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H-DIVISION PROGRESS REPORT
December 20, 1955 - January 20, 1956

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

A. General

Seven representatives of H-Division participated in the test conducted on January 18 at NTS. In the course of this operation, one member of the Laboratory staff and three Reynolds Electric Company employees received theoretical overexposures to radiation. In any accident of this sort an attempt is ordinarily made to ascertain the precise cause not for disciplinary purposes but to provide assurance that a similar situation will not occur again. In the present instance, the principal fault appears to lie in the fact that beta-gamma levels of the magnitude which were encountered simply were not anticipated. Because of this, the operation was carried out without the same meticulously careful planning which is the rule for such occasions. H-Division certainly accepts its share of the responsibility for this episode. It seems readily apparent that all of those who were concerned with this operation are well aware of the multiplicity of errors which combine to produce this result, and it is felt sincerely that there is no danger of a repetition. Some gratification may be derived from the fact that the amounts of exposure were unquestionably not great enough to cause any injury except to our pride and our previously good record.

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Per Sharon Anderson
(Name of person making the classification) (Date)
By Paul Blais 6/14/78
(Signature of person making the classification)

Mentioning accident records brings us to a consideration of the Laboratory's disabling injury experience for calendar year 1955. During this year there were a total of 16 disabling injuries with a frequency rate of 20 (number of injuries per million man-hours worked), which was the lowest such rate in the Laboratory's history. The severity rate, while much lower than last year, was still higher than preceding years because of two injuries resulting in permanent partial disability, one the loss of sight in an eye, and the other amputation of two fingers. Serious accidents here are so few and far between that even a single one seriously upsets the severity rate.

It is also worthy of mention that the fire loss for the entire Laboratory in 1955 came to a total of $50.00. At present, the Laboratory has gone seven months without any fire loss.

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The research activities of the Division continue along both programmatic and basic lines. Of considerable significance are two documents, LA-1987, "Biological Effectiveness of Nuclear Radiations from Fission Weapons," by P. S. Harris, and LA-1981, "Plutonium Hazards Created by Accidental or Experimental Low-Order Detonation of Atomic Weapons," by W. H. Langham, P. S. Harris, and T. L. Shipman, both documents classified SECRET, RD, Weapons Data.

The Los Alamos Human Counter (4 π Liquid Scintillation Counter) is now in full use and has proven to be an instrument of far greater sensitivity than was originally hoped. The first major study to be undertaken will be concerned with the level and distribution of potassium in the body.

The study of the biological effects of radiation which has been one of the principal concerns of Group H-4 will continue for increasing interest is developing in the general fields of radiopathology, biochemistry, and enzyme chemistry in an attempt to explain the basic nature of the changes involved. As an example of this newer philosophy, one should note the abstract in Sec. C. 5 of the Group H-4 report.

B. Personnel (Jan. 1 - Feb. 1, 1956)

1. New Hires

1/1	SCHUCH, Robert L.	H-4	Biophysics
1/5	CREEDEN, Eugene P.	H-7	Engineering
1/16	MILLER, Restus J.	H-1	Tech Area Monitoring
1/16	TANGMAN, Edward P.	H-5	Field

2. Terminations

1/6	SIMMONS, Albert F.	H-1	DP Sites

3. Total Personnel

SM	58
Military	2
SCP	87
Military	1
ASC	37
TOTAL	185*

*Includes 3 casual and 3 limited employees.

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Jerry Lehner 6/14/78
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II. GROUP H-1, MONITORING (Dean D. Mercer, Group Leader)

A. General

Seven members of the Group left for monitoring duty at the Nevada Test Site during this report period.

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B. Incidents

On January 1, two boys removed a lead container contaminated with radium from the rear of [redacted] Building. The container had 15,000 c/m of alpha and 45 r/hr gamma on the inside. One boy's father reported the incident to Wright Langham who, in turn, monitored each boy and found 500 c/m on the hands of one of them. This contamination was reduced to zero after scrubbing. The container had been posted, but the sign was believed to have been removed by persons unknown prior to the removal of the container by the boys.

C. Special Monitoring

On January 13, a survey was made of the 250 KV X-ray machines in Bldg. 81 at GT Site.

D. Special Work

1. The new-type Du Pont 555 film, which was reported to be equal in sensitivity to the Eastman Type K, was calibrated and found to give equal to or at least no greater sensitivity than the 502. The threshold response was no greater.

2. Extrapolation chamber measurements were taken from a D-38 disk and found to be 207 mrep/hr. There seems to be some controversy over this figure and the measurements will therefore be repeated.

3. The rad-safe procedures concerning the fabrication and machining of D-38 spiked with .5% U-233 were established and submitted to CMR-6, CMX-1, and the Shops Department.

4. The final write-up on contamination resulting from uranium rolling operations was submitted to G. Hanks of CMR-6 for inclusion in his report on the subject.

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

A. Accident Record

	Jan. 1, 1955 to Jan. 1, 1956	1954
Man-hours Worked	5,525,191	5,491,455
Number of Disabling Injuries	16	24
Number of Days Lost	3,056	6,553
Frequency (Accidents per 1,000,000 man-hours)	2.9	4.4
Severity (Days Lost per 1,000,000 man-hours)	551	1,190

B. Industrial Accident Experience

On December 23, 1955, [redacted] Per-4, bruised her right thumb when she slammed a metal drawer on it. She did not report to our First Aid room as the injury at that time appeared to be nothing more than a bruise. On January 8, 1956, [redacted] went to the LAMC for treatment of her right thumb which was swollen and painful. The following day the thumb was lanced at the base of the nail by Dr. Shultz. [redacted] was advised to stay home until the thumb had healed. Days lost time: 14.

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C. Fires

There were no losses from Laboratory fires during this report period. The Laboratory has gone seven months without a fire loss. The 1955 fire loss for the Laboratory was $50.00 which is exceedingly low for such a high-valued installation.

D. Motor Vehicle Accidents	Jan. 1, 1955 to Jan. 1, 1956	1954
Miles Driven	1,806,745	1,667,645
Number of Accidents	30	23
Rate (Accidents per 100,000 Miles	1.66	1.38
Total Cost	$3,731.36	$3,912.56
Accident Cost per 100,000 Miles	$ 206.00	$ 235.00

There were five vehicle accidents during December which involved Laboratory personnel. Two were skidding accidents, one a backing accident, one occurred when a government vehicle changed lanes, and the other was a slight personal injury when a vehicle hit a security inspector who was checking badges.

E. General

1. The Safety Office, in conjunction with Groups H-2 and H-5, has started a series of lectures at S Site entitled "Explosive Safety", "Industrial Safety", "First Aid", and "Industrial Hygiene".

2. J. Robert Penland assisted other H-Division Groups at the Nevada Test Site on Project 56 from January 8 until January 21.

3. The Safety Office was represented at several meetings of the New Sigma Building Planning Committee.

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4. On Thursday, January 19, at 2:40 P.M., a civil defense exercise was held in the Los Alamos Community. The Group Leader was notified of the scheduled date and time of the exercise. Since the exercise was primarily a test for the Los Alamos School system, Division Leaders and Department Heads were notified of the date of the exercise. They were asked to pass this information on to their employees at the time the sirens sounded or before that time, as necessary, in order to reduce any confusion that might occur within the Laboratory. No problems arose in the Laboratory at the time of the school exercise.

5. One of the large shots conducted by GMX-6 at R Site resulted in a broken plate glass window at Speer's Department Store in the Community Center. Apparently atmospheric conditions contributed to the damage since similar shots have been fired in the years past without damage to the townsite. No changes are contemplated in the firing procedures.

6. Recently, a Laboratory employee suffered minor acid burns of the face when the cap of a nitric acid bottle gave way. Investigation of the incident revealed that a considerable number of caps for nitric acid bottles as sold by the

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General Chemical Corporation were fractured. It is believed that these caps are fractured during the packaging process. A letter has been sent to the Department of Supply and Property calling this condition to their attention and requesting that they notify the vendor of this condition also.

7. The Group Leader has attended several meetings with J-4 when he was consulted about shipping problems related to Operation Redwing. Recommendations were made concerning maintenance and shipping of tube trailers.

8. A classified report on "Safety Considerations in the Rolling of Uranium Sheet" was completed and will receive limited circulation as an informal LAMS report.

9. During the testing of a Model 63 camera, the rotating mirror broke in two pieces at 350 revolutions per second. The mirror fragments and parts of the camera case and lenses struck by these fragments were thrown around the firing chamber which was occupied by three people. No one was hit by the fragments. As a result of this incident, safety walls are being installed between the rotating mirror cameras and the operating personnel. It is planned to make the mirrors of slightly softer materials in order to avoid shattering. More exhaustive series of speed tests are also planned. We are reviewing the entire problem of safety associated with high speed cameras and plan to issue, in conjunction with GMX-9, a safety manual on this subject.

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IV. GROUP M-4, BIOMEDICAL RESEARCH (Wright H. Langham, Leader)

A. General Remarks on Group Activities

Gordon Gould took part in a meeting of the Cardiovascular Study Section of the United States Public Health Service in Washington on January 9-10, and consulted with Drs. LeRoy and Stamler in Chicago on January 11.

Wright Langham participated in a meeting of a panel to discuss the hazards of internally-absorbed radioactive materials at the Argonne National Laboratory January 10-11. Donald G. Ott and he visited with Dr. Henry Gilman at Ames, Iowa, on January 13-14, where they presented seminars.

B. Group Publications

1. Manuscripts Completed

Two papers to be submitted to Blood, The Journal of Hematology, for publication adjacently, by Jean C. Sabine (with the assistance of Helen M. Miller) have been sent to D-Division. They are entitled "The Clinical Significance of Erythrocyte Cholinesterase Titers. II. An Aid to Short-Term Prognosis in Appropriate Cases", and "III. In Microcytic Anemias".

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"Clinical Experience in Removal of Radioactive Material from the Body", by Harry Foreman, has been sent to D-Division. This paper was presented on October 19, 1955, at a meeting at the Argonne National Laboratory and is to be published in an AEC document to be entitled "Proceedings of the Conference on Radio-Element Removal".

"Effect of X-Irradiation on Hepatic Cholesterol Synthesis", an abstract by R. G. Gould, L. V. Lotz and E. M. Lilly, was completed, approved by D-Division and sent in for publication in Federation Proceedings in March, 1956.

"Biological Effectiveness of Nuclear Radiations from Fission Weapons", by Payne S. Harris has gone through editorial and is to be published as LA-1987, Secret RD Weapons Data, with limited distribution.

LA-1986, "Biological Effects of Inhalation of High Concentrations of Tritium Gas", by T. T. Trujillo, E. C. Anderson and W. H. Langham, unclassified document, has gone through editorial and is ready for reproduction.

2. Papers Published

"The Los Alamos Human Counter", by E. C. Anderson, R. L. Schuch, J. D. Perrings and W. H. Langham, Nucleonics, Vol. 14, No. 1, 26-30, January 1956.

"Liquid Scintillators. I. Pulse Height Comparison of Primary Solutes", by F. Newton Hayes, Donald G. Ott, Vernon N. Kerr and Betty S. Rogers, Nucleonics, Vol. 13, No. 12, 38-41, December 1955.

"Liquid Scintillators. II. Pulse Height Comparison of Secondary Solutes", by F. Newton Hayes, Donald G. Ott and Vernon N. Kerr, Nucleonics, Vol. 14, No. 1, 42-45, January 1956.

"Preparation of C^{14} Standard for Liquid Scintillation Counter", by D. L. Williams, F. N. Hayes, R. J. Kandel and W. H. Rogers, Nucleonics, Vol. 14, No. 1, 62-64, January 1956.

"Counting Suspensions in Liquid Scintillators" is mentioned under Technical Advances in Nucleonics, Vol. 14, No. 1, 74, January 1956.

LA-1981, "Plutonium Hazards Created by Accidental or Experimental Low-Order Detonation of Atomic Weapons", by W. H. Langham, P. S. Harris and T. L. Shipman, Secret RD Weapon Data, has been reproduced and given limited distribution.

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C. Major Areas of Progress in Sections

1. Biochemistry Section (R. Gordon Gould, Leader)

a. Effect of X-Irradiation on Cholesterol and Fatty Acid Synthesis (Gould, Lotz, Lilly). Continuation of work on the mechanism of the tremendous increase in hepatic cholesterol synthetic rate 48 hours after 2400 r has been directed at possible hormone effects. Total adrenalectomy did not abolish the effect of X-irradiation but hypophysectomy did appear to in the one experiment which has been completed so far.

However, the hypophysectomized animals were all very close to death, and a number did die just before the experiment was carried out. They do not have as much resistance to either X-irradiation or fasting as normals. Additional experiments with lower radiation doses and shorter periods of fasting are now being carried out.

Cholesterol synthesis in adrenals was demonstrated for the first time in these experiments, largely because it was so greatly enhanced by X-irradiation. In one experiment the specific activity values were 167 for control rat adrenals and 2230 for X-irradiated; in a second, the values were 61 and 4410 d/m/mg. This effect is as large in magnitude as that in liver and suggests the possibility that radiation causes such a tremendous increase in utilization of adrenal cortical hormones that synthesis of cholesterol in the adrenal is greatly stimulated. This is being explored.

b. Clinical Electrophoresis Studies (Magee, Gould). Partly as a result of our filter paper electrophoresis studies, the diagnosis of agammaglobulinemia was made on a 5-year old boy. Subsequent therapy with gamma globulin has apparently resulted in a remarkable improvement in this child who had been chronically ill for several years. This case is felt to justify the many determinations that were run on suspected cases of this rare disease which turned out to be normal in serum protein levels.

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2. Biophysics Section (Payne S. Harris, Leader)

Nothing new to report.

3. Organic Chemistry Section (Wright H. Langham, Leader)

Nothing new to report.

4. Radiobiology Section (John B. Storer, Leader)

Nothing new to report.

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5. Radiopathology Section (C. C. Lushbaugh, Leader)

During the past year the Pathology Section was faced with few programmatic problems and its various services were rendered with greater facility through the Section being expanded to six members. As a result of these factors, the Section devoted the majority of the time to trying to obtain a better understanding of the fundamental pathologic changes which underly injury and death from ionizing radiations.

In the sixty years since the first dermal burn from radium occurred, an enormous literature has been written concerning the pathology and physiology of the lethally-irradiated animal or human being. Much of the material is excellent; many of the experiments are very ingenious; but all fail to explain why the injury develops and why death occurs. It may be presumptuous, therefore, for such an isolated and small group to have set its goal as the solution of the problem of the cause of death from irradiation. One of the first things that the Section accomplished in this regard was to define the question. This task was helped immensely by the pathologic study of the deaths of the monkeys exposed to high doses of gamma radiation. In this study many pathologic lesions were found, some of which had never been described before, but all of which were found to fall short of being the kind of lesion which by itself or with the other lesions was capable of causing death. This study concluded that the various morphologic lesions reflected a common underlying lesion whose nature was unknown.

Our previous work with the beta irradiated skin had followed a similar pattern in that the dermal ulceration was an obvious late effect of the irradiation damage. In that study we attempted to study the skin lesion enzymatically and found that, contrary to expectation, enzymatic activity as reflected by glycolysis and oxygen consumption was enhanced rather than destroyed. The papers in which we reported this work concluded that since enzymes themselves cannot be manufactured locally or replenished rapidly, enhancement then must be due to release of the potential activity of uninjured enzyme systems through destruction of inhibiting substances.

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This thesis was tested first by going to the voluminous literature to see what had been written upon such inhibiting systems and the destruction upon them. It was learned that the enzyme systems about which most appears to be known in this regard are those dealing with proteolysis and that as early as 1904 the first report was written that showed proteolysis of irradiated tissues was greatly enhanced. One of our major accomplishments has been to extend this

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forgotten observation by perfecting for our usage a method for determining the amount of inhibiting substances in the blood serum, following radiation exposure. Whole-body irradiation or intraperitoneal injection of trypsin, a proteolytic enzyme, causes a pronounced diminution in the amount of these inhibiting substances in the blood. Since there does not appear to be a similar diminution in amount of circulating natural proteolytic enzyme following irradiation, it stands to reason that this uninhibited enzyme would be allowed to react with the body tissues in the absence of inhibitors and thus produce injury. It is also seen from the data that following the period of depression in amount of inhibiting substances there is a period of enhancement of inhibition.

We reasoned, therefore, that if one could time the injection of proteolytic enzyme into the abdominal cavity of mice before irradiation so that the wave of reactive enhancement of inhibition corresponded with the period of inhibitor destruction by irradiation that protection against irradiation damage would be afforded. Effects of parenterally-injected proteolytic enzyme upon the survival of mice after 600 r as modified by the time of the injection were studied. It was shown that such treatment makes quite marked changes so that the survival is raised from 29.0 per cent in the case of the controls to 85 per cent in the case of the mice injected one hour before irradiation and depressed to 4 per cent when the injection was given four days after irradiation. We also found that three to four days after irradiation both rats and mice can be killed by an intraperitoneal injection of trypsin which will not kill a normal animal. At autopsy these animals show widespread hemorrhages similar to those of hemorrhagic diathesis of radiation damage.

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Preliminary experiments have been completed which were designed to determine whether the proteolytic enzyme of the intestinal tract might not be the "toxic" substance which is freed by radiation damage. In these experiments loops of the small bowel were isolated in vitro and filled with solutions containing trypsin, or buffer alone, or tryptophane alone. These tightly tied loops were then dialyzed against physiologic buffer solutions and the enzyme and the amino acid products of proteolysis and autolysis were looked for in the dialysate. Analysis of these experiments shows that during the period when the blood inhibitor is being reduced that enzymatic digestion in the intestine is inhibited strongly; that about two days after exposure there is a short time when trypsin penetrates the bowel wall more easily than in the controls and that these changes are dose-dependent. These experiments appear to confirm our original assumption that the proteolytic enzyme of the intestinal tract may be freed to penetrate beyond the

barriers of the intestinal tract and cause proteolysis in essential areas. Another series of preliminary experiments have shown that shortly after irradiation the proteolytic enzymes of the upper small intestine can be found throughout the entire intestinal tract. It is thought by us that this movement of the proteolytic enzyme to places where it is not usually present and where therefore adequate inhibiting mechanisms may not be present, may be another means whereby proteolysis of the irradiated animal is enhanced.

These experiments have encouraged us to formulate this thesis for presentation to the Federated Societies for Experimental Biology meeting in Atlantic City this coming April, with the following abstract as a basis:

beryllium foils by Group P-12 has continued and 7 air samples collected during these operations were also below tolerance. Since it is necessary to handle the thin foils in the open, careful checks were made for surface contamination. A total of 28 swipe samples revealed that the contamination was minimal.

B. Uranium

A conference was held with CMR-6 and CMR-7 on problems relating to N-Division projects. Steps to be taken during processing and fabrication of uranium carbide were discussed and control measures proposed and adopted.

C. Plutonium

A conference between H-1, H-5 and CMR-11 was held to agree upon modifications of the new process line in Room 500 at DP West. Installation of a dry box for nickel plating of plutonium and other changes were made.

A possible new method for coprecipitating polonium with bismuth sulfide was investigated but proved unsuccessful.

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Work on the recovery of plutonium from glass filter papers is continuing.

D. Thorium

Preparation is being made for the analysis of urine samples for thorium^{230}. It is anticipated that this procedure should be fairly straightforward since the actual manipulations involved follow closely those used in the regular plutonium analysis. At the same time, preparations are also being made to measure thorium^{232} by a colorimetric method. This procedure probably will be much more difficult.

E. Thallium

Group CMR-6 is now pressing and welding thallium-plated materials. An inspection of these operations in Sigma Building was made with a representative of Group H-2. Adequate precautions were being taken and urine samples will be collected.

Thallium metal has been machined during this period in the Beryllium Shop with no measurable exposures to the operator. In T Shop, sawing and filing operations on thallium-plated material were carried out. An investigation was made of a complaint of tingling sensation on the hands while working with this material. After an investigation and discussion with Group H-2, it was agreed that the symptoms did not result from this very slight exposure.

Group CMX-2 has completed the initial preparation of thallium azide and is now filling detonators. Recommendations have been made to protect the individual doing the filling. When these detonators are tested later at DF Site, air samples will be collected.

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P. TNT

A total of 18 air samples were collected for TNT analysis at S Site during machining and pouring operations. These include 12 samples collected on the swing shift. All samples showed concentrations well below permissible levels.

G. Ozone and Oxides of Nitrogen

Welders in TA-3 Shop complained of irritating fumes emitted during inert gas welding on aluminum. An investigation revealed that these irritating fumes did form immediately after the arc was struck. The odor was predominantly that of ozone, although oxides of nitrogen were probably present also. A ventilated welding hood was provided for this work, and a letter of justification for the installation of a Ruemlin fume hood was written to Eng-2. This investigation will continue since irritating fume appears at some times and not at others.

H. Foam Plastics

An inspection was made of the foam plastic work at S Site. One complaint involved skin exposure to ingredients of this material and another, first reported as due to octyl, was found to be due to exposure to foam plastic materials. The principal offender appears to be the ingredient tolyl di-isocyanate. A memorandum listing the necessary precautions for handling these materials has been written to the Group Leader.

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Date 10/1/78

I. Ventilation

A ventilation study was made with Eng-4 on the design of an adequate blower and filter bank was agreed on since one hood is to be used for ashing material containing plutonium. This unit was designed, constructed and tested within a 15-day period. It should be satisfactory for the purpose intended.

A study was made of the necessary ventilation on Baker-Perkins mixers at TA 9 and at S Site. The local ventilation for the TA 9 installation has been designed and approved.

Local exhaust ventilation on machines to be used for work on tuballoy enriched with 0.5 per cent uranium^{233} at T Shop has been recommended. The machine will be enclosed and exhausted through the portable blower and filter unit.

At the request of Eng-2, a study was made of the exhaust ventilation on the soldering operations at R Site. This system is badly designed and also found to be exhausting very little air. Recommendations for improvement were made to Eng-2.

Two members of the Group participated in a conference with representatives of CMR Division, Black and Veatch, and the AEC on ventilation requirements for the new Sigma Building.

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J. Miscellaneous

Work is still continuing on an improved method for the determination of barium by the dichromate method.

A new continuous alpha sampler-counter-alarm has been built by Group P-1 and is now undergoing tests by Group H-5. This unit which incorporates all of the good features of previous models is only 1/4 as large and weighs only 35 pounds.

Four new orifices for the new DP West stack samplers have been constructed and calibrated.

Following a conference with Group W-3, recommendations were made for ventilation requirements for the use of a cut-off wheel on lithium fluoride.

After being advised by Group GMX-3 of their plans to use large quantities of finely divided lead powder, recommendations were made for adequate control measures. Air samples will be taken during operations with this material.

Irving Sax of Nuclear Development Associates visited the Group to discuss problems involved in handling beryllium and to observe beryllium operations here. John Ege, John Pingel, and Roy Kelso from Argonne National Laboratory visited Groups H-1 and H-5 to observe and discuss plutonium operations.

A report on the potential hazards and problems involved in the incineration of radioactive wastes has been prepared for the Group Leader of H-4. The basic purpose was to supply information for the Bureau of Standards Committee on Radioactive Waste Incineration.

Two members of the Group spent part of this reporting period at the Nevada Test Site.

K. Statistical Summary

1. Air samples collected or field tests made for:

Beryllium	
Air samples	57
Swipes	28
TNT	18
Mercury (labs)	1
2. Plans approved	3
3. Sanitation	
Water samples	18
5. Analyses completed:	
Air	
Beryllium	53
Oxides of nitrogen	4
TNT	18

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Biological (urine)		
Mercury		2
Plutonium		228
Polonium		8
Protactinium		1
Tritium		120
Uranium (radiometric)		3
Uranium (fluorometric)		153
Miscellaneous		
Beryllium swipes		25
Plutonium on Kleenex		10
Plutonium in tissue		8
Uranium (fluorometric)	in soil	67
Uranium (")	in tissue	2
Uranium (")	in water	16

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VI. GROUP H-6, RADIOLOGICAL PHYSICS (Harvey I. Israel, Leader)

A. Special Problems Section (S. Shlaer, Leader)

1. General

S. Shlaer was on vacation Dec. 19 to Dec. 30, inclusive.

2. Work in Progress

a. Preliminary measurements of the spectral sensitivity of one of J-10's detectors were made with monoenergetic radiations between 6 and 30 Kev. It was found that the response, in terms of ergs/cm^2 sec., was flat up to 14 Kev after which the response fell off because of the incomplete absorbtion of the incident radiation by the crystal. A 5" crystal has been mounted on the photomultiplier to verify the cause of fall-off at high energy.

b. While waiting for the group of detectors which J-10 proposes to use overseas to be fabricated, several changes are being made in the 50 kvp fluorescent sensitometer setup. The different components are being fixed in reproducible positions and the detector track is being carefully aligned to the center of the fluorescent beam.

3. Work Completed

a. The ratios between the ranges of the three Model 120 Balanced Chamber tritium monitors have been determined by means of gamma-ray sources. Previously they had been calibrated by means of tritium and gamma rays for only one scale.

b. The new P-1 calibration facility for high intensity radiation has been calibrated with thimble chambers and vibrating reed electrometer equipment.

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From our measurements it is apparent that a scatter component of over 30% of the primary component exists in their setup. This may lead to errors in calibration when nonneutral detectors are calibrated.

c. The film developing equipment for Kirtland AFB has been completed and shipped.

d. The wiring diagram of Norelco 300 kv constant potential equipment has been received. It is clear from this that a magnetic amplifier to regulate the milliamperage of the X-ray tubes can be applied to the equipment without getting into the high potential generators. Thus, no modifications of these need be specified. The regulator can be inserted in the control cabinet by ourselves without too much trouble. The only information we lack to design this regulator is the emission characteristics of the various X-ray tubes as they vary with primary filament voltage and current. A request for such information has been forwarded to Mr. Gobus of Norelco.

e. A brief resume of our need for constant potential X-ray equipment has been sent to G. H. Tenney of GMX-1 so he may add it to his justification for the purchase of such machines.

B. Meteorology Section (Maj. Orin W. Stopinski, OIC)

1. General

During the period January 10 through January 13, John C. Garlock was at Kirtland AFB in Albuquerque for the purpose of discharge as a Master Sergeant and subsequent appointment as a Warrant Officer in the Air Force.

Classification changed to Unclassified
by authority of the U.S.E.R.D.A.,
For Warren Anderson
(Person authorizing change in classification) (Date)
Jean Lehner 6/14/78
(Signature of person making the change, and date)

2. Operations

a. Major Stopinski left for the Nevada Test Site January 8, to participate in Project 56.

b. The Meteorology Section was advised that it is to occupy a different location in the new Administration Building than had previously been decided on; consequently considerable planning and co-ordination with Engineering has been necessary since the first of the year regarding the relocation and installation of weather equipment. The actual move is now tentatively set up for the latter part of March, 1956.

C. Nuclear Field Test Section (W. S. Johnson, W. R. Kennedy, A. O. Dodd)

1. General

a. Project 56, NTS

The report period was for the most part taken up by getting ready for and carrying out a fallout program incorporated with the fourth one-point

detonation, actually done on January 18. Considerably more fission product activity was encountered following this detonation than had been found after the third shot of the series, and this fact caused changes in recovery procedures.

Three members of the Group, together with two from H-1, and one each from H-3 and H-5 planned, implemented and carried through the fallout project. Data was collected and is at present enroute to the Laboratory for analysis and interpretation.

b. Redwing

Conferences and discussions have been held with J-Division and H-6 personnel relative to the activities, capabilities and operational problems of the Fallout Prediction Unit.

2. Laboratory Activities (A. O. Dodd, B. F. Schnap)

a. Approximately 60,000 gallons of chemical waste from CMR-Building were sampled and assayed for alpha activity. All batches were released to H-7.

b. Cooling water and drinking water from CMR-Building and DP West were sampled and assayed for alpha activity. No activity was detected in the drinking water or the cooling water from CMR-Building. Cooling water systems at DP West with previous histories of contamination exhibited trace amounts of plutonium alpha activity.

c. The analyses of soil samples taken in November 1955 from various locations in Los Alamos County were completed for uranium. All results were background (<1 μgm U/gm of soil) with one exception. This location will be resampled and assayed.

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VII. GROUP H-7, INDUSTRIAL WASTE

A. Plant Operation

1. TA-45, Tech Area

Recirculation of one tank of treated waste was necessary during the early part of this period because residual activity exceeded discharge requirements. Influent uranium concentration was higher than usual (850 - 940 C/M/L) but laboratory data indicated that the high count in the recirculated effluent was due to plutonium rather than uranium. A possible explanation is that a considerable amount of sludge was recirculated as a result of drawing down settling tanks to permit visual inspection of sludge accumulations.

Some overtime operation was required on week ends to prevent overflow of raw waste holding tanks and the vacuum filter was operated over two week

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ends in order to eliminate an excessive accumulation of sludge.

One sand filter was completely overhauled and work was started on a second filter on January 19. All sand and gravel was removed and screened before replacement, and ports in the main and surface wash water lines were inspected and cleaned. Sand was found to be in relatively good condition but much of the gravel had consolidated into an impervious layer over most of the filter area. As a result, filter washing efficiency was very low and effective filter area seriously reduced. After replacement, sand and gravel was acidized to remove accumulated calcium carbonate scale. The efficiency of the filter was very much improved.

2. TA-21, DP West

Operations were generally routine except that recirculation of several tanks of treated waste was necessary in order to meet discharge requirements. Raw waste flow was approximately 10,000 gallons a day for the period. This represents about a 2000 - 3000 gallon a day increase over the average daily flow for the preceding summer session.

3. TA-35, Ten Site

The plant was operated for a short period but the raw feed pump lost prime so frequently that overnight operation was impossible and daytime operation required constant operating attention. For that reason, operation was abandoned pending installation of a check valve in the raw feed suction line. The valve was installed near the end of this period and operation resumed. Operating efficiency of the plant was very much increased. Continuous operation is planned until volume of waste in storage is satisfactorily reduced.

B. Research and Development

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Per Sharon Anderson
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By Jean Lehner 6/11/75
(Signature of person making the change, and date)

1. Plant Operation

a. TA-45, Tech Area.

A series of laboratory tests was run to determine the effect of sludge recirculation on effluent activity. The tests indicated that return of as much as 10% by volume of a heavy (9.47% solids) Tech Plant sludge caused no substantial increase in activity of supernatant liquor. The basis for the apparently contradictory statement under Tech Plant Operations is that a large amount of much higher activity DPW sludge was probably involved in that operation.

b. TA-35, Ten Site

The first of a series of laboratory resin column studies was completed. Raw feed was a simulated Ten Site waste consisting of Sr^{90}-Y^{90} spike and controlled amounts of hardness and various detergents. Data at hand indicates that some such agents seriously affect the efficiency of ion exchange columns in

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removal of both gross β and strontium activity.

Laboratory tests indicate that of the total radiostrontium, only 10% is strontium^{90}, hence the effluent produced from these runs was of drinking water quality insofar as radioactivity is concerned.

Investigations are continuing to find some simple control test such as gross count, total hardness, pH, etc., which can be correlated to the radiostrontium in the effluent.

c. General

Work on fixation of activity in various clays is being continued. Preliminary work on sealing bricks formed from such clays with plastic materials has been started. Preliminary work indicates that sealing the surface of bricks containing absorbed radioactivity with plastic material has some advantages in preventing leaching.

Studies have been started on treatment of the raffinate to be expected from reclamation of the uranium from the new reactor at Ten Site. A synthetic solution containing the expected waste constituents has been prepared and various mixtures of clays have been used in preparation of bricks. When a suitable mixture is obtained it is planned to spike the solution with mixed fission products from the water boiler and conduct "hot" experiments.

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Per [redacted] Date
By [redacted] 6/14/78
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2. Laboratory

Work was resumed on the fluorometric determination of uranium. Recent methods of preparing the sodium fluoride disk by fusing the fine powder in a furnace with controlled heat for a specified period of time have met with some success.

Additional information was obtained concerning the separation of Sr^{90} and Y^{90}, the separation of Ba^{140} and La^{140}, and the separation of Ba-Sr from La-Y in solutions containing Ba, La, Sr, and Y. Tables were prepared covering 25 or more separations for each category. The tables present the following information: beta and gamma count of the spikes used, the beta and gamma activity of the supernatant and precipitate in each case, the per cent activity in supernatant and precipitate, and the per cent activity recovered. For the Ba-La separation the beta-gamma relationships were determined. This information will be of value in the presentation of the proposed method for the determination of Sr^{89} and Sr^{90} in the presence of Ba and La.

3. Nitrate Reduction

In the continuous process the 35 liter mixing basin reduces 42 g of nitrate nitrogen per day or about 12 g per liter. This amounts to 12,000 ppm per

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day or 500 ppm per hour. The process is at present approaching the maximum rate of nitrate reduction but further concentrations will be increased until the process breaks down.

The four batch process cylinders are being continued to increase the concentrations. There is no apparent difference between 8-hour mixing and 15-hour mixing as noted in the analyses. Two cylinders are being fed identical feeds of alcohol and sodium nitrate and one cylinder is getting an additional feed of 500 ml settled sewage twice daily. At lower rates of feed there was no essential difference in the two cylinders but at higher rates of feed the process receiving the sewage is reducing the nitrate and oxidizes alcohol more efficiently than the control. At the present feed rate the sewage fortified sludge is effectively reducing the nitrate nitrogen from 420 ppm to essentially 0 ppm in 8-hour mixing. The maximum is being approached.

Two other cylinders are receiving disproportionately large amounts of alcohol in one and nitrate in the other. No essential changes have been noted from last month's report.

An apparatus for measuring rate of CO_2 production in this experiment has been set up but a series of unfortunate difficulties has been encountered in getting it to function properly. As soon as these measurements can be made, the experiment will be essentially complete and after a few other determinations the project will be discontinued.

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Jessie Lehner 6/14/78
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4. Environmental Studies

Mineral and radiological analyses were run on [illegible] and river water samples. Nothing unusual was noted in these data.

Tables and summaries have been prepared for the 111 water samples received during 1955. These data, along with comparisons with results obtained in previous years, will be sent to USGS with a copy remaining in our files. The yearly averages fall very much in line with the averages obtained for past years. No contamination problems due to Los Alamos waste treatment methods are indicated.

C. Visitors

J. V. McNamara, Fire Protection Engineer, SFO, Albuquerque, inspected the Tech Plant on January 17, 1956.

Dr. Theis, Mr. Conover and Mr. Abrahams of USGS, Albuquerque, visited the Group on January 16 to discuss possible revisions in the co-operative and environmental studies program.

February 8, 1956

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

clA - H-Div. Files (following circulation to
H-Div. Group Leaders)

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