MINUTES OF THE NEVADA HAZARDS EVALUATION GROUP MEETING

SEPTEMBER 26-27, 1968

INTRODUCTION

The Nevada Hazards Evaluation Group convened at 0850 hours on September 26, 1968, at the Atomic Energy Commission's Nevada Operations Office, Las Vegas, Nevada, Dr. J. S. Malik, Chairman, presiding. The purpose of this meeting was to review items of Group concern outlined in the meeting agenda included herein as Enclosure 1.

Enclosure 2 lists the meeting participants.

I. GREEN CASTLE

LCol. H. W. Baker, HQ/DASA, briefed the Group on the current status of the proposed GREEN CASTLE Exercise. The Army Combat Development Command (ACDC) intends to complete the revised Operations Plan as a post-GO Nuclear Operations Plan by May 1969 after which presentation to the NV/HEG is expected. The Army has been directed to write an alternate GREEN CASTLE plan for the Ft. Irwin area. It appears likely that the ACDC will submit a proposal through Test Command, DASA, to conduct an ADM experiment as part of the underground program.

II. USPHS I-131 DATA EVALUATION

Dr. D. S. Barth, U.S. Public Health Service, briefed the Group on the

PHS program to study the I-131 radionuclide deposition that might result from the testing of nuclear devices by the U.S. Atomic Energy Commission Starting in 1963, the PHS has collected data from three different types of experiments in order to develop human I-131 exposure dose prediction models covering a variety of field sources of radioiodine under a variety of meteorological conditions. These types of experiments are:

a. The "AD HOC" Experiment, covering an unexpected venting (for example, PIKE, PINSTRIPE),

b. A Planned Field Experiment, under controlled conditions, in connection with the conduct of a planned PLOWSHARE cratering experiment for instance (PALANQUIN, CABRIOLET, BUGGY, etc.), and

c. Synthetic I-131 Release Experiments over the forage at the PHS experimental farm at the NTS.

The Public Health Service efforts are directed toward an early warning prediction device that will predict an I-131 problem downwind in the off-site population whenever any source of radioiodine is generated at the Nevada Test Site or any other testing location.

Peak gamma exposure rates at ground level are determined by monitors with portable survey instruments. In addition, air samples are collect at ground level. These air samples lead to an integrated air concentration for I-131. It has been possible to establish some correlation between both the above measurements and the I-131 peak in milk that wil occur there later. Forage samples are taken to determine the number of

picocuries of I-131 per kilogram of forage and from this level to more accurately estimate the peak level of radioiodine in milk which will occur at that location at some later time. Milk is then measured for I-131, the peak of which should occur between two and four days after the test, providing a final confirmation of any potential problem.

The substitution of uncontaminated hay for contaminated green forage can reduce the potential radioiodine in milk and ultimately the resultant dose to humans, depending upon the time intervening between the test and the substitution. For example, the substitution of uncontaminated hay on D+3 days can reduce the potential dose about 70 percent compared to total dose when no countermeasures are employed.

Prediction before the test event has been primarily the function of ESSA. The source information is provided by the Laboratory conducting the test. Then, based upon certain meteorological assumptions (shear, the wind speeds, diffusion, dispersion, etc.) ESSA predicts a deposition value in picocuries per square meter.

Using the information collected from various tests and experiments the PHS has constructed various graphs and tables by which rough estimates of the radioiodine level to be expected in milk can be made following a test. Various conditions of green forage densities, pasture types, and hay ingestion have been covered. Peak gamma exposure rate readings at the time of cloud passage are corrected to H+6 hours and have been correlated to peak I-131 milk concentrations.

The PHS studies also include air-to-milk ratios and milk-to-forage ratios that can be applied as prediction tools for future tests conducted under similar conditions.

PHS data indicate that restricting animals fed in the open to a single feeding after the cloud passage will result in one-fourth to one-twentieth of the peak radioiodine in subsequent milk production that would be seen if there were continous feeding. Similarly, if water is applied to fresh green forage immediately after the cloud has passed over, potential dosage may be reduced by about a factor of ten.

III. PREDICTION OF I-131 LEVEL ON THE GROUND

The Group discussed the need of an improved particle diffusion model as an extension of the PHS prediction scheme in the determination of I-131 deposition on the ground. The D model, currently utilized, is a "close-in" model that is extended beyond its range of applicability. Differences in wind direction at different heights tend to spread out the radioactive particles and reduce both the cloud concentration and the eventual ground concentration. A new model which determines cross-wind distance in the conventional wind shear fashion used in most close-in prediction models and which brings the particles to the ground by an eddy diffusion process instead of the conventional fallout process would do much toward refining the prediction of I-131 deposition on the ground. The Group decided to defer a recommendation that NVOO investigate the applicability of some of the newer diffusion models until after

LRL has been approached about the possibility of putting WASP data into a technique being developed by T. Crawford at LRL.

IV. MEDICAL IMPLICATIONS OF I-131

Col. J. C. Fitzpatrick, Field Command, DASA, briefed the Group on the medical aspect of radioiodine exposure, particularly with respect to the human thyroid gland. Although there are 24 isotopes of iodine, the important ones in fission production are I-131, I-132 and I-135 because of their physical half-lives. The physical half-life of I-131 is 8.05 days. I-131 emits .608 mev beta which is the most important emission for thyroid injury. It penetrates three millimeters of tissue and is primarily responsible for cellular destruction of the thyroid. The biological half-life which depends upon the health of the patient, his state of nutrition, thyroid function, etc., varies from 60 days to over 138 days. Because the physical half-life is so short it becomes dominant and the effective half-life is about 7.6 days.

In clinical medicine I-131 is the most commonly used iodine isotope. Diagnostic uses usually involve microcurie amounts from 5 to 15 microcuries. For therapy, doses are usually in the millicurie range, about 7 to 8 millicuries which amounts to a dose of I-131 per gram retained of 70 to 100 microcuries. The highest doses, given to people with carcinoma, are about 150 millicuries total.

An important factor in considering the hazard of I-131 is the fact that the uptake of I-131 for children and for adults is approximately the

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same for a given oral intake. This amounts to a ten times larger dose to the 2-gram thyroid of a one-year-old child compared to an adult's thyroid which weighs 20 grams. Therefore, one-year-old children were considered by the FRC to be the critical segment of the population. For instance, the doses to the thyroid gland of people on Rongelap were: adults, approximately 160 rads from iodine, 175 rads from external gamma from fallout; and children, 700 to 1400 rads from iodine, 175 from external gamma. Severe damage to the cells of the child's thyroid normally results in hypothyroidism. This condition hinders growth, results in poor metabolism, the cholesterol goes up, hardening of the arteries develops sooner, and possibly even carcinoma.

There is some confusion regarding maximum permissible dosage of I-131. The National Bureau of Standards Handbook gives the maximum permissible body burden for the thyroid as .7 microcuries; total body is 50. The Federal Radiation Council put out a level of 80 to 100 picocuries per day intake for a year as a maximum allowable dose for children. The ICR listed 700 picocuries total per liter of milk intake for adults. Another set of figures by the FRC for population groups contains 1.5 rem per year to the thyroid for an individual who is not a radiation worker but the RPG for an average of a suitable sample of exposed population group is 0.5 rem per year. "A suitable sample is considered to consist of children of approximately one year of age, using milk from a reasonable homogeneous supply." For radiation workers it is 30 rem per year or 10 rems for 13 weeks.

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To be effective, protective actions must be not only operationally feasible but also prompt. The substitution of uncontaminated hay or milk must be in sufficient quantity. There is a 90 percent reduction for 20 days of milk substitution. People in an affected area can be given iodine but in a large population this involves risks to individuals who are pregnant. However, it is believed that where iodized salt is used routinely, the uptake of radioactive iodine is reduced. It should be noted that the Federal Radiation Council concluded that such protective actions are not justifiable under conditions most likely to occur to avert "individual" doses of less than 30 rads to the thyroid. But since the "individual" varies from the "average suitable sample of the population" by a factor of 3, protective action is justifiable at the 10 rad levels--the dose that might be received if protective action were not taken. There is however some leeway because the FRC allows that level of 10 rads to be raised if the protective action will have a high impact on the community in question. SNL

There was some discussion regarding the justification of raising the I-131 dose NV/HEG standard from 1.5 rads per year to a less restrictive figure more consistent with national standards in the event of a resumption of atmospheric testing--perhaps to the PAG level of 10 rads.

V. AIR FORCE PREDICTION TECHNIQUES FOR I-131 DEPOSITION

Captain J. E. Dieckhoner, AFWL, Kirtland AFB, discussed the U.S. Air Force technique for predicting I-131 ground deposition. This system

is based on field test data from the JOHNNY BOY shot and further work by Dr. K. J. Russell. Dr. Russell concluded that a one-hour dose rate of one r per hour corresponds to 6.4 microcuries of fractionated I-131 per square meter and to 18.5 microcuries of unfractionated I-131 per square meter. Using a simplified model from the National Academy of Sciences, National Research Council document on radioactive fallout, this ground deposition in microcuries per square meter is multiplied by 32.7 to determine the infant thyroid dose in rads. The total thyroi dose can be related back to the gross gamma dose rate. For one value, the 1.5 rad child thyroid dose related back to 2.48 mr per hour at H+1 hour. Using a DASA model, documented in the form of graphs and nomograms contained in Air Force Technical Manual 136-1, the Capabilities of Atomic Weapons (TM 23-200), parameters such as fission to fusion yield, height of burst, wind, etc., can be applied. It appears that the ground deposition prediction compares favorably to the NRDL "D" model. Capt. Dieckhoner pointed out that the Air Force is primarily interested in ~~hour~~-by-hour prediction and does not place emphasis on th mr per hour predictions.

VI. COMMENTS ON ROUGH DRAFT OF THE F-106B/AIR 2A NUTEX

In response to the Chairman's desire to express the problems involved in the F-106 NUTEX, it was suggested that TC/DASA be advised of the following problem areas which will require further investigation:

a. The marine ecology association with the Gulf circulation patterns,

b. Evaluation of the impact of radioactive contamination on that marine ecology,

c. Definition of reliable water, surface, and air route traffic surveillance systems to insure control of the operational area,

d. Further development of a fail-safe destruct system from the ground, and

e. Waiver of radiation dosage to the delivery air crew from the high altitude burst.

Additional rewording of the evaluation draft in the areas of radioactive deposition, drone contamination and the warhead environmental sensing device was also suggested.

The Group discussed the use of EC-121 Early Warning Aircraft and the ground display thereto in order to control the Exercise area. It was agreed that the evaluation draft should be reworded in more general terms not to include the method of range control but rather that control should be insured.

In view of some qualms regarding drone operation, it was agreed that Group members would, time permitting, make a trip to the Eglin Air Force Base Drone Facility late in October for first hand observation of drone operations and equipment.

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The Group discussed the I-131 and Cesium-137 fallout concerns and the investigation of further meteorological and fallout data from Weather

Bureau records. It was decided however to defer further action pending the receipt of additional information utilizing existing LRL and DASA techniques and records.

VIII. COMMENTS OF PILOT LIGHT EVALUATION DRAFT

It was pointed out that the bomb planned for detonation has other Mods available and that Mod 3 should be considered for the PILOT LIGHT exercise to more reliably insure a limitation in yield and avoid renewing reservoirs which had been suggested earlier. However, it appears that the yield was chosen in order to get an appropriate height of burst.

Apparently the PILOT LIGHT plan does not yet provide for the removal of the wire lead to the AMAC option selector switch GROUND position. Mr. Reed reminded the Group that this wire should be removed or tied to the AIR position to preclude the GROUND option selection and the probability of a resulting flare dud which might present flash blindness and retinal burn problems. The Group was informed that it is planned to preclude the GROUND selection at the aircraft centerline station, the only station to be used, by adding a jumper cable between the connector and existing plugs to open the three lines that control the GROUND function. Additionally, the probability of an inadvertent surface burst because of failure of the radar to function has been found to be one-in-a-thousand rather than one-in-two-hundred as previously assumed.

In connection with other eyeburn hazard probability and the problem of controlling people, an informal recommendation that NVOO consider the

investigation of Ft. Irwin as alternate PILOT LIGHT site appears reasonable notwithstanding the accompanying need for an expansion of the Public Health Service network to cover that area.

The question of a safe overpressure for helicopters involved in the exercise was resolved by the explanation that the helicopters would not be airborne at the time of detonation.

In response to the question of the possibility of a non-exercise source simulating the radar signal to the aircraft, the TPQ-10 radar was described in detail. The command signals are carried by UHF data link. Three crystal controlled channels, or frequencies, are available for preselection and utilization. There are four code options for use as desired on the channel selected. The signals transmitted are tone modulated signals. There are two basic modes by which the exercise aircraft is picked up and tracked, skin track mode and beacon mode. These modes may be selected in skin track only, beacon track only, or skin/beacon track. It is intended that the beacon only will be utilized in the exercise.

If a bomb is not known to be safe, there is a provision to remove not only safing power but all pulse power by disengaging a circuit breaker which insures cutting all power to the weapon. An indication of such an unsafe position after the weapon has been armed would be by the lighting of warning or disagreement lights.

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Concerning the A4/A6 bomb rack reliability, the Group was informed that cause of weapon "hangup" has been the failure of a pin-type mechanical linkage on the forward hooks. These pins are being replaced whenever the rack is due for overhaul, after 90 drops, not feasible at the squadron level, but rather accomplished at a maintenance center because of the major disassembly required.

A specific designation of a jettison area, whether it be the target are or some other area, is considered necessary as a means of guarding against an aircraft or weapon, or both, going into a line of exercise troops or other area which is potentially dangerous.

Marine Corps representatives pointed out the difficulty involved with the single engine A4 in that a flameout or loss of the engine results i the loss of hydraulic power. This, in turn, makes the maneuvering of the aircraft to a specific location extremely difficult. The A6, however, could maneuver on one engine and probably make it back to the landing strip.

During a discussion on the safe fire area for howitzers and action to be taken in case of an abort, it was pointed out that the safe quadrant area to which the plan refers does not refer to a target impact area but rather to a safe muzzle elevation. In the event of an abort, or a "hold," the round would be "punched out" or removed by removing the primer and the propellant charge and depressing the muzzle and physically pushing out the round.

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Although the use of the howitzer in an airdrop exercise appears safe one should be aware of the possibility of a surface burst. Since shell action on impact is unpredictable, one should plan for detonation on impact and even full yield.

In response to a previous question regarding the radioactive film badging of exercise personnel, it was noted that current plans are to badge all participating personnel.

Enclosures:
1. Meeting Agenda
2. Attendees (uncl)

Distribution:

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[redacted] ENCLOSURE 1

NV/HEG MEETING OF SEPTEMBER 26-27, 1968

TENTATIVE AGENDA

September 26 - A.M.

Bikini Revisited . . . . . T. McCraw

PHS I-131 Data Evaluation . . . . . PHS

Comments on I-131 Problems . . . . . NV/HEG Members (James, Merritt, Dummer, Evans)

September 26 - P.M.

Medical Implications of I-131 . . . . . Col. Fitzpatrick

I-131 Prediction Techniques . . . . . Capt. Dieckhoner

Discussion:

Critique of F106B/AIR-2A and PILOT LIGHT Evaluations

September 27

PILOT LIGHT

Radar Control
A4/A6 Rack Reliability
Electrical Modifications of A4/A6
Abort & Jettison Philosophies
Jettison Area Designation
Safe Fire Area for Howitzers
Yield Selection [redacted]
Dud Implications
Ft. Irwin Versus NTS

F106B/AIR-2A

Wind Patterns
48 hr. No Rain Predictions
Fallout Trends (Weather Bureau DF Data)
Pre-aid Post Exercise Surveys
I-131 Predictions
Cs-137 Problems

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ENCLOSURE 2

NEVADA HAZARDS EVALUATION GROUP MEETING

NEVADA OPERATINS OFFICE

LAS VEGAS, NEVADA

SEPTEMBER 26-27, 1968

A T T E N D E E S

NV/HEG MEMBERS

LCol. H. W. Baker, USAF	HQ/DASA
LCol. J. D. Davis, USAF	TCDASA
J. E. Dummer	LASL
E. C. Evans, III	NRDL
Col. J. C. Fitzpatrick, MC, USA	FC/DASA
D. W. Hendricks	NVOO
R. A. James	LRL
J. S. Malik, Chairman	LASL
M. L. Merritt	Sandia
J. F. Moulton, Jr.	HQ/DASA
Maj. V. T. Penikas, USAF	AWFL
R. E. Reed	Sandia
R. E. Yoder	LRL

OTHER ATTENDEES

D. S. Barth	USPHS
D. E. Bernhardt	USPHS
Lt. P. R. Blankenhorn, USA	TCDASA
R. T. Brandt	NWEF, KAFB
F. N. Buck	USPHS
F. D. Cluff	NVOO
Maj. G. A. Deegan, USMC	USMC
Capt. J. E. Dieckhoner, USAF	AWFL
D. R. Fields	NWEF, KAFB
D. J. Hart	NVOO
J. W. Henderson	NVOO
H. F. Mueller	ESSA/ARL
C. M. Oswald	NWEF, KAFB
Maj. J. M. Solan, USMC	3rd Marine Air Wing
O. W. Stopinski	LASL
Capt. J. L. Thacker, USMC	3rd Marine Air Wing
Maj. D. H. Thomas, USAF	AFSWC
Maj. A. J. Trent, USMC	5th Marine Division
Cdr. R. M. Wagner, USN	HQ/DASA

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INCOMPLETE DOCUMENT REFERENCE SHEET

The archive copy of this document is incomplete.

Pages missing _____

Enclosures missing #2 (Presentations on I-131 at NV/HEG mtng. of Sept 26-27 1968 (UNCL)

Attachments missing _____

Other _____

Carol Spelman
signature

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