727308

MAR 24 1971

C. Wayne Bills, Director
Nuclear Technology Division

REVISION OF BRIEF ENVIRONMENTAL STATEMENT

Attached are three revised copies of the brief Environmental Statement for Phase I of the NRTS Long Distance Diffusion Tests which was submitted to you on March 12. The revisions of paragraphs 4, 5, 7, and 9 do not change our conclusion that the proposed tests will not adversely affect the human environment within or outside the boundaries of the NRTS.

Original Signed By
Donald I. Walker

Donald I. Walker, Director
Health Services Laboratory

Enclosure:
Above Report - 3 copies

BEST COPY AVAILABLE

REPOSITORY INEL
COLLECTION Long Distance Diffusion Test
BOX No. Cabinet #4 Drw #4 RESL CEA-690 Room 102
FOLDER Revision of Brief Environmental Statement

HSLE HSL

PGVoillequé:dc DIWalker
3/23/71

Hq Reading
File

1189865

BRIEF ENVIRONMENTAL STATEMENT

FOR

NRTS LONG DISTANCE DIFFUSION TESTS

A. BACKGROUND

1. Time-integrated concentrations (TIC) measured (weekly) by the Health Services Laboratory's (HSL) environmental monitoring program during a period (May-June, 1968) of radioactivity release from the Idaho Chemical Processing Plant (ICPP) have been compared with computed TIC values for the same period. The computations were performed using a mesoscale transport/puff diffusion code developed by National Oceanic and Atmospheric Administration (NOAA) personnel and are based on radioactivity release data provided by ICPP. The ratio of the measured TIC to the computed TIC was determined for each of eight sampling locations. The average value of the ratio was 4 at 4 km, 25 near 10 km, and 84 near 25 km (straight line distances from source to sampler). The expectations (a) that the ICPP release values (measured by the stack monitor) are probably too low and (b) that the plume was depleted by deposition imply that ratios corrected for these effects would be even greater than those quoted. These results cast doubt upon the validity of long range diffusion calculations made as part of safety analysis reviews for the Station's reactors; the distinct possibility exists that the extrapolation of diffusion parameter (σ_y) versus distance curves beyond the range of the data (about 3 km) may not be valid. A series of controlled releases and concentration measurements to evaluate mesoscale atmospheric dispersion at the National Reactor Testing Station (NRTS) is needed.

2. A known quantity of a non-depositing tracer will be released at a controlled rate under well-documented and continuously monitored meteorological conditions. Pre-test forecasting, situation analysis during the release, and documentation will be provided by NOAA personnel. At their disposal will be real time wind data for the NRTS and environs as well as forecast maps and teletype data of the National Weather Service. Air concentrations will be measured at distances as great as 40 km from the release point using sampling and analytical techniques appropriate to the tracer employed.

3. The testing program will have two phases. The first will consist of tests in which the tracer is released for a relatively short period of time (~ 1 hour) and is transported to the sampling grid by a

1189866

strong, directionally consistent wind. Two tracers have been identified for Phase I tests: radioactive methyl iodide and (non-radioactive) sulfur hexafluoride. Phase II tests will involve releases over longer periods of time (2-24 hours) to permit the influence of diurnal wind direction and stability changes on tracer transport. Sequential sampling (hourly intervals) locations at various distances and directions from the release point will yield data on the temporal concentration variations as well as the time-integrated concentration. Sulfur hexafluoride appears to be the best tracer available for Phase II testing.

4. Available diffusion data for the NRTS were obtained using uranine dye in tests similar to those planned for Phase I. Computations of expected concentrations for Phase I tests will be made using existing data. The ratio of the methyl iodide concentrations expected to those derived from uranine for the first Phase I test is taken to be 5 for purposes of this analysis. This ratio will be measured for the first test and will be considered as part of the analyses of potential risks of subsequent Phase I tests. Analyses for Phase II testing for which larger ratios may be observed, will rely on Phase I data.

B. IMPACT OF PHASE I RELEASE OF RADIOACTIVE METHYL IODIDE

1. The first experiment in Phase I will involve the release of five curies of radioactive methyl iodide (CH_3I-131) from the 75-meter stack at ICPP. The CH_3I-131 will be generated and released by personnel of the Chemical Research and Engineering Branch of Idaho Nuclear Corporation (INC) with the approval and supervision of INC Nuclear and Operational Safety (NOS). Air sampling and analysis will be performed by HSL and NOAA using techniques developed for other HSL and HSL/NOAA programs.

2. The principal concern in an evaluation of the impact of CH_3I-131 releases is the potential dose and risk to members of the public. There are no NRTS facilities directly downwind of ICPP when the prevailing wind is from the southwest. Should the wind field indicate significant transport toward a facility, the release can be terminated; the potentially exposed facility will be notified in accord with procedures established for the Experimental Cloud Exposure Study (EXCES) releases from Grid III. Appropriate NRTS health physics offices are notified prior to any release; it should be noted that the most serious potential problem is not exposure of personnel but interference with facility monitoring equipment.

3. The Monteview-Mud Lake-Terreton area in which some 2000 people reside is nearest to the northeastern boundary of the NRTS. The

1189867

distance from ICPP to the nearest site boundary is 42 km; Monteview is approximately 52 km distant. Estimated relative axial concentrations for these distances range from 5.0×10^{-8} m^{-2} to 4.1×10^{-8} m^{-2} for Class B conditions and from 6.0×10^{-8} m^{-2} to 5.0×10^{-8} m^{-2} for Class C conditions. All four values assume a mixed layer of 1700 m, which is the average value for the month of March for the NRTS. Since the population of interest is rather widely dispersed and because either Class B or Class C conditions are acceptable for testing, an estimate of $\chi\bar{u}/Q$ of 5×10^{-8} m^{-2} is reasonable on the basis of past NRTS diffusion data. A recent comparison of the diffusion of uranine dye and methyl iodide at the NRTS has indicated that the $\chi\bar{u}/Q$ value for methyl iodide is about 5 times greater than that for uranine dye, a depositing tracer. Accordingly, a $\chi\bar{u}/Q$ value of 2.5×10^{-7} m^{-2} will be used for the following calculations.

4. The plume centerline air concentration in the Monteview-Mud Lake-Terreton area for a 60-minute release is estimated to be 7×10^{-11} $\mu Ci/cm^3$. This estimate assumes a mean wind speed of 5 m/sec, which represents a probable lower limit for a test during the month of March. A child located on the centerline of the plume throughout the duration of the release would be exposed to a TIC of 2.5×10^{-7} $\mu Ci\ sec/cm^3$ which would result in a dose equivalent to the thyroid of 0.15 mrem (for the critical group of children). The dose equivalent for such an exposure decreases as the age of the exposed person increases; the dose equivalent to a person aged 25 is estimated to be 0.075 mrem.

5. Cattle would be exposed to a similar TIC, and data from the Controlled Environmental Release Test (CERT) Program indicate that some contamination of milk will occur. Consumption of 1 liter of the contaminated milk per day would result in a dose equivalent of 0.058 mrem to the thyroids of children in the critical group. Since methyl iodide is virtually non-depositing, air to vegetation transfer is not an important milk contamination pathway.

6. There is a possibility that some methyl iodide may be converted to molecular iodine (I_2) for which air to grass transfer would be important (during the grazing season). The amount converted will be monitored as part of the experiment. Should significant conversion to I_2 occur, the expected air concentrations would be reduced to values similar to those anticipated for uranine dye and the thyroid doses would also be reduced.

7. The risk of inducing thyroid cancer in a member of the critical group of children can be computed using risk estimates made by Task Groups of the International Commission on Radiological Protection (ICRP). The probability that the 0.21-mrem dose to a member of the critical group would result in induction of thyroid cancer in that individual is about 4×10^{-9}. The risk of contracting thyroid cancer from "natural causes" is about 20×10^{-6} per person per year.

1189868

8. It is recognized that some small rodents, jackrabbits and perhaps antelope may be exposed to higher TIC than those to which the members of the public are exposed. Although it is possible that thyroid carcinomas might be induced in some individual animals the probable impact on these populations is not considered significant.

9. Conduct of the Phase I tests does not pose a significant threat to the NRTS vegetation or animal communities nor to vegetation or animal life on adjoining lands. The thyroid cancer risk for any individual member of the public in the critical group (assuming very unfavorable exposure conditions) is at most 1/5000 the natural risk of thyroid cancer. No irreversible commitments of NRTS land resources are involved; Test Grid three is maintained for such testing, but the testing does not preclude future alternative uses. The alternative of using sulfur hexafluoride for all Phase I tests has been considered but is not feasible at this time because the required sampling techniques have not been adequately developed.

Revised: March 23, 1971.

PGV

Paul G. Voillequé
Environmental Branch
Health Services Laboratory

1189869