[redacted]

18.2.59

DD/100/08.

THIS IS COPY No. 2 ..... OF 36 ..... COPIES

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

422 II
Health Committee - Papers etc

WEAPONS GROUP

FOURTH ANNUAL REPORT ON HEALTH AND SAFETY

[redacted] 19/2

[redacted]

February 1959

[redacted]

[redacted]

422 II
Health Committee - Papers etc

UNITED KINGDOM ATOMIC ENERGY AUTHORITY

WEAPONS GROUP

FOURTH ANNUAL REPORT ON HEALTH AND SAFETY

[redacted], [redacted]

February 1959

[redacted]

[redacted]

C O N T E N T S

[redacted]

[redacted]

1. Introduction

This report presents Health and Safety data for the Atomic Weapons Research Establishment, Aldermaston for the period from 1st January to 31st December, 1958.

During this period there has been only one case of overexposure and that was confined to the hands (see 2.2.1).

Despite a considerable increase in the scope of active work and of quantities of materials involved, radiation and contamination levels have been maintained generally well below the maximum permitted. One exception, a contaminated workshop is discussed in 2.1.2.

2. Radiological Protection of Authority Employees

This year has seen a continuance of the policy of maintaining conditions such that levels of exposure and contamination are kept as low as possible concomitant with efficient and economical working and, in any case, lower than the maximum levels laid down by the Health Panel.

Liaison has been maintained with the Engineers responsible for the design of buildings in which active work is to be carried on. To assist with this, the Health Physics Branch produced, for the use of the Engineers, a guide to fundamental health physics principles and their application to building design.

The system of survey in which a team of surveyors led by a Supervisor is attached to a group of buildings has been continued. In this way the surveyors become familiar with the processes in the buildings and the past year has seen an increased integration of the survey teams into the functioning of the various sections. It is considered that this close liaison is most important and contributes materially to the protection of all concerned with active processes.

An attempt has been made to increase the scope of neutron monitoring but the present method of assessment (track counting) is tedious and laborious and alternative methods are being investigated.

2.1 Environmental Monitoring

2.1.1 External Radiation

It is the practice at A.W.R.E. for the Health Physics Branch to advise on shielding requirements before work involving penetrating radiations takes place and to carry out a full survey before regular operations start. This ensures that does to operators are kept to a minimum.

The results of surveys for external radiation levels are given in Table 1. A survey is deemed satisfactory if the radiation levels measured are such that a weekly dose of 0.3r is unlikely to be exceeded.

[redacted]

[redacted]

Table 1

Surveys for Penetrating Radiation

Total Number of Surveys	Number	
	Satisfactory	Unsatisfactory
90	88	2

Most of the survey work carried out during 1958 was around fixed installations (e.g. X-ray sets, accelerators)

In all cases the protection given by the building and local shielding is adequate.

The two unsatisfactory surveys were made around a glove box in which β-γ emitters were being manipulated. As these surveys were taken before operations were started no whole-body depth doses of any significant level were received. The operations were carried out with adequate shielding and in any case were subsequently discontinued.

2.1.2 Contamination of Surfaces and Air

Table 2

Surveys for Contamination

Total number of surveys	Number	
	Satisfactory	Unsatisfactory
1462	1393	69

The mpls used during the year were:- Pu, Po, Ac, U_{233} $10^{-4}\mu c/cm^2$
Nat.U, U_{235}, Th $10^{-3}\mu c/cm^2$
$\beta\gamma$ emitters. 4 x $10^{-4}\mu c/cm^2$

The general level of surface contamination in most buildings was satisfactory during the year. More contamination measurements were made by using the α-probe technique than by smear testing.

One notable exception to the generally low level arose in a building used for casting, machining and generally fabricating enriched uranium. It was shown that certain operations resulted in considerable local contamination which was subsequently transferred throughout the building by the normal traffic. Local shoe barriers were placed at the entrances to the areas concerned and this considerably helped to reduce the spread. In addition, the local extracts to the operations were improved. Glove failures in box work have shown a marked decrease during the year and have not contributed to any significant contamination.

Air Sampling

20,494 air samples of all types, including stack samples, were taken. This, compared with 15,432 samples run in 1957, shows an increase of 33%.

These are subdivided into "Routine" and "Special" samples. Routine samples include all stack samples, all daily 'statics' and those 'portable' samples run to cover routine work where no special hazard was expected.

Special samples are all those taken to cover operations where breathing apparatus was worn, samples run inside fume cupboards or active ductings, and tests during or after fires or extract failures etc.

[redacted]

[redacted]

TABLE 3

Air Sampling Results

Type	Total Number of Samples	Number and percentage of results above			Highest result mpl
		0.3 mpl	1.0 mpl	10 mpl	
Routine	18439	805 4.4%	240 1.3%	7 0.4%	35.0
Special	2055	743 36.2%	332 16.2%	100 4.9%	326.0

(Some air samples have been taken inside ductings and of these the highest result was 2250 mpl).

The percentage increase in the 'above 0.3 mpl' and 'above 1 mpl' classes over the 1957 figures was largely the result of the greater number of samples (3785) run in a building where the general level of activity is higher than in any other building on site. Changes in operating technique based on recommendations made by the Health Physics Monitoring and Survey Section have shown a marked lowering of activity level during the past 3 months. Much work previously done in the open laboratory or workshop is now carried out in fume cupboards under strictly controlled conditions.

The routine sample of 35 mpl was taken during preliminary investigations into the hazard of a graphite machining operation. The operator has since worn breathing apparatus on this job.

The highest special sample of 326 mpl was the result of an extract shut-off in a box containing Uranium Fluoride. The sample was run in the open laboratory. The operators now use breathing apparatus when a similar hazard is anticipated.

2.2 Personnel Monitoring

2.2.1 External Radiation

All personnel who regularly enter controlled areas are issued with film badges on a monthly basis. Additionally for special operations, badges may be changed and examined more frequently and quartz fibre dosimeters and wrist film badges may be issued.

Films are normally interpreted by assessing shielded (γ) and unshielded (β-γ) densities with curves obtained by calibration with a radium source as recommended by the Health Panel. However, in cases where the source of radiation is known and is specific, e.g. processes involving Uranium and Actinium, curves for films calibrated with these materials are used in interpretation of doses (see 2.6, 9.12 and 9.14)

In all 1,717 personnel employed at Aldermaston, A.W.R.E. outstations and by contractors were issued with film badges during 1958. Results for Aldermaston and outstations are analysed below. Annual doses for all other personnel show that no individual exceeded 1.5 rad (shielded) and 2.0 rad (unshielded).

[redacted]

[redacted]

TABLE 4

Results of body monitoring films assessed for gamma radiation

Number of people wearing films	1541	
Number and percentage of people exceeding annual dose of 1.5 rad	9	.58%
3	1	.06%
4	nil	nil
5	nil	nil
6	nil	nil
7	nil	nil
8	nil	nil
9	nil	nil
10	nil	nil
Number of occasions when the 13 week dose limit of 3 rad has been exceeded	1	
Total dose received (man-rad)	109.2	
Film assessment threshold dose (r/4 weeks)	0.02	

Of the nine persons exceeding an annual dose of 1.5 rad, four received all, or nearly all, the dose on overseas trials.

The single case of over 3 rad in 13 weeks (also included as one person exceeded 3 rad per annum) also occurred on an overseas trial.

23% of the total dose received during 1958 was incurred on trials overseas (viz. 25.1 man-rad)

Table 5

Comparison of whole body gamma doses with those of previous years.

YEAR	1958	1957	1956
Number of people wearing films	1541	1317	946
Number of people receiving 5 rad	nil	3	3
Percentage of people receiving 5 rad	nil	0.2	0.3
Total annual man-rads	~~94.6~~ 109.2	118.5	~~109.2~~ 94.6

Table 6

Results of body-films assessed for beta-unscreened gamma radiation

Number of people wearing films	1541	
Number & percentage of people exceeding annual total of 20 rad	nil	nil
45 rad	nil	nil
60 rad	nil	nil
75 rad	nil	nil
Number and percentage of people exceeding 20 rad in 13 weeks	nil	nil

[redacted]

[redacted]

Table 7

Comparison of whole body beta unscreened gamma doses with those of previous year

Year	1958	1957	1956
Number of people wearing films	1541	1317	946
Number of people receiving 75 rad	nil	nil	nil
Percentage of people receiving 75 rad	nil	nil	nil
Highest dose (rads)	14.76	9.4	17.0

The highest dose quoted (viz. 14.76 rad) refers to an operator who has for the greater part of the year been involved in casting and manipulating large quantities of natural uranium for long hours.

Table 8

Results of wrist unscreened monitoring films assessed for beta gamma radiation

Number of people wearing films	110	
Number and percentage of people exceeding annual total of 20 rad	4	3.64%
45 rad	nil	-
60 rad	nil	-
75 rad	nil	-
Number and percentage of people exceeding 20 rad in 13 wks	1	0.9

The single case of more than 20 rad in 13 weeks involved a dose of 24 rad to the left hand and 33 rad to the right hand during box manipulations of β-γ emitters. The technique used has been discontinued and remote handling devices are being installed. This man is no longer employed on the work which gave rise to these exposures.

Table 9

Comparison of wrist β/γ doses with those of previous yesrs

Year	1958	1957	1956
Number of people wearing films	110	68	54
Number of people receiving 75 rad	nil	1	0
Percentage of people receiving 75 rad	nil	1.5	0
Highest dose (rad)	L.H.24.50 R.H.33.72	L.H.58.2 R.H.79.1	L.H.40.6 R.H.48.2

[redacted]

[redacted]

Table 10

Results of body neutron badges

Number of people wearing badges	40	
Number and percentage of people exceeding annual total of 1.5 rem	nil	nil
3 rem	nil	nil
4 rem	nil	nil
5 rem	nil	nil
6 rem	nil	nil
7 rem	nil	nil
8 rem	nil	nil
9 rem	nil	nil
10 rem	nil	nil
Total dose received (man-rem)	10.00	
Threshold dose (rem)	0.05	

The technique employed on this work was to examine and count under a microscope the proton recoil tracks produced in a nuclear emulsion plate.

Table 11

Results of wrist neutron badges

Number of people wearing badges	22	
Number and percentage of people exceeding annual total of 1.5 rem	nil	nil
3 rem	nil	nil
4 rem	nil	nil
5 rem	nil	nil
6 rem	nil	nil
7 rem	nil	nil
8 rem	nil	nil
9 rem	nil	nil
10 rem	nil	nil
Highest dose (rem)	1.25	

The highest dose was received by a man who has been manipulating fuel elements in an experimental production line.

Remote handling devices have now been installed and as a result exposures have been cut down.

[redacted]

[redacted]

2.2.2 Skin and Wounds

Table 12

Cases of skin contamination and of possibly contaminated wounds referred to surgeries

Total number of cases with contamination for more than 24 hours.	2
Total number of cases where skin broken	11
Total number of wounds excised	1

2.2.3 Excreta: Urine Sampling

Uranium: The frequency of sampling has been maintained, viz. U.235 weekly U.238 fortnightly. The method has been fluorescopic examination of spot samples.

If a U.235 sample is shown by fluoroscopy to be 5 µgm/litre or more, a full eight-hour sample is taken and examined by counting.

Table 13

Results of urine analysis for U 235 and U 238

Total samples		µg/litre		
		>5 <10	>10 <20	>20 <40
U235	2381	2	nil	nil
U238	1815	78	47	13

Some urine samples from R.O.F., Cardiff have been estimated for U238. All were found to be less than 5 µg/litre.

Table 14

Results of urine analysis for Pu^{239}

	Routine Samples				Special Samples			
	Persons		Samples		Persons		Samples	
	No.	%	No.	%	No.	%	No.	%
Totals	402		1123		34		39	
above investigation level	10	2.5	69	6.1	1	3.3	5	12.8
above action level	0	0	5	0.4	0	0	0	0

mpbb (max. permissible body burden = 0.04 µc

investigation level = 0.004 µc = 0.1 mpbb

action level = 0.04 µc = 1.0mpbb

Routine samples are those which are taken regularly; the frequency of sampling being based on the degree of contact. Special samples are taken as part of a personnel hazard evaluation associated with an incident where an intake risk could have existed.

[redacted]

[redacted]

Of the 402 persons from whom Routine samples for analysis of Pu^{239} were taken, 108 were employed for only a short time on work with Pu^{239} and in these cases only one sample was taken.

Two of the five Routine samples above action level were additional samples taken to follow the excretion pattern of Pu^{239} in an individual who had sustained a body burden in 1953 through a cut caused by contaminated glass-ware (This case also accounts for two routine samples above investigation level).

The ten cases shown above investigation level were as follows:-

(a) A Supervisor working in an area where highly active conditions prevail. Frequent samples have been taken from this individual and none has exceeded 0.3 mpbb.

(b) Eight persons included although the period for which 0.1 mpbb has been maintained has not exceeded two months and one person who has a sustained body burden about 0.1 mpbb which originated previously to 1958.

Table 15

Comparison of results of urine analysis for Pu^{239} with those of previous two years

YEAR	1958		1957		1956	
	No.	%	No.	%	No.	%
Total Persons	436		294		269	
Above investigation level	11	2.5	16	5.4	33	12.3
Above action level	0	0	0		1	0.4

Table 16

Results of urine analysis for Po^{210}

	Routine Samples				Special Samples			
	Persons		Samples		Persons		Samples	
	No.	%	No.	%	No.	%	No.	%
Totals	248		768		3		3	
Above investigation level	0	0	1*	0.1	0	0	0	0
Above action level	0	0	0	0	0	0	0	0

mpbb (maximum permissible body burden) = 0.04μc

Investigation level 0.004 μc = 1 mpbb

Action Level 0.04 μc = 1.0 mpbb

* Residual sample of incident which occurred during 1957 and discussed in Third Annual Report on Health and Safety 1957.

[redacted]

[redacted]

Table 17

Comparison of results of urine analysis for Po^{210} with those of previous two years

	1958		1957		1956	
	Number Persons	%	Number Persons	%	Number Persons	%
Total	221		172		148	
Above investigation level	0	0	6	3.5	5	3.3
Above action level	0	0	2	1.1	1	0.7

Table 18

Results of urine analysis for Tritium

	Routine Samples internal		Special Samples	
	No.	%	No.	%
Totals	469		182	
Above investigation level	23	4.9	55	30.2
Above action level	0	0	29	15.9

mpc (maximum permissible concentration) = 0.04 µc/ml

Investigation level 0.02 µc/ml = 0.5 mpc

Action level 0.04 µc/ml = 1.0 mpc

On two occasions during the year multi-curie level sources of tritium were handled during special operations. Prior knowledge of the operations enabled a scheme of daily urine sampling to be undertaken for all persons engaged on the work. This sampling scheme accounted for 172 of the special samples taken during the year, for a considerable proportion of special samples above investigation level and for all samples above action level. The samples above action level were taken from two individuals who sustained, respectively, body burdens of three and four times the maximum permissible concentration of 0.04µc per ml of body fluid. The above two cases also accounted for 36 of the 55 samples above investigation level. The remaining special samples above investigation level were taken from other persons involved in this operation.

Table 19

Comparison of results of urine analysis for Tritium with those of previous two years

Year	1958		1957		1956	
	Number	%	Number	%	Number	%
Routine Samples	469		528		382	
Above investigation level	23	4.9	79	15.0	57	14.9
Above action level	0	0	0	0	10	2.6
Special Samples	182		5		3	
Above investigation level	55	30.2	0	0	0	0
Above action level	29	15.9	0	0	0	0

[redacted]

[redacted]

Table 20

Results of urine analysis for Ac^{227} and comparison with those of previous years

Year	1958		1957	
	No. samples	% No.	Samples	%
Totals	20		42	
Above investigation levels	1	5.0	7	16.79
Above action level	0	0	0	0

mpbb (maximum permissible body burden) = 10 μc/24 hr

investigation level 1μc/24 hr = 0.1 mpbb

Action level 10 μc/24 hr = 1.0 mpbb

Table 21

Results of urine analysis for Ra^{226} (no samples prior to 1958)

	No. samples	%
Total	12	
above investigation level	1	8.3
above action level	0	0

mpbb (maximum permissible body burden) = 0.1 μc

Investigation level = 0.01μc = 0.1 mpbb

Action level = 0.1 μc = 1.0 mpbb

Table 22

Results of urine analysis for gross α (no samples prior to 1958)

	No. samples	%
Total	8	
Above investigation level	3	27.5
Above action level	0	0

mpbb (maximum permissible body burden) = 0.04μc

Investigation level 0.004μc = 0.1 mpbb

Action level 0.04 = 1.0 mpbb

The one Ra^{226} sample and the three gross α samples above investigation level were taken from one individual employed on work involving the handling of a wide variety of α emitters. The cause was traced back to an unsafe practice on the part of the individual. Correction of this was followed by a decrease in the results of subsequent samples to less than the investigation level.

Table 23

Results of urine analysis for Gross β (fission products) and comparison with those for previous year

	1958		1957	
	No. Sample	%	No. Samples	%
Total	10		9	
Above investigation level	0	0	0	0
Above action level	0	0	0	0

[redacted]

[redacted]

mpbb (maximum permissible body burden) = 1.0 μc

Investigation level 0.1μc = 0.1 mpbb

Action level 1.0μc = 1.0 mpbb

2.3 Incidents of interest

2.3.1 One of the two cases of persistent skin contamination referred to in 2.2.2 above, was in a maintenance electrician and no cause for this contamination was found in his work. This led to the discovery that the source of contamination was his own home where his wife was receiving treatment with an ointment containin' thorium.

2.3.2In order to carry out a special experiment it was necessary to seal a bare 3 curie Co_{60} source in a perspex sphere. This resulted in severe "crazing" of the perspex and subsequent release of a small amount of Co_{60} in an area normally used for sealed sources only.

The release was discovered at a very early stage and the area was checked and cleaned very soon afterwards. No significant dose was received by any individual.

2.3.3 During a routine filter change operation in an active building it was found that the new filter can required slight modification. A welding operation was carried out on the can with the filter medium still inside. When the filter was offered up to the manifold it caught fire. Local action by the maintenance staff and the fire brigade soon put out the fire which was confined to the cotton asbestos inside the can. No area or personal contamination was detected.

2.4 Criticality

During 1958 the Group Criticality Panel met ten times and dealt with 54 cases. Most of these were concerned with weapons but there were also problems associated with the clearance of buildings and the handling and storage of fissile materials for the reactors HERALD and HORACE.

There was no unpredicted criticality or near criticality incident.

2.5 Site Emergency Plans

A control room has been set up in the main Health Physics building. This contains maps of the site and surrounding district on which is kept relevant information.

One map has details of a radiation background survey carried out on site and surrounding district (up to 25 miles in all directions), another has plotted positions of interest (farms, wells, schools, phone boxes, etc).

A stock of protective clothing and other equipment is kept in this room and the supply of emergency monitoring equipment (e.g. 1413, 1368, 1324 monitors) at the agreed level.

Close liaison is maintained with R. A.F. Upavon on prevailing meteorological conditions.

The mobile Health Physics Laboratory has been supplemented by the addition of two Land Rovers.

There has been no official site emergency exercise during the year but the general organisation has been brought to readiness during a number of practice fire alarms for individual active buildings.

The main difficulty revealed by these exercises was that of communication. It was found that immediately there is a warning of an impending or actual incident the use of telephones should be controlled and general site information given out by the public address system. Arrangements are being made in the Site Emergency Plans at A.W.R.E. to implement these findings.

[redacted]

[redacted]

2.6 Investigations relating to Radiological Protection of Employees

2.6.1 Personnel Monitoring Films

Work has been done during the year on the calibration of FM 1 films against sources other than radium. It has been shown that the Health Panel recommended method of interpreting films gives doses 10-20% lower than actually received from actinium (see 9.14). Corresponding errors for uranium are 30-50% lower than actual (see 9.12). As reported in 2.2.1 above, appropriate curves are now used at Aldermaston to evaluate films work by personnel working with actinium and uranium.

2.6.2 Personnel neutron monitoring system

A system is proposed utilizing the activation of amorphous sulphur by the S^{32} (n,p) P^{32} reaction at neutron energies above 3 MeV (see 9.2). The authors suggest this method as an alternative to the present tedious track counting in nuclear emulsions but certain fundamental disadvantages in the system are discussed.

2.6.3 Measurement of actinon and thoron in laboratory atmospheres

Further development of a Chamberlain (AERE) "thoron-in-air monitor renders the instrument capable of detecting 10^{-2} m.p.l. thoron and 10^{-1} m.p.l. actinon in laboratory atmospheres (see 9.10).

3. General Industrial Hygiene

3.1 Inactive Toxic Hazards

3.1.1 Beryllium

The beryllium sampling programme has consisted entirely of sampling with portable air samplers around specific operations. The sampling time has varied between 5 and 30 minutes and results are given here in terms of the permissible continuous breathing level of 2 $\mu g/m^3$. Results indicate that this level has not been exceeded for more than an hour or so and then only at ~~frequent~~ infrequent intervals.

There is definite evidence that some of the higher samples have been caused by pick-up from contaminated hands and from coat sleeves of ~~operations~~ operators.

During experimental work and during operations when short term tests have indicated previously that there is a risk of air concentrations greater than 1 mac face masks and full protective clothing are worn.

Examples of such work are unloading a sintering furnace, die loading and disassembly for hot pressing and ingot removal after vacuum casting.

Table 24

Results of air sampling for beryllium

Samples	Number	%
Total	1179	
Less than 0.1 mac	457	37.9
Between 0.1 and 1.0 mac	632	53.6
Between 1.0 and 10.0 mac	90	8.5

mac (maximum allowable concentration = 2 $\mu g/m^3$

Highest figure recorded = 14.8 $\mu g/m^3$

There has been no clinical evidence of beryllium poisoning.

[redacted]

[redacted]

3.1.2 Mercury

Table 25

Results of air sampling for mercury

Samples	Number	%
Total	225	
Less than 0.5 mac	111	49.3
Between 0.5 & 1.0 mac	98	43.2
Between 1.0 & 2.0 mac	16	7.1

mac (maximum allowable concentration = 75 ug/m^3

Table 26

Results of urine sampling for mercury

Samples	Number	%
Total	1032	
More than 0.1 mg/litre	108	10.5

mac (maximum allowable concentration) = 0.1 mg/litre

Highest single sample = 0.245 mg/litre

Clinical examinations = 712

There has been no evidence of any symptoms arising from exposure

3.1.3 T.N.T.

Number of examinations.....1290

Three persons have been suspended from contact because of incidental illness.

3.1.4 Lead

Total examinations - 65. No suspensions

3.1.5 Chrome Plating:

Total examinations - 145. No suspensions.

4. Industrial and General Safety

4.1 Accident Statistics

Table 27

Industrial Staff Accidents

	1957	1958
Frequency rates	0.67	0.53
Mean duration	199	137
Severity rate	135	72

Non-Industrial Staff

There have been five accidents with the total loss of 58 working days.

[redacted]

[redacted]

5. Medical Services

5.1 Surgery Attendances

Table 28

Cases attending Surgeries

Cause of initial attendance	Number	percentage
Occupational	2103	100
Open Wounds	1126	53.5
Contusions	372	12.9
Crushing injuries	37	1.7
Post Traumatic Sepsis	8	.38
Sprains/Strains	143	6.8
Fractures and Dislocations	9	.42
Eye injuries Foreign Bodies	168	7.98
Eye injuries Chemicals	37	1.7
Burns Thermal	147	6.9
Burns Chemical	25	1.14
Burns Radiation	-	-
Major Injuries	-	-
Dermatitis	25	1.14
Electric Shock	3	0.14
Gassing	1	0.05
Other Toxic Hazards	2	.09
Non-occupational		

Injury 1675 Total new cases... 8434

Illness 4656 Total attendances 21913

5.2 Special Services

5.2.1 Radiography

A total of 6580 examinations were made. Again most of these were routine chest x-rays.

5.2.2 Pathological Laboratory

5714 routine blood counts have been made plus a number of miscellaneous pathological and biochemical examinations.

5.2.3 Physiotherapy

There have been 4338 attendances

5.3 Medical examinations

Total examinations 4594
New entrants examinations 1851
Percentage unfit... [redacted] ... 0.7
Repeat examinat[redacted] ... 2743

[redacted]

5.4 Sickness Absence

	Male (%)	Female (%)
Industrial staff	3.23	7.4
Non-Industrial staff	2.0	3.35

5.5 Deaths

Table 29
Cause of Death

	Category of Disease	Internat: List No.	Cause of Disease and Region Affected	Age and Sex	Est.	Radiation Exposure
1.	II	151	Cancer of Stomach	[redacted]	A.W.R.E.	No
2.	II	151	Cancer of Stomach	[redacted]	A.W.R.E.	No
3.	II	162	Cancer of lung	[redacted]	A.W.R.E.	No
4.	II	162	Cancer of lung	[redacted]	A.W.R.E.	No
5.	II	162	Cancer of lung	[redacted]	A.W.R.E.	No
6.	II	162	Cancer of lung	[redacted]	A.W.R.E.	No
7.	II	162	Cancer of lung	[redacted]	A.W.R.E.	No
8.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	No
9.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	No
10.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	No
11.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	No
12.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	Yes
13.	VII	420	Coronary Thrombosis	[redacted]	A.W.R.E.	Yes
14.	VII	422	Myocarditis	[redacted]	A.W.R.E.	Yes
15.	VII	440	Hypertension and Heart Disease	[redacted]	A.W.R.E.	No
16.	VIII	491	Bronchopneumonia	[redacted]	A.W.R.E.	No
17.	VIII	527	Status Asthmaticus	[redacted]	A.W.R.E.	No
18.	VIII	493	Pneumonia	[redacted]	A.W.R.E.	No
19.	XVII	819	Multiple Injuries	[redacted]	A.W.R.E.	Yes
20.	XVII	975	Suicide (drowning)	[redacted]	A.W.R.E.	Yes

[redacted]

[redacted]

6. Staff, Education and Training

6.1 Staff

Table 30

Health Physics, Medical and Safety Staff

	No. of Staff Employed	
	Investigations	Service Groups
Health Physicists	1	7*
Health Physics Ancillaries	2	42
Medical Officers		4
Medical Ancillaries		7
Nursing Staff		10
Chemical Analyists	3	10
Safety Officers		5
Safety Ancillaries		8

* Four of these seven Health Physicists have been engaged part-time on Investigations: the total effort amounting to about 1 man-year.

6.2 Education and Training

This is accepted as part of the normal work of the Health Physics Branch and no staff are allocated on a full time basis.

During the year, lectures have been given to over 300 staff of all grades and a talk on health physics is now part of the site training programme. During 1959 a similar talk will be given to all new entrants as part of the Site Introductory Course.

Longer and more detailed courses have been completed for health physics survey staff.

All talks on health physics have been very well received and there is a very keen interest shown by all staff at A.W.R.E. on general radiation safety.

7. Protection of Contractors' Employees and Extra Mural Workers

The policy remains that in general Contractor's staff are not allowed in controlled areas but the few who are allowed in for special work are treated in the same way as Authority staff and the Contractor is made aware of the exi existence of contact.

There has been a big increase in the amount of work being done for A.W.R.E. by Contractors outside the Establishment and in all cases satisfactory arrangements have been made for the protection of their staff from radiological and toxic hazards. In certain cases contractors' staff have been trained in monitoring techniques, so that the Health Physics Branch can be relived of the day-to-day routine checking.

This in no way affects the final control on hazards and over one hundred visits have been made to firms to check that the recommendations made for radio-active and toxic materials are being carried out.

[redacted]

[redacted]

Table 31

Results of air sampling for Beryllium on Contractors' premises

	Number	%
Total	101	
Less than 0.1 mac	62	61.5
Between 0.1 and 1.0 mac	38	37.7
Between 1.0 and 10.0 mac	1	0.8

mac (maximum allowable concentration) = 2 $\mu g/m^3$

Highest figure recorded 2.3 $\mu g/m^3$

There has been no clinical evidence of beryllium poisoning.

8. Protection of the General Public

8.1 Waste Disposal

A revised authorisation from the Minister of Housing and Local Government and the Minister of Agriculture, Fisheries and Food for disposal of active waste came into effect on 24th July, 1958. The conditions for discharge of liquid effluent from A.W.R.E., Aldermaston into the River Thames at Pangbourne were repeated and in addition permission was given for discharge of very low level effluent into the sewers of the Bradfield Rural District Council and thence into the sewers of the Kingsclere and Whitchurch Rural District Council.

8.1.1 Solid Wastes

Table 32

Disposal of Solid Wastes

Destination	Tonnage		Activity in curies	
	Gross	Nett	α	β-γ
Atlantic	1602	80	689.5	5
Hurd Deep	288	215	10.5	1
Harwell (incineration)	16	12	0.02	*
Local incineration	10	10	*	*

* = negligible activity

8.1.2 Liquid Wastes

Discharge of very low activity liquid waste into the Silchester Sewage Works began on 1st September, 1958. From then until the end of the year, the total quantity so discharged was only 2% of the maximum authorisation.

Discharge into the River Thames during 1958 was about 48% of the maximum authorised quantity.

[redacted]

[redacted]

8.1.3 Gaseous and Particulate Wastes

The total α and βγ activity discharged to the atmosphere over the year amounted to 21 milli-curies.

Of the alpha particulates the largest proportion was due to Natural Uranium, and on the βγ side practically the whole of the release was due to gaseous emission.

All stack outlets are continuously monitored. Ponds in the vicinity of the Establishment have been assayed at regular intervals. There has been no detectable increase in activity in pond water.

Visits have been made by representatives of the interested Ministries (viz. Agriculture, Fisheries and Food, and Housing and Local Government) who were satisfied that the activity being discharged from stacks is well below the permissible level. At their request arrangements have been made to inform these Ministries of the stack discharge figures at four weekly intervals.

Greater effort has been given to district monitoring in order to establish background activity (see 2.5)

8.2 Transport of Toxic Materials

All consignments of radioactive material from A.W.R.E. are controlled by a named officer who makes certain, consulting as necessary Health Physics and Criticality Panel, that all materials are satisfactorily packed and that the escorting officer is briefed.

All regular journeys follow set routes, and procedures to be followed after an incident have been defined.

In the case of weapon components the escorting officer is normally accompanied by a responsible member of the Health Physics staff.

8.3 Investigations relating to the protection of the general public

The investigation into a possible relationship between stack release and deposition in grass in the neighbourhood is necessarily a long-term project. There has been no significant increase in activity in stack release or in that measured in samples of grass. Work continues.

[redacted]

[redacted]

9. Selected Reports

	Classification	Author	Report No.	Title
9.1	[redacted]	[redacted]	A.W.R.E.O-4/58	Effect of gamma rays on records film. Interim Report No.2.
9.2	[redacted]	[redacted]	A.W.R.E.O-31/58	A Personal Neutron Dosimeter
9.3	[redacted]	[redacted]	A.W.R.E.O-49/58	Ignition of Plutonium, Part II. Particle size distribution measurements
9.4	[redacted]	[redacted]	A.W.R.E.T34/58	Operation Antler - gamma dose-distance measurements.
9.5	[redacted]	[redacted]	A.W.R.E.T44/58	Operation Antler - Radiological survey operations in the Alice Road area.
9.6	[redacted]	[redacted]	A.W.R.E.T53/58	Sampling of radioactivity at outlying stations in the Pacific during April/ May 1958.
9.7	[redacted]	[redacted]	H.P.Memo 2/58	Some notes on the possible effects of large releases of radioactive or toxic materials.
9.8	[redacted]	[redacted]	H.P.Memo 3/58	Note on the efficiencies of the three detection systems for Pacific fall-out.
9.9	[redacted]	[redacted]	T.C.R.7/58	Relative importance of external and inhalation hazards to personnel in fall-out areas, and in aircraft.
9.10	Unclassified	[redacted]	H.P.Memo 1/58	A method of measuring Actinon and Thoron in laboratory atmospheres.
9.11	Unclassified	[redacted]	H.P.Memo 5/58	The calibration of personnel monitoring film emulsion with Natural Uranium
9.12	Unclassified	[redacted]	H.P.Memo 6/58	The use of glass discs for the mounting of radio-active sources.
9.13	[redacted]	[redacted]	A.W.R.E. O-28/58	The calibration of personnel monitoring film with Actinium 227

[redacted]

Reference XY/159/02

Notice of Meeting on Radiological Decontamination

A meeting will be held at 2.30 p.m. on Wednesday, April 22nd in Room B2, Castlewood House, W.C.1, under the chairmanship of D.A.W. Plans. The purpose of the meeting is to examine the need for improving liaison between the various organisations concerned with problems of radiological decontamination, and if necessary, to agree on a means of co-ordination of effort.

Some difficulty has been experienced in choosing a day suitable to all concerned, but it is hoped that the date arranged will allow the maximum possible attendance.

A list of Service and other representatives who are invited to attend, or send deputies, is appended.

Ministry of Supply,
A.W. Plans,
Room 666,
St. Giles Court, W.C.2.
Museum 3644, Ext.1391,
6th April, 1959.

[redacted]
for D.A.W. Plans.

Distribution:

As attached list
File.

Radiological Decontamination Meeting, 22nd April, 1959.

Admiralty

[redacted]

A.R.L.
D.P.R.
Medical Dept.

War Office

[redacted]

R.A.M.C.
Works (C.& S.).
Works (M.& E.).
G.S.(W)11.
J.S.N.C.G.D.
J.S.N.C.G.D.
Science 1.

Air Ministry

[redacted]

M.A.5.
O.R.28.
Science 2.

Home Office

[redacted]

Scientific Advisers' Branch.
" " "

A.W.R.E.

[redacted]

Chief of Materials
Chief Naval Representative.
Senior Military Officer.
Chief R.A.F. Representative.
A.H.S.C.

Ministry of Supply

[redacted]

D.A.W. Plans.
A.W. Plans.
C.D.R.D.
C.D.E.E.
T.A./D.G.S.R.(M).
T.A./D.G./A.G.S.