REF: H-96

23

I. ADMINISTRATION (T. L. Shipman, M. D., Leader):

A. General Remarks:

An indoctrination course for monitors in Task Group 7.1 was held at the Nevada Proving Ground November 3 through 5. About 150 prospective monitors attended this course which was under the general supervision of Major John Servis, the Rad-Safe Officer for TG 7.1. In arranging the curriculum, Major Servis was assisted by those members of H-Division who have had the widest experience in rad-safe activities at tests. Five representatives of H-Division assisted Major Servis as instructors. The general feeling was that this course was most successful. A small number of those attending had apparently been selected at the last minute and were not adequately prepared. In general, however, it is felt that rad-safe operations at Operation Castle will be better supervised and better carried out than ever before.

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A meeting was held at Los Alamos on October 28 to consider the results of experimental work on sheep which has been performed here, and to draft a report to the Commission on the present status of our thoughts concerning the possibility of damage to sheep in Nevada and Utah at Operation Upshot-Knothole. Dr. Gordon Dunning, of the Division of Biology and Medicine, presided and in attendance were a number of veterinarians representing the Bureau of Animal Husbandry, the University of Tennesses, and the State of Utah. There appeared to be general agreement that the lesions observed on the Nevada-Utah sheep, while superficially similar to radiation injury, were actually different from experimentally produced lesions.

The ulceration caused by an exposure of 25,000 rep to the shaven skin

has healed in a period of nine weeks. An exposure of 45,000 rep, with the applicator applied to the surface of the wool, which was 35 mm thick at the time, produced no burn although it did cause epilation. Dr. T. N. White has calculated that the distance and the density of the wool decreased the surface dose to approximately 3% at the skin. It further appears that the minimal dose for epilation is approximately 400 rep to the skin.

There would seem to be very little connection between atomic bombs and firefly lanterns. Nevertheless, the latter are being used in a study which shows considerable promise. The substance adenosinetriphosphate appears to be deficient in tissue which has been damaged by radiation. This same material has the property of exciting the luminous material in the firefly. Mixing the two materials and placing them in a scintillation counter appears to be a very exact method of measuring extremely minute amounts of ATP. This study could lead not only to a greater understanding of the nature of radiation damage to cells but could conceivably suggest lines of investigation for the treatment of radiation injury.

A new approach is being tried on the study of injury to the lung produced by inhaled radioactive particles. A technique has been devised wherein minute metallic beads may be intriduced directly into the lung tissue by means of a hypodermic needle. Work is continuing to perfect this technique. In the meantime, studies are under way to produce such beads which are chemically inert but which will give off the desired amount of alpha or beta radiation. This should bring us closer to the answer to the question of whether or not a single radioactive particle might be able to produce significant and permanent damage to the tissue surrounding it.

Dr. T. N. White, of Group H-6, has undertaken a critical review of the basis for air lane closure during tests at NPG. This has always been a trouble-some problem but it is felt that there now exists enough data to permit a

considerably improved formula to be applied to the problem.

B. Personnel (Nov. 1 - Nov. 30):

1. New Hires:

11/2	SPALDING, Patricia	H-DO	Secretary
11/9	DUMMER, Jerome E., Jr.	H-1	General Monitoring

2. Terminations:

11/2	REDHEAD, George R.	H-1	Tech Area Monitoring
11/2	VANDERVOORT, Raymond C.	H-1	Special Assignments
11/6	ALTAVILLA, Thomas G.	H-1	Tech Area Monitoring
11/9	KOENIG, Virgil L.	H-4	Biochemistry

3. Total Personnel:

SM	39
Military	3
RA	16
SCP	75
Military	1
ASC	26
TOTAL	160

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

A. Personnel:

1. Thomas Altavilla reported for work on October 21 and terminated on November 6.

2. Felix Vigil returned from Dahlgren Naval Proving Ground on October 23. Following his return, at a meeting between W-3 and civilian and naval personnel from Dahlgren, it was decided that no monitoring service would be needed at this time or within the near future.

3. James R. Schaeffer returned from military leave on October 27. He is replacing Raymond Vandervoort, who transferred to CMR-4 on November 2.

4. George Redhead transferred to CMR-3 on November 2.

5. Jerome Dummer reported for work on November 9. He is a health physicist and will eventually have as his main interest the monitoring of accelerators and reactors.

6. The Associate Group Leader attended an orientation tour of Kirtland Air Force Base on November 18.

B. General:

1. The results of the special matching body and wrist badges issued to Group W-1 by Neil Davis has indicated that the "onion" assembly could be done without an overexposure approximately six times per week for each individual.

2. The question of radiation emitted from oralloy (U^{235}) was investigated with the use of film, making several 1-hour exposures at contact and at distances up to 1/4" using aluminum filters. Thirty-three mr/hr was found at contact and 17 mr/hr 1/4" away, with 10 mils of aluminum between the film and U^{235}. The conclusion drawn was that there was no external hazard from U^{235} for soft x rays or beta rays.

3. Concern over the exposure to personnel assembling HE to tuballoy pits initiated the measurement of tuballoy betas at approximately 20" with an unshielded GM tube from a large tuballoy disk. The tolerance was found to be 24 hours per week to the body at 20".

4. Recommended radiologic safety procedures were drawn up for GMX-3 to follow during the process of breaking HE from tuballoy pits. An investigation and discussion with the group indicated no particular hazard to which the inspector was exposed. However, additional problems could be foreseen concerning the cleaning of tuballoy pits. A revised procedure plan for handling tuballoy pits was drawn up in rough draft and submitted to GMX-3.

5. Decontamination of the Source Room in the basement of HRL Building is proceeding satisfactorily. By use of the Vacu-Blaster, all spots of Sr^{90} contamination have been reduced to 0.07 mr/hr or less with but two exceptions which are 1 mr/hr and 5 mr/hr. It is expected that we shall be able to reduce these spots to levels where we will be able to paint the floor.

6. Tritium operations were started at Ten Site with the material in the hoods on November 19. The activity peak detected within the room with the Continuous Tritium Monitor was found to be 40 uc/M^3 (tolerance used is 50 uc/M^3 for 40 breathing hours per week).

7. Two polonium "squabs" were sectioned at TA-33, Area 9, in the open air by the disposal pits on November 2 and 3. The personnel involved picked up contamination to the exposed areas of the head ranging in excess of 20,000 c/m alpha, but were successfully decontaminated, with the exception of [redacted] neck, which reduced to only 5000 c/m. Pressure hood covers are planned for the next operation in order to prevent contaminating the head.

8. The P-4 Cockcroft-Walton machine located in Z Building attained a flux of 5×10^{10} n/sec on November 17. Initial results of the survey at this "Q" will give a weekly tolerance dose in the H-1 darkroom within 8 hours. Fortunately, this level can be held for only short periods of time. A more complete report is forthcoming.

C. Contaminated Accidents and/or Incidents:

1. On November 12, trouble was experienced in unit No. 2 mixer in Room 501, DP West. The resulting contamination was confined inside of the unit and personnel exposure was low. The cause of the incident is still undetermined.

2. On November 18, [redacted] of P-3 broke a brittle plastic tubing while attaching a ground lead of the Van de Graaff machine in SM-40. The tubing held tritium gas under two atmospheres of pressure. Rupture of the tubing resulted in exposures to tritium of [redacted] and [redacted] P-3 now plans to regularly change tubing before it becomes brittle or replace altogether with glass. Urine assays from this operation were negligible with the exception of [redacted] who had 1000 uc/L. It is believed that [redacted] received his exposure from tritium targets not handled under a hood or with rubber gloves. This finding has instigated action toward correcting handling procedures, and daily urine samples are to be collected on [redacted] and weekly samples on the remaining personnel.

[redacted]

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

A. Accident Record

	Jan. 1 to Nov. 1, 1953	1952
Man-hours Worked	4,333,593	5,985,003
Number of Disabling Injuries	13	18
Number of Days Lost	155	199
Frequency (Accidents per 1,000,000 Man-hours)	3.0	3.0
Severity (Days Lost per 1,000 Man-hours)	0.03	0.03

B. Industrial Accident Experience:

1. On October 2, [redacted] of H-Division Office, suffered a lost-time injury when he strained his back while lifting a 70 pound vacuum pump. Lost time: 8 days.

2. On October 27, [redacted] GMX-8, suffered a lost-time injury when he strained his back while carrying a heavy casting. Lost time: 6 days.

C. Fires:

1. A fire occurred in Room 5130 of the CMR Building at 10:40 p.m., October 25, when solvents used in disposing of NaK caught fire. Damage, confined to one sliding door panel of the hood, was valued at $5.00.

2. A fire occurred at DP West in a drybox involving degreased uranium turnings. The fire was quickly extinguished with helium and there was no damage.

D. Motor Vehicle Accidents:

	Jan. 1 to Nov. 1, 1953	1952
Miles Driven	1,445,391	1,820,000
Number of Accidents	30	49
Rate (Accidents per 100,000 Miles)	2.01	2.7
Total Cost	$1,165.03	$1,900.00
Accident Cost per 100,000 Miles	$ 80.90	$ 105.00

E. Property Damage:

1. A 1953 Ford sedan was damaged when the car rook collapsed as a result of overpressure caused by a scheduled explosion. The vehicle was placed at a shelter about 400 to 500 feet from zero but due to an oversight the windows were closed. The estimated damage was $355.00.

2. The Week end preceding November 2, a water flooding occurred in the basement of Building 81 at GT Site causing considerable damage to electrical

Classification changed to Unclassified by authority of U.S.A.E.C.D.A.; Per Eugene Sandoval (Signature of person making change in classification) (Date) 6/21/78; By Jean Sullivan (Signature of person making the change, and date)

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equipment. The floor was covered with water to a depth of 15 to 20 inches when the flow was discovered about 8 a.m. on Monday, November 2. No estimate of damage can be made at this time due to the extensive cleaning, drying, and replacement of parts and equipment. A more detailed report will follow.

F. General Remarks:

1. This office scheduled a demonstration of safety equipment by representatives of the Mine Safety Appliances Company on November 9 and 10. Several H-Division Groups and representatives of other Divisions reviewed the display.

2. The program of Indoctrination of Security and Fire Protection Personnel was extended to GMX-6 and W-1 facilities.

3. Austin Burch visited the Naval Supply Center, Oakland, California, November 10, to review the uranium hexafluoride containers and the handling and emergency procedures for shipping of this material to the Forward Area. This trip culminated the work done by H-3 in examining the problem of the use of substantial quantities of UF_6 in the forthcoming Castle operation.

4. The Group Leader visited the Naval Supply Center, Oakland, California, in his capacity as Safety Advisor for Task Group 7.1. There was a meeting there on November 17 summing up plans for shipping of special materials to the Forward Area for Castle.

5. H. F. Reinhard and J. I. Banash, safety consultants on problems of compressed and combustible gases were at the Laboratory October 26 and 27.

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

A. General Remarks:

1. Virgil Koenig transferred from H-4 to P-Division and John Larkins was transferred to H-4 from CMR-7.

2. Gordon Gould attended the meetings of the Central Society for Clinical Research and the American Society for the Study of Arteriosclerosis in Chicago. He presented a paper at the former entitled "Oxygen Metabolism and Blood

Cholesterol Synthesis." His term as a member of the Program Committee of the latter Society expired and he was elected a Director. Jean Sabine attended medical meetings and visited the AEC project at the Medical School in Rochester, New York.

B. Biochemistry Section:

1. Keeran, Kohr:

Cleaning and packing glassware and getting ready to move occupied a good deal of time.

2. Kohr, Gould:

Work was continued on absorption of various T-sterols, particularly on purification of crude cholesterol from animals fed T-dihydrocholesterol and T-sitosterol. In spite of the fact that it is universally agreed that these two sterols are not absorbed at all, our results indicate very definitely that absorption does occur, although to a somewhat smaller extent than for cholesterol. The absorbed sterol is converted into cholesterol or, in the case of sitosterol, into some substance behaving the same as cholesterol in the dibromide purification procedure. Because of the sceptical reception these results will receive, we are planning to repeat the dihydrocholesterol experiments using C^{14} labeled material instead of tritium and to do similar studies on humans.

3. Kohr, Gould:

The Santa Fe studies on T-cholesterol absorption curves in normals and cardiovascular patients were finished. So many samples were contaminated that the results are not conclusive and more patients will be studied as soon as possible.

4. Keeran, Gould:

The previously mentioned irradiation experiment was completed. The results are of considerable interest since a marked increase in the rate of

hepatic cholesterol synthesis was observed with no change in the rate of synthesis in the rest of the body. This experiment will be repeated and extended.

5. Gould, Keegan:

The irradiation of cholesterol in crystalline form and in alcohol solution was studied. No perceptible effect was noted after 100,000 r in the former case and 50,000 r in the latter, as judged by melting point and colorimetric analysis. The effect of irradiation on cholesterol and fatty acids in plasma and in animal tissues will be studied.

6. Hayes:

Mr. Hayes presided at a "Symposium on Scintillation Systems" on October 30 at Los Alamos, and presented two papers:

a. Development and Uses of Organic Scintillation Detectors.

b. Tritium and C^{14} Scintillation Counting.

He also attended the Fourth AEC Organic Chemists Informal Meeting, October 21-23 at Los Alamos, and presented a talk on scintillation counting.

7. Hayes, Rogers, Sanders, J. Larkins:

Cs^{137}, Co^{60}, Pu^{239} and Hg^{203} calibrations at various intensities have been run on liquid plastic scintillators. Linearity vs source strength is observed but intersource variations in plastic to liquid ratios are causing considerable confusion. The synthetic and testing programs are continuing.

8. Hayes, Williams, Rogers:

A publication "Liquid Scintillation Counting on Natural C^{14}" appeared in Physical Review, Vol. 92, Oct. 15, 1953, p. 512.

9. Sabine:

The investigation of the effects of radiation on the red cell cholinesterase of mice, begun last month, has been carried through the 28th day. As with plutonium-injected mice, there was a sharp rise on the fourth day followed by a sharp fall which is about half of the mice was followed by a

sharp fall which in about half of the mice was followed by a secondary rise during the twelfth to seventeenth days and then a return to normal. By the twenty-eighth day most of the values were normal.

A series of low-dose radiation exposures has been started, for study of the fourth-day peak which constitutes a hematological finding in the absence of significant changes in the red cell conventional hematology.

10. Foreman, Trujillo:

The study on the correlation of the excretion of barium-lanthanum mixtures with body burden in rats continues. We now believe that we have worked out all the bugs of the apparatus.

The final details of the study on the metabolism of Ca EDTA in humans were collected. This included repeat determinations of the distribution of the drug between cells and plasma and checkup chromatograms. The paper has been prepared in final form for publication and has been sent in for declassification.

11. Anderson:

Development of the firefly counter for ATP continues. A study is being made of the effects of various parameters, such as pH, on light emission. The sensitivity of the method as it now stands is estimated as about 0.01 micrograms phosphorous as ATP. Lora Belle Hughes is doing all the work.

A dry-ice refrigerator has been constructed so that the Swiss Cs-Sb tube can be used also. This tube has about four times the cathode sensitivity of the one being used now (Li-Sb) but has 1000 times the noise at room temperature. Cooling to dry ice temperatures should reduce the noise by at least this factor. A logarithmic spiral light pipe is being built by Jim Perrings so that the sample can be maintained at room temperature while the tube is cooled.

Calculations are being made of dosage expected from Godiva for the design of a monkey-mouse exposure.

12. Mares:

Tissue analysis of 3 rats injected I. V. with 7-C^{14} caffeine for the 24-hour metabolism study has been completed. Excretion as CO_2, and by kidneys and in feces as well as concentration in various tissues, follows the same pattern as the 1-C^{14} compound.

Seven, possibly eight, metabolites are found in the urine and methods of separation are being investigated so that these compounds may be identified by chemical methods.

The Technicon Fraction Collector has been assembled and put in operation. Absorption columnsof Macerated Whatman Filter Paper No. 40 and potato starch have been run. Separation was inadequate with the physical setup used. Refinements of these columns and other materials are being tested.

Nydrazid, 10 mg/kg daily subcutaneously for 10 days, was tested for its effect against mice Crocker Sarcoma 180, and rat Walker Carcinoma Sarcoma 256. Six animals were used per point. When nydrazid was given at the time of transplant of tumor and at first signs of palpable tumor growth, the course of tumor growth and life of the animal compared with the controls. When the animal was injected for 10 days before tumor transplant, for both tumors, the growth appeared more rapid and the animal died somewhat sooner, or not later than the controls. Animals given nydrazid alone showed only a slight decrease in weight, regained rapidly as soon as the drug was stopped.

C. Radiobiology Section:

1. Worman, Larkins:

Work on the X-ray exposure section during the past month included a number of exposures for various investigators, as follows:

a. For Rothermel and Woodward: Calibration of the 50 KV-50 MA G. E. X-ray machine at T Site for depth dose exposures of rat brains and subsequent exposures of the rats to high doses of radiation.

b. For O. Johnson: [redacted] several sets of plastics to 250 KV-15 MA

X radiation at T Site.

c. For Gould: Exposed samples of chclesterol to 50,000, 100,000, and 150,000 r X ray on the 5- KV-50 MA equipment at T Site.

d. For Sabine: Exposed 60 mice to 300 r at T Site on Picker 250 KV at 15 MA.

e. For Woodward: Checked 360 c. Cobalt^{60} source at Ten Site for future calibrations and exposures.

f. For Rothermel: Exposed 240 mice at various doses on G. E. Maxitron 250 at hospital.

g. For Spalding: Eight baby rats exposed to varying doses on 100 KV Picker at HRL.

h. For Schweitzer: Exposed 90 mice to varying doses of X ray on the Picker 250 KV at 15 MA at T Site.

i. For Sabine: Fifteen mice exposed to a dose of 50 r on the 100 KV Picker at HRL.

j. For Boone: Radiographs made on chests of rats using Picker at HRL. Fifty-eight radiographs were made including PA and lateral positions.

k. For Worman: Calibrations completed on Picker portable at HRL and graphs made at 5, 10, and 15 MA at 55, 65, 75, and 85 KVP.

2. Boone Turney:

Studies on the cell surface adsorption of radioactive compounds. -- A repeat microbiological assay by H. influenzae to determine the specific activity of the C^{14} labeled coenzyme I more closely approximated that of the nicotinic acid. One more assay is being done as a final check and sufficient C^{14} labeled coenzyme II has been isolated to obtain a specific activity which is now in progress.

Extractions of the spent medium to determine what has happened to

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the remaining 50% of the nonadsorbed nicotinic acid or its amide is showing promising results. The medium is being serially extracted with ether through the pH range from 1 to 8.5. Chromatograms on the extractions show that the only remaining metabolite is nicotinamide. Nicotinic acid is converted to this compound which seems to remain as such.

Particle size and local radiation studies of the respiratory tract of the rat. — Small stainless steel pellets have been imbedded into the lungs of rats with very little effect to date. The technique is now being developed so that it will not be necessary to open the chest cavity. Jim Perrings has made very small gold pellets (spherical) which will be the metal of choice for electroplating if no ill effects result. To date, multiple gold pellets have been imbedded and found on X ray of the chest to be in the lungs. Fred Worman has been taking the chest films. The techniques still need perfecting.

The relationship of pyridoxine to isoniazid as an antimetabolite in the rat. — A new extensive study has been undertaken to determine what relationship, if any, exists between pyridoxine and isoniazid in animals. Eighty rats have been divided into 4 groups, 20 animals per group.

a. Control - Basal diet plus B_6.

b. Pyridoxine def. enhanced by desoxypyridoxine-basal diet plus desoxypyridoxine.

c. Pyridoxine def. (basal diet) plus 50 mg/kilo isoniazid daily.

d. Basal diet plus B_6 plus 120 mg/kilo isoniazid daily.

All animals are being pair-fed and injected daily. The experiment will be divided into 4 phases:

a. The effect on weight loss, symptoms, etc.

b. The effect on tryptophane metabolism as measured by xanthurenic acid output.

c. Mitotic depression of B_6 deficiencies and isoniazid plus animal pathology which will be done by Dr. Lushbaugh.

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d. C^{14} isoniazid metabolism studies in [redacted]

Phase one of the experiment is nearly completed. The data indicate there is a definite relationship metabolically between B_6 and isoniazid.

3. Woodward, Rothermel:

Effects of massive, paid doses of X rays on the rat brain. -- Rats have been given head irradiation with 50 KVP X rays at a dose rate of about 7000 r/min. The following dosage groups were selected: 2500 r, 5000 r, 10,000 r, 20,000 r, 50,000 r, and 100,000 r. It was found that the neuromuscular signs of whole body irradiation at corresponding dosage levels were duplicated by head irradiation alone; i.e., in co-ordination, weakness, nervous irritability, and at the high doses, convulsions. Animals are being followed for survival times.

An apparatus to test memory-motor functions of rats has been made by Jim Perrings and is being used to train a group of rats. It is planned to use these rats to test the effect of dose rate variations on the nervous system.

4. Boone, Woodward, Rothermel:

Relative effectiveness of thermal neutrons and X rays in overcoming resistance to leukemia transplants in mice. -- Mice have been obtained and are being bred as carriers for a leukemia strain. Further work is temporarily in abeyance.

5. Rothermel, Woodward:

Effects on survival times of mice of rem 30 day-lethality-comparable doses of X rays and thermal neutrons. -- It has been observed that animals given LD_{50-30} doses of thermal neutrons have an earlier wave of death than animals given LD_{50-30} doses of X rays. Some differences in mechanism between these two radiations are therefore postulated. By using survival time as an index, it is hoped to obtain an indication of the acute effectiveness of thermal neutrons in the high dose range (5000 rem and above). Comparable doses of thermal neutrons and X rays (based on 30 day lethality in mice) will be given to different groups

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of mice in doses up to 20,000 r and survival times [redacted] OFFICIAL USE ONLY

6. Rothermel, Schweitzer:

Observations on the incidence of lens opacities in mice exposed to X rays and thermal neutrons are continuing.

D. Radiopathology Section:

1. Hale:

Rapid dose studies. -- Determination of the changes in mitotic indices of regenerating livers of rats exposed to rapidly delivered amounts of X radiation was completed. Determination of these changes is now being made in jejunums under similar conditions. Additional unirradiated animals were obtained in order to strengthen the observations on normal indices.

2. Hughes:

A supply of firefly lanterns was obtained from Dr. McElroy of Johns Hopkins University. With the aid of E. C. Anderson and his Section the sensitivity of firefly lantern extract to ATP is being studied. The effects of pH, concentration of buffer, concentration of firefly extract upon the response of the system to one microgram of adenosinetriphosphate are being determined. Under the most recently developed conditions 1.0 ug of ATP has been producing 4000 c/s.

3. Lushbaugh, Spalding, Hale:

Beta ray burns in sheep. -- The preliminary phase of this experiment is about completed. The ulceration caused by 25,000 rep to the shaven skin healed in nine weeks.

Calculations by Tom White explain well why burns were not obtained with 45,000 rep when the applicator was applied to the surface of wool 33 mm thick. The distance and the density of the wool decreased the surface dose to about 3% at the skin. Epilation occurred here and the calculated minimal dose for this phenomenon to occur in sheep is about 100 rep to the skin.

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A sheep was finally obtained from the Nevada Proving Ground area that was said to have had old healed lesions similar to those seen last Spring. Lesions were present on the animal. There is a superficial resemblance of these scars and scabs to those that result from radiation. They also resemble wounds made by other forms of physical trauma. These wounds are under histological study.

4. Lushbaugh, Wellnitz:

Pathological changes in the pituitary gland and islets of langerhans of rats exposed to rapid dose rates of X radiation. — Special stains that are specific for the beta cells of the pituitary gland and pancreas are being made of these organs in rats so that this histopathological study can be completed.

5. Spalding, Hale, Lushbaugh, Langham:

LD_{50} of intrauterine versus new-born rats. — The LD_{50} of intrauterine and new-born rats is being determined in order to determine whether the shielded mother confers any degree of protection to the intrauterine about-to-be born rats.

One hundred and eight mature female rats have been obtained for this study and 41 have been bred so far. Four have the uterus containing the term fetal rats exposed to X radiation. The operative procedures, shielding and exposure techniques have been established by these experimental runs.

6. Spalding:

Rat ovum. — In order to evaluate the effects of X radiation upon the primitive germ cell the intact rat ovum is being studied following lethal doses of X radiation to the entire rat.

This material is still under study but already many peculiar and bizarre changes have been observed. The most typical change is parthenogenic fermentation.

7. Hale, Woodward, Lushbaugh:

Application of in vivo acridine dyes to radiopathology. — Acridine

dyes stain living plant cells in a manner dependent upon their viability. Under ultraviolet light the nucleus of a normal cell appears green; the nucleus of a sick cell, yellow; and that of a dead cell, orange-red.

The intravenous toxicity of this dye for rats is being studied along with the stainability of the mammalian cells.

8. Lushbaugh, Langham, Hale, Spalding:

Bean sprouts. — Broad beans have been obtained and the growth characteristics of the root sprouts are being studied. The technique of the use of the growing root as a measure of biological effectiveness of radiation is being developed here so that the many unusual devices at Los Alamos for producing extremely rapid dose rates can be applied to the RBE problem.

9. Wellnitz, Smith, Lushbaugh:

Pathology Section service. — This portion of the section continued to serve the group by producing histological sections, radioautographs, photomicrographs and post-mortem examinations. Progress was made in developing methods for speeding up the processing of routine specimens so that more time could be available for the development and use of special visual and staining techniques.

A dye vasoflavine was obtained in order that the study of the vascular effects of radiations could be begun again. Special lop-eared rabbits were also obtained for this experiment. This technique will involve the use of ultraviolet photomicrography which is now being developed in Mrs. Wellnitz' laboratory.

10. GROUP H-5, INDUSTRIAL HYGIENE (H. F. Schulte):

A. General Remarks:

Activities for this month were quite varied with substantial progress being made in a number of important investigations. A number of outside persons visited the Group and members of ~~the Group participated~~ in several meetings at

[redacted]

Los Alamos and elsewhere.

B. Test Operations:

The major project of this period has been the investigation of the characteristics of fallout particles. The procedures and techniques of photomicrography of such particles has been developed to the extent that photographs have been made of a number of cascade impactor slides. These photographs and others will be used in checking the calculated calibrations of the stages of the impactors and will also give information on the total dust loading of impactors.

Fallout particles from the Papoose Lake Area were crushed and radioautographs made of single particles. These will be used in an attempt to establish a relationship between particle activity, film density and spot diameter. Following a suggestion from the Eastman Kodak Company, Kodalith film is being used to make contact prints, yielding spots with sharply defined peripheries. It is hoped that more quantitative data can be obtained by this technique.

Mr. James G. Terrill of the U. S. Public Health Service visited the Section to discuss the Public Health Service Report on Upshot-Knothole and future participation in test operations. An AEC meeting reviewing progress of studies on sheep on the Nevada Range during the last test operation was held in the Health Research Laboratory and material of interest to this Section was presented at this meeting.

C. Incinerator:

All three Sections of Group H-5 have co-operated during this period in making 24 separate test runs on the incinerator. This involved the collection, analysis and counting of 144 barium-lanthanum samples from the various ducts for the evaluation of air cleaning. This data is now being assembled and evaluated before further activities on this project are undertaken.

[redacted]

D. Lithium:

During the latter part of this period, one phase of the Los Alamos Scientific Laboratory's work on lithium materials was completed. A total of 24 air samples were collected in conjunction with CMR-6 work in Sigma Building and in CMR Building. All of these were below our tentative tolerance with the exception of three samples collected during loading of dies prior to hot pressing. The 30 air samples collected in the Shop Division (Building M-1) were all below tolerance. The ventilation system which has been installed there to permit recovery of air-borne lithium is performing satisfactorily in preventing the escape of lithium into the work room air.

E. Beryllium:

The new Beryllium Shop in TA-3 began work on October 27. Air samplers have been installed at each machine where work is being done and a Hemeon sampler has been set up to collect hourly samples of the general room air. Daily air samples are also being collected in the filter room above the machine shop and in the exhaust duct after the Dustube filter. All of the results obtained to date have indicated satisfactory control and the concentration in the stack is decreasing slightly with use, indicating increased efficiency of the filter as the load builds up to the optimum density.

A careful investigation was made of a fire that occurred in Wing 5 of CMR Building on October 25 in which some beryllium was presumably involved. However, very little beryllium was found by means of swipe tests and it was later learned that the maximum amount of beryllium involved was 2 milligrams.

A survey was made of beryllium compound storage at SM-31 and recommendations were made for cleaning of the bins containing leaking 5-pound bottles of beryllium nitrate.

F. Uranium:

At TU Building, 20 air samples were collected and analyzed for uranium

concentration in the duct downstream from the vacuum cleaner conveying system. The heavy load carried by these ducts results in a substantial loss of uranium at the stacks despite the high efficiency of the filter. Experimental work is now being done in the laboratory to determine the best method of coating such filters to cope with this situation. Zinc oxide fume and asbestos floc are being studied for this purpose.

The Laboratory Section is studying the correlation of the fluorometric and radiometric methods of determining uranium. It is possible to run larger samples fluorometrically and so, possibly, obtain accurate measurements at low concentrations. However, this method will be examined more critically. There is still a need for a method of utilizing larger samples for radiometric analysis; several methods of doing this are being studied.

G. Styrene:

A study was made of an operation at Anchor Ranch involving the growth of large crystals from styrene. The ventilation of this operation was found to be inadequate and recommendations are being made for the correction of this condition.

H. Methyl Acetate:

Air samples were collected at Anchor Ranch where operators are exposed to a mixture consisting primarily of methyl acetate and toluene. The optimum ventilation conditions were determined and recommendations made to maintain these conditions.

I. Carbon Tetrachloride:

Close surveillance is being maintained on the continued use of carbon tetrachloride. Now that most of the various groups of the Shop Department are housed under one roof and use a general stock room, it is possible to maintain a closer check on the use of carbon tetrachloride. Upon the recommendation of Group H-5, the Shop Department has initiated a system whereby each man must

[redacted]

have a signed slip from his foreman before he can check out carbon tetrachloride from the stock room. During the first two months that this system has been in operation, there has been an encouraging decrease in the [redacted] carbon tetrachloride and substitute materials have been used. A card file of carbon tetrachloride users has been initiated at the S Site stock room. At this site, every man checking out carbon tetrachloride will be required to fill out a card stating his name, quantity withdrawn and place of use of the material. This file will be reviewed at intervals by the H-5 representative at S Site. At DP Site it was found that carbon tetrachloride was being used to clean wax pencil marks from "boats". Acetone has been recommended as a substitute for this purpose. At Two Mile Mesa it was found that a gallon of carbon tetrachloride and smaller amounts of benzol were used each month in cleaning electrical parts. Both of these materials were eliminated and trichloroethylene substituted.

J. Tritium:

The assembly and testing of equipment for the calibration of tritium "sniffers" is continuing. One of the basic considerations in designing this experiment has been to determine whether there is any variation in the response of the "sniffers" due to changes of air flow through the ion chamber when the tritium concentration remains constant. The effects of humidity on this response will also be studied.

An inspection was made of the new tritium hoods and tower being installed at DP Site and final approval was given to the proposed ventilation system for this installation. The new portable tritium assay apparatus is nearing completion by the Laboratory Section.

K. Boron:

Collection and analysis of air samples for boron exposure at S Site is continuing.

L. TNT:

[redacted]

All air samples collected [redacted] determination during this peri-

showed concentrations below the maximum permissible level.

M. Miscellaneous:

Considerable time has been devoted to the repair and calibration of high volume air samplers to be used on a survey of TA-1 and the town site for possible contamination during the destruction of D Building. The new glass filter papers will be used in the samplers for the collection of alpha active material. In addition to this work, sampling points and procedures for sampling have been outlined and the actual collections will be conducted by Group H-1.

The Group has been cooperating with Group H-1 in the evaluation of the Vacu-blast machine being used to remove strontium^{90} contamination from one of the vault floors in the Health Research Laboratory. Dust samples have been collected on the molecular filter to measure total dust concentrations and [redacted] activity. To date, the results obtained are very encouraging and with the exception of the operation of the edging attachment this machine can be used with minimal exposures to contamination.

Documents on the determination of lithium and on the determination of [illegible]ium are now in preparation. The fractional distillation equipment used [illegible] the analysis of solvents is now being installed.

During the month the Group was visited by Mr. Fred Ingram, industrial hygiene engineer for the University of California; Dr. N. Claybourn, medical director of the Pantex Company; and Mr. Gordon Dunning of the Division of Biology and Medicine, AEC, Washington.

Six members of the Group attended a one-day meeting of the Rocky Mountain Section, American Industrial Hygiene Association in Pueblo, Colorado. One member of the Group attended the meeting of the American Public Health Association in New York and, in addition, visited the Health and Safety Division of the New York Operations Office. Another member of the Group attended the meeting of the Industrial Hygiene Foundation in Pittsburgh and also visited the

[redacted]

Westinghouse Atomic Energy Project there. The Group Leader participated in a tour of Kirtland Air Force Base and several members of the Group attended the series of lectures given by Dr. Glasstone on "The Introduction to Nuclear Physics."

M. Statistical Summary:

1. Air samples collected or field tests made for:

Barium-lanthanum incinerator samples	144
Beryllium	87
Boron	6
Lithium	54
Methyl Acetate	5
Normal Uranium	20
Strontium	8
TNT	6

2. Sanitation

Water samples collected	47

3. Plans approved 2

4. Analyses Completed:

Air:

Beryllium	186
Boron	3
Lithium	49
TNT	6
Uranium	11

Biological (urine):

Lead and mercury	1
Plutonium	103
Polonium	82
Radium	5
Uranium (fluorometric)	121
Uranium (radiometric)	29

Miscellaneous:

Barium-lanthanum in incinerated waste ash	144

Classification changed to [redacted]
by authority of the U.S.E.R.D.A.,
Per [redacted]
(Person authorizing change in classification) (Date)
By [redacted]
(Signature of person making the change, and date)

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VI. [redacted] H-4, RADIOLOGIC PHYSICS (T. N. White):

A. General Remarks:

A critical review of the basis for air-lanes closure during tests at NPG has been requested by J-Division and SFOC. This will probably require several months to complete.

At the request of Dr. Lushbaugh, there was calculated the ratio of skin dose to the dose delivered at the surface of the wool on a sheep's flank by a strontium beta radiation applicator.

T. N. White attended the monitors' training school at NPG Nov. 3 - 5, and the inspection trip to Kirtland AFB Nov. 18.

B. Special Problems Section (S. Shlaer, H. Israel):

1. General:

a. Robert Barker and Edwin Fenks were at NPG Nov. 2 - 5.

b. Edwin Bemis was in New York City Nov. 18 - 20 attending the IRE-AIEE-ISA conference on electronic instrumentation and neucleonics in medicine.

c. [redacted] has been on sick leave from Nov. 2 to date.

2. Work in Progress:

a. Calibration of a number of Sr^{90} beta sources is being made. Film exposures of the sources have been made that will yield information as to the distribution of active material in each source and information as to the relative surface dose rates of the sources. An extrapolation chamber measurement is being made of one of the sources to determine its surface dose rate. This work is being done in order that H-4 may choose one, or more, of these sources to replace a Sr^{90} source, previously used by H-4, which has been found to be leaking.

b. Further experiments are being performed with boiling thorium chloride solution. This is being done in an attempt to determine the maximum

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concentration of thoron daughters which can be collected on a "molecular" filter used as the fifth stage of a cascade impactor. From the increased activity found on the fourth stage of the impactor, it appears that boiling times longer than 15 minutes induces the dispersion of larger par[redacted] in air. This may be the result of increasing amounts of water vapor [redacted] introduced into the air.

c. Plans are being made to revise the General Monitoring Handbook. It is hoped that a completely revised book can be made available some time early in the coming year.

d. Work is continuing on the study of the effects of thermal neutrons on cadmium shielded film and on the study of fallout of soil particles made airborne by a high intensity, short duration arc.

3. Work Completed:

a. Edwin Bemis and Robert Barker served as instructors for the monitors' school held at NPG Nov. 3 - 5.

b. Assistance was given H-2 in planning an X-ray film development unit.

c. Assistance was given the Weather Section in servicing their instruments.

C. Meteorology Section (Maj. George J. Newgarden, 3rd. CIC):

1. Operations:

a. Dr. E. F. Cox, Sandia Corporation, visited the Weather Section with Mr. D. G. Harris, AEC Safety, on 12 November, to discuss blast problems associated with local experimental shots. Dr. Cox proposed that the Weather Section prepare a local high altitude forecast prior to each local shot and predetermine the blast effects through the use of Dr. Cox's technique devised at NPC. Dr. Cox was advised of our forecast capabilities. The matter rests while the Laboratory and AEC consider Dr. Cox's recommendations.

b. Lt. Col. Collison, Sandia, visited the Weather Section on 19 November to discuss fallout techniques used at NPG. Col. Collison was particularly interested in fallout problems associated with a surface atomic burst.

c. Zia Company contacted the Weather Section relative to establishing a wind power generator on the Jemez Mountains. They were provided with climatological data, primarily wind information, and advice concerning the proposed installation.

d. Prepared a local climatological study for use in construction of a new test site at Los Alamos.

e. Initiated a forecast verification program in the Weather Section. It is hoped that through the use of such a program we can determine our forecast capabilities quantitatively for one, two, and three day forecasts. Further, we hope to improve our forecasting abilities through such a program as well as determine the most difficult periods or seasons of the year to forecast.

f. Lt. Col. Lulejian visited the Section to discuss fallout techniques used at NPG. Col. Lulejian had just attended a weather conference at the Santa Fe Operations Office in which the Air Weather Service and U. S. Weather Bureau were represented.

D. Nuclear Field Test Section (W. R. Kennedy, P. R. Schiavone):

1. Upshot-Knothole:

a. Four pieces of contaminated steel were submitted to the Section for study by the Las Vegas Field Office via Jack Clark. Simple tests with a survey instrument and X-ray film indicated that the radiation was chiefly from particulate material adhering to the steel surfaces. The most active piece of steel submitted was extrapolated to read approximately 35 mrep/hr (beta and gamma) at contact. Recommendations were made as to methods of handling similar

[redacted]

and larger pieces of this material by NPC contractor personnel.

b. Order of magnitude calculations of beta surface dose to be expected in areas receiving a uniformly distributed fission product activity were made. It is of interest to note that a ratio of approximately 20 exists between the beta surface dose (expressed in microcurie hours per square centimeter) and the gamma whole body dose (expressed in roentgens) when the material is assumed to be uniformly distributed on the ground and on the surface receiving the beta exposure.

2. Castle:

a. William R. Kennedy and P. R. Schiavone spent four days at NPC acting as instructors for the Castle project rad-safe monitors' school. The course was considered quite successful. However, only the operation itself can bear this feeling out.

Following the above course, pertinent test monitoring problems were given to the H-1 monitors at LASL as part of their current training course.

b. Film badges to be used for personnel during Castle were examined. The badges were judged satisfactory with the exception of the sealing of the polythene envelopes in which they were enclosed. Approximately 10% of a box of 50 badges, selected at random, were found to leak at the corners of the envelopes. Steps have been taken to remedy this situation.

3. Laboratory Activities (A. C. Dodd, B. F. Schnapl:

a. Routine analysis of the waste retention tanks in the CMR Building was made. The maximum value found was 6000 d/m/l plutonium, with an average value for tanks dumped during the month of approximately 500 d/m/l - well below the chronic mpc of 3300 d/m/l.

b. Drinking water and cooling water for CMR Building and DP West were analyzed for plutonium. All results were negative with the following exceptions:

[redacted]

[redacted]

DP West cooling water: Equipment Room 2 - 240 d/m/l
" " 3 - 212,000 d/m/l, 22 Oct.
" " 3 - 3,360 d/m/l. 13 Nov.
" " 4 - [redacted] d/m/l

No corrective measures were taken during th[redacted] period between assays of water from Equipment Room 3. The operati[redacted] personnel thought the sudden rise in contamination came from a dry-box in the system which was undergoing maintenance. Since the high level did not persist, process leakage into the system was not occurring.

c. Samples of soil were again collected from Pueblo Canyon; the interval since the last collection being approximately one calendar quarter. Analyses are not yet complete. Those which have been completed give comparable values to those last reported. This last set of samples was secured following a prolonged dry spell of weather. We have since had some snow, and can anticipate more in the near future. It is hoped that a short dry spell will occur in the next month so that similar samples can be taken to determine the washing effect of the wet weather.

Dec. 2, 1953

T. L. SHIPMAN, M. D.
Health Division Leader

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