H-DIVISION PROGRESS REPORT

August 20 - September 20, 1956

REF: H-241

22

A

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

A. General

As a result of the splitting of CMR Division, the Contaminated Laundry at DP Site has been placed under the administration of Group H-7.

Over the past number of years the members of Group H-4 have pursued their studies concerning the effects of radiation confining them primarily to the prompt acute effects of relatively large doses. The time has now come for a shift in emphasis and a start has been made at beginning all over again with interest directed primarily at the delayed and long-term effects of comparatively small doses. The first of these studies is described in some detail in the H-4 Monthly Report. At the same time, Dr. R. Gordon Gould is on leave of absence for a year of study in England. It is hoped that he will bring back new techniques and philosophies relating to the fundamental biochemical changes which ultimately result in the effects of exposure to radiation which we have been observing with such care over the past number of years.

B. Personnel (9/1/56 - 9/30/56)

1. New Hires

9/1	MONTOYA, Polly L.	H-7	Laundry
9/1	SALAZAR, Aguida V.	H-7	Laundry
9/1	MARTINEZ, Filiberto E.	H-7	Laundry
9/1	MAESTAS, Jacobo	H-7	Laundry
9/1	TAFOYA, Pasqualita	H-7	Laundry
9/1	VAROZ, Jose A.	H-7	Laundry
9/1	SALAZAR, Juan B.	H-7	Laundry
9/1	ORTEGA, Arturo E.	H-7	Laundry
9/1	NELSON, Margaret M.	H-7	Laundry
9/1	LOVATO, Leo M.	H-7	Laundry
9/1	SALAZAR, Carlos E.	H-7	Laundry
9/1	FALKNER, Elizabeth O.	H-7	Laundry
9/1	RENDON, Lourdes A.	H-7	Laundry
9/1	WILLIAMS, Lee Ella	H-7	Laundry
9/1	NIVENS, Rebecca Mae	H-7	Laundry
9/1	SISNEROS, Alice B.	H-7	Laundry
9/1	LUJAN, Augustine	H-7	Laundry
9/1	ROYBAL, Maria N.	H-7	Laundry

9/1	VARELA, Ricardo	H-7	Laundry
9/1	VIGIL, Norberta R.	H-7	Laundry
9/1	VIGIL, Elias	H-7	Laundry
9/1	VILLAREAL, Ernestine R.	H-7	Laundry
9/1	POSTON, George B.	H-7	Laundry
9/1	SCHAFFER, Joseph	H-7	Laundry
9/1	MONTOYA, Frank A.	H-7	Laundry
9/1	SALAZAR, Arsenio S.	H-7	Laundry
9/1	MARTINEZ, Jose U.	H-7	Laundry
9/1	BROWN, Esequias	H-7	Laundry
9/3	GEOFFRION, Robert D.	H-1	CM Bldg. Monitoring
9/13	MINOR, Mary June	H-4	Administration CASUAL
9/24	PATTERSON, Gayle H.	H-1	General Monitoring

2. Terminations

9/3	GRIFFIN, E. Eugene	H-1	General Monitoring	
9/5	DODD, Aubrey O.	H-6	Nuclear Field Tests	
9/5	FENICHEL, Irwin R.	H-6	Special Problems	SUMMER
9/7	ALBRECHT, George J.	H-1	CM Bldg. Monitoring	
9/7	BOWMAN, Ronald R.	H-6	Special Problems	SUMMER
9/7	GARCIA, Meliton M.	H-5	Field	"
9/7	NEW, Peter S.	H-DO	Property	"
9/7	PRICE, Richard W.	H-4	Radiobiology	"
9/10	GUEVARA, Francisco A.	H-7	Engineering	
9/10	DRESBACK, Shirley N.	H-1	General Monitoring	
9/14	FISHER, William R.	H-4	Radiobiology	SUMMER
9/14	LUCY, Barbara P.	H-1	General Monitoring	"
9/18	STEDMAN, Edith B.	H-4	Radiobiology	"
9/18	STEDMAN, Wilfred D.	H-4	Radiobiology	"

3. Group Transfer

		From:		To:	
9/3	AEBY, Jack W.	H-1	General Monitoring	H-6	Nuclear Field Tests

4. Total Personnel

SM	58
Military	1
SCP	110
ASC	44
TOTAL	213*

*Total includes 5 casual employees and 1 limited

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

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II. GROUP H-1, MONITORING (Dean D. Meyer, Leader)

A. General

Douglas Lier (Navy) commenced indoctrination with H-1 on September 4.

B. Incidents

1. On August 23 and 26, three persons were thought to have been inadvertently exposed to an excessive dose of neutrons in the P-9 Van de Graaff area. On the first occasion, the target was empty but the neutron deflector failed to operate and the alarm sounded. [redacted] had 191 mr of gamma and [redacted] 168 mr. Both of their neutron plates recorded insignificant exposures. On the second occasion, [redacted] was on a ladder in the basement when the machine was turned on, and again the alarm sounded. The film badge he wore was processed; it read only 110 mr of gamma and no significant neutrons.

2. On August 22, in Group P-3, [redacted] and [redacted] removed and worked with the ion source of the small Van de Graaff. [redacted] received 50 microcuries/liter in the urine and [redacted] 222 microcuries/liter. H-1 has investigated this operation again and has recommended a plastic bag for transfer from the machine to the hood. H-1 has advised exchanging the gloves periodically and to keep the source within the hood during the time of repair. The half-mask for use of persons wearing glasses has been received and is ready for the use of people in P-3.

3. In CMF-9, at 10:30 a.m. on September 18, an electrician accidentally broke in a hood a small glass ball containing tritium. Urine samples indicated less than significant exposure. The glass read no more than background 12 inches from the Sniffer, but read 15,000 $\mu c/m^3$ at 1/2 inch.

C. Special Work

1. The emission measurements from UO_2 loaded graphite were completed. The surface dose rates were measured from both the machined and rough (non-machined) sides for each piece. In addition, U^{235} was measured. The rough side was found to measure slightly higher than the machined side. [redacted] measurements were made:

[redacted] U^{235}	
[redacted] U^{235}	
Depleted U^{235}	190 mrad/hr
UO_2 loaded graphite	60 mrad/hr*

*Variation determined by thickness and surface condition.

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The range of 2.3 mev betas was calculated to be .125 to .250 inches in the loaded graphite of infinite thickness. The neutron emission from this combination is negative. The material can be handled with bare hands four times the length of time of normal undiluted U^{238}.

2. A leaking mesothorium source owned by P-3 was enclosed in an additional capsule at Ten Site through arrangements made by H-1. The source was then calibrated by H-1 with the use of Victoreen r-chambers.

3. The total exposures for all persons issued film badges in 1953, 1954, and 1955 were tabulated and divided into various exposure ranges for a subsequent report to the AEC.

4. A survey of sources of radiation in the Administration Building was made in preparation of an adequate policy concerning the usage of such sources within the building.

5. The exposure of J-11 personnel to Pu, Sr^{90} - Y^{90}, Am 241, Cm^{242}, has been reevaluated by H-1. A more comprehensive urine assay scheduling has been initiated from this evaluation.

D. Special Monitoring

In the preparation of U^{235} loaded graphite at GMX-2 Anchor Site, GMX-2 prepared a mixture of coke, thermax, erucic acid, benzine and 92% oralloy oxide and then extruded the mixture. The toxicity of benzine was safeguarded against with the use of organic vapor cartridges. An outside wool pad was also applied for dust. Standard protective clothing was worn. The maximum contamination consisted of 4000 c/m on the floor, 1000 c/m in the mixing chamber, 3000 c/m on the booties and 600 c/m on small equipment. All items were decontaminated to zero count with the exception of items like the screen. The highest air sample in the vicinity of the mixing was 327 $d/m/m^3$. The one nose count taken was negative. The components of the respirator cartridge were counted and found to be insignificant. Since the room is provided with no special ventilation, the problem of mixing major quantities would be magnified.

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

A. Accident Record

	Jan. 1 to Sept. 1, 1956	1955
Manhours Worked	3,757,505	5,523,191
Number of Disabling Injuries	13	16
Number of Days Lost	*6,308	3,056
Frequency (Accidents per 1,000,000 Manhours)	3.5	2.9
Severity (Days Lost per 1,000,000 Manhours)	1,680	551

(*Includes 6000 days which is the ASA charge for a fatality)

B. Industrial Accident Experience

On April 11, [redacted] CMX-3, dropped a casting on his left thumb causing lacerations and fracture of the thumb. Lost time was 60 days.

C. Fires

There were no Laboratory fires during this report period.

D. Motor Vehicle Accidents

	Jan. 1 to Sept. 1, 1956	1955
Miles Driven	1,229,968	1,806,745
Number of Accidents	17	30
Rate (Accidents per 100,000 Miles)	1.38	1.66
Total Cost	$1,882.70	$3,731.36
Accident Cost per 100,000 Miles	$ 153.00	$ 206.00

There were three motor vehicle accidents involving Laboratory personnel during August. Two were backing accidents [redacted] driver scraped a post.

E. General

1. The Safety Office arranged [redacted] Physics Building for key Security and Fire Protection personnel.

2. The Safety Office reviewed the proposed program of CMR-3 with respect to zirconium processing. The site facilities were examined and flow lines were discussed.

3. The Safety Office supervised the disposal of approximately 300 lbs of lithium hydride.

4. An investigation was made and a separate report written on the failure of a heise gauge at TA-33.

5. Safety surveys were made of CMX-8 facilities at Kappa Site and CMX-2 facilities at Anchor Site East. Considerable improvement has been made at each of these sites since the previous surveys.

6. A lecture and demonstration on artificial respiration and use of fire extinguishers was given to the members of Group J-12.

7. A survey was made of the sodium storage and handling procedures at Ten Site.

8. Frequent surveys have been made of TA-46 and the work of N-Division followed quite closely.

9. This office worked with Henry Laquer, CMR-9, in an experiment involving discharging and igniting large volumes of hydrogen gas.

10. Recommendations and specifications concerning installation of elevators in test towers at Nevada were made to Group J-6, the J-Division engineering group.

11. The H-3 Group Leader, in collaboration with Dr. T. L. Shipman, was a technical adviser in a series of meetings held by Atomic Energy Commission representatives from LAAO and Washington and Zia Company officials on the subject of pay rates for Zia craft personnel.

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

A. General Remarks on Group Activities

F. N. Hayes, R. L. Schuch, E. C. Anderson and P. S. Harris have been away on official business.

Harry Foreman presented a talk entitled "Mechanism of Plutonium Binding by Bone" on July 20 at the Gordon Conference on Bones and Teeth. He also attended the meeting of the 20th International Physiological Congress in Brussels on July 26-29.

Gordon Gould is to spend the next few months doing research with Dr. Popjak at the Experimental Radiopathology Research Unit, Hammersmith Hospital, London, England.

B. Group Publications

1. Manuscripts Completed

"Relative Biological Effectiveness of Tritium Beta Particles for Production of Mortality in Mice", by John E. Furchner. Submitted for publication in Radiation Research.

"Chelation in Physiological Systems", by Harry Foreman and Camille Finnegan. Submitted for publication in the Journal of Laboratory and Clinical Medicine.

2. Papers Published

"Metabolism of C^{14}-Labeled Isoniazid in Vitamin B_6-Deficient Rats", by Irene U. Boone, Marguerite Magee, and Donna Faye Turney. J. Biol. Chem., Vol. 221, No. 2, 781-789, August 1956.

"A Chromosome Study of the Wild Pig (Pecari angulatus) and the Domestic Pig (Sus scrofa)", by J. F. Spalding and R. O. Berry. Cytologia, International Journal of Cytology, Vol. 21, No. 1, 81-84, March 30, 1956.

C. Major Areas of Progress in Sections

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

a. Comparison of C^{14}-Acetate and H^3 Water as Indicators of Biosynthetic Rates (Bell, Lilly, Gould). The experiment described last month has now been completed. The following conclusions can be drawn. C^{14} given as acetate and H^3 given in the form of HTO incorporate into liver cholesterol to the same extent. This substantiates the assumption that each is equally suitable for investigational purposes.

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)

a. The Effect of Single or Multiple Exposures of Mice to Gamma Rays and Neutrons on Life Span, Tumor Incidence, Fertility, and Incidence of Ocular Lens Opacities (Storer, Sanders, Spalding, Furchner, Boone, Strang, Rogers, Lushbaugh).

On the basis of work by the Biomedical Research Group over the past five years, it is now apparent that the relative biological effectiveness of a wide variety of radiations (gamma rays to fission fragments) rarely exceeds 2 or 3 when acute effects in mice and rats are used as the biological end point. RBE values of 10 or more are used, however, in considerations of "tolerance dose" values for human beings, since values obtained in animals for acute effects may be entirely different from those obtained for chronic effects. In order to determine 1) the RBE of a variety of radiations for the production of chronic effects, and 2) the effect of various doses of these radiations on the life span, fertility, etc., of animals, the following experiments have been undertaken in collaboration with Groups P-4 and N-2.

Forty-two hundred female mice were individually numbered by tatooing and randomly distributed to 28 groups of 150 mice each. Fourteen of these groups were then given single exposures to graded doses of Co^{60} gamma rays, 14 Mev neutrons from the Cockcroft Walton, or fission neutrons from Lady Godiva, according to the following schedule:

Group	Number Mice	Type Radiation	Dose (rep)
1	150	Co^{60} gamma	50
2	150	" "	100
3	150	" "	200
4	150	" "	400
5	150	" "	600
6	150	14 Mev Neutrons	25
7	150	" "	50
8	150	" "	100
9	150	" "	200
10	150	fission neutrons	25
11	150	" "	50
12	150	" "	100
13	150	" "	200
14	150	none (controls)	--

The remaining 14 groups are receiving weekly exposures to the same three radiations. The doses (which will be given for 25 weeks) are being delivered according to the following schedule:

Group	Number Mice	Type Radiation	Dose/week	Total Dose (rep)
15	150	Co^{60} gamma	12	50
16	150	" "	22	300
17	150	" "	32	550
18	150	" "	42	800
19	150	" "	52	1050
20	150	14 Mev neutrons	2	50
21	150	" "	12	300
22	150	" "	22	550
23	150	" "	32	800
24	150	fission neutrons	2	50
25	150	" "	12	300
26	150	" "	22	550
27	150	" "	32	800
28	150	none (controls)		--

Thirty-five mice from each of these 28 groups are being examined biweekly for ocular lens opacities. The time to death of each mouse is being recorded and complete autopsies to establish cause of death are being performed.

An additional 400 mice were divided into 4 groups of 100 each and irradiated (single exposure) as follows:

Group	Number of Mice	Type Radiation	Dose (rep)
1	100	Co^{60} gamma	400
2	100	14 Mev neutrons	200
3	100	fission neutrons	200
4	100	none (controls)	--

These mice have been set aside for special pathology studies in which freshly sacrificed animals are required.

Ten groups of 20 male mice each are being irradiated weekly (for 25 weeks) according to the following schedule:

Group	Number of Mice	Type Radiation	Dose/week (rep)
1	20	Co^{60} gamma	12
2	20	" "	22
3	20	" "	32
4	20	14 Mev Neutrons	2
5	20	" "	12
6	20	" "	22
7	20	fission neutrons	2
8	20	" "	12
9	20	" "	22
10	20	none (controls)	--

These mice are being test-bred with 3 females after each exposure to determine the time of onset of sterility. The litters from successful breedings will, of course, be examined for possible abnormalities although very few are to be anticipated in as small a population as that being used.

Upon completion of the above outlined experiments it is anticipated that specific answers may be obtained to the following questions (among others):

1) What is the relative biological effectiveness of 14 Mev neutrons and fission neutrons for:

a) life shortening
b) the production of tumors (including leukemia)
c) the production of lens damage
d) the production of sterility

2) To what extent does fractionation (protraction) of dose affect the severity of the changes enumerated in Question 1?

3) To what extent is life shortened per rep of gamma rays or neutrons? (The extrapolation to human beings appears to be reasonably straightforward because of certain characteristics of the Gompertz function for both species.)

4) Do repeated doses of neutrons add to a greater extent than repeated doses of gamma rays for production of the effects listed in Question 1? To what extent do they add?

5) Are any unique, long-term pathological changes produced by neutron exposures?

5. Radiopathology Section (Dr. [illegible], Group Leader)

Nothing new to report.

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

A. Evaulation and Control Work

1. Beryllium

Following the rearrangement of machines in the Beryllium Shop, and the installation of the new exhaust hood, the machining operations were very heavy. None of the air samples collected in the shop and filter room were more than 0.1 of the tolerance figure.

2. Graphite

A study under way in the graphite machine shop in Sigma Building was continued in an effort to obtain weighted exposures for all types of operations. In cooperation with SD-2, special experiments were made at Building 96 during the machining of graphite. These experiments were run to determine the particle size

and the quantity of dust resulting from milling graphite. The information obtained will enable us to determine the type of local exhaust hoods and air cleaning equipment necessary when machining graphite containing enriched uranium.

3. Plutonium

A study at DP West to determine the particle size of plutonium dust during various operations was continued. In order to obtain an adequate quantity of material for particle size analysis, it was necessary to run some of the impactors for five days.

4. Mercury

In addition to surveys made following mercury spills, we are continuing a study of the exposures resulting from the handling of mercury in the H-3 Decontamination Laboratory; all exposures have been minimal.

5. Enriched Uranium

We have cooperated with Group H-1 during the processing of enriched uranium and benzene by Group CMX-2. All buildings involved were monitored and an air sampling program was set up. The results of the first survey made by Group H-1 indicate that the exposures to both uranium and benzene were insignificant.

6. Ventilation

We have reviewed the preliminary plans for the new Sigma Building prepared by the Architect Engineers. All ventilation and air cleaning originally recommended have been incorporated.

A ventilation survey was made following the installation of a new exhaust system in the grinding room at TA-3 shop. A resurvey was made in the beryllium room to determine the air flow through the hoods under various conditions of operation. It was found that the air flow through the beryllium machining hoods was approximately the same as when installed and originally approved. A ventilation survey covering 16 fume hoods was made in Building 460 at S Site. Preliminary conferences have been held to discuss ventilation control measures for the proposed new CMB and N-Division additions to Ten Site. Several conferences have been held with Eng-2 and the AEC in an attempt to clarify the discrepancies in the specifications covering the proposed venturi scrubber installation in the new Radiochemistry Building. Additional data has been supplied to the A-E and the fabricator. Since this is an experimental device to remove radioactive iodine and acid mist, it will not be possible to insist upon a given efficiency for the venturi scrubber. A final proposal is being made at this time.

We have conferred at various times with Eng-2 personnel on the problem of evaluating and redesigning the exhaust system for the basement of the Administration

Building. An experimental procedure has been devised to determine the desirable method of exhausting in Graphic Arts Department. We have made recommendations relative to the type and design of a hood for the control of fumes from the N-1 test furnace.

A total of eight sets of plans were approved during this period.

B. Research and Development

More detailed information on the following problems is contained in the Supplementary Section Reports.

1. Evaluation of Plutonium Exposures

We have continued work in assembling a bibliography on this subject for the proposed conference to be held at Los Alamos. An analysis of plutonium urine assays has been initiated; the compiled data will be discussed with T-Division in an effort to determine the significance of the results.

2. Ten Site Stack Study

Practically all work on installing a venturi scrubber at Ten Site has been stopped. The evaluation of the stack discharge from the RaLa cell is proceding satisfactorily. A sampling nozzle and special filter paper holders have been fabricated and actual sampling will be initiated in the near future.

3. Respiratory Protective Equipment

A report on the respiratory protective equipment problem at Los Alamos was prepared and submitted to the AEC Division of Biology and Medicine.

4. Plutonium Analysis Development

A few plutonium samples have been run with available equipment using the Hanford method with satisfactory results. We have placed orders for additional equipment which includes plating equipment and nuclear track cameras. This equipment will enable full scale experimentation on the determination of plutonium in urine.

5. Analytical Procedure Development

A method for the determination of thallium in all filter media and in urine has been reduced to absolute practice. The initial phase of a study on chlorinated hydrocarbons has been completed. A study of [illegible] complete.

6. Physical Properties of Beryllium Compounds

Another battery of beryllium samples were run for solubility with somewhat erratic results; a slightly modified sampling technique is being considered in an effort to find more concordant values.

C. Miscellaneous

We have received six continuous alpha sampler-counters from Group P-1. These samplers have been calibrated against plutonium standards. In addition, six large air pumps, fabricated especially for the continuous samplers, have been calibrated.

We have supervised the initial run by Group N-2 using ammonia gas through experimental tubing in an electrical furnace; personnel were equipped with Universal gas masks. Several recommendations were made to reduce the possibility of exposure in future runs.

D. Statistical Summary

1. Air samples collected or field tests made for:

Beryllium	80
Graphite	45
Mercury	8
Plutonium (cascade impactor)	14

2. Plans approved 8

3. Sanitation

Water samples collected	20

4. Analyses completed

Air

Beryllium	73
TNT	6

Biological (urine)

Americium	5
Lead	1
Mercury	6
Plutonium	281
Radium	2
Strontium ^{90}	20
Thallium	1
Thorium ^{230}	4
Tritium	104
Uranium (fluorometric)	72
Uranium (radiometric)	74

Miscellaneous

Beryllium on resp. filters	7
Thallium on swipes	6
Uranium in water	8

5. Research and Development

Laboratory Section Projects

No. 2 - radiometric uranium analysis, little progress due to personnel shortage.

No. 3 - radio-strontium analysis, no progress.

Engineering Development Section Project

No. 4 - dust chamber, preliminary plans complete.

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

A. Special Problems (S. Shlaer)

1. General

a. Considerable assistance on our program was derived from the work of two graduate students assigned to us for the summer.

b. E. Bemis returned from his vacation September 4.

2. Work in Progress

a. An expression describing the reflection of neutrons from an infinite plane moderator has been derived by S. Plesset in RAD-196. This expression is being evaluated as a function of distance between source and moderator; it is being coded for the IBM 704 machine.

b. Work is continuing on a filter for use in monitoring of radioactive noble gases.

c. A review of the first draft of the REDWING report is in progress.

d. Two "Rudolph" neutron monitoring instruments have been calibrated. One will go to H-1 for use and evaluation while the other will be compared with the presently used converted Pee Wee under a variety of conditions.

e. Investigation of electrical leakage during and post irradiation by Ra gamma rays in the Victoreen thimble chambers is continuing by means of the vibrating reed electrometer. It was discovered that with the thimble chamber in the vibrating reed electrometer a change in its temperature produced large currents. This is probably due to the change in chamber [illegible]

f. Work is progressing on the preparation of thin ZnS (Ag) screens for use in alpha ray detection.

3. Work completed

a. Aid was given to H-1 on some counting and counting equipment problems.

b. The calculations of Greening's theory when a second emulsion layer is introduced show that only a small change in the spectral sensitivity results. Theory and experiment are still in disagreement by a factor of about 2 maximally.

c. Attempts to remove thoron daughters (Pb 212) from activated charcoal that had adsorbed thoron have been unsuccessful. Further work on this has been discontinued.

d. Mice injected with thorium-B (Pb 212) have a distribution of their activity in their tissues similar to that observed when they inhale thoron. The blood activity is almost entirely in the red cells and the specific activity of the kidney is higher than that of other tissues.

B. Meteorology Section (Orin W. Stopinski)

1. General

O. W. Stopinski attended the following conferences:

a. Headquarters JTF-7, Washington, D. C., on August 21, relative to the formation of a permanent weather research section of the Task Force to be concerned solely with Task Force weather problems.

b. Mercury, Nevada, on August 29, relative to the planned research program of the US Weather Bureau for the Nevada Test Site. At this conference the program was outlined and discussed. It was pointed out to the Weather Bureau personnel that their first responsibility was to meet operational requirements, with the basic research aspect being secondary in nature.

c. Group N-2, Pajarito Site, Los Alamos, relative to present and future requirements for weather support. No requirements exist at present, but tentative plans imply direct support some time in the future. This conference was the first of a series, with the purpose of determining the exact nature of required support for Los Alamos directly.

d. J-Division, relative to the ultimate disposal of the Weather Bureau, National Bureau of Standards fallout computers. One of the computers is to be modified, and later a decision is to be made relative to modification of the second computer. It was agreed at the conference that there exists no requirement for placement of a computer at Los Alamos, since more basic research can be accomplished through extensive utilization of the IBM computers presently available.

e. H-6 Weather Section with Mr. Charles Schaefer, USWB, assigned to the FCDA, relative to the work that is being contemplated in support of civil defense activities.

2. Operations

Bayo Canyon activities

a. The portable wind equipment of the Section was installed in Bayo Canyon to allow GMX-5 to have a record of canyon winds for some of their early

experiments in which direct weather support from the Section is not required.

b. Repair work was completed on the Point Weather trailer for the Section.

c. New wind equipment was installed at Point Weather, replacing the old Air Force equipment formerly used.

d. A study was completed for the month of November. This study is to be used in resolving the question of continued activities in Bayo Canyon into the month of November.

A study of wind data, requested by H-1, was completed and forwarded. The study was requested in relation to burning activities in Bayo Canyon.

Installation of the surface observation site at SM 43 was completed. Starting the first of September the official observations are now being taken at this location.

The data relative to NTS, on file in the Section, was inventoried. Copies of the inventory were forwarded to the Weather Bureau, Washington, and Las Vegas. The inventory was distributed to these agencies for the purpose of acquainting them with the availability of data, which might not be readily accessible from other sources.

3. Work in Progress

a. Work has continued on the forecast study for Los Alamos.

b. A search for experimental data on fall velocities of small particles has been initiated. It is proposed that this work be reviewed and thought be given to a proposal of starting experimental work, [illegible] sufficient data exists. So far, it appears that little experimental work was ever done in this field.

C. Nuclear Field Test Section (W. R. Kennedy)

1. General

a. A copy of the 7.1 dose record for CASTLE was located for UCRL, who had need of it to compile dose statistics.

b. The Brostrum, another cargo ship carrying freight from Eniwetok, arrived in Oakland. In view of our findings on the Mann, it was considered unnecessary to send monitors for off loading. However, an instrument was taken by the S-DO representative, and spot checks made on the cargo. No significant radiation contamination was found.

c. Jack Aeby was transferred from H-1 to H-6 on September 4. However, he will continue with H-1 through the first source run, tentatively scheduled the last week in September, to break in his replacement.

2. Laboratory (B. F. Schnap)

a. Routine analysis of chemical waste from CMR Building was made. All batches were released to H-7.

b. Drinking water at CMR and DP West were analyzed for alpha activity. None was found. Circulating water at DP West contains some contamination in those systems having histories of contamination.

c. Samples of dirt taken from various spots at NTS at other times for other reasons were assayed for plutonium with the following results:

12-18-53	Yucca Flat (Top 3")	0 d/m/gm
2-15-55	Station 3-300	0 "
2-15-55	Area 9-b	0 "
2-15-55	Area 4	0 "

VII. GROUP H-7, INDUSTRIAL WASTE (Conard W. Christenson, Leader)

A. Plant Operation

1. TA-45, Tech Area

Operations have been routine and effluent quality satisfactory throughout the period. Exceptionally high flow was received from TA-1 during the first week in September and overtime operation was required on September 9. Flow had returned to normal during the last week of the period.

Considerable progress has been made in decreasing the accumulated sludge in the settling basins by operating the sludge filter twice daily during normal working days with a single daily run over the week ends. No sludge has been received from the DP Plant since the sludge trailer has developed leaks and all sludge is being held at Building 35 pending [illegible] the new sludge filter.

2. TA-21, DP West

Flow was relatively high during the period but operations were otherwise routine. Effluent quality was very good.

Installation of the vacuum filter is nearly complete. A representative of the filter manufacturer is expected during the week of September 24 to check and start the unit in accordance with requirements of the contract for installation. The unit will permit final disposal of sludge at the DP West Plant and eliminate the hazardous procedure of hauling wet sludge to TA-45.

3. TA-35, Ten Site

Four additional runs were completed during the period. A total of 48,980 gallons of waste was treated of which 11,500 gallons were discharged and the remainder for retreatment. The relatively large amount returned was due to

the fact that for one run an attempt was made to "exhaust" the column and determine the point at which effluent quality approached raw feed quality. A total of 34,300 gallons was passed through the column. While only 4200 gallons was of satisfactory quality for discharge, the column was still removing more than 75% of the radioactive material in the raw feed. The run was shut down when the feed tank was empty.

Two succeeding runs were made using waste returned to the plant during prior runs. Although the gross beta activity of this waste was only about 1200 c/m/ml, an average of only about 2000 gal/run could be discharged. Effluent activity at that point rapidly increased to about 500-600 c/m/ml and remained at that level until shutdown.

A new procedure using tap water (instead of recirculated waste) in air cleaning equipment will require more or less continuous operation of the resin column because the very substantial concentration of [illegible] in these units will be eliminated.

B. Research and Development

1. Plant Operation

a. TA-21, DP West. Experimental work was started to determine the suitability of locally available sand for use in filters at TA-[illegible] DP [illegible]. Preliminary results indicate that samples tested would be unsatisfactory without extensive washing, screening and possibly acid treatment. This work was undertaken because of the extremely high freight rates on commercially available filter sand.

b. TA-35, Ten Site. Plans for installation of an additional resin column, which will permit series operation and intermediate treatment are being drawn. Mixing and handling equipment for cement-sludge mixtures will be incorporated in the drawings. It is expected that the new equipment will increase the length of runs, improve effluent quality and provide a satisfactory means for final disposal of sludge.

A new sampling device, controlled by a water meter, has been developed and is expected to increase accuracy of sampling.

2. Clay Fixation Studies

Further study was made on the effect that surface area plays on the leachability of fired clays when compared to weight of the samples. Bricks fired at 1200°C with M.F.P. (2×10^5 c/m/gram fired brick, β) were crushed and sieved through a standard sieve nest consisting of sieve numbers: 10, 20, 40, 60, 80, 100, 200. Samples passing each sieve were weighed to the nearest hundredth gram

and leached in tap water for 2-7 day periods and each leach counted, recording the 90% certainty counting ranges for reliability. Tabulated results of the activity leached in counts per minute per square centimeter versus counts per minute per gram indicated a trend that leaching is more of a function of surface area than of weight or mass, but not decisively so. One assumption made in determining surface area was that each particle passing a particular sieve was smooth surfaced. This is not true for clay particles, which may account for observed irregularities in the data and if taken into account, more clearly indicate that leaching of fired clays may be primarily a surface function.

Additional fabrication to our drum pelletizer was made to provide more flexible operations. In making pellets much is to be learned, with the main problem being a satisfactory method of intrdduction of clay and waste to the drum. Several inquiries were instigated to gain first hand knowledge of similar equipment and of operating techniques.

One item of concern in firing clays has been, how much activity is driven off with the gases at various heat levels? Three approaches to this problem present themselves in more or less a qualitative manner, these being: a) a known spike in clay and waste carriers in surface cups which are counted after various heat levels; b) collect gases at various heat levels directly from a muffle furnace and count; and c) digest dried and fired clays in acid and count activity at various heat ranges.

A series of surface cups were set up using Sr^{90} as a spike in levels of 5 to 7 x 10^3 c/mg. A good grade of ball clay was used, Harbison-Walker with water, H_3PO_4, and $Al(NO_3)_3$ waste carriers. Counting was done at 100°C, 600°C, and 1200°C levels. There was a reduction of count in all surface plates to the original spike, but no significant difference between the surface cup counts at the different heat levels. This would possibly indicate more of a shielding effect rather than activity driven off by gas carriage.

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By ______________
(Signature of person making the change and date)

A gas collector has been installed to a muffle furnace consisting of: a filter queen with paper filter; water ~~trap, water jacket, glass and lucite tubing~~; stainless steel tubing into top center of muffle furnace. Assembly is complete and one run is now in progress. Filter paper counts will be made by H.L.

3. Laboratory

Five weekly composited samples of laundry wastes have been analyzed for radioactive strontium. The values varied from 1 to 2.5 d/m/ml with an average value of 2 d/m/ml. Since a large percentage of the strontium is the Sr^{89} isotope, we feel the MPC values for drinking water are not being exceeded.

A sample of demineralized water from N-1, TA-46, was analyzed for conductivity, pH and total solids. It was determined that the water was sufficiently pure to be used in the batteries at TA-46.

A procedure for the determination of potassium by use of the flame spectrophotometer has been set up. It was necessary to make some adjustments to the instrument before this could be done. Now that the instrument is working properly an attempt will be made to set up a procedure for determining strontium.

The studies on the use of a second resin column in series with the present column at Ten Site have continued and it appears that, with normal wastes, upwards of 500 column volumes of primary resin effluent can be treated in a second column before MPC values are exceeded. This is with a feed of some 10 times the MPC values. It was reported previously that the presence of large amounts of sodium and potassium had no effect on removals of strontium in distilled water through resin columns. Further studies have indicated that the presence of these ions in tap water do decrease the removals considerably. These studies were carried out on used resin columns and are now being repeated with new resin and it is hoped that that more consistent results will be obtained.

The addition of plutonium to Ten Site wastes and subsequent treatment through ion exchange columns has been started. Preliminary studies indicate that only about 50% of the plutonium is removed by this treatment and regeneration removes only about one-third of the activity held in the column. Further studies will be continued on this phase of the work with an attempt to increase removals by pH adjustment, valence adjustments and destruction of complexing agents. It may be necessary to pretreat these wastes by [redacted] exchange treatment.

4. Environmental Studies

During the period, 25 [redacted] personnel and were analyzed for various radioactive and mineral constituents. In general, the data obtained agreed well with previous results from similar samples.

Also received from USGS personnel were 29 soil samples from Acid and Pueblo Canyons. The samples were analyzed for gross alpha, gross beta, and gross gamma activity. The results were pleasingly low and were even lower than previous similar samples.

A sample of gravel from inside the Pantex Igloo 5-17 was analyzed for gross beta, gross gamma, separated strontium, and per cent Sr^{90}. The values were all low.

A table was prepared concerning approximately 150 water samples obtained in 1950 from the Tech Area outfall, 1/4 mile below the outfall, and 1/2 mile below the outfall. The samples had been analyzed for gross alpha activity, chloride, and pH. These data were filed for comparison with similar samples collected at later dates.

Five samples of water from the Los Alamos distribution system were analyzed for nitrate nitrogen and fluoride. The nitrate-nitrogen values ranged from 0.8 to 1.2 ppm while the fluoride values ranged from 0.5 to 1.75 ppm.

A water sample from the Welfare Building in Santa Fe was analyzed for fluoride. The value obtained was 0.2 ppm.

5. Tuff Core Studies

One of the tuff cores through which a plutonium solution had been passed was autoradiographed by John Enders of H-1 and it was found that the plutonium was quite uniformly distributed throughout the core. This was rather surprising since it was expected that a large proportion of the activity would be retained in the upper inch or less of the core.

Because of the erratic results obtained from the percolation tests and the doubts as to the effect of the non-uniform coating of the polyester on the tuff cores, it was decided to discontinue this experiment until a better method of sealing the outside of the cores could be developed. The Plastics Section of CMB-6 is working on this and feel that a better method will be a seal of neoprene cement with a neoprene sleeve covering this. This method will [illegible] procedure.

C. Laundry Section

The contaminated laundry was transferred from CMR Division to H-7 effective September 1.

1. Proposed Sigma Building

Several meetings were held during the current month with H-1 and W. McCall of CMB-7 on the dispensaries and change rooms for the new Sigma Building at TA-3. The meetings were successful in that changes were made which were almost entirely satisfactory to all parties concerned, based upon presently available information.

2. Proposed K-Division Building at Ten Site

A meeting was held with C. Sundquist of ENG-2 and Dean Meyer concerning laundr service requirements of the new K-Division Building. All requirements were met for efficient laundry and supply service when the building goes into operation. (Note - It will be almost essential to have a service vehicle equipped with an hydraulic lift tail gate since the entrance to the dispensary will be at ground level and there will be no external ramps or loading platforms.)

3. Operational Changes

After discussion with H-1, it was decided that the needs of the Laboratory can best be served by supplying only two types of contaminated clothing, ALPHA and BETA-GAMMA. A memorandum to this effect was circulated to about 33 groups and sections affected and has already resulted in [redacted] operations at the Laundry Plant.

4. Proposed Changes at Ten Site

Meetings will necessarily be held in the next few months with the aim of providing better service at Ten Site and to take care of proposed changes to be made in the near future. Facilities [redacted].

5. Operations

The total number of items dispensed by the Laundry for the period September 4-28 inclusive, is as follows:

	DP West	DP East	CM Bldg.	Sigma	Misc.	Total
Boots, single	12,900	600	22,800	300	3,356	39,956
Coveralls	2,768	286	490	962	1,148	5,654
Smocks and Lab Coats	84	153	4,131	354	305	5,030
Cheesecloth, bolts	180	14	162	32	53	441
Gloves, surgical, pairs	7,836	0	4,992	862	3,564	17,256
Respirators and Masks	423	34	150	43	123	773

The total number of garments washed was 66,448 pieces or 31,784 pounds. This is an average of 1,673 lbs/day for 19 working days. This compares with 1,841 lbs/day for the previous month.

Of a total of 5,585 coveralls processed from September 4 to September 28 inclusive, 5 were rejected on the first wash and 8 out of 26 were rejected on the second wash. The amount of coveralls discarded because of contamination and/or wear and tear was 210 of which 25 were contaminated. The amount of smocks and lab coats discarded as above was 285*. Of a total of 4,889 smocks and lab coats processed, 6 were contaminated after the first wash.

For 19 working days, a total of 890 respirators were washed and monitored, or an average of 47 per day. This is a decrease of 17 per day from the previous month.

	Total	Rejected	%
First wash	881	15	1.7
Second wash	7	2	28.6
Third wash	2	0	0.0
	890	17	1.9

*This figure includes 175 old style smocks which were held in reserve and are now being disposed of to the contaminated dump.

[redacted]

During 1954 about 150 respirators were processed each day. In February 1955, a program was initiated at DP West which allowed each employee two personal respirators to be changed on a weekly basis rather than twice daily. During the same year DP East ceased contaminated operations. The combined result was to reduce respirator processing to about 60 per day at the present time.

On September 20 a memorandum was sent to the parties concerned about a change in internal procedure. Effective that date clothing which had previously been drawn by the groups and sites and marked by a group or site number was discontinued and absorbed by H-7. All clothing is now marked (or will be) either ALPHA or GAMMA and will be supplied upon request in reasonable quantities.

D. Meetings

A meeting was held with R. Phillip Hammond of K-Division to discuss the new developments at Ten Site and their impact on our Group. The expansion is going to require a considerable increase in our activities and will undoubtedly require additional facilities. The extent of this additional work cannot be determined until their plans are more definite.

A meeting was held with Jim Lilienthal, CMB-7, and Leo Chelius, H-1, to discuss the construction of the new building for N-Division activities at Ten Site. It is apparent that there will be a solid waste disposal problem of some magnitude here and a good possibility for some liquid wastes containing fairly high concentration of mixed fission products. No definite plans can be made on these until the building plans are further along.

A meeting was held with Leo Chelius, H-1, Mr. Montgomery of N-Division, and several members of ACF to discuss rad-safe and waste disposal facilities for N-Division operations in Nevada. There will be a difficult problem in solid waste disposal at this site. The liquid wastes can probably be handled in simple seepage pits but the extreme shortage of water at this site may require treatment and reuse of water. More data will be obtained on this later.

A meeting was held with Mr. McCall of CMB Division, Mr. Slocum of Black and Veatch, and Mr. Princell of AEC, at which it was finally determined to discharge all rinse water from the plating shops to the sanitary sewer system at [redacted].

Elgin Rex and C. W. Christenson attended the ACS meeting in Atlantic City September 17-21. The Group Leader visited Brookhaven National Laboratories September 20-21.

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

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