[redacted]

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Fig. 2.22

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Fig. 2.23

[redacted] b3

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03 56

2.6 THE BOOSTER

The operation of the Booster is described in some detail in Chap.3 of this volume so we shall give here only a brief description.

[redacted]

Fig. 2.24

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[redacted]

[redacted]

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[redacted]

Fig. 2.25

Reaction Rate as a Function of Time

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[redacted]

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[redacted]

Fig. 2.26

Depletion of Tritium as a Function of Time

[redacted]

[redacted]

When the D-T reaction goes, a flood of 14-Mev neutrons is released which then cause fissions in the surrounding material. The fission rate is thus "boosted" so that the resulting yield is much larger than would have been the case had no D-T reaction occurred. This sudden boosting of the fission reaction will, of course, accelerate the disassembly of the active material. For this reason, the amount by which the yield will be boosted will depend upon when the D-T reaction occurs.

[redacted]

CHAPTER 3

DIAGNOSTIC MEASUREMENTS

B. R. Suydam

3.1 INTRODUCTION

It is the purpose of the Greenhouse experiments to test weapons of two categories, normal fission bombs and experimental bombs containing a mixture of deuterium and tritium.

Because of the existence o this second category of weapons, the diagnostic experiments will be far more complex than those which have been done in the past.

This chapter naturally divides into two main sections. In the first of these we shall discuss the diagnostic experiments to be performed on the normal fission weapons. The second section will be devote to a description of the experiments which are designed to study the thermonuclear D-T reaction.

3.2 DIAGNOSIS OF THE FISSION REACTION

The main features of a nuclear explosion and the theory of the three crucial diagnostic measurements thereof have been adequately described elswhere[1] and will be assumed known to the reader. Suffice it

[1] Scientific Director's Report for Operation Sandstone, Vol III (Sandstone No. 9).

to say that if the transit time τ (the time from the firing of the ~~deto-nators~~ X-unit to the initiation of the fission reaction), the multiplication rate α, and the efficiency (or alternatively the energy yield) of the explosion are known, then it can be determined whether the explosion was typical for a bomb of the type fired. Moreover, if the explosion proves to be atypical, it is possible to deduce from such measurements in what way the bomb failed to behave in a normal fashion.

3.2.1 The Transit-time Experiment

The transit time will be measured essentially in the same fashion as has been done in the past. This is accomplished by using a cathode-ray oscillograph to measure the time between the firing of the ~~detonators~~ X-unit and the first appearance of gamma rays outside the bomb. The gamma rays here measured are the same as those used to determine the initial value of alpha and are picked up by a sensitive ionization chamber or scintillation detector (both will be used) placed near the bomb.

Transit time will be measured by a group from the Naval Research Laboratory under the direction of W. Hall.

3.2.2 Measurement of Alpha

The theory underlying the determination of alpha from a measurement of the prompt gamma radiation has been adequately discussed elsewhere[2] and need not be repeated here. The basic idea is to measure

[2] Ibid., Chapter 3.

the prompt gamma-ray intensity as a function of time, and this will be done with two types of detectors, fast ionization chambers and scintillation detectors.

In the past the principal method of measuring alpha has been the so-called Rossi technique which employs a large, fast ionization chamber. A Rossi-type alpha chamber consists of two concentric cylindrical electrodes, spaced about 1 cm apart and about 5 ft in length. The chamber is made fast by using a gas mixture of 95 per cent argon and 5 per cent carbon dioxide, and by employing a high accelerating voltage, about 2500 volts, between the two electrodes. The above choice of gas assures an ion mobility which is high, and which is independent of the collecting field over the working range; thus space-charge effects are minimized. Rossi-type ion chambers will be used in the Greenhouse alpha determination, but only as a check for the scintillation detectors.

The theoretical superiority of scintillation detectors over ionization chambers for measuring time-dependent gamma-ray intensities is best understood if we inquire as to the relationship between the gamma-ray intensity and the collected current for an ionization chamber.

When an ion-pair is created in the sensitive volume of the chamber, the positive ion, because of its great mass, may be considered not to move. The electron will move under the influence of the collect

[3] The pertinent theory of the Rossi-type alpha chamber is worked out, e.g., in LAB-J7-15. Results are quoted here.

field, but its drift velocity is limited by the many collisions it makes with gas molecules. For the argon and carbon-dioxide mixture used, the electron drift velocity is essentially independent of field strength and is about 4.4 cm per μsec. It therefore takes an electron about 0.23 μsec to cross the 1-cm gap in the chamber.

Now consider how the current to the positive electrode varies with the incident gamma radiation. This current is clearly proportional to the total number of free electrons present, which is equal to the total number created up to the instant of time in question minus the number collected at earlier times. For the Rossi chamber, then, the collection current will be approximately proportional to the average value of the gamma intensity over the period of 0.23 μsec immediately past. If we represent the gamma intensity at the chamber as Φ (t) and collection current as I (t), the exact relationship works out to be

$$\Phi(t) = K \sum_{n=0}^{\infty} \frac{d}{dt} I(t - n\tau) \quad (3.1)$$

where τ is the time it takes an electron to cross the chamber (τ = 0.23 μsec) and K is a factor of proportionality which may be determined by a static calibration of the chamber. If the collection time τ is long compared with times during which Φ (t) varies by large amounts, the series (Eq. 3.1) is essentially equal to its first term and the chamber is an integrating device.

Equation 3.1 shows that, if an ionization chamber is used, the gamma intensity must be obtained from the slope of the recorded [redacted]

I vs t curve. This means that currents must be measured to high precisio in order that the gamma flux versus time may be deduced with only modest accuracy. For a scintillation detector, on the other hand, the light out put of the phosphor, and hence the plate current of the photoelectric cel used to measure this light, is proportional to the instantaneous value o the gamma flux. The resulting gamma flux vs time curve is therefore just as accurate as the recorded current vs time curve. Of course any electrical distortion present in the recording circuits will modify the above statements for both ionization-chamber and scintillation detectors, but i will do so in a known and calculable fashion.

The alpha-measuring experiment will involve a number of gamma-ray detectors adjusted by means of distance and gamma-ray absorbers to respond to various portions of the wide range of prompt gamma-ray intensities encountered during the nuclear reaction. Common timing will be provided so that the relative times at which the various detectors respond will be determined. This common timing scheme will thus enable one to fit the various records together in time and so produce a complet curve of prompt gamma-ray intensity vs time, extending from the lowest detectable level to the highest which occurs. It is expected in this way to follow the nuclear reaction from a very low level (a few pounds c TNT equivalent) through its maximum and well out into the region where alpha becomes negative. As mentioned previously the principal detectio scheme will employ scintillators. A back-up scheme using Rossi-type chambers will also be employed, principally because this has been our past method for measuring alpha.

It will be seen from the foregoing description that the alpha experiment is much more elaborate than is strictly required to diagnose the performance of a fission bomb. Accordingly, the results of the experiment will give much more information than merely the answer to the question: was the explosion typical?

hydrodynamics of the early stages of this process is quite simple and amenable to calculation. Alpha measurements which extend from very low reaction levels into the region where alpha begins to drop are therefore very valuable for two reasons. The mathematical form of the alpha versus time curve in this region can be calculated theoretically; a measurement in this region therefore affords a check on theory. Moreover, theory provides us with a correlation between the absolute fission level of the bomb and the break in alpha. This enables us to assign an absolute level to any portion of the fission reaction[4] and to determine the important quantity Γ_o , the number of gamma photons escaping the assembly per fission.

Recent improvements in the theory on one hand and the use of differential detectors on the other will give much more accurate results for the Greenhouse shots. The real importance of the quantities Γ_o and the absolute level will be apparent later when we discuss thermonuclear reactions.

[4] This statement is not strictly true for very late stages of the fission reaction, when alpha is very small and the prompt gamma rays are not simply correlated to the fission rate.

3.2.3 <u>Determination of Yield</u>

The principal method for determining the total energy re-leased by a nuclear explosion is the radiochemical analysis of sample of the bomb. The principle of the radiochemical method is this: a sample of bomb materials is collected and the activity of some fissio product whose yield is known is determined. This together with a de-termination of the amount of unburned material, Pu^{239} and U^{235}, give the fraction of fissionable material burned and hence the efficiency The efficiency known, the total yield can be readily calculated from known total amount of fissionable materials in the bomb and the know energy release per fission. It is seen that radiochemistry gives an absolute (i.e., independent of any calibration) determination of the yield.

Samples of the bomb will be collected by flying drone aircraft, fitted with special air filters, through the radioactive cloud. This is an expensive operation but is known from Sandstone results to work well and give good bomb samples. In addition it is planned to attempt a ground collection of bomb samples by means of heavy steel bottles firmly anchored to the ground where they will be enveloped in the ball of fire and (it is hoped) in the cloud of fission fragments. A third collection method will be attempted, i.e., firing specially equipped rockets through the cloud.

The success of the ground sampling bottles is highly problematical and presents very great problems, but this method will represent a great simplification over drone aircraft operations in future tests if it works. In addition to such purely mechanical problems as securely anchoring the bottles so that they will remain fixed during the strong blast, and the proper opening and closing of collecting ports under extremely adverse conditions, there remains the fundamental problem of whether the fission fragments will ever reach the bottle, and if they do, when. These last questions cannot be answered on theoretical grounds, but rather must be settled by the results of the test. Estimat concerning these crucial questions have been attempted and we believe that the chance for success has been maximized.

Another method of obtaining the yield of a nuclear explosion is the measurement, by means of motion photography, of the rate of growth of the ball of fire. A knowledge of the radius of the ball o fire as a function of time when used together with the well-known blast scaling laws and with such existing observations of this function for shots whose absolute yields are known will give an accurate estimate of the yield. This method, as contrasted with radiochemical analysis, is a relative measurement and requires calibration. The three Sandstone shots together with Bikini-Able and Trinity provide us with the required calibration to such precision that yields determined in this fashion are about as reliable as are radiochemical yields.

An absolute determination of the early delayed gamma-ray intensity together with a knowledge of the transmission properties of air can in principle be used to determine the total activity within the ball of fire and hence the absolute yield of the explosion. This was tried at Trinity with indifferent success and will be tried again, much more elaborately, at Greenhouse. For the coming tests, much more precise gamma-measuring equipment will be used.[5] In addition the gamma spectrum will be measured so that corrections for the air absorption can be made. This is a difficult experiment, but if it succeeds it will give us our first absolute check on radiochemistry.

From past experience[5] it appears that the total gamma-ray dosage at any fixed distance from a nuclear explosion is proportional to the energy released. Accordingly, precise measurements of total gamma-ray

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[5] See Chap. 4 of this volume for a discussion of our knowledge of gamma radiation, and a discussion of gamma-ray measurements to be conducted at Greenhouse.

dosage received as a function of distance should give an accurate rela tive yield determination. In contrast with the ball-of-fire method, this scheme has not been accurately calibrated. It is expected, howev that sufficiently accurate gamma-ray detectors will be used in the Greenhouse tests and that a good calibration of this method will resul This, if achieved, will be an important result, as conditions are conceivable (such as an underground or underwater shot) which would make other methods of yield determination difficult, if not impossible.

A fifth method of determining yields, which depends on blast scaling laws, is to measure the time between the first appearanc of light and the minimum of the light curve. This is accomplished by an instrument which was named the bhangmeter by F. Reines, who propose this method. The bhangmeter will be used for the Greenhouse shots, bu more as a test of the instrument than as a device for measuring yield

3.3 DIAGNOSTIC EXPERIMENTS FOR WEAPONS WHICH INVOLVE A THERMONUCLEAR REACTION

A thermonuclear reaction is, as its name implies, a reaction br about by collisions between nuclei which are induced by their thermal agitation. As the coulomb barrier of any nucleus is high, only nucle of the smallest possible charge can be considered if one is not to re prohibitively high temperatures. In addition, if the reaction is to place fast enough that an appreciable amount of material reacts, nuc are required which have a large cross section for the reacton in que

Accordingly, we are limited to the isotopes of hydrogen; the reaction with the largest cross section is the D-T (deuterium-tritium) reactio

As the reaction we are studying is a binary reaction, its speci rate, i.e., the number of reactions per second per unit volume, will proportional to the square of the particle density, and it will also increase very sharply as the temperature rises. Thus as the reaction proceeds the energy released tends to raise the temperature and to in crease the reaction rate. On the other hand, high temperatures mean high pressures and hence rapid expansions which tend to quench the re action. If these were the only considerations, things would be compl cated enough. Actually, however, many more complications arise.

Anything which tends to cool the nuclear gas or to reduce its density has a quenching effect on a thermonuclear reaction. Hydro-dynamical expansion does both. There are other cooling agents, howe The first is heat conduction. This process becomes quite rapid at h temperatures because of the high heat conductivity of the electron g so that it is necessary that the electron gas become not too hot if conduction losses are not to be prohibitive. A second cooling agen which again increases with the temperature of the electron gas, is bremsstrahlung, that is, the radiation of electromagnetic energy and loss of kinetic energy of an electron which is deflected by the coulom field of a nucleus. The third cooling agent is the inverse Compton effect. When electrons and photons collide, energy is transferred fro one particle to the other. If the electrons are more energetic on the average than are the photons, the electrons will lose energy on the average and the radiation field will gain. Inverse Compton effect ten therefore to equalize the "temperatures" of the radiation field and th electron gas.

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3.3.1 The Booster

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Merely a yes or no answer to the question whether some tritium has burned can hardly be called a detailed study of the thermonuclear reaction. In addition to this information it would be desirable to know the answers to the following questions:

1. How much tritium has reacted?
2. At what nuclear temperature did the reaction go?
3. At what density did the reaction take place?
4. What was the reaction rate?
5. What was the state of the material in the vicinity of the D-T mixture when the reaction started?

It is the purpose of the diagnostic experiments to answer some of these questions.

3.3.3 Determination of the Amount of Tritium Consumed

The experiments designed to determine how much tritium burned depend on the fact that every tritium atom consumed releases a 14-Mev neutron, whereas, the fission reaction yields very few neutrons as energetic as this. Thus any experiment which measures the high-energy neutron yield is a potential handle on this important question.

One method of obtaining the high-energy neutron yield is the use of threshold neutron detectors placed at various distances from the bomb. By obtaining in this fashion a high-energy neutron flux versus distance curve, the source strength of the bomb can be obtained.

Another method, which is equivalent to the above in principle but differs considerably in detail, consists of the use of a nuclear track camera. Such a device consists of a collimator which produces an essentially unidirectional beam of neutrons which then bombards a thin hydrogenous radiator. The recoil protons from this radiator are detected at known angles from the neutron beam by nuclear track photographic plates, and their energies are determined by measuring the lengths of the proton tracks. In this way a neutron spectrum is measured and any particular high-energy groups can be separated from the rest. Actually several such cameras will be used at several distances from the explosion, so that measurements of high-energy neutron flux as a function of energy and distance will be determined.

[6] See also Chap. 5 of this volume which describes the neutron experiments in somewhat more detail.

Both of the above described diagnostic experiments will be performed by Los Alamos Group J-3, under the direction of W. E. Ogle and L. Rosen.

This experiment will of course be performed by the radiochemistry group, Los Alamos Group J-2, under the direction of R. W. Spence, and will probably give the most reliable measure of the quantity of tritium consumed.

Other diagnostic experiments are expected to contribute information regarding the amount of tritium consumed. Such experiments, however, are directed primarily at obtaining other information; those described above are the ones being relied upon for determining this important information.

3.3.4 The Temperature of the Nuclear Reaction: The Tenex Experiment

If a deuterium and a tritium nucleus were to react at rest, a neutron of 14-Mev energy would be liberated. This is no longer strictly true if the particles react in flight. In the latter case, the neutron emitted, when observed in the center-of-gravity system of coordinates, would have an energy of 14 Mev plus four-fifths of the kinetic energy carried into the reaction by the reacting particles. Actually, of course, the center of mass of the reacting particles will be in motion relative to the observer, so that there will be a Doppler energy shift superimposed on the energy in the center-of-mass system. Thus, the neutrons released by the D-T reaction will have energies which cover a band in the neighborhood of 14 Mev, with the band being broader the higher the velocity of the reacting particles, i.e., the higher the nuclear temperature. It is relatively easy to show that the velocity distribution is roughly Gaussian with a half-breadth dependent on the temperature.

The Tenex experiment will determine the distribution of the 14-Mev neutrons in velocity, by placing scintillation detectors at a considerable distance from the explosion so that neutrons of various energies are separated by noting their arrival time. In order that spuriously long times of flight, caused by air scattering of the neutrons, may be eliminated, the detectors must be placed behind collimating tubes. These tubes will contain lead absorbers to reduce the gamma-ray background.

Two stations will be employed for this experiment, one at 200 and one at 1,000 yd. The time resolution, about 0.1 microsecond, will not be sufficient to give a velocity resolution at the near station. The purpose of this station is to enable one to subtract, from the data yielded by the far station, any finite neutron pulse breadth which is caused by finite burning time rather than a velocity spread. The resulting neutron intensity versus time curve will give some sort of an average nuclear temperature for the reaction.

3.3.5 Determination of Density

An ingenious experiment has been devised for determining the density of the D-T mixture at the time the thermonuclear reaction takes place.

The success of this experiment evidently depends on a determination of the amount of tritium consumed.

3.3.6 **Determination of the Reaction Rate: The Dinex and Ganex Experiments**

It was pointed out by W. E. Ogle and F. Reines[7] that a time-dependent study of the 14-Mev neutrons from a reacting bomb assembly could give considerable information. In the first place, in principle, such measurements can yield information regarding the fission rate as a function of time in a much cleaner fashion than can the conventional alpha measurements (we are here concerned with the varying alpha region) because the processes involved are much simpler.

[7] See LAMS-1062, LAB-J-655 and LAB-J-711 for early considerations of this experiment.

[8] This statement is true only for fissions induced by thermal neutrons. The 14-Mev neutron yield can, however, be determined for other neutron energies.

For the foregoing reasons, the <u>Dinex</u> experiment, i.e., the experiment which measures 14-Mev neutrons as a function of time, will probably yield less information than was originally hoped for. It can, however, yield the very valuable information of D-T reaction rate as a function of time.

On the basis of the foregoing discussion, the Dinex experiment can be easily understood. Essentially, we follow the D-T reaction rate by measuring the 14-Mev neutron flux as a function of time.

Thus the requirements put on the detectors by the high time resolution are fast response, good energy discrimination, and good angular discrimination.

A single detector for the Dinex experiment consists of a collimating tube, a proton radiator, a magnet, and a proton collector. The collimator serves to define the direction of the neutron beam; it therefore serves the double purpose of eliminating neutrons which have suffered large-angle scattering and of uniquely correlating the energy of a recoil proton with its direction. The magnetic analyzer accepts those, and only those, protons which are ejected from the hydrogenous radiator by 14-Mev neutrons. The 14-Mev neutron flux is thus measured as a proton current at the collector which is essentially a Faraday cage; the current is 1.6×10^{-19} ampere per proton per second. We

[9] One shake = 10^{-8} sec.

[redacted]

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speak of the primary neutrons as having an energy of 14 Mev. Actually, of course, the energy band width is finite because of the Doppler spread discussed under the Tenex experiment.

A large shield is required for the Dinex experiment, in order that collimating holes can be made, and in order to keep spurious radiation from reaching the proton collector. In the absence of such a shield, gamma radiation falling on the proton collector will eject Compton electrons and thus produce a background current. ~~To a lesser extent, fission neutrons can cause a similar trouble.~~

After the D-T reaction starts, of course, background troubles are much less severe.

Before the thermonuclear reaction starts, the level of 14-Mev neutrons is low and the proton current at the collector is correspondingly small. In order to record such signals amplification is required, and this poses a very severe problem in amplifier design. At the peak of the thermonuclear reaction, on the other hand, the signal available at the collector is such as to require attenuation before being recorded. Altogether, the range of signal level to be recorded is about 10,000 to 1. Accordingly, each proton collector will drive a bank of cathode-ray oscillographs, each recorder having a different sensitivity and hence recording over a different range of signal level.

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In addition to the Dinex experiment discussed above, there is the Ganex experiment, which is also designed to measure the D-T reaction rate as a function of time. The Ganex experiment also utilizes the 14-Mev neutrons released by the D-T reaction, but the detection scheme is different.

In the Ganex experiment, the 14-Mev neutrons, after passing through a collimator (not, however, a particularly good one), are allowed to fall on an iron converter. The iron inelastically scatters the high-energy neutrons, thus giving rise to gamma radiation. A scintillation gamma-ray detector is then placed behind a collimator which points at the iron converter; the gamma rays from this converter are thus measured as a function of time.

As compared with the Dinex experiment, the Ganex experiment has one definite virtue and two definite disadvantages. In the Ganex experiment the iron converter will be placed in the tower cab and the gamma detectors will be placed on the ground near the base of the tower. Thus, the severe problem faced by the Dinex experiment, i.e., the transmission of signals down the tower over transmission lines which are subjected to a large gamma flux, is avoided in the Ganex experiment. The Ganex experiment suffers the disadvantage of the lack of a clean energy discrimination and therefore will not work at low levels, for the background from fission neutrons and gamma rays will obscure such signals. The complicated intermediate processes, i.e., the inelastic scattering of neutrons and (n,γ) reactions in iron, make it much more difficult to interpret current at the detector in terms of an absolute reaction rate in the D-T mixture. Accordingly, the reaction rate versus time curve which this experiment yields is purely relative. Absolute reaction rates can only come out of correlating Ganex results with the determination of the total number of D-T reactions (see Sec. 3.3.3).

3.3.7 The X-ray Experiment

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The mechanism of X-ray absorption is the photoelectric effect, i.e., the absorption of photon accompanied by the ejection of a bound electron. The energy of the photon which was destroyed is imparted to the electron which therefore escapes its atom with an energy equal to that of the absorbed photon minus the binding energy of the electron. Following the photoelectric ejection of an electron there will be an unoccupied "hole" in one of the electron shells (usually the K-shell) into which an electron will drop from some outer shell. This gives rise to the emission of an X-ray photon characteristic of the transition involved; the process is known as <u>flourescence</u>. The frequency of the flourescent radiation will evidently depend on the shell from which photoelectrons are ejected; thus if K-shell electrons are ejected, the characteristic K-radiation will result.

The operation of the X-ray detectors can be understood in the light of the preceding discussion. Primary X-radiation from the bomb is allowed to fall on a metallic sample, which takes the form of an appropriat compound (a benzoate or a tartrate) dispersed in polystyrene. The resulting flouroscent radiation is then passed through a beryllium window which serves to stop photo-electrons and partially to filter out low energy flouroscent radiation. The remaining flouroscent radiation fall on a metallic plate [redacted] fro which it ejects photo-electrons which are collected by a ten kilo volt [redacted] elect field. Because of the strong energy dependence of the photoelectric effect the luminescent efficiency and the filtering action combine to make a detec which is sharply energy selective. Four groups of detectors will be used, each group in a separate X-ray beam, and each peaked at a different energy. There are three groups of three detectors each and one group of two detect making eleven in all.

As with the Dinex experiment, serious difficulties are introduced by the magnitudes of the primary signals involved. However, the struggle there was always to gain signal level, whereas, the X-ray experiment is at every point plagued with too much signal. The fluoresc [redacted] cannot be placed in the tower cab, for instance, because the level of the Xrays is such as to vaporize them [redacted] before a significant readi flucrescers

can be taken. The [redacted] are accordingly placed at the end of a long evacuated pipe, at the bottom of the tower. The inverse r^2 loss thus achieved brings the Xrays to a reasonable level.

All in all, the X-ray experiment is seen to be extremely difficult and by no means certain of success.

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RS-5267-1
2/8/94

AREA SURVEY FORM

(MONTHLY)

Date	Time	Location	Program	Survey Performed By
8/19/96	12:30	12-84 Bay-6	W55	Energy 7709

Sample Number	Location	Contamination: Removable (dpm/100cm2) Alpha	Removable Beta	Removable Tritium	Total All (dpm/100cm2)	Total Alpha (dpm/100cm2)
1	Door Handle	<LLD	<LLD	<LLD	N/A	Bkg.
2	Desk					
3	Cart					
4	Red Phone			19		
5	Table	11		13		
6	RADECO Stand	<LLD		<LLD		
7	Vent Control	3				
8	Unit Press	<LLD				
9	W55 Tooling					
10		3				
~~11~~	~~Drinking Fountain~~	N/A	N/A	N/A		N/A
~~12~~	~~Drinking Fountain~~					

Exposure Rates (@ 30 cm)	Beta/Gamma mR/hr	Neutron mrem/hr
Max		
Min		

DOE b(3)

SEE REVERSE SIDE FOR MAP OF SURVEY LOCATIONS

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW

1ST REVIEW-DATE: 2/24/98
AUTHORITY: DAOC DADC DADD
NAME: [illegible]
2ND REVIEW-DATE: 7/28/98
AUTHORITY: ADD
NAME: AR Schmidt

DETERMINATION [CIRCLE NUMBER(S)]
1. CLASSIFICATION RETAINED
2. CLASSIFICATION CHANGED TO:
3. CONTAINS NO DOE CLASSIFIED INFO
4. COORDINATE WITH:
5. CLASSIFICATION CANCELLED
6. CLASSIFIED INFO BRACKETED
7. OTHER (SPECIFY):

PORTABLE INSTRUMENTS

Instrument	S/N	Calibration Due Date	Background		Efficiency
Neutron Monitor	87915	12/13/96	<.1	mrem/hr	
Gamma Monitor	2677	11/27/96	<.1	mR/hr	
Scintillation Probe	105725	8/26/96	20	cpm	~~.920~~ .135
Pancake Probe	105669	10/11/96	60	cpm	.13

LABORATORY COUNTERS

Gas Flow Proportional: 2
Background: Alpha (cpm) .1 Beta (cpm) 23

Liquid Scintillation: 7
Background: 18 (cpm)

Laboratory Analyst: F. Ward 9258
Efficiency: Alpha .36 LLD 2 dpm; Beta .42 LLD 6 dpm
Efficiency: .64 LLD 10 dpm

CLASSIFIED BY L. Auman (NAME)
Program Engineer (PERSONAL IDENTIFIER & TITLE)
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COMMENTS:

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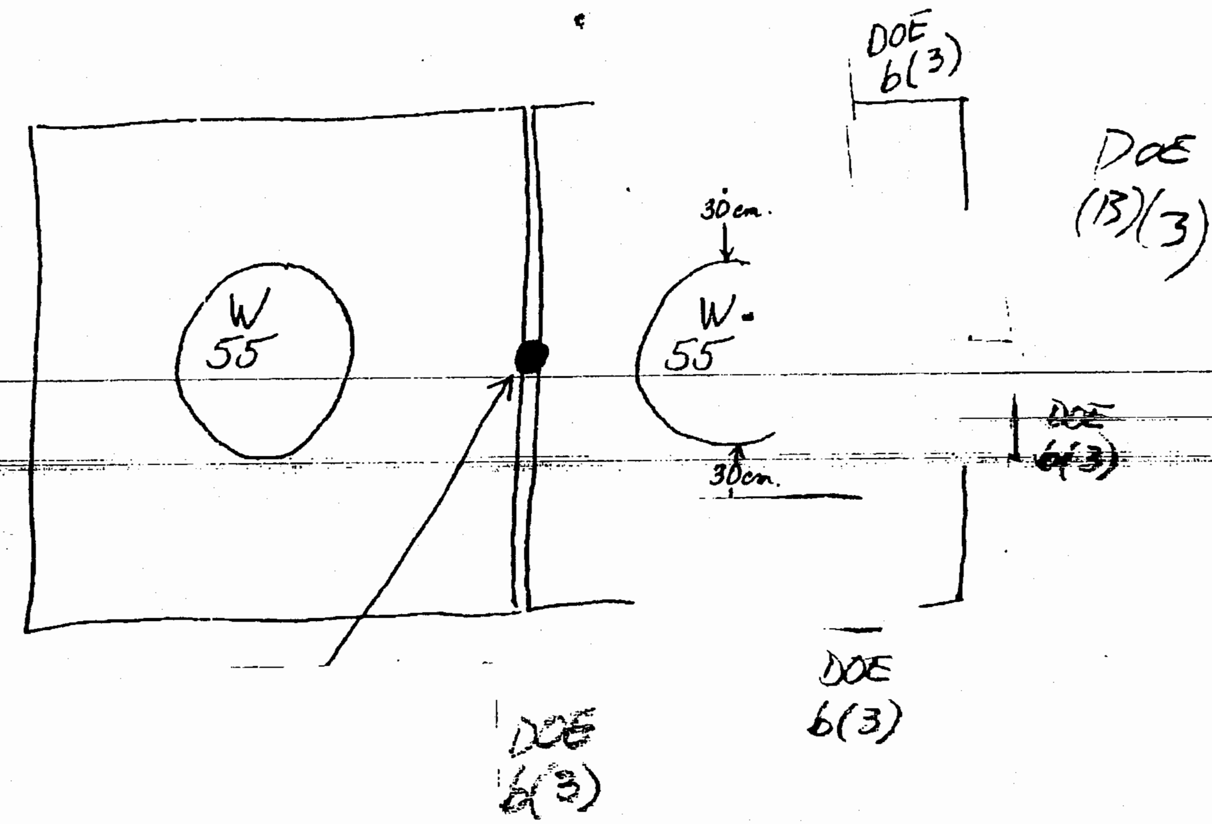

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W-55 CELL LOGBOOK(U) #176376

2/28/96 UNIT # 246547

0640. ENTERED CELL & PERFORMED PRE-OPS. PT. R.H... & M. CRUZ ENTER CA TO PERFORM PRE-OPS & D... TOOLING.

0655 TOOK SMEAR ON 55-2-272 Ø dpm.

" " " 55-2-282 3 dpm.

" " " 55-2-312 10 dpm.

0710 " " " ~~45~~-2-123 Ø dpm.

0715 " " " 55-2-308 AFTER DECON 16 dpm.

0720 " " " 55-2-139. 10 dpm

0723 " " " INNER BULKHEAD 6 dpm.

0730 PT's PREPARE TO PLACE UNIT INTO DOWN DRAFT BOX.

0735 SURVEYED TRANSPORT CART OUT OF CA 10. dpm.

0815 FRISKED PERSONNEL OUT OF CA FOR BREAK.

0845 ENTERED CELL & BRIEFED PT's OVER WATER SAMPLE RES...

0900 PT'S SUIT UP TO ENTER CA.

0910 PT's: J. MOORE, R. STONE, S. SOTTILE RST: M. CRUZ ENTER CA & RESUME OPS.

0935 SURVEYED BALLISTICS CASE OUT OF CA 13 dpm

0945 FRISKED PERSONNEL OUT OF CA FOR BREAK.

0955 LEFT CELL FOR BREAK..

1020 ENTERED CELL, PERSONNEL SUIT UP.

1030 PT's S. SOTTILE, J. MOORE, R. STONE, J. MCQU... RST M. CRUZ ENTER CA & RESUME OPS. DOE B(3)

1040 REMOVED FROM OE CASE.

1045 TOOK SMEAR OF INSIDE OF BEFORE DECON...

1050 TOOK SMEAR OF OE CASE BEFORE REMOVAL FROM DOWN DRAFT BOX. 22 dpm

1105 BEGAN TO FRISK PERSONNEL ...

1110 LEFT BAY FOR LUNCH.

1215 ENTERED CELL PERSONNEL SUIT UP

1235 PT'S J. MOORE, R. STONE, F. RODRIGUEZ, S. S...

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