This is an internal Phillips report, and must be handled on that basis. Management approval must be obtained for its distribution outside Phillips Petroleum Company.

727311

PTR-746
April 1965
1

R

MONITORING PROGRAM FOR THE SNAPTRAN-2 DESTRUCTIVE TEST

REPOSITORY INEL
COLLECTION INEL Public Reading Room Human Radiation Experiments & Related Collections
BOX No. U.S. DOE Public Reading Room IDO Univ. Place, 1776 Science Ctr. Dr., Idaho Falls, ID
FOLDER Monitoring Program for the SNAPTRAN-2 Destructive Test (PTR-746)

~~Bob Buckhart 10-3-83~~
Rusty Grant 2-6-95

J. R. Fielding

LIBRARY LOAN COPY

LOAN COPY
THIS REPORT MAY BE RECALLED AFTER TWO WEEKS. PLEASE RETURN PROMPTLY TO:
INEL TECHNICAL LIBRARY
PHILLIPS PETROLEUM COMPANY

PHILLIPS 66

ATOMIC ENERGY DIVISION

NATIONAL REACTOR TESTING STATION
U.S. ATOMIC ENERGY COMMISSION

1188891

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

PRINTED IN USA

1189892

REACTOR SAFETY

PTR-746
Issued: April 1965

MONITORING PROGRAM FOR THE SNAPTRAN-2 DESTRUCTIVE TEST

by

J. R. Fielding

PHILLIPS
PETROLEUM
COMPANY

Atomic Energy Division
Contract AT(10-1)-205
Idaho Operations Office
U. S. ATOMIC ENERGY COMMISSION

1189893

SUMMARY

Measurements will be made of the direct radiation, airborne radioactivity, and beryllium released from the SNAPTRAN-2 destructive test. The data from these measurements will be used to assess the radiological hazard and to determine a source release factor. Attempts will be made to distinguish between the dose (both gamma-ray and neutron) of the transient and the dose from the decay of the fission products produced by the transient. The direct dose from the cloud will be measured as well as the dose from fallout downwind of the test. The radioactive (isotopic) air concentration of the cloud and the beryllium concentration will be measured. Attempts will also be made to measure relative concentrations of the radioactive noble gases in the cloud as well as taking particle-size measurements of the radionuclides within the cloud.

1189894

CONTENTS

SUMMARY ii

I. INTRODUCTION 1

II. OBJECTIVES 1

III. MONITORING PROGRAM 1

IV. RADIOLOGICAL MEASUREMENTS 6

1. SOURCE TERM MEASUREMENTS 6

1.1 Fission Gas Sampling 7
1.2 Particulate Activity 7

2. FALLOUT ACTIVITY 8

3. PARTICLE SIZE 8

4. IODINE MONITORING 8

5. DIRECT RADIATION MEASUREMENTS 9

5.1 Excursion Dose Rate 9
5.2 Radiation Doses From the Reactor Excursion 9
5.3 Gamma Radiation Dose Rate From the Radioactive Cloud 10
5.4 Radiation Dose From the Radioactive Cloud 10
5.5 Dose Rate From Residual Fission Product Decay 10
5.6 Fission Product Decay Radiation Dose 10
5.7 Neutron Radiation Dose 11
5.8 Total Radiation Dose 11
5.9 Residual Contamination 11

V. BERYLLIUM MONITORING 11

VI. TEST DAY OPERATIONS 12

FIGURES

1. SNAPTRAN radiological grid, 2- and 10- meter arcs 2

2. SNAPTRAN radiological grid, 25- and 50- meter arcs 3

3. SNAPTRAN radiological grid, 100-, 200-, and 300-meter arcs 4

4. SNAPTRAN radiological grid, 500-, 900-, and 1500-meter arcs 5

1189895

MONITORING PROGRAM
FOR THE SNAPTRAN-2 DESTRUCTIVE TEST

I. INTRODUCTION

The experience and information obtained in the SNAPTRAN-3 destructive test has initiated a modification of the existing radiological monitoring grid located at the IET complex. This paper is being written to incorporate the modifications into the existing radiological monitoring network so the entire monitoring program for the SNAPTRAN-2 destructive test can be studied and suggested improvements given. In addition, this paper will serve as a guide for test day operations in the recovery and assimilation of data. This report describes only those measurements to be made by Phillips Petroleum Company. ID Health and Safety will be responsible for radiological monitoring extending beyond the IET obstruction fence, including the random instrumentation in surrounding towns and other off-site locations.

II. OBJECTIVES

The Phillips Petroleum Company AED monitoring network will be oriented in conjunction with the ID grid to obtain data for evaluation of the radiological hazards of the SNAPTRAN-2 reactor destructive test including the measurement of fission product release, direct gamma and neutron doses, spread of airborne contamination and the spread of beryllium.

III. MONITORING PROGRAM

The Phillips Petroleum Company AED monitoring network includes a radiological monitoring grid (Figures 1, 2, 3, and 4) which is established as a series of concentric arcs with the reactor test pad as the center. A heavy concentration of sampling equipment will be placed in a 60° sector, oriented with the centerline of the proposed "cloud" trajectory, 30° east of true north.

The grid stations along each arc will be marked with a five-foot steel post. The sampling equipment will be fastened near the top of this post in order to simulate a man's breathing height and to reduce interference from ground dust and vegetation pertubations.

The information obtained from downwind samplers positioned on the SNAPTRAN-3 destructive test monitoring grid indicated that the samplers were spaced too far apart to obtain sufficient information about the radioactive cloud. In order to correct this deficiency, the number of samplers on the 60° downwind sector will be increased to allow a greater density of samplers on each arc. In particular, relatively inexpensive samplers, ie, fallout plates and film dosimeters, will be used extensively within 50 meters of the reactor. On the 25- and 50-meter arcs, the film dosimeters and fallout plates will be approximately 3 feet apart, allowing a definite measurement of the boundary of the radioactive cloud. Major stations, with their air samplers, fission gas detectors, ion chambers, etc, have also been increased to ensure adequate sampling and to reduce the possibility of the cloud going undetected between two adjacent stations.

1189896

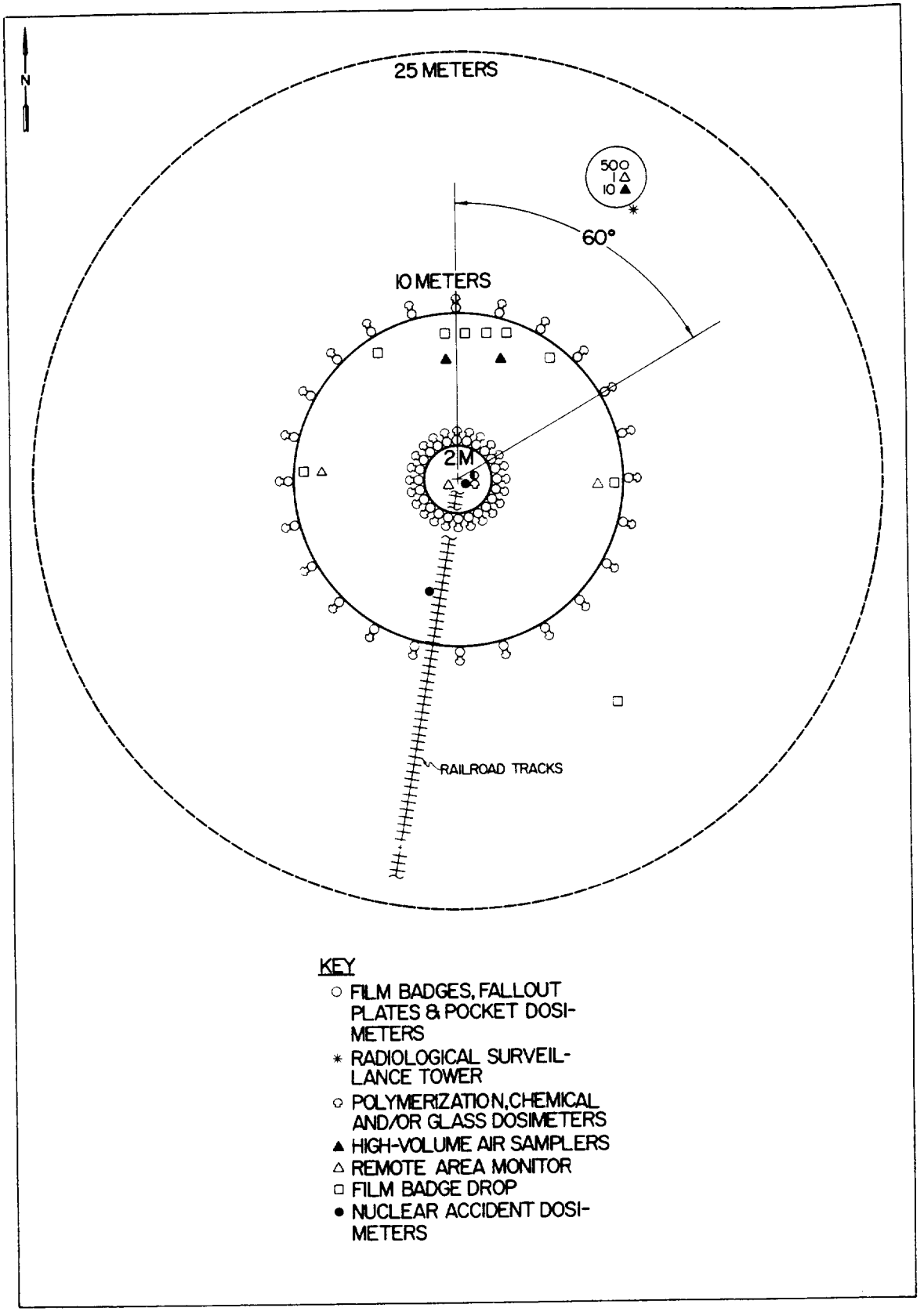

FIG. 1 SNAPTRAN RADIOLOGICAL GRID, 2- AND 10-METER ARCS.

1189897

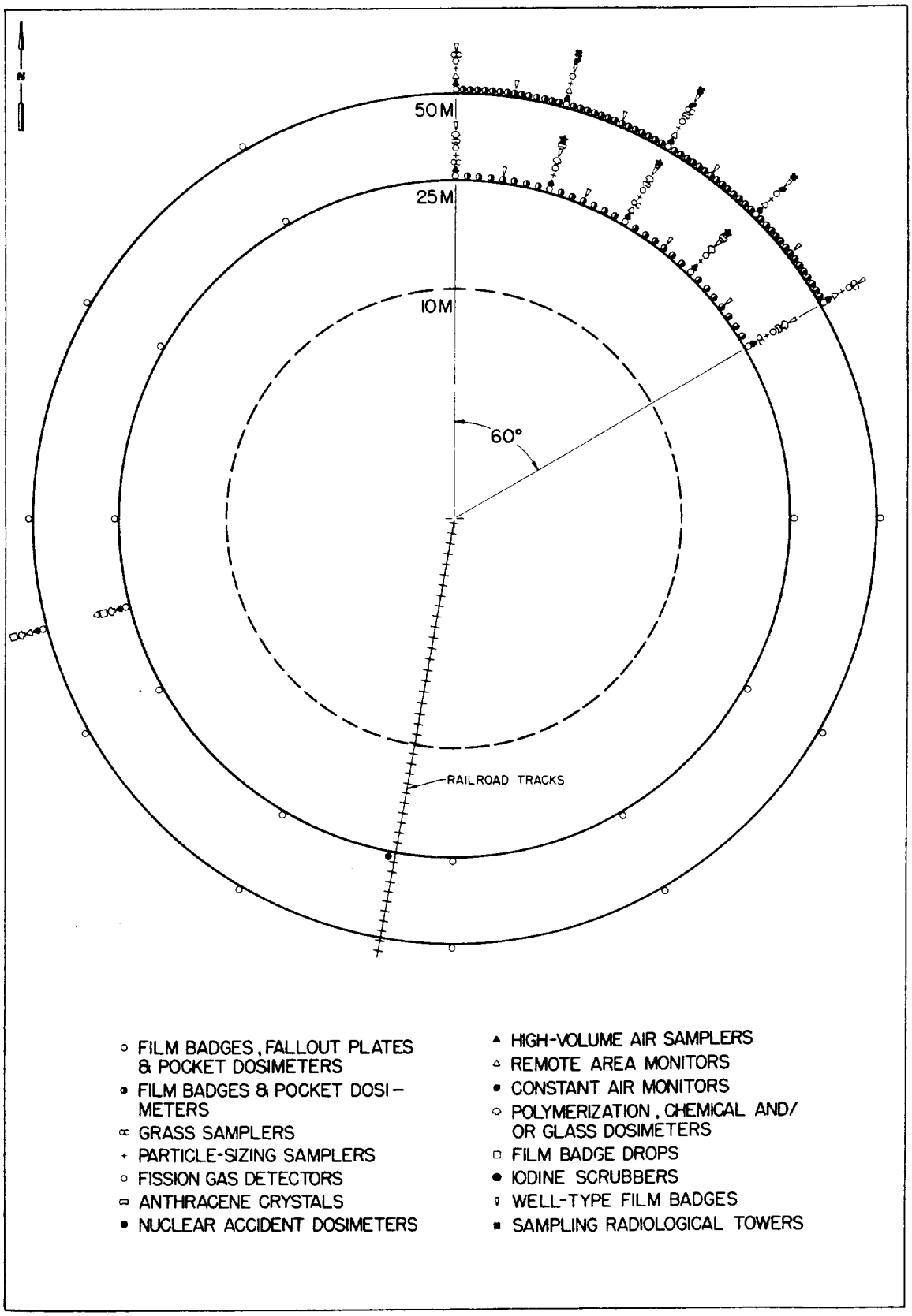

FIG. 2 SNAPTRAN RADIOLOGICAL GRID, 25- AND 50-METER ARCS.

1189898

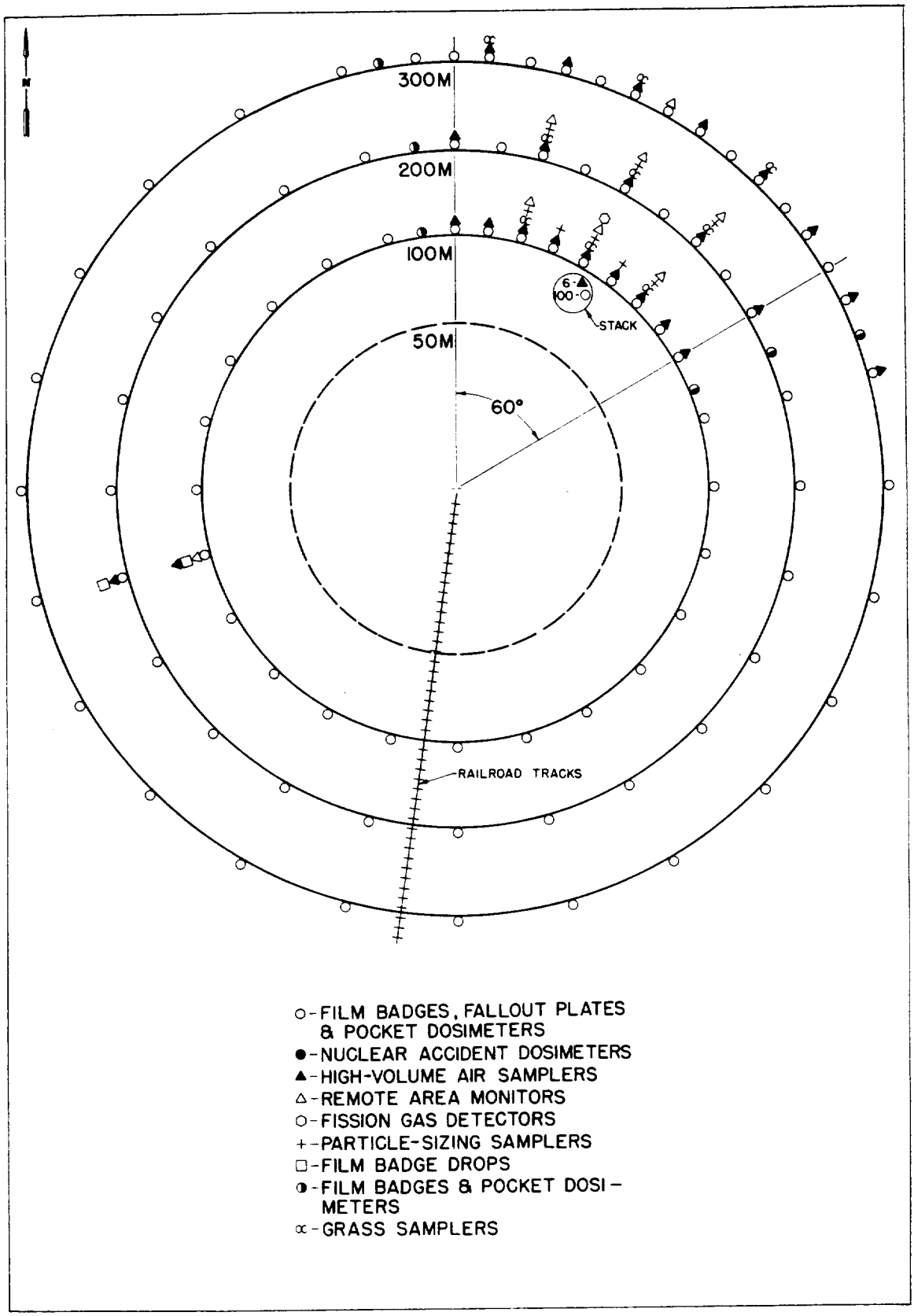

FIG. 3 SNAPTRAN RADIOLOGICAL GRID, 100-, 200-, AND 300-METER ARCS.

1189899

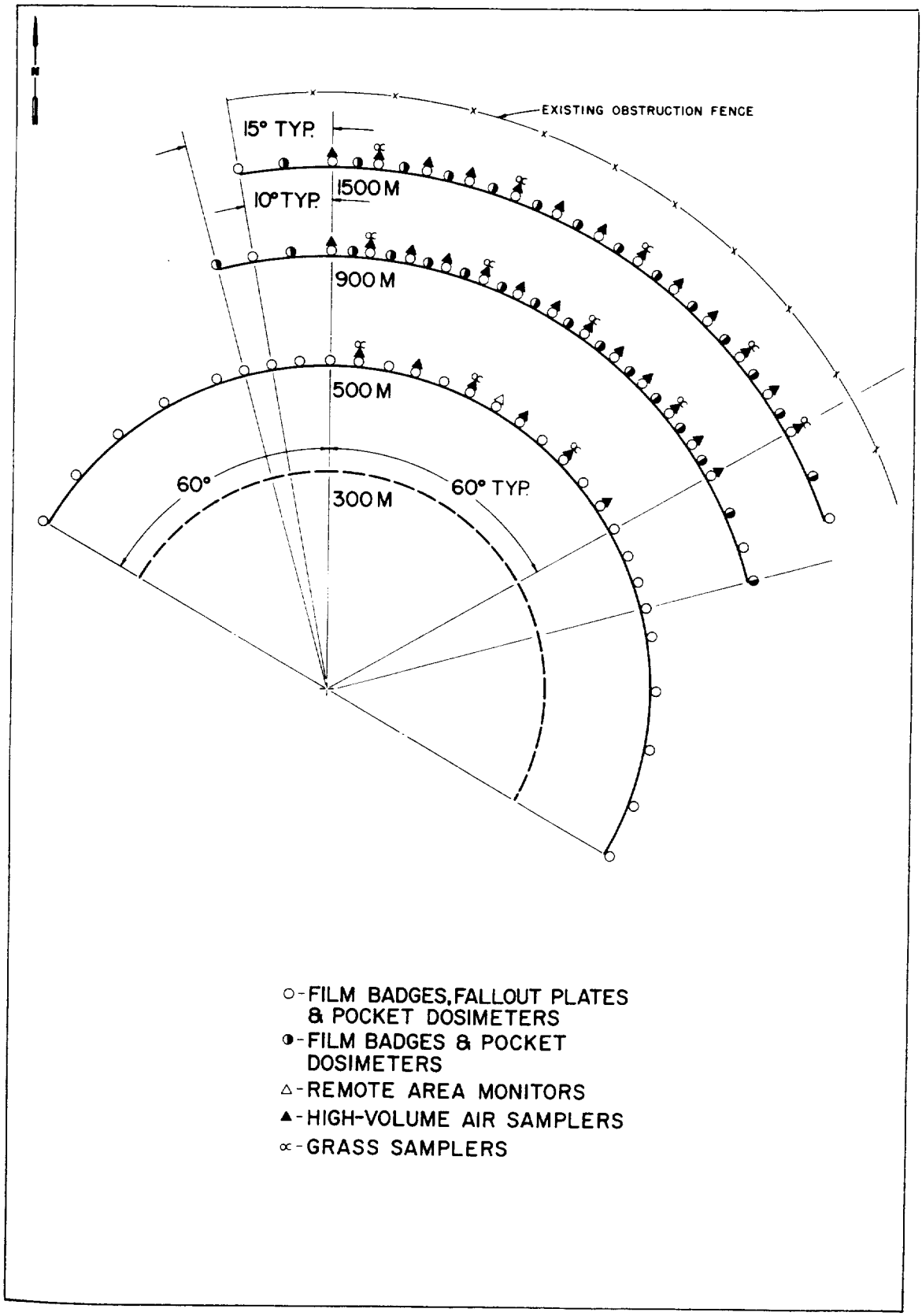

FIG. 4 SNAPTRAN RADIOLOGICAL GRID, 500-, 900-, AND 1500-METER ARCS.

1189900

IV. RADIOLOGICAL MEASUREMENTS

1. SOURCE TERM MEASUREMENTS

It is felt that the instrumentation positioned around the reactor and on the radiological monitoring grid will measure most aspects of the radiological consequences of the destructive test. Particular emphasis, however, will be given to measuring parameters necessary to calculate the quantity of fission products released from the reactor. The most commonly used and acceptable method for determining this release fraction is to apply a Sutton-type diffusion equation to the data obtained on the downwind samplers and calculate the source term which would have given the measured distribution. In addition to the U. S. Weather Bureau's meteorological measurements of wind speed, wind direction, wind fluctuations, and vertical temperature profile, Sutton's basic diffusion equation requires a measurement of the radial, vertical, and lateral cloud diffusion.

The radial spread (length) of the radioactive cloud will be determined at two points, the 25- and the 50-meter arcs. This measurement will be made by using recording equipment connected to anthracene crystals. These beta sensitive detectors will "see" only the beta particles; and because of the relatively short range of this type of radiation, the cloud arrival and departure time can be determined. This information, coupled with the wind velocity, will yield the length of the cloud at these two points.

The vertical distribution of the radionuclides carried by the cloud will be monitored by sampling devices mounted on lines which are connected to three 60-foot poles on the 50-meter arc. A vertical grid will be established by securing a line between the top of the three poles with sample lines spaced across this top line and secured to the ground. Film badges and fallout plates will be spaced on this vertical grid. Because of the relatively short range of beta particles, the beta activity recorded on film badges will describe the vertical profile of the cloud. In addition to this grid, the radiological tower on the 20-meter arc, with samplers spaced to the top of its 150-foot height, will provide a second vertical measurement. Since this tower is close to the reactor, the recorded information on its samplers can be used to estimate the release height of the cloud. To provide additional downwind measurement of the vertical diffusion of the cloud, tenative plans are to have samplers elevated into the path of the cloud by the use of six kites, three on the 100-meter arc and three on the 200-meter arc. Early experimentation with Weather Bureau type, box kites indicates these kites will give sufficient lift to hoist lightweight samplers, such as film badges and fallout plates, into sampling positions.

The width of the cloud can be determined on all downwind arcs by observing beta dose measurements on grid film badges and the activity deposited on high-volume air sampler filters. A highly sensitive counting technique is being established so that a gross count can be made on all grid air sampler filters. This detecting device, which will utilize two scintillation crystals mounted opposite each other, will provide a means of detecting activity on the filters down to background levels so that it can be accurately determined whether

1189901

or not the cloud passed over a particular sampler. In addition to this counting technique, autoradiography will be performed on high-volume air sampler filters and fallout plates which do not show radioactivity by other techniques. This sensitive film method will give positive verification of any activity at a given grid position, which may have been on the fringes of the cloud.

In combination with the U. S. Weather Bureau's meteorological measurements, the above information will be used to establish the meteorological diffusion and stability parameters C_x, C_y, C_z, and n for Sutton's diffusion equation. The remaining necessary data will originate from high-volume air sampler analysis.

1.1 Fission Gas Sampling

A few of the fission gases have half-lives sufficiently long that the gas is carried beyond the sampling grid before the gas decays to particulate daughters. Filtering media will not collect noble gases as they do the particulate daughters; therefore, a fission gas detector was designed to capture a sample of the radioactive noble gas at the three foot level. The gases will be collected by drawing a sample of the cloud through a high-efficiency, Microsorban filter into an airtight balloon. Air and other gases will be pulled into the balloon while the cloud is passing. The trapped noble fission gases will then be allowed to decay to their particulate daughters for a prescribed length of time after which the balloon will be deflated through a second high-efficiency filter. The amount of daughter products trapped on the second filter and the activity plated on the balloon's inner surface will be measured by using a multichannel gamma-ray spectrometer. Using the known half-lives and decay chains of the noble fission gases and their daughter products, analytical techniques will be applied to calculate the amount of noble gases originally sampled. Since these fission gas detectors are on the 50-meter arc, where data is available to calculate cloud size, the cloud volume and quantity of gas sampled will be used to calculate the total quantity of noble gases released with the cloud. This method of determining fission product release will be compared with the diffusion-type calculations based on particulate measurements. The comparison will provide a check on the validity of the diffusion model.

1.2 Particulate Activity

Particulate activity will be collected on approximately 100 high-volume air samplers positioned at strategic locations on the monitoring grid. Some of these samplers will be modified to obtain greater flow rates by enlarging the inlet side of the sampler and allowing the air to be drawn through two, four-inch-diameter filters. These modified air samplers will be used on distant arcs where the increased flow rates are desirable because of the specific activity reduction in the cloud caused by radioactive decay and cloud dispersion. All of the filters from the high-volume air samplers in the cloud path will be counted for gross activity using scintillation counters and also will be analyzed isotopically on a multichannel spectrometer.

1189902

2. FALLOUT ACTIVITY

Fallout plates made from a sticky-type paper will be used to obtain fallout distribution and isotopic identification of the fission products deposited on the monitoring grid. These fallout plates will be mounted on a metal frame and then fastened on a flat platform at the top of each five-foot post that marks the grid station. The fallout plates will be folded with their adhesive side together or will be covered with a thin film of adhesive plastic to avoid the possibility of the deposited activity on the plate becoming dislodged or to avoid the possibility of cross contamination between plates during recovery and analysis. Isotopic isopleths will be drawn to represent the distribution of radioactive fallout materials using the analysis data obtained from the fallout plates.

3. PARTICLE SIZE

It is important that particle-size distribution of airborne particulate activities be made because particle deposition in the lungs is a function of particle size. Three types of particle-sizing samplers will be used to measure this distribution: the Unico cascade sampler, the Anderson sampler, and the Cyclone sampler.

The Unico sampler is a Cascade-type impactor with four deposition stages and a backup filter. Particles with mass median diameters between 20 and 0.5 microns can be separated on the four stages.

The Anderson sampler consists of six stages in series through which the sample of air is drawn. Each stage contains a sizing plate, perforated with 400 holes, and a backup stainless steel plate, coated with a silicone particle adhesive. The size of the holes is constant for each stage, but is smaller for each succeeding stage. This sampler is designed so that any airborne particle with a diameter of one micron or larger will be collected on one of the stages.

A few two-stage cyclone samplers will be used. These two-stage collectors consist of a cyclone sampling device in series with a high-efficiency filter. The cyclone stage captures the larger particles, ie, those above 10 microns in diameter. The smaller particles (less than 10 microns in diameter) are captured by the backup filter.

4. IODINE MONITORING

Three approaches are being considered to monitor the iodine isotopes released to the environment.

(1) The high-volume air samplers will be modified to allow a standard one-inch-deep activated charcoal cartridge to fit behind the particulate filters. Although iodine exhibits a complexity of behavior when it is released to the environment,

the most effective method of collecting the molecular iodine is by the use of charcoal traps.

(2) Several of the particulate filters will be treated with silver nitrate. Filters impregnated with silver nitrate initiate a reaction between sampled iodine and the silver on the filter to form a stable silver iodide complex. Some indication of the chemical state of the iodine may be obtained by placing the silver nitrate filters in series with the charcoal cartrdiges. Depending on the chemical state of the iodine, it may penetrate the silver nitrate filters but be trapped by the charcoal cartridges.

(3) Consideration is being given to some method, such as water or organic scrubbers, in an attempt to capture the HI which is formed by the reaction of the hydrogen available from the fuel and the fission product iodine. HI is almost infinitely soluable in water, so experimentation with a water vacuum cleaner or similar mechanism is being studied for the purpose of collecting HI in a water trap.

5. DIRECT RADIATION MEASUREMENTS

5.1 Excursion Dose Rate

The Engineering Test Branch personnel plan to monitor the excursion by placing gamma-sensitive mini chambers in and around the reactor core. The signal from these detectors will be recorded on high-speed magnetic tapes allowing the detector and recording system to follow the prompt gamma dose rate from the reactor excursion. This information will be used to calculate the dose rate from the destructive excursion. The calculated dose rate will be plotted on semilog paper (R/hr versus msec) to compare the dose rate as a function of time for each chamber position.

5.2 Radiation Dose From the Reactor Excursion

The dose contribution from the prompt radiation can be calculated by graphically integrating under the dose rate curve obtained in Section IV-5.1.

Film badge drop stations will also be used to measure the prompt radiation dose. The drop stations will consist of two identical film badge dosimeters, one permanently attached to the station with the second dosimeter held in place by an energized solenoid which releases the dosimeter following the power excursion. The released dosimeter will drop into a shielded receptacle and will measure only the prompt radiation dose, while the duplicate dosimeter will measure the total integrated dose due to the excursion-plus fission product decay. The dose from the excursion can then be obtained by a difference method. These film dosimeters stations will be spaced in a straight line at a number of distances from the reactor (Figure 1) to determine the variation of the radiation dose with respect to distance from the reactor.

1189904

5.3 Gamma Radiation Dose Rate From the Radioactive Cloud

The gamma radiation dose rate from the radioactive cloud will be determined by 15 gamma-sensitive ion chambers located at several downwind positions. The signal from each of these ion chambers will be fed into continuous pen recorders located at the IET control center. A visual inspection of the recorder graphs will give immediate indication as to the relative severity of the radioactive release. A few of these ion chambers will be elevated on the radiological surveillance tower and other poles in an effort to obtain a time history of the radiation intensity of the cloud.

5.4 Radiation Dose From the Radioactive Cloud

An estimate of the gamma radiation dose from the cloud will be made by integrating under the dose rate curves obtained in Section IV-5.3 above.

A second method utilizes the film badge dosimeters analysis results. The film dosimeters will be placed in a small well which will be dug at each major grid station on the 60° sector. The wells will be fitted with a metal can about four inches deep, and film dosimeters will be placed in them where they will be shielded from the direct radiation of the reactor and fallout. Thus, the well dosimeters will monitor only the radioactive cloud to give an integrated gamma exposure reading for the radiation received from airborne radiation.

5.5 Dose Rate From Residual Fission Product Decay

Fission product gamma radiation decay will be monitored by three ion chambers located at the 25-, 50-, and 100-meter upwind locations, three chambers located inside the test cell and fifteen ion chambers spaced on the downwind monitoring grid.

The upwind ion chambers will be positioned in direct line of sight of the reactor. By assuring a minimum amount of shielding, the traces from the recorders can be plotted and a curve representing dose rate versus distance obtained. An additional ion chamber will be attached to the remote-controlled, telescoping camera boom which can be positioned to give gamma dose rates between eight and fifteen feet from the reactor. The gamma dose rates monitored by all of these ion chambers are recorded by strip chart recorders; thus by visual inspection of the chart, it can be ascertained when reentry can be made and the relative hazards involved.

5.6 Fission Product Decay Radiation Dose

This measurement will be made by film dosimeters at the film badge drop stations. The dose recorded on the released film dosimeter will be subtracted from the total dose recorded on the film dosimeter that was held stationary. The dosimeters will be recovered when field checks indicate that radiation levels are approaching tolerable limits.

The gamma decay radiation dose can also be obtained by integrating under the dose rate curve of the recorded upwind ion chamber output readings.

1189905

5.7 Neutron Radiation Dose

Several neutron activation systems will be used to measure the neutron spectrum and the neutron dose resulting from the reactor excursion. The principle neutron dosimeter that will be used is the ORNL Hurst-type, nuclear accident dosimeter (NAD). These dosimeters will be positioned where they can be recovered as soon as possible after the destructive test. Two NADs will be attached to a 200-foot clothesline, and three NADs will be positioned along the railroad track. The latter three NADs will be fastened to large rings so that a protruding pole on the shielded locomotive will "snare" the rings and transport the NADs to the TSF area where they can be recovered manually.

The NAD dosimeters will be evaluated by the Analytical Chemistry Branch of ID. The appropriate neutron RBE factors will be assigned to each energy group and a total dose assigned. If instrumentation is available in time, the thermal and fast neutrons will also be monitored by the use of thermoluminescent dosimeters.

5.8 Total Radiation Dose

The total radiation dose as contributed by the excursion, the residual fission product decay, and the radioactive cloud will be recorded by film dosimeters, chemical dosimeters, glass dosimeters, thermoluminescent dosimeters, and polymerization dosimeters. The type of dosimeter used at a particular station will be determined by comparing its sensitivity range with the expected dose at that station. All film dosimeters will be NRTS personnel plastic film packet with enclosed sensitive and insensitive film for measuring high- and low-range exposures.

5.9 Residual Contamination

Recovery of test samples from distant points on the radiological grid will be accomplished with two four-wheel drive vehicles. These vehicles are equipped with two-way radios and radiological monitoring equipment including scintillation-type, dose-rate meters and conventional air monitors. The scintillation detectors will aid in the detection of radioactive contamination due to fallout, and the air monitors will provide a warning to vehicle operators of any unsafe airborne radioactive contamination.

V. BERYLLIUM MONITORING

At the time of the reactor destruction, the beryllium in the reactor assembly may be fragmented to the extent that a toxic hazard could develop. In order to evaluate this hazard, beryllium samplers will be positioned where early recovery is possible. Special air-intake lines will be monitoring the atmosphere just above the reactor. Filters will be placed in these lines at the coupling station where the shielding will allow reentry teams to make an early recovery of these samples. The filters, after recovery, will be sent as soon as possible to ICPP for emission spectra analysis. The beryllium hazard assessment will be made from these analyses. In addition, beryllium analyses will also be made on high-volume air sampler filters, Cyclone sampler filters, and fallout plates to determine the degree of fragmentation and spread of the beryllium.

1189906

VI. TEST DAY OPERATIONS

In preparation for the destructive test, all major items necessary to activate the monitoring grid will be positioned and tested for operation well in advance of the actual test day. Radio communication will be established between IET, mobile field units on the grid, and the grid control center at TAN-606 so that any problem encountered in the field can quickly be resolved. Background measurements will be made to evaluate the natural beryllium contamination and the background radiation levels at the IET test site.

Prior to the destructive test, "dry-runs" will be performed of positioning and recovering filtering media and other radiological samples to acquaint crews with orderly and speedy recovery of samples.

On the day of the test, countdown procedures will have been scheduled so that the grid can be activated in four hours and the test area cleared of personnel for operation of the test. Crews on the outer arcs (beyond the 300-meter arc) will be concerned with positioning sampling items and starting thirty 3.5-kilowatt generators. These generators will supply power for all the electrical-powered equipment beyond 300 meters. The powered sampling devices beyond the 300-meter arc will be activated two to four hours prior to the test time and allowed to run during the test and until the area is declared safe for reentry teams to enter and retrieve the samples.

The power for the inner grid (out to and including the 300-meter arc) is supplied from the IET building. One manual circuit breaker controls the power for all the sampling devices on the inner arcs so these samplers will be made ready prior to the test and remain on standby until the instant of the destructive test. At T minus 10 seconds, the inner grid network will be energized; and the samplers will be allowed to run for one minute. This one-minute interval will allow ample time for complete sampling of the primary radioactive cloud.

Recovery of the radioactive samples will be accomplished by two groups of assigned personnel. One group will work under the direction of the IET Health Physics Foreman in recovering samples around the IET complex out to a distance of 100 meters. The second group will work under the direction of the TSF Health Physics Foreman in recovering samples beyond a radius of 100 meters.

Careful recovery of samples will be made to assure that there will be no loss of activity in the handling of samples or any cross contamination between samples. As field recovery is made, each sample (ie, particulate filters and carbon cartridges from high-volume air samplers, the heads of the particle-sizing samplers, and the filters and balloons from the fission gas detectors) will be removed and placed in individual plastic bags. The film badges will be collected in one large plastic bag and delivered to a control point where they will be monitored for contamination. The fallout plates with their supporting framework will be placed in large boxes especially made to keep adjacent plates from coming in contact with each other.

Two control points will be operated to aid in the systematic recovery of the samples on the grid. All samples recovered from within the IET security

fence, ie, out to and including the 100 meter arc, will be carried to the IET underground automobile turn-around room. A laboratory counter and portable instruments will be available at this point to monitor the packaged samples before shipment to TAN 606. A shuttle service will be established between this area and TAN 606. Certain priority items, such as NADs, beryllium samples, and four high-volume air filters suspected of being in the path of the cloud, will be recovered first with nonpriority samples being collected as time permits.

The second control point will be a trailer house located outside the north gate of the exclusion fence. This receiving station will be the point through which all Phillips Petroleum Company samples on the outer grid (beyond the 100-meter arc) will be routed. This trailer is equipped with portable monitoring instruments, protective clothing, "hot" and "cold" change areas, first-aid facilities, respiratory equipment, a two-way radio, and decontamination facilities. As samples are received from the grid, they will be identified, monitored, and dispatched to TAN 606.

A receiving area for all samples will be established at the rear entrance of TAN 606. As samples are brought to this point, they will be identified and routed to those responsible for analysis. The MTR Radiation Measurements Section will analyze all high-volume air sampler filters, carbon cartridges, fallout plates, fission gas detector filters, and the particle-sizing plates that have significant activity. The Spectroscopy Section of ICPP will analyze the special beryllium filters, several fallout plates, and several high-volume air filters for Be contamination. The ID Analysis Section will analyze the nuclear accident dosimeters.

The majority of the samples will be analyzed at TAN 606 where a 512-channel gamma spectrometer is available for analysis work. As samples are brought to TAN 606, they will be identified and monitored by a sensitive scintillation detecting system; and if activity is detected, the sample will be routed to the spectrometer room. Samples with minimum activity will be set aside until time permits the mounting of these samples for autoradiography analysis. Fallout plates will be removed from their frames, folded together, and packaged for analysis. The sampling heads of the particle sizers will be carefully disassembled and their individual stages prepared for analysis.

Control and identification of samples at TAN 606 will be made by Health Physics personnel. A Polaroid camera will be mounted on the oscilloscope of the gamma spectrometer to photograph several of the spectra as an aid to establish an optimum counting sequence as a function of intensity of the sample radiation levels and half-lives of the collected materials.

All data that is acquired from the several groups assisting in analysis work will be forwarded to the Health Physics building at TAN 606. This data will, in turn, be correlated and prepared for the Engineering and Test Branch personnel.

1189908

DISTRIBUTION

P. M. Arnold
J. P. Lyon
M. H. Bartz
D. R. deBoisblanc
W. E. Nyer
L. J. Weber
K. K. Kennedy ID (3)
A. L. Ayers
B. F. Boardman
F. H. Tingey
J. F. Kaufmann
M. E. Thomas
G. O. Bright
F. Schroeder
J. C. Haire
T. R. Wilson
F. L. Bentzen
E. C. Newman
F. C. Haas
J. W. McCaslin
J. F. Sommers
R. E. Hayden
N. G. Reece
I. J. Wells
D. K. Jenson
L. J. Johnson
O. L. Cordes (6)
A. L. Smith
R. S. Peterson
O. M. Hauge
G. F. Brockett
W. J. Neal
R. W. Decker
D. G. Reid
J. M. Waage
G. B. Matheney
W. E. Kessler
G. L. Smith
R. B. Johns
R. P. Rose
F. L. McMillan
T. J. Wadsworth (2)
STEP Internal (25)
Technical Library (10)
J. R. Fielding (4)

1189909