errors. Should these prove unacceptable we will have new wedges made.

B. Weather Section (O. W. Stopinski)

1. Work in Progress

- a. Work continues on the local climatological study.
- b. Work continues on computing fallout statistics on various communities around the state.

2. Work Completed

- a. A temperature and moisture analysis for the Ski area for the 1961-62 winter season was made and forwarded.
- b. Proposed meteorological conditions for the reactor destruct experiment to be conducted at NTS was forwarded to L. D. P. King.
- c. Fallout patterns, first, second and third degree burn lines, one and five psi overpressure lines for a 1, 5, 20 and 100 megaton surface burst and a 20 megaton air burst were made and forwarded to W. Langham for the Weisner Committee.
- d. Minor instrument repairs to instruments at White Rock, and the meteorological equipment at SM-43 were made.
- e. Miscellaneous climatological data was forwarded to Zia, Eng-1, and contractors.

C. Environmental Radiation Section (W. R. Kennedy)

1. General

- a. None of the alpha particulate air samples taken during the month gave values in excess of 4×10^{-15} $\mu\text{c}/\text{cc}$.
- b. Beta-gamma activity in air has increased slightly over the past monthly period and so has the precipitation activity.

	<u>Average</u>	<u>Maximum</u>	<u>Date of Maximum</u>
Air	7.62×10^{-12}	31.05×10^{-12}	4/20-4/23
Water	2,196 $\mu\text{c}/\text{M}^2$	22,751 $\mu\text{c}/\text{M}^2$	4/20-4/23

- c. The continuously recording gamma rate meters indicated a few short time rises, which correlate with the Omega stack gas activity.
- d. Both of the continuous tape air samplers indicated the arrival of short half-lived active material for short periods of time during the month. On each occasion wind direction was from the Omega stack.

2. Laboratory

a. Waste from CM Building was routinely assayed for excessive alpha activity. All batches were released to H-7 for disposal.

b. Drinking water and c.c. water for CM Building showed no Pu. DP West cc. water continues to show trace amounts of Pu with no significant change from last month.

c. The results of analysis for water samples will be reported in the near future.

3. Field

a. Continued attention was given to the evaluation of USGS field studies at Los Alamos.

b. A suggested outline for environmental research, exclusive of the atmosphere, for the Los Alamos laboratory was prepared.

VI. GROUP H-7. INDUSTRIAL WASTE (C. W. Christenson, Group Leader)

A. Engineering Section

1. Plant Operation

a. TA-45, Tech Area. Because of short filter runs the graphilter medium in one of the three rapid sand filters was replaced with anthrafilt. The incrustation of calcium carbonate to the filter media and piping is under study. Sodium carbonate in varying amounts was added to the waste with little success in CaCO_3 reduction. Fluorides showed better results but appeared in the effluent in excessive concentrations. These studies will continue for aid in TA-50 operations.

Composite samples are now being collected from TA-1. To date no evidence indicates that stand-by operations will be required to treat wastes from this source when the treatment plant is moved to South Mesa.

b. TA-21, DP West. Americium raffinate production dropped below 2,000 gallons for the month. Equipment for the electric hoist and trolley were received but have not been installed. Continued study on effluent turbidity using cotton filters goes on. Leaching studies on cement-vermiculite blocks with americium continue to show low activity in the lixivium.

c. TA-35, Ten Site. Fifty-one thousand gallons of waste were treated by ion exchange and discharged to the canyon. Storage space to age fresh waste is now at 65% of total.

d. TA-50, Central Treatment Plant. As of May 21, 1962, 46% of construction was completed. Plant equipment is being placed according to schedule. No delays are anticipated at this time for final completion in October.

e. TA-1, Delta Bldg. - Tunnel Kiln. With minor stoppages, both the electrical heating and hydraulic systems functioned normally during this period.

Off-gas filtering equipment has been installed with help from J. Coulter and H-5 personnel. We now have the capability to sample off-gases generated in the kiln and this equipment will be used when radio nuclides are introduced with the ceramic sponges.

f. Soaking and Drying Equipment. Leaks in the condensers and blower were repaired. The condenser, after having been removed twice has been coated at each end with plastic. A slight water leak is still present, but it is believed the unit will function satisfactorily.

B. Laboratory Section

1. Ceramic Sponge Studies. A more detailed study of the distribution of radioactivity within the ceramic sphere has been

made. It has been fairly well established that Ru¹⁰⁶ is not uniformly distributed but tends to concentrate near the surface; the highest concentrations of activity are found within 3/16" of the surface of a 1 1/4" sphere. The activity at this point increases by a factor of 2.3 between the first and fifth soaking cycle. At the fifth cycle, about 52% of the activity is located in the outer 3/16" of the sphere which represents about 36% of its volume. It is hoped that different compositions of ceramic or changes in drying methods will provide a more nearly homogeneous distribution of radionuclides after several soaking cycles.

2. TNT Studies. The past period has been devoted to a study of the biochemical reactions of organisms now growing in the pilot tank with a view toward their identification. The tank is not maintained as pure culture system since this would be impossible under large scale operation, hence organisms, other than the original, have developed.

The original organism~~s~~ has tentatively been typed as Pseudomonas aeruginosa. Six additional colonies have been picked; identification reactions are being carried out.

The mixed culture in the pilot tank continues to degrade TNT at a rate comparable to the initial activity. No decreases in population have been observed over the past month.

3. U. S. Geological Survey Program. All nuclear waste treatment plant operations were summarized thru 1961, and submitted to the U. S. Geological Survey, Ground Water Branch, Albuquerque. These data are to be incorporated in an environmental report of the Los Alamos area by the U.S.G.S. Water Sampling Program. Data collected by the U.S.G.S. for more than 10 years have been evaluated and classified in terms of magnitude both radiologically and

chemically. Trends from these data showed that: (1) There is no evidence of increasing contamination at any of the sampling points. (2) Potable waters meet the U.S.P.H.S. drinking water standards. (3) The sampling points for both potable and surface supplies have established the water quality for the Los Alamos area. No indications at the present show that pollution from any Los Alamos operations have affected them.

4. Soil Sampling Program. This program is a supplement to the water sampling program. This technique is used in Acid and Pueblo Canyons and at locations where known or suspected radioactive material have been discharged.

These data, like the water sampling analyses represent several years of samples which have been analyzed for radioactivity in this Laboratory.

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