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H-DIVISION PROGRESS REPORT

June 20 - July 20, 1953

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I. ADMINISTRATION (Thomas L. Shipman, M. D., Leader)



A. General Remarks:

Members of almost all Groups in the Division, as well as the staff of CMR-10, participated either directly or indirectly with H-4 in an experiment in which monkeys were exposed to massive amounts of radiation delivered at a high dose rate. The experiment was sponsored by the Air Force and carried out as a joint program by the staff of the School of Aviation Medicine, Randolph Field, and H-4. A barium-lanthanum source of approximately 27,000 curies was used to deliver to the animals a dose of approximately 1000 r/min. The source, contained in a tuballoy pot, was adequately shielded behind a wall of lead and concrete bricks. Constant monitoring service was provided by H-1 and there were no exposures to any participating personnel beyond acceptable limits.

Approximately 140 Indian rhesus monkeys were exposed; over half of these had been previously trained to carry out certain performance tests with the object of recording alterations in performance after irradiation. The remaining animals were carefully studied from the viewpoints of physiology, biochemistry, radiopathology and neuropathology. The doses delivered to the animals ranged from 1000 r to 30,000 r. The experiment afforded opportunities to a number of people to carry out small experiments of their own, both biological and physical.

It appears that every participating Group obtained the data desired. Some weeks will be required for preliminary analysis of the data but a preliminary report will be forthcoming as soon as possible. The friendly and efficient co-operation between Laboratory personnel and those from Randolph Field calls for

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the highest commendation and proves unquestionably that civilian and military groups can work comfortably together. The entire experiment presented a wide variety of extremely interesting problems which will be discussed in detailed reports later on. One thing which is obvious is that sources as large as 25 kilocuries can be used for experimental work safely in a relatively inexpensive, temporary, homemade facility. It appears, however, that this approaches the limit of source strength without utilizing a number of refinements and improvements in the method of packaging such a source.

The very nature of the Los Alamos Scientific Laboratory has caused it to pioneer in a wide variety of fields. Almost all its work requires concurrent research and development in methods of protecting personnel involved. Over the past two or three years many private contractors, as well as AEC operating installations, have taken over processes which were originally done as small production or pilot plant processes at Los Alamos. Almost every Group in H-Division has at one time or another enjoyed the privilege of discussing with representatives of these large new contractors measures to be utilized in protecting their personnel as they take over certain operations already familiar here. In some cases this has involved the actual training provided for monitors, industrial hygienists, etc. In the period covered by this report our Safety Engineer visited Livermore to assist in certain specific problems, while a representative of the Fluor Corporation, Architect Engineers for the new Shipon River Plant, visited Los Alamos to discuss a variety of health problems. It invariably turns out that such discussions are instructive to our own personnel and it is hoped that they are helpful to the visitors.

H-Division notes with regret the transfer from Los Alamos of Lt. Col. Clifford A. Spohn, Officer-In-Charge of H-6 Meteorology Section for the past two years. Col. Spohn's contributions in the fields of predicting fall-out and estimating cloud height in the Nevada tests have been of extreme value.

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He is now replaced by Major George J. Newgarden III.

Dr. Simon Shlaer, Leader of the Special Problems Section of Group H-6, has completed construction of a new densitometer to be used in the interpretation of film badges. The instrument will still undergo considerable testing but it offers promise of much improvement in our present procedures. The principles employed in this instrument are not new nor are they utilized in any instruments commercially available. Two beams from the same incandescent source are made to enter two apertures in an integrating sphere. On the way to the sphere they pass through a sectored disk rotating at a speed synchronous with the power line frequency. One beam passes through the film, the other through a disk-shaped optical wedge. The wedge is rotated until the two beams are of equal intensity. At this point the photomultiplier tube observes no fluctuation of the intensity within the sphere and the density of the film can be read directly. The advantages of this densitometer are:

1. A large area of the film is evaluated at one time.
2. Since the system evaluates the two beams with respect to one another 120 times a second, it is insensitive to lamp brightness fluctuations.
3. The system is independent of electronic circuit characteristics.
4. The system always compares the unknown with a primary standard, the calibrated wedge whose stability is known to be very good.
5. The method of evaluating film density is in accordance with standards specified for the film industry.

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B. Personnel (July 1 - July 31) by Eugene Sanderson
(Person making change in classification) (Date)

1. New Hires:

7/10	SMITH, Rita Mary	H-1 Radiopathology
7/13	CARLOCK, M/Sgt. John C.	H-6 Meteorology

By Dean Lehner 6/20/78
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2. Terminations:

7/13	EMERICK, Richard D.	H-1 TA Monitoring
7/14	SPOHN, Lt. Col. Clifford A.	H-6 Meteorology
7/24	CLARK, M/Sgt. George L.	H-6 Meteorology
7/31	STORER, John B.	H-1 Radiobiology
7/31	CARLSON, Florence	H-2 First Aid

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3. Total Personnel:

SM	39
Military	3
RA	14
SCP	78
Military	1
ASC	<u>29</u>
TOTAL 164	

II. GROUP H-1, MONITORING (Dean Meyer, Leo Chelius):

A. General:

1. Robert Elliott returned from Dahlgren, Virginia, and resumed work in the Group on July 1. George R. Redhead reported for work in the Group on June 29 and was assigned to the Tech Area Monitoring Section. Richard Emerick transferred to CMR-6 on July 13.

2. A survey was made of the facilities of the Naval Ordnance Test Site at Chino Lake, California. They appear adequate for the work planned in connection with the Elsie and Button programs.

3. Work is still progressing on calibration of film to tuballoy betas to re-establish Ellery Storm's correction factors for exposures to tuballoy. All measurements made by Ellery Storm for determining the first factors were made at contact. Larger pieces of tuballoy will be obtained from CMR-6 and further investigations will be made.

4. Experiments with RaLa contaminated material were commenced at the incinerator on June 29. On the basis of preliminary runs, modifications to the equipment are being made which should improve the functioning of the incinerator both from the operational and health standpoints.

5. Four drop tests were carried out at Kappa Site and the assembly became damaged so that disassembly was impossible. Therefore, the equipment had to be burned. The area was monitored after burning and no contamination was found except in the burning pit. Filter queen samples were run during burning

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at a distance of approximately 35 yards, but due to shifting winds, no counts were picked up on the filter queens, with the exception of the last test where filter queens gave a reading of 7.5 d/m/M^3 and 12.5 d/m/M^3 .

6. Slow neutron pocket chambers without cadmium shields were issued at the Omega Water Boiler to H-4 personnel on July 2. These were worn on head and wrist by personnel working at the North Port. In this particular operation the head is exposed to the open port and the body is fairly well shielded. The head will be considered a part of the body on the amount of dosage to be received. At full scale the chambers will read approximately two daily tolerances. The results of the slow neutron pocket chambers are to be entered on the exposure record cards. Ed Bemis of H-6 is planning an instruction write-up to be used with the slow neutron chambers.

7. A source was delivered to MRA from Ten Site on July 9 and the monkey experiments began on July 10. Personnel from this group have been providing monitoring services to cover the operation on a two-shift basis. Film badges have been processed, read and evaluated twice daily to provide each shift with a record of previous exposures. There have been no overexposures to operating personnel. The experiment will extend into the next period, with additional monkey experiments to be carried out at Omega.

8. Equipment contaminated by Sr^{90} but below the tolerance limit ($0.05 \mu\text{r/hr}$) now be returned to salvage providing it bears a new type tag stating that equipment is contaminated but does not create a health hazard.

9. As of July 13, Sigma and Tu Buildings were transferred from the Tech Area Section to the General Monitoring Section for health coverage.

10. The exhaust system in Wings 2, 4 and 5, CMR Building, were shut off July 11. Air tests taken during this shut down did not show any high counts. One was working in these wings during this shut down.

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permissible level). Additional urine assays indicate no further exposure.

The effective half-life is approximately eight days for this exposure.

III. GROUP H-3, SAFETY (Roy Reider):

A. Accident Record:

	Jan. 1 to July 1, 1953	1952
Man-hours Worked	2,640,859	5,985,003
Number of Disabling Injuries	8	18
Number of Days Lost	110	199
Frequency (Accidents per 1,000,000 Man-hours)	3.0	3.0
Severity (Days Lost per 1,000 Man-hours)	0.04	0.03

B. Industrial Accident Experience:

1. On June 26, [redacted] GMX-7, accidentally tripped braid cutter causing plunger to cut side of tip of right index finger. Lost time was 16 days.
2. On June 30, [redacted] GMX-3, received a disabling injury when he caught his left foot between an electric cart and wall.

C. Fires:

1. A minor fire occurred in K-Building when an electric soldering iron was left plugged in and was resting on some papers which ignited. The incident was discovered by a security inspector who turned in an alarm. The fire was put out by one extinguisher; there was no loss.
2. An electrical short occurred in the ammeter of a van-type truck resulting in an elevated heat condition in the wiring. Wiring and related equipment only were damaged. The vehicle is used to haul explosives but contained no explosives at the time of the incident. An evaluation of maintenance procedure is being instigated by the operating group, GMX-3. Cost of repair: \$10.00.

D. Motor Vehicle Accidents:

	Jan. 1 to July 1, 1953	1952
Miles Driven	856,603	1,820,000
Number of Accidents	20	49
Rate (Accidents per 100,000 Miles)	2.3	2.7
Total Cost	\$575.62	\$1900.00
Accident Cost per 100,000 Miles	\$67.00	105.00

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7. As a result of a recent ruling by the Los Alamos Field Office of the Atomic Energy Commission, emergency devices (sirens and red lights) have been removed from all vehicles operated by this Laboratory except those vehicles used in the intersite hauling of explosives. The Laboratory has asked that an exception be made in the case of these vehicles since the safety experience in their operation has been so good for many years and also since there appears to be no conflict with recent state regulations prohibiting lights and signs on other than emergency vehicles as long as Laboratory transportation is intersite.

8. On July 9 - 10, the Group Leader, H-3, visited the Livermore Site of the University of California Radiation Laboratory. This visit was made in the Group Leader's capacity as Safety Officer of the Scientific Task Group 3.1 organized for the forthcoming Castle Operation. The visit was concerned with the safety of the operating procedures and engineering design to be followed by the Livermore Laboratory in the future Eniwetok tests.

IV. GROUP H-4. BIOMEDICAL RESEARCH (W. H. Langham):

A. General Remarks:

F. N. Hayes continued from Chicago to Yale University to discuss scintillation counting techniques with persons at that institution. Virgil A. J. took a trip to California to discuss new equipment.

Progress of All Sections:

All Sections of Group H-4 (~~excepting Organic Chemistry~~) participated in a large scale co-operative experiment between Randolph Field School of Aviation Medicine and the Los Alamos Scientific Laboratory. The co-operative experiment involved a study of the effects of massive, rapid doses of gamma rays on primates. Because all of the time of the various sections was devoted to this co-operative study, there was no individual progress to report. About 140 monkeys were exposed to massive doses of gamma rays and a wide variety of studies conducted to

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determine the effect of radiation on survival, behavior, physiology, hematology, and biochemistry of the animals. In general, the co-operative experiment was a success. Reports of the results will be made in the future as soon as adequate time has elapsed for analysis of the data.

C. Organic Chemistry Section:

1. General Remarks:

Deaths occurred in the families of both [redacted] and [redacted] which involved absences from the Laboratory. We were visited by Dr. Thomas Haley of the Radiation Laboratory of the University of California. Several days were spent in the precision weighings of metallic films on targets intended for use in the Cockcroft-Walton accelerator.

2. Work in Progress:

- a. Work on the labeling of pyridoxine with C¹⁴ is still in progress.
- b. Some preliminary runs for the synthesis of the dicalcium salt of 2-methyl-1, 4-naphthohydroquinone diphosphate.
- c. Writing on the book ORGANIC SYNTHESSES WITH ISOTOPES is under way.
- d. Work on the labeling of "Mesantoin" is still in progress.

3. Work Completed:

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No work has been completed this month. Signatures

(Person authorizing change in classification) (Date)

4. Reports:

By John Fisher

No reports were written this month. (Person making the change, and date)

V. GROUP H-5, INDUSTRIAL HYGIENE (H. F. Schulte, E. C. Hvatt):

A. General Remarks:

The activities of the Group were varied during the month but a few large projects required a great deal of time and effort. The incinerator tests, a new stack sampling program at DP West, and the move of the Beryllium Shop to its new location required close supervision by H-5, but the less spectacular activities were continued without interruption.

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B. Test Operations

Most of the work of the Section during the month involved handling requests from various agencies for information on Off-Site Rad-Safe problems associated with the Upshot-Knothole Operation. These requests have come from the Santa Fe Operations Office, the U. S. Public Health Service, the Air Force, Harvard University, M. I. T., and J-Division. They have involved primarily compilation of specific data in the form desired by the requesting office for a particular use.

The counting equipment returned from Nevada has again been set up and put into operation at the Los Alamos Medical Center. This equipment has been checked and is ready for use. A start has been made on the preparation of a report on the Buster-Jangle operation.

C. Incinerator:

Sampling equipment was designed and used successfully at the various sampling points on the incinerator. This was a very difficult problem because of the high temperatures and large amounts of water encountered. Using this equipment, concentrations of activity were measured at four points on the air cleaning system during runs involving combustion of materials containing barium-140 and lanthanum-140 from Ten Site. The data obtained indicate that the cleaning system can be operated successfully but other difficulties connected with charging and unloading the incinerator were encountered and will require additional changes to the unit. Two men devoted practically full time to this work during the month.

D. Plutonium:

Following a conference at DF West on the problems associated with the emission of contaminated air from the stacks, a comprehensive study was begun on the existing air cleaning system. Sampling points have been located at a number of places in the system and daily air samples are being taken. Difficulties

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are being experienced because of extremely corrosive materials in the system, but samples are being collected successfully and should permit an evaluation of the contribution of specific operations to the duct contamination. This study will be continued for at least another month.

E. Beryllium:

CMR-2 work with beryllium continues on a large scale in the new CMR-Building. CMR-5 and CMR-7 are also doing beryllium work in this building. One man has been devoting most of his time to these operations and, as a result, has been able to collect more breathing zone samples and make detailed studies on specific operations. While no excessive exposures have occurred, results indicate that the precautions being used are necessary.

Air samples and swipe tests were made for beryllium during the recent inventory of beryllium stock by the Supply and Property Department. Here, too, the air samples demonstrated that the protective equipment worn during inventory was essential in preventing excessive exposure.

The Beryllium Shop is now in the process of moving to the new Shop Building on South Mesa. Protective clothing was supplied and used and air samples taken while equipment was being dismantled and cleaned in the old shop. Similar precautions are being taken during its installation in the new building. However, this work has been halted temporarily because of lack of personnel available for moving.

F. TNT:

Health problems associated with TNT operations were discussed with a representative of the Fluor Corporation, the architect engineers for the new Spoon River Plant. At their request, the data on air concentrations for the last three years were reviewed and a report summarizing these data was prepared for the Fluor Corporation.

A new method of analyzing air samples for TNT has been developed by the

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Laboratory Section and is being tested in the field by taking comparison samples by the two methods. The hoods in the new analytical laboratory at S Site are being studied to determine their effectiveness.

G. Phosphorus:

At the request of Group P-10, observations were made on the process of preparing phosphorus films. As carried out at present, these operations do not appear capable of causing a health hazard. However, several unusual procedures are planned and air samples will be taken when the conditions warrant.

H. Boron Recovery:

Boron¹⁰ is being recovered from a plastic mixture at DP West. The present phases of this operation involve the use of considerable quantities of toluene. However, air samples collected during the operation have been well below permissible levels. After the material has been concentrated, boron itself may become a problem since it will be present as a fine dust. Air samples will be collected to study this material.

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I. Cyanide:

Per James Sanderson

Air samples were collected in the electroplating room of Building at the request of CMR-6. These were analyzed for cyanide content, and concentrations found were all well below permissible levels.

James Sanderson 6/26/58
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J. Water:

Some difficulty is again being experienced with water samples collected at isolated sites. These sites are at the end of long runs of pipe or they have small water storage tanks. While all the samples collected are potable, there have been many justified complaints of bad taste and odors due to long standing. These conditions have been brought to the attention of the Zia Utilities Section for correction.

K. Miscellaneous:

Two members of the Group completed the brief course in Fundamentals of

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VI. GROUP H-6. RADIOLOGICAL PHYSICS (Thomas N. White):

A. Special Problems Section (S. Shlaer and H. I. Israel):

1. Work in Progress:

a. Preliminary performance tests on the new densitometer were made, and the tests have shown that the instrument is capable of meeting the requirements set up for it. Construction work on the instrument continues and is nearing completion.

b. The study of the effect of thermal neutrons on film emulsion continues. A series of films is being exposed to varying doses of neutrons in the standard pile.

c. In the film badge development program, a fluorescence sensitometer has been constructed and will be ready for use shortly. A set of radiator foils has been obtained for use in this investigation.

d. A study of the effects of very high intensity thermal radiation on the surface of various kinds of soil has been initiated. At present, investigation is being made into the feasibility of producing the necessary experimental conditions in the laboratory.

2. Work Completed:

a. Assistance was given to H-1 in doing monitoring for H-4 which was required during recent experiments with high intensity sources.

b. Analytical expressions for photoelectric cross-section in terms of atomic number have been obtained. The expressions were calculated and fitted as closely as possible to the values in NBS Report 1003. It is hoped to use the expressions to obtain reasonable values for elements not included in that report, separate expressions were determined for a number of energies in the range 50 Kev to 1 Mev.

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B. Meteorology Section (Maj. Geo. J. Newgarden, 3rd. OIC):

1. Personnel:

a. M/Sgt. John C. Garlock joined the Section on 19 July as M/Sgt. George Clark's replacement. Sgt. Clark departed 27 July.

2. Operations:

a. Maj. Veryl D. Dotson, Assistant Inspector of the 4th Weather Group, Baltimore, Maryland, inspected the Section on 16 July.

b. Reports:

1) Considerable time was spent during the period in the preparation of "The Activities of the Special Weather Advisory Service" report to the Test Director for the Upshot-Knothole series. It is anticipated that the draft will be furnished D-Division for publication by 1 August.

c. Major Newgarden attended a fall-out symposium conducted by the Rand Corporation, Santa Monica, California.

C. Nuclear Field Test Section (Wm. R. Kennedy and P. R. Schiavone):

1. Buster-Jangle:

a. Final report is awaiting revision of Appendix D on fall-out.

2. Tumbler-Snapper:

a. No change on air crew exposure report.

b. Experiments are being conducted on pieces of contaminated iron from one of the Tumbler-Snapper towers in an effort to determine the nature of the contamination. Successive radioautographs and radiation intensity measurements are being made following etching of the iron in acid solutions. The activity apparently occurs in discrete particles imbedded in the surface of the iron. A report will be written following completion of the study.

3. Castle:

a. Assistance was given CTU-7 in preparing and presenting fall-out data from Ivy to Castle project officers as a guide in Castle project planning.

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4. General

a. Considerable time was spent learning coding methods and one period of machine operation was utilized on the 701 calculator of T-1 Group.

5. Laboratory Activities (A. C. Dodd and B. F. Schreier)

a. Acid waste tanks for CMR Building were assayed for alpha contamination before emptying. All had insignificant amounts of activity.

b. Follow-up analyses of circulating water at DP East located the source of contamination as one particular vacuum bench. Operating personnel were informed of the result.

c. Samples of soil from Los Alamos Canyon at varying depths below the surface of the ground were analyzed for plutonium. Previous assays from this area had given higher results in 1947 than in 1953. Apparently the activity has not moved into the surface but has been swept downstream by erosion. Results of the current assays are tabulated:

3 inches below surface	-	2 d/m/gm
6 " " "	-	2 "
9 " " "	-	2 "
12 " " "	-	2 "

Samples of soil from Pueblo Canyon were taken upstream from the Los Alamos highway crossing. An average of three assays was approximately 8 d/m/gm, a result considerably higher than an assay of a sample taken in February at the Los Alamos-Pueblo junction. The assays are being repeated, and further sampling will be done both upstream and downstream from these locations.

d. Rinse water from the air intake system of one wing of the CMR Building was assayed for plutonium. Result was approximately one tenth of drinking water MPC.

e. Drinking water and circulating water from the CMR sites were assayed for the materials used at the sites. Considerable plutonium (approximately twice drinking water MPC) was still present in the DP West Building 4-5 circulating water systems. All other assays were insignificant.

August 5, 1953

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