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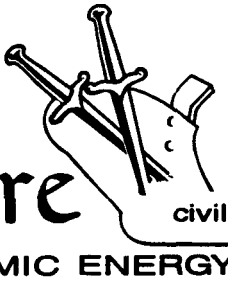
# CABRIOLET

## WEATHER PREDICTIONS AND SURFACE RADIATION ESTIMATES FOR PROJECT CABRIOLET

**ISSUANCE DATE: MAY 1989**

**NOAA, WEATHER SERVICE NUCLEAR SUPPORT OFFICE**
**LAS VEGAS, NEVADA**



Plowshare

civil, industrial and scientific uses for nuclear explosives

UNITED STATES ATOMIC ENERGY COMMISION / PLOWSHARE PROGRAM

MASTER

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PNE-961

# WEATHER PREDICTIONS AND SURFACE RADIATION ESTIMATES FOR PROJECT CABRIOLET

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Prepared for the U.S. Atomic Energy Commission (currently U.S. Department of Energy), Nevada Operations Office, Under Contract SF54-351. This report does not constitute a formal NOAA scientific publication.

## DISCLAIMER

In the late 1960s and early 1970s, all reports pertaining to Project CABRIOLET were published as Peaceful Nuclear Explosions (PNE) reports and were given PNE numbers. Since this report is being published so long after the fact and the Plowshare Program has been de-emphasized, it was decided to publish this report as a U.S. Department of Energy, Nevada Operations Office (DOE/NV) report. The original PNE number assigned to "Weather Predictions and Surface Radiation Estimates for Project CABRIOLET" was PNE-961.

Since the time this work was done, the Air Resources Laboratory-Las Vegas (ARL-LV) transferred back to the National Weather Service (formerly U.S. Weather Bureau) and is now known as the Weather Service Nuclear Support Office, Las Vegas, (WSNSO); the Lawrence Radiation Laboratory (LRL) was renamed the Lawrence Livermore National Laboratory (LLNL); the U.S. Public Health Service (USPHS) local office has become part of the Environmental Protection Agency (EPA); the Environmental Science Services Administration (ESSA) was renamed the National Oceanic and Atmospheric Administration (NOAA); and the U.S. Atomic Energy Commission (AEC) has become part of the U.S. Department of Energy (DOE). The former names will be used throughout this report for the sake of expediency.

Also, Nevada state highways have been renumbered or realigned since 1968. The old numbers and alignments are used in this report.

V. E. Quinn
March 1989

## ABSTRACT

This report documents the activities of the Air Resources Laboratory-Las Vegas (ARL-LV) in support of Project CABRIOLET. The participation of ARL-LV in the Safety Program is stressed, but the full scope of objectives and functions is covered. A description is given of observational facilities used to provide weather services. Weather and fallout predictions issued for the project as well as prediction procedures and techniques are discussed. A comparison of predicted and observed weather and fallout is made. The results of these activities will serve as a basis for planning and participating in future projects.

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## CHAPTER 1

## INTRODUCTION

### 1.1 HISTORICAL DESCRIPTION*

Project CABRIOLET was a nuclear experiment in hard, dry rhyolite rock executed as a part of the Plowshare Program for development of nuclear excavation. CABRIOLET was detonated on January 26, 1968, at approximately 0800 (PST), 1600 (GMT), in Area 20, Nevada Test Site (NTS). The resultant yield was 2.3 $\pm$ 0.5 kt. The emplacement hole was U20I at geodetic coordinates.

Longitude: W 116°30′ 52.0082"
Latitude: N 37°16′ 51.0715"

Surface ground zero (GZ) was 6,197 feet MSL; emplacement depth (to the working point) was 170.75 feet. The resultant crater was characterized by the following dimensions and volumes:

A. Radius of apparent crater ($R_a$)--54.58 meters, 179.4 ft.

B. Maximum depth of apparent crater ($D_a$)--35.48 meters, 116.4 ft.

C. Average apparent crater lip crest height ($H_{al}$)--9.69 meters, 31.8 ft.

D. Radius of apparent lip crest ($R_{al}$)--65.14 meters, 213.7 ft.

E. Radius of outer boundary of continuous ejecta ($R_{eb}$)--201 meters, 660 ft.

F. Lip volume apparent--184,900 cubic meters, 241,887 cubic yards.

G. Crater volume, apparent ($V_a$)--137,600 cubic meters, 180,025 cubic yards.

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*Provided by the Lawrence Radiation Laboratory for verbatim inclusion in this report.

## 1.2 BACKGROUND

The Environmental Science Services Administration (ESSA), by agreement with the Atomic Energy Commission's Nevada Operations Office (AEC/NVOO), is responsible for providing all meteorological support required by the NVOO Test Manager to conduct nuclear tests safety. This ESSA responsibility is met by its Air Resources Laboratory--Las Vegas (ARL-LV) within the Effects Safety Division, Nevada Operations Office (ESD/NVOO).

ARL-LV is organized and staffed to provide the specialized meteorological services peculiar to the Safety Program associated with nuclear testing, as well as to develop, through continuing research, improved methods of weather and fallout prediction. Weather observing and forecasting are functions of the NTS Operations Branch, while the Radiation Branch has the responsibility for fallout prediction. Backup services are provided by an Engineering and Instrumentation Branch and a Research Branch which includes a Climatology Section and a Computer Section. Projects such as CABRIOLET also require items of meteorological support for the Technical Program in addition to those normally provided for support of the Safety Program. These requirements often govern actual execution of the tests.

The Project CABRIOLET Technical Programs imposed restrictions on the meteorological conditions under which the project could be conducted successfully, as follows:

A. Initial winds, at ground zero and the proximate on-site area, blowing into a sector defined as 325°T clockwise to 060°T.

B. A near-neutral lapse rate of temperature from the surface up to 1,000-2,000 feet above the surface.

C. No clouds below 20,000 feet MSL, at zero time and during the first few hours postshot, which could hamper aircraft sampling or photography.

D. No precipitation during the test nor during the first 10 to 12 hours postshot in the vicinity of the debris cloud.

The restrictions were subject to varying degrees of relaxation as the event date approached, but they were considered inflexible for operational planning.

## 1.3 OBJECTIVES

ARL-LV NTS Operations Branch objectives in support of Project CABRIOLET were to:

A. Provide and interpret climatological data required by the various participants for preevent planning and preparation;

B. Provide meteorological observations and data to the technical programs;

C. Provide weather and air trajectory predictions to the Test Manager and his Advisory Panel; and

D. Document the state of the atmosphere in the mesoscale area around the experimental site at (and for a short period subsequent to) the time of detonation.

# CHAPTER 2

# PROCEDURES

## 2.1 DATA REQUIREMENTS

2.1.1 Safety Programs. Data for the Safety Programs were collected to aid in meteorological prediction and to document the state of the atmosphere at H-hour and during a sufficient period postevent to provide time and space detail for correlation with measurements of early-time cloud dimensions and radiological measurements.

The data collected for the purposes of weather prediction varied from Teletype weather resumes received through major Weather Bureau Forecast Centers to local surface observations of meteorological phenomena transmitted verbally via radio to the weather trailer. All were subject to selective interpretation by the Briefing Meteorologist in assessing the forecast problem and arriving at a prediction of the various weather elements for shot time.

Documentation of the state of the atmosphere at and near Ground Zero (GZ) was accomplished through the close-in instrument network. Wind information, both surface and aloft, gained through use of the wind towers, wind sounding equipment, and tetroon flights, was used to produce wind flow analyses and air parcel trajectories. Vertical temperature profiles were obtained from radiosonde observations. (See Section 2.2.2).

Following the final readiness briefing, meteorological data were interpreted by the Weather and Radiation Briefers in order to keep the Test Manager and his Advisory Panel advised concerning meteorological aspects of the Safety Program.

Weather parameters pertinent to the test included:

A. Vertical wind and temperature structure in the layer through which the nuclear cloud could be expected to rise.

B. Time and spatial variation of wind direction and speed in the general area of the test, at the surface and aloft.

C. Airflow patterns (streamlines) and air trajectories at various levels from the surface through the layer of concern.

D. Significant cloudiness and precipitation in the general testing area and along the downwind path of the nuclear cloud.

E. Areas of icing and turbulence aloft which might hamper aircraft operations along the nuclear cloud path.

2.1.2 Technical Programs. The technical programs had requirements for selected meteorological information.

The Blast Prediction Group required that the radiosonde observation taken from the U20b complex at shot time be completed to balloon burst, which occurred at 67,726 feet MSL.

The LRL Fallout Measurements Program required the latest trajectory forecast, wind ladder forecast, and vertical stability forecast after each formal weather briefing. This program also required the shot time rawinsonde (radiosonde data plus winds-aloft) data to 500 mb by H+1 hour.

The LRL Nuclear Cratering Group required air trajectory forecasts from each briefing and updated forecasts at H-1/2 hour, H+1 hour, each hour through H+6 hours, and every six hours after that time until completion of their program.

The Battelle Northwest Program required the air trajectory forecasts from each briefing and updated forecasts every six hours after H-Hour until completion of their program.

All of these programs required information from the Federal Aviation Agency (FAA) Air Route Traffic Control (ARTC) Center radars concerning precipitation in or near the nuclear cloud.

## 2.2 DATA SOURCES

2.2.1 National Meteorological Network. Sources of large-scale meteorological data available to the Briefing Meteorologist included the following:

A. National Weather Facsimile.

B. National Weather Teletype, Service A.

C. National Weather Teletype, Service C.

D. Weather Surveillance Radar Facsimile Link with FAA Radar at Salt Lake City, Utah.

E. Computer-Prepared Trajectory Forecasts from the National Meteorological Center, Suitland, Maryland.

2.2.2 ARL-LV Instrumentation. The national meteorological reporting network of Weather Bureau Stations yields little or no data to identify significant mesoscale atmospheric circulations in the vicinity of NTS. Such weather features are often critical in predicting probable air parcel trajectories from the site. These mesoscale features, which are embedded in the regional-scale flow, can be determined only through frequent meteorological observations from a number of stations

peripheral to NTS. The primary problem is the paucity of winds-aloft observations in the unpopulated areas of the southwest which produces gaps in the regional meteorological analyses. The weather observing facilities established by ARL-LV consisted mainly of surface wind towers and a network of upper-air wind observation and temperature sounding stations. These provided timely information to the weather briefers and augmented the other sources of meteorological data.

Surface (Low-Level) Winds. Four 30-foot wind towers of the Systron-Donner (SYSTRAC) radiotelemetered wind system were installed in a grid around the event site. In addition, one analog wind system on a 9-foot tower was installed near GZ (Figure 2.1). All winds were recorded in the Pahute Control Point (CP) weather trailer.

Radar Winds Aloft. M-33 radars, modified for electronic tracking of meteorological balloons to obtain winds aloft information, were established at the Yucca Flat Weather Station, Tonopah Test Range, Supplemental Test Site C (STS-Site C), Highway 25, and U20b (Figure 2.2).

The Yucca Flat weather station is a permanent observing station for ARL-LV. Data from the Tonopah Test Range were supplied through the cooperation of Sandia Corporation personnel. The Supplemental Test Site near Warm Springs, Nevada, supplied information from a unit used in support of operations in Hot Creek Valley.

Pilot Balloon Winds Aloft. Eight ARL-LV mobile upper-air observation units, using single theodolite pilot balloon (pibal) equipment and techniques, whereby 1000-ft winds aloft are calculated from azimuth and elevation angles as measured with the theodolite during optical tracking of the ascent of a helium-filled balloon having an assumed constant ascension rate, were committed to the operation. Due to the mobility of the units, locations remained flexible until D-1 day and D day. Positions were established according to the predicted prevailing wind regime over NTS (Figure 2.2). The units were placed to form a grid, in combination with the participating radar units, which would best define the mesoscale circulation over the testing area.

Special winds aloft observations were also taken at the U.S. Weather Bureau Airport Stations at Las Vegas, Ely, and Winnemucca, Nevada; Pocatello, Idaho; Medford, Oregon; and Boise, Idaho. These observations were taken as required, following telephone requests from the ARL-LV Project Supervisor to the individual stations.

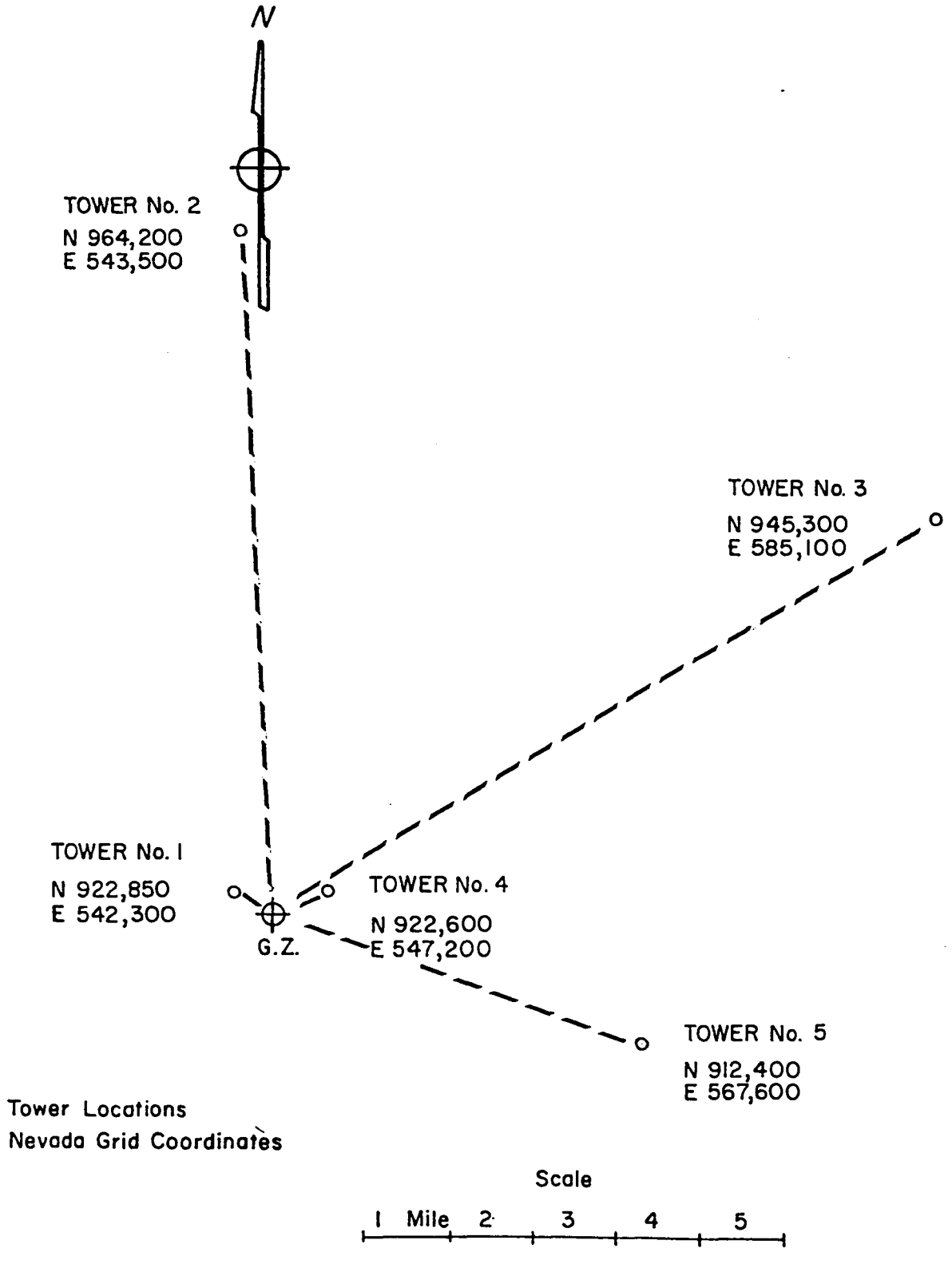



Figure 2.1. CABRIOLET telemetered wind towers.

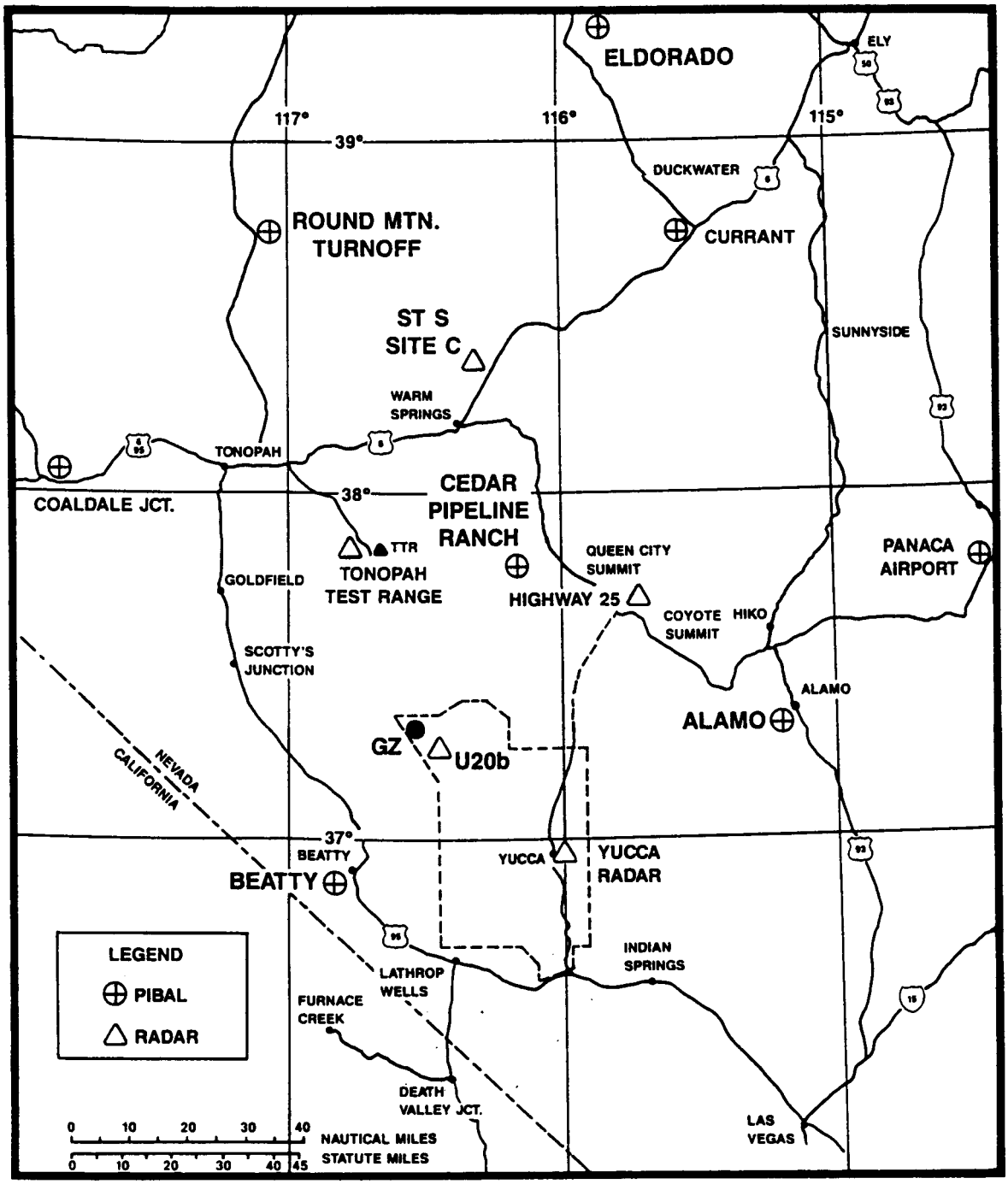



Figure 2.2. CABRIOLET upper-air observation stations.

Radiosonde Observations. Radiosonde capability (atmospheric vertical temperature, pressure, and relative humidity observations) was established near GZ at Station U20b in Area 20, NTS. Spatial variability was determined by similar soundings from the Yucca Weather Station, the Supplemental Test Site, and the Sandia Corporation weather station at the Tonopah Test Range.

Some radiosonde instruments were modified by ARL-LV to acquire temperature profiles only. These were designed for use at the U20b complex prior to D day to ascertain trends in the temperature aloft for the information of the weather briefers.

Tetroon Observations. Constant-level helium-filled tetrahedral balloons (tetroons) were released locally and tracked by radars in the FAA network controlled from the ARTC Center at Salt Lake City (Figure 2.3). The tracks of the tetroons helped to describe the air parcel trajectories encountered on D day.

Tetroons, in groups of four, were released according to the following schedule:

| Time (hrs.) | Stabilization Height (ft. MSL) | Release Point |
|---|---|---|
| H-26 | 12,000 | Yucca Flat |
| H-9 | 12,000 | Yucca Flat |
| H-3 | 12,000 | Pahute CP |
| H | 12,000 | Pahute CP |
| H+3 | 12,000 | Pahute CP |
| H+3 | 16,000 | Yucca Flat |

Standard 60-inch Schjeldahl tetroons were used. Each tetroon carried a Suchy corner reflector target to enable the FAA radars to track them over long distances. The tetroons were released near the Pahute Mesa Control Point or the Yucca Flat weather station in order that they would not interfere with aircraft operations and yet would tend to fly parallel to the track of the nuclear cloud.

The 12,000-foot stabilization height was chosen because it is the lowest altitude at which radar tracking is effective in the area through which the tetroons would be flying. Below 12,000 feet in this area, radar targets are often lost in the ground return. The tetroons released to fly at 16,000 feet were used to determine higher-level air trajectories.

Miscellaneous Instrumentation. Surface observations of pressure, temperature, and relative humidity were obtained at U20b complex using a precision aneroid barometer, standard mercurial thermometer, and a sling psychrometer.

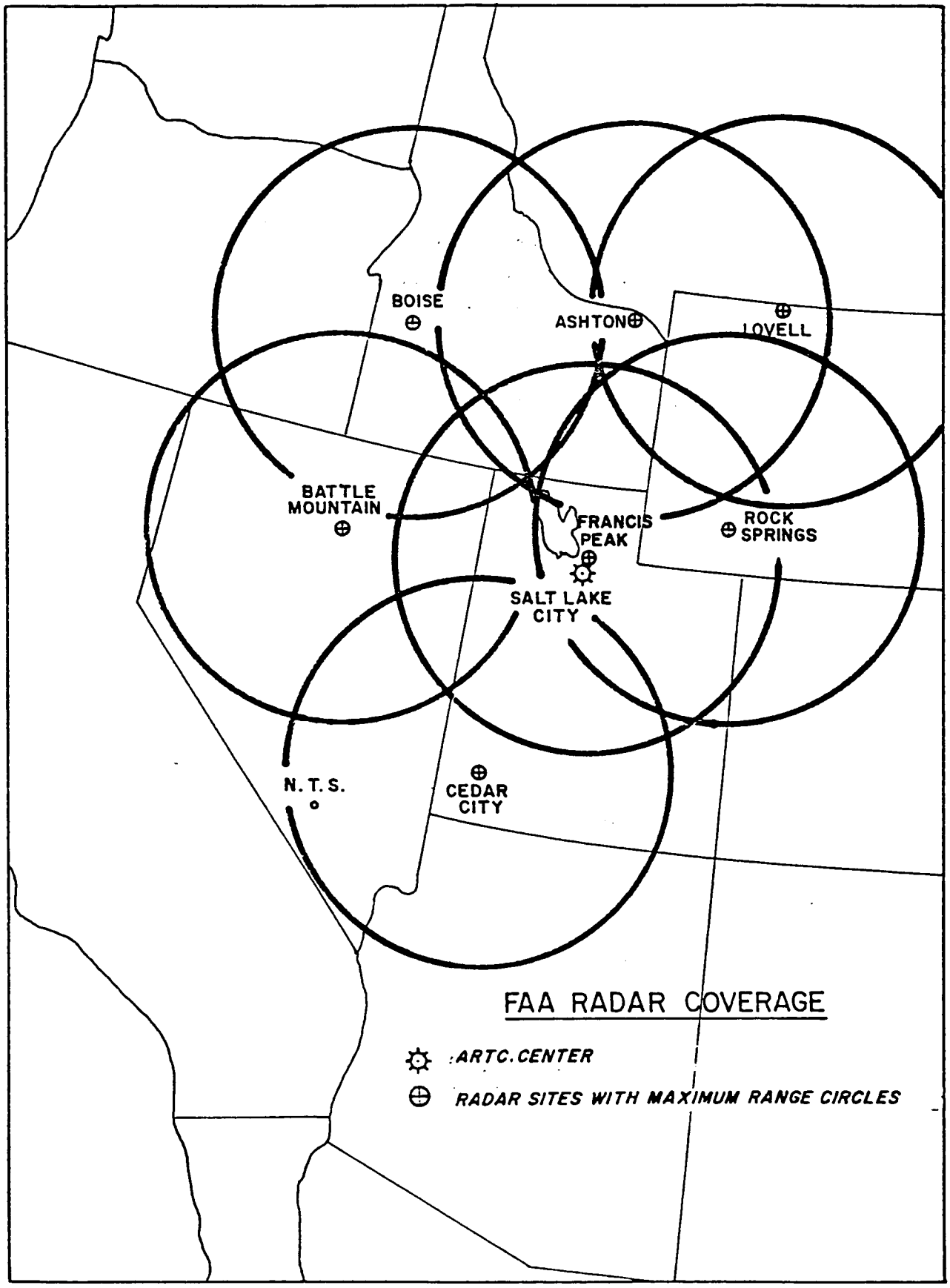



Figure 2.3. Federal Aviation Agency radar network.

A hygrothermograph exposed in a standard instrument shelter was installed near wind tower 1 (Figure 2.1), approximately 2,500 feet northwest of ground zero, to obtain a continuous record of temperature and relative humidity at that location.

One hundred selected U.S. Weather Bureau cooperative observers in Nevada, Utah, Idaho, Wyoming, and Colorado were requested to take precipitation samples at their regular observation times, from D day for the following three weeks. All cooperative observer stations were in the expected downwind sector. For this purpose, each observer was shipped one dozen 4-oz plastic bottles to store samples of the daily precipitation collected. Collection instructions, along with marking and mailing tags, were included in the shipment. All sets of samples were remailed from the collection station directly to Lawrence Radiation Laboratory for processing and analysis.

## 2.3 OPERATIONS

2.3.1 Preevent Operations. Climatological data and summaries were provided to NVOO Effects Safety Division, the Lawrence Radiation Laboratory, and to various other interested agencies and contractors. Initial climatological data were furnished in the fall of 1965 and were subsequently updated after each postponement of the project.

The primary climatological effort concerned defining the probabilities of achieving, during the winter season, the desired meteorological conditions for conducting the test. Accordingly, emphasis was placed on determining the statistical frequencies of favorable on-site winds, mixing depths, cloudiness, precipitation, and long-range air trajectories associated with favorable initial winds.

Certain of the climatological data were summarized and presented in the form needed for construction, planning, and other routine site operations.

Climatological data and their application to the objectives of the project included:

A. ARL-LV records of surface and upper air wind direction and speed data acquired from NTS instrumentation to define the frequency of occurrence of acceptable winds and various other wind-related statistics;

B. ARL-LV records of surface temperature on Pahute Mesa to define the temperature regime in the general test area during the winter months;

C. ARL-LV records of precipitation on Pahute Mesa to define seasonal precipitation amounts and types; and

D. Other sources, primarily National Weather Records Center data, for analyzing and constructing air parcel trajectories from NTS.

2.3.2 Event-Oriented Operations. The U20b weather observing station was activated on D-2 days. Radar upper-wind observations were taken hourly between 0600 and 1200 PST and vertical temperature soundings at 0600, 0800, 1000, and 1200 PST. Both wind and temperature soundings were terminated at 20,000 feet MSL. Hourly surface weather observations augmented the upper-air data. Mobile pibal stations began winds-aloft runs between H-6 hours and H-4 hours. Some cooperating U.S. Weather Bureau stations commenced special winds-aloft observations as early as H-10 hours.

On D day, the entire mesoscale winds aloft observing net was activated. Observations began at 0200 PST at most of the locations and continued for as long as the need for data continued, in most cases to as late as 1400 PST. The frequency of the observations was hourly except in the case of some of the radar winds-aloft observations which were on a half-hourly schedule. The positions of the mesoscale wind sounding network relative to GZ are indicated by Figure 2.2.

D day upper-air soundings of temperature, pressure, and relative humidity were taken at H-6 and H-Hour at the U20b location, and tetroons were launched at H-26, H-9, H-3, H, and H+3 hours.

Special upper-wind soundings were made by selected U.S. Weather Bureau stations downwind on a three-hourly schedule upon request from ARL-LV personnel.

The above meteorological data are in the Appendix.

# CHAPTER 3

## RESULTS

The weather pattern required to produce the conditions necessary for the Technical and Safety Programs consisted of a trough of low pressure aloft oriented north-south and lying to the west of the test area, and a surface pressure gradient which would produce southerly surface winds. This pattern seemed to be developing by January 24 as a weak cold front moved into the Pacific Northwest and was expected to move southeastward to a position from Utah across Nevada to central California by January 26. A major low-pressure trough aloft off the coast was forecast to move eastward and produce the desired southwesterly upper winds. Forecasts of pertinent meteorological parameters were presented to the Test Manager and his Advisory Panel at 2030 PST January 24 (D-2), 1500 PST January 25 (D-1), and 0500 PST January 26 (D day). The D day presentation is summarized below:

0500 PST, January 26, 1968

A low pressure area is developing in northern Nevada with a second low forming off the Washington coast and moving southward. We can expect a cold front which extends southwestward out of the low in northern Nevada to pass through our area late today.

Aloft, a major trough of low pressure is becoming well established over the West Coast with a closed low expected to form off the Oregon coastline and move southeastward by late tomorrow.

Winds at 10,000 feet MSL will result in an air trajectory at that level which will be over North Dakota in one day and off the East Coast in less than three days.

Precipitation will be general all along the air trajectory path north of Ely, Nevada.

Vertical stability will limit initial vertical mixing to below 8,000 feet MSL with later mixing through 12,000 feet and capping again at about 14,000 feet.

Briefing charts are shown in Figures 3.1 through 3.3.

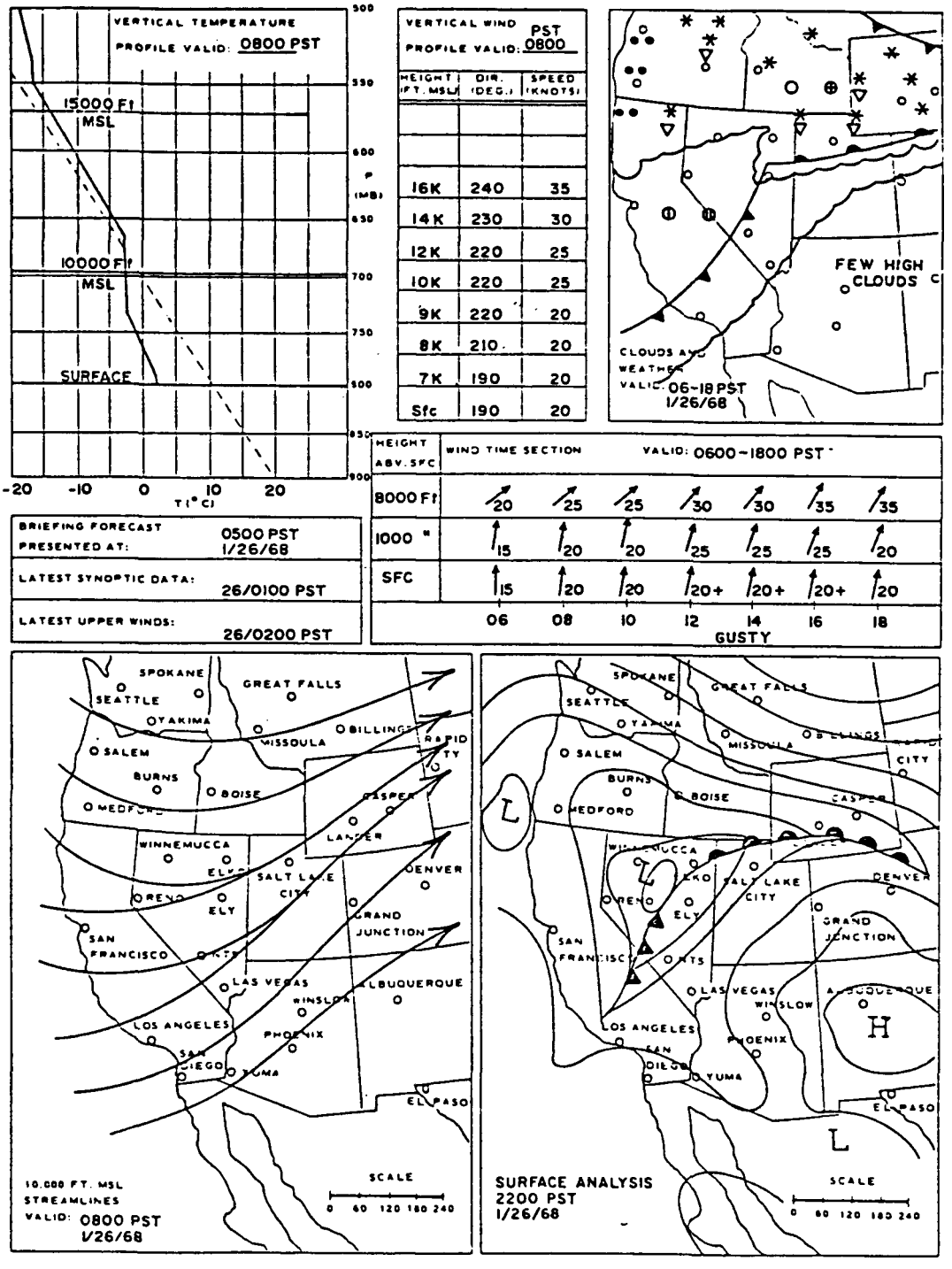



Figure 3.1. Weather briefing chart, 0500 PST, January 26, 1968.

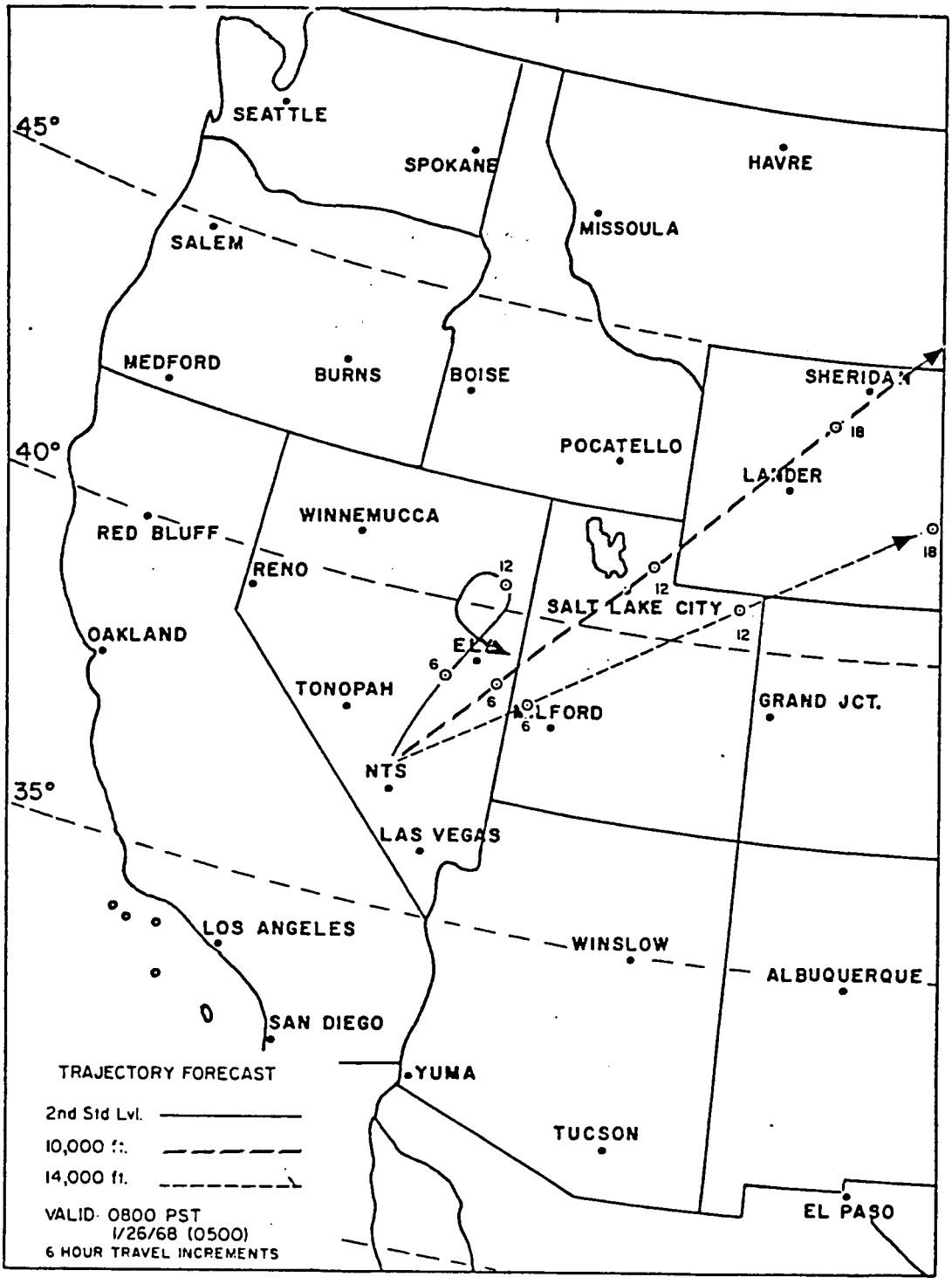



Figure 3.2. Trajectory forecast, 0500 PST, January 26, 1968.

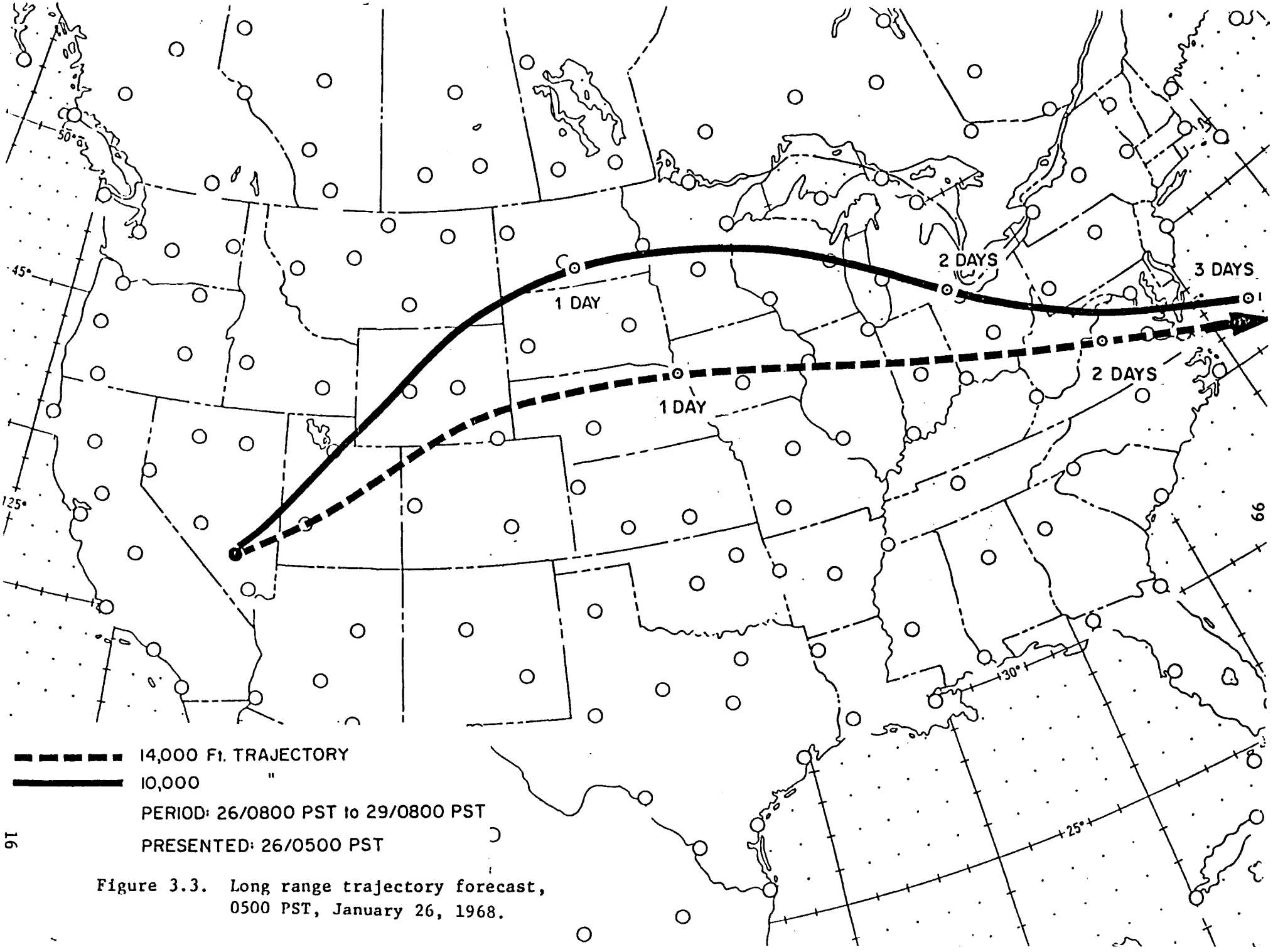



Figure 3.3. Long range trajectory forecast, 0500 PST, January 26, 1968.

# CHAPTER 4

# DISCUSSION

## 4.1 WEATHER DESCRIPTION/FORECAST VERIFICATION

D day weather was as predicted, with minor exceptions. Precipitation was general north of Ely, Nevada, as the surface low pressure area stagnated in central Nevada (Figure 4.1). Sky cover over the test area consisted of a middle cloud overcast, and visibility was unrestricted. Between the Nevada Test Site and Ely, the sky was mostly cloudy to overcast as evidenced by the 1030 PST observation at the Supplemental Test Site near Warm Springs, Nevada.

Wind directions, at the surface and aloft, in the vicinity of the testing area were southerly and southwesterly at zero time and remained so for several hours postshot, as forecast.

The flow pattern aloft was essentially as predicted, but deepening of the low pressure area aloft over the Pacific Northwest resulted in streamlines over the states northeast of Nevada which were oriented somewhat more north-south than had been forecast (Figure 4.2).

The vertical temperature profile measured at zero time (Figure 4.3) was in very good agreement with the forecast.

The degree to which the special restrictive criteria outlined in the Background section of this report were met is discussed below.

A. Initial winds were blowing into the desired sector.

B. The atmospheric vertical stability was nearer an isothermal condition than the specified neutral lapse rate condition.

C. The overcast cloud layer at about 18,000 feet MSL did not meet the requirement of no clouds below 20,000 feet MSL for aerial photography.

D. There was no precipitation in the testing area during the test. However, the debris cloud entered a precipitation area some 8 to 10 hours postshot.

## 4.2 GENERAL

Overall effectiveness of the instrumentation placed to support the event was good. Minor instances of equipment malfunction or suspected spurious data were noted.

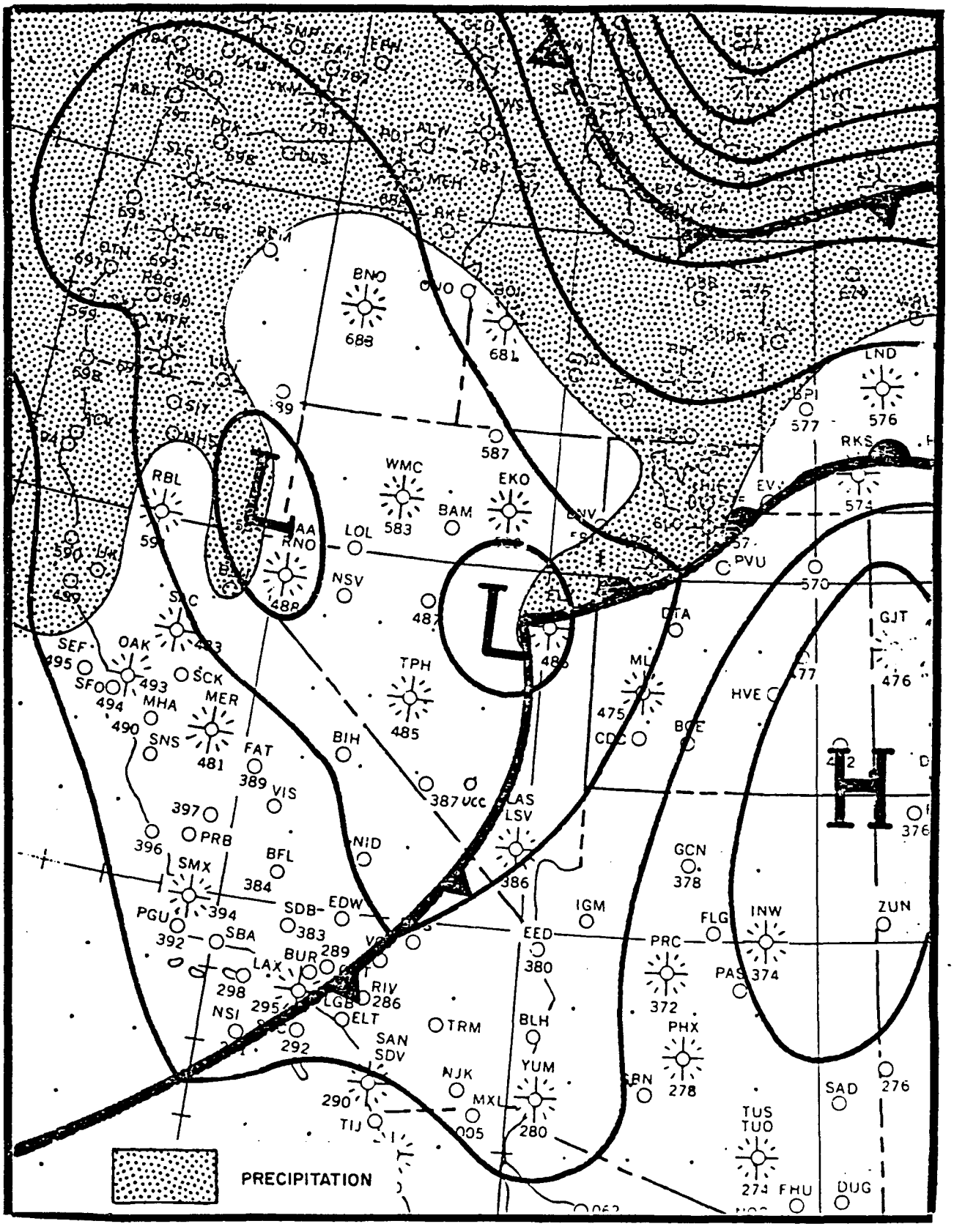



Figure 4.1. Surface weather chart, 0700 PST, January 26, 1968.

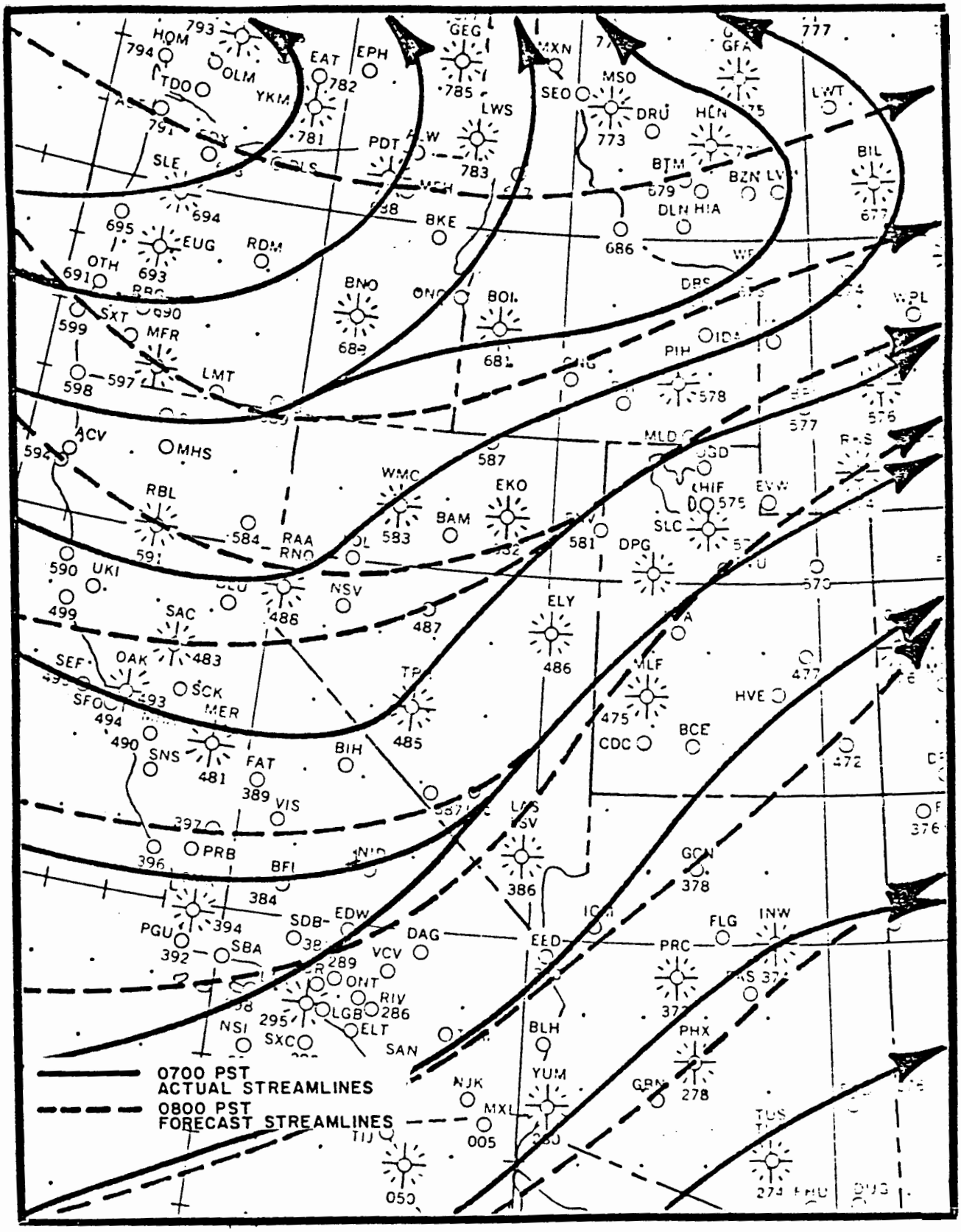



Figure 4.2. 10,000 ft MSL streamline analysis, 0700 PST, January 26, 1968.

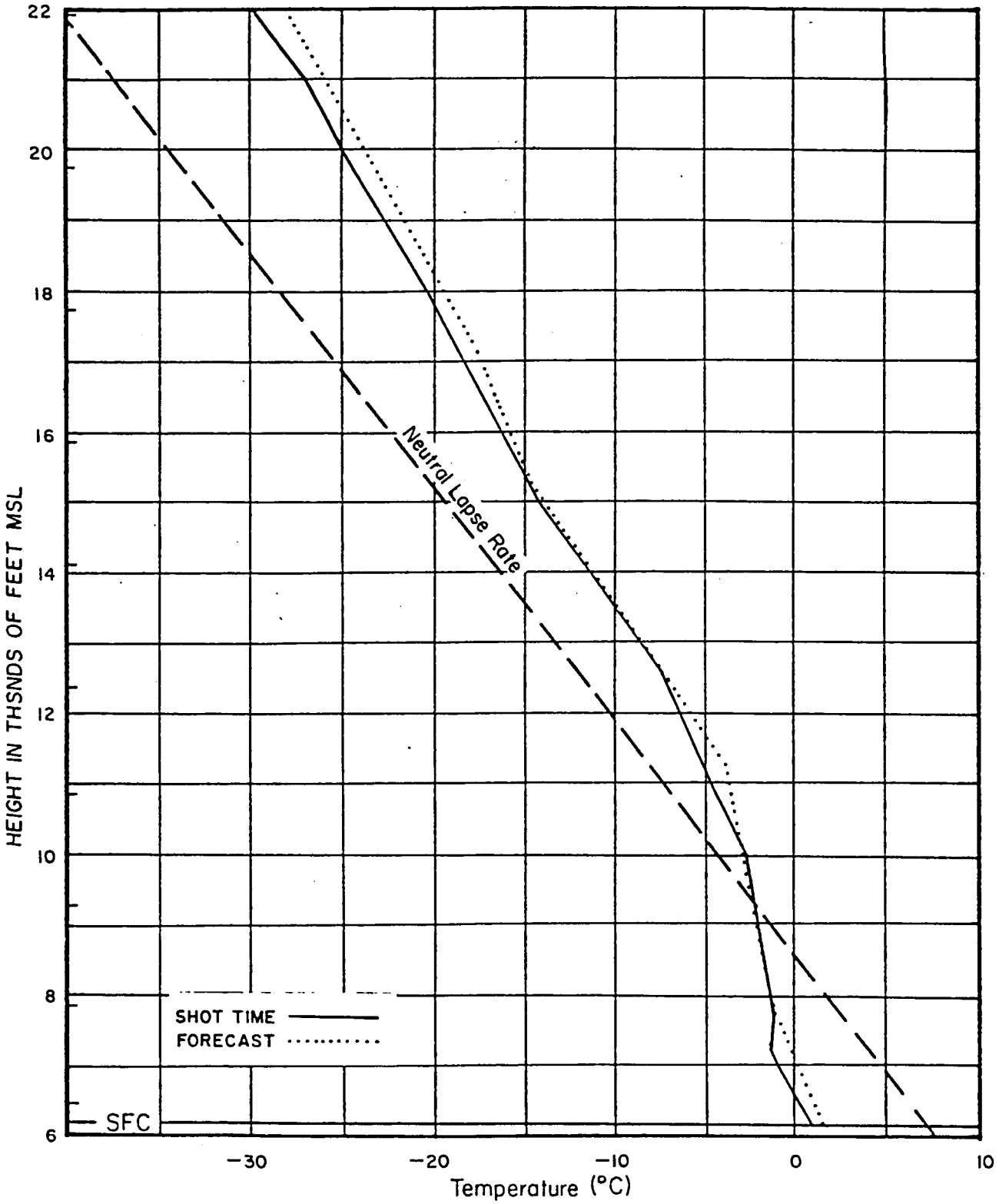



Figure 4.3. Shot-time vertical temperature profile.

The Systron-Donner temperature sensor situated near GZ required a correction which later tests showed was not linear. These data were considered doubtful and do not constitute a part of the report.

The radiotelemetered wind data from the station in Gold Flats exhibited a consistent northeasterly component even though general area winds were strong from the south quadrant. Since the station was located on the flats to the north of Pahute Mesa, it is conceivable that the station could be reflecting a low-level eddy effect.

# CHAPTER 5

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

Weather measurement and prediction objectives were met. This was a safety support activity providing information to the Test Manager and, to a lesser degree, to the technical programs.

## 5.2 RECOMMENDATIONS

ARL-LV is staffed and equipped to provide simultaneous meteorological support for routine underground testing at NTS, reactor testing at NRDS, and one off-NTS underground test. Adequate meteorological support of Project CABRIOLET required a much greater commitment of our resources than does an underground weapons test or a reactor test, a degree of effort which would have made it difficult to provide the support for any other project similar to CABRIOLET during the same operational period. We recommend that scheduling be such that maximum-effort events be separated so that meteorological support is not diluted by overlapping requirements.

We also recommend that, whenever possible, requests for meteorological support be made known to the ARL-LV Project Supervisor as early as possible. There were instances, particularly during preparation for the first planned execution of Project CABRIOLET, when meteorological support items were added in the final stages of project preparation. It is important that special requests for meteorological support be outlined to the Project Supervisor in sufficient time to permit him to make orderly plans for men and equipment.

Meteorological support could be improved through increased use of computer facilities for automation of data processing and for local numerical prediction of air trajectories and other meteorological parameters based on the latest local mesoscale data. Long-range ARL-LV plans include increasing use of electronic computers and automation (even to the extent of automated data acquisition systems), subject to funding capabilities.

# PART 2--RADIATION

## CHAPTER 6

## INTRODUCTION

Predictions of downwind fallout intensities were required as an integral part of the Test Manager's Operational Safety Program for CABRIOLET. The Radiation Branch, ARL-LV, had the responsibility of preparing fallout predictions for presentation at formal readiness briefings and for conducting a postevent evaluation of the fallout prediction method used. Program objectives in support of Project CABRIOLET were to:

A. Provide preliminary fallout predictions requested by various participants for the preparation of technical and safety plans;

B. Provide operational fallout predictions to the Test Manager and his Advisory Panel; and

C. Analyze observed radiological and meteorological data in order to document the local fallout pattern, compare the observed and predicted fallout, and determine the validity of the ARL-LV fallout prediction method in the case of CABRIOLET.

# CHAPTER 7

# PROCEDURE

## 7.1 FALLOUT PREDICTION

7.1.1 Preevent Planning. Fallout estimates were initially provided to the Effects Safety Division, NVOO, in early 1966 as guidance for Project CABRIOLET safety planning. In late 1966, estimates were also furnished to the Lawrence Radiation Laboratory (LRL), Livermore, California.

The preliminary fallout calculations encompassed a variety of meteorological conditions and analog models. Nonmeteorological data necessary to the prediction of fallout were provided by LRL. Such data included device yield and emplacement information. Final selection of the analog model best suited for the prediction of CABRIOLET fallout was coordinated with the Laboratory.

7.1.2 Event Support. Fallout predictions were made using a scaling technique (Reference 1) which has been employed in previous excavation experiments. This technique involves a direct scaling of new event parameters to those associated with a suitable analog model event. This implies the basic assumption that the particle size and size-activity distribution of the CABRIOLET cloud would be similar to that of the analog model. Comparison of yields and depths of burial between the two events provided a basis for estimating the maximum depositable amount of activity for CABRIOLET.

Meteorological information required for the fallout scaling technique are predictions of the vertical profiles of temperature and wind. Just prior to a scheduled readiness briefing, these predictions, prepared by the Weather Briefer, were utilized by the Radiation Briefer for estimating the associated meteorologically determined scaling parameters. These basic scaling parameters include nuclear cloud layer thickness, mean layer transport speed, and fallout hodograph (graphical depiction of the vertical distribution of wind direction and speed) shear determined by vectorial integration of winds through the entire cloud layer. All three parameters are normally time dependent and require interval scalings. With the predicted parameters, the analog model centerline (or hotline) fallout H+1 hour exposure rate versus distance curve was then directly scaled for prediction of the CABRIOLET centerline deposition intensities.

At the readiness briefings, the following information was presented:

A. The selected analog model.

B. The pertinent device-related data.

C. The meteorologically determined scaling parameters.

D. Fallout sector, centerline, and main debris cloud arrival times.

E. Centerline deposition external-gamma infinity exposure as a function of distance.

F. Maximum downwind extent of the 10- and 0.5-rad child's thyroid dose potentially resulting from the ingestion of $^{131}I$-contaminated cows' milk, based on Knapp's (Reference 2) conversion, adjusted for dry-feed conditions.

## 7.2 FALLOUT ANALYSIS

Postevent requirements assigned to the Radiation Branch, ARL-LV, involved the evaluation and analysis of radiological data to document the observed fallout pattern, to establish a better empirical background for possible improvement of prediction techniques, and to provide additional analog models for future events.

The following organizations provided the radiological data used for the postevent construction of the CABRIOLET fallout pattern:

A. U.S. Public Health Service.

B. Lawrence Radiation Laboratory.

C. Reynolds Electrical & Engineering Co., Inc.

D. EG&G, Inc.

Procedures followed in determining the CABRIOLET fallout field intensities and pattern were:

A. Analysis of gamma exposure-rate versus time profiles for the maximum cloud passage exposure rate and time of occurrence, the termination time of cloud passage, and subsequent decay characteristics of the residual radiation.

B. Normalization of deposition intensities to an H+1 hour value, using decay analyses when necessary.

C. Construction of an H+1 deposition exposure-rate contour pattern representative of ground-monitored radiation data, mobile and stationary.

D. Determination of the fallout centerline and associated H+1 exposure rates as a function of distance.

E. Calculation of the centerline infinity exposure as a function of distance.

F. Area integration of the H+1 deposition exposure rate contours.

G. Integration of the resulting H+1 exposure rate intensity versus area curve and conversion to an equivalent H+1 fission yield.

H. Computation of the fraction of total activity appearing as deposited activity.

Observed radiological, meteorological, and visual data were used to evaluate CABRIOLET scaling parameters. The results permitted a comparison of the predicted to observed parameters used in scaling for the fallout prediction. Postevent comparisons were extended to also include predicted and observed infinity centerline deposition exposure, fallout sector, and hotline orientation.

Finally, a postevent verification was performed to ascertain how well the scaling technique and analog model employed for the CABRIOLET event could calculate the observed fallout levels when utilizing scaling parameters determined postevent.

# CHAPTER 8

# RESULTS

## 8.1 FALLOUT PREDICTION

At the initial (D-2) readiness briefing, the fundamental assumptions adopted for preparing fallout predictions during the test support phase of Project CABRIOLET were presented.

At the final (H-3) readiness briefing, the vertical temperature profile and winds forecast were discussed and interpreted as the basis for the prediction of vertical nuclear cloud mixing, mean cloud layer transport speed, and fallout sector shear. The vertical extent of cloud debris mixing was predicted to be 5,000 feet at H+1 hour and the maximum mixing depth not to exceed 6,000 feet for the first five hours of cloud travel time. A mean layer transport speed of 20 mph to H+2 hours and 25 mph thereafter was estimated for the CABRIOLET cloud. The fallout sector shear was expected to average about 25 degrees.

The predicted fallout sector, hotline, and main cloud debris arrival times presented at the H-3 briefing are depicted in Figure 8.1. The corresponding H-3 hour external-gamma infinity exposure prediction along the fallout hotline is shown by Figure 8.2. Conversion of these projected exposure levels to potential iodine thyroid (ingestion) doses under dry-feed assumptions provided a maximum downwind distance prediction of 4 miles for the 10-rad dose and 22 miles for the 0.5-rad dose.

At H-1/2 hour, a final fallout sector and hotline prediction, revised on the basis of observed H-1 hour winds, was displayed to the Test Manager and members of the Safety Advisory Panel. Figure 8.3 presents the revised prediction. The initial bearing of the fallout hotline from ground zero was projected to be approximately 340 degrees.

## 8.2 FALLOUT ANALYSIS

Gamma exposure-rate versus time profile data within a 10-mile radius of ground zero were collected by an array of LRL and REECo ground telemetry units. In addition to these measurements, mobile and stationary ground-monitored exposure-rate data were provided by REECo and USPHS. Supplementary ground data included USPHS dosimetry results. Construction of the observed CABRIOLET fallout pattern was based on the analysis and interpretation of the above radiological measurements.

Deposition decay analyses revealed decay rates varying as a function of distance and time. In general, decay rates approximated $t^{-1.1}$ near the deposition hotline. Resuspension of deposited particulates was evident at

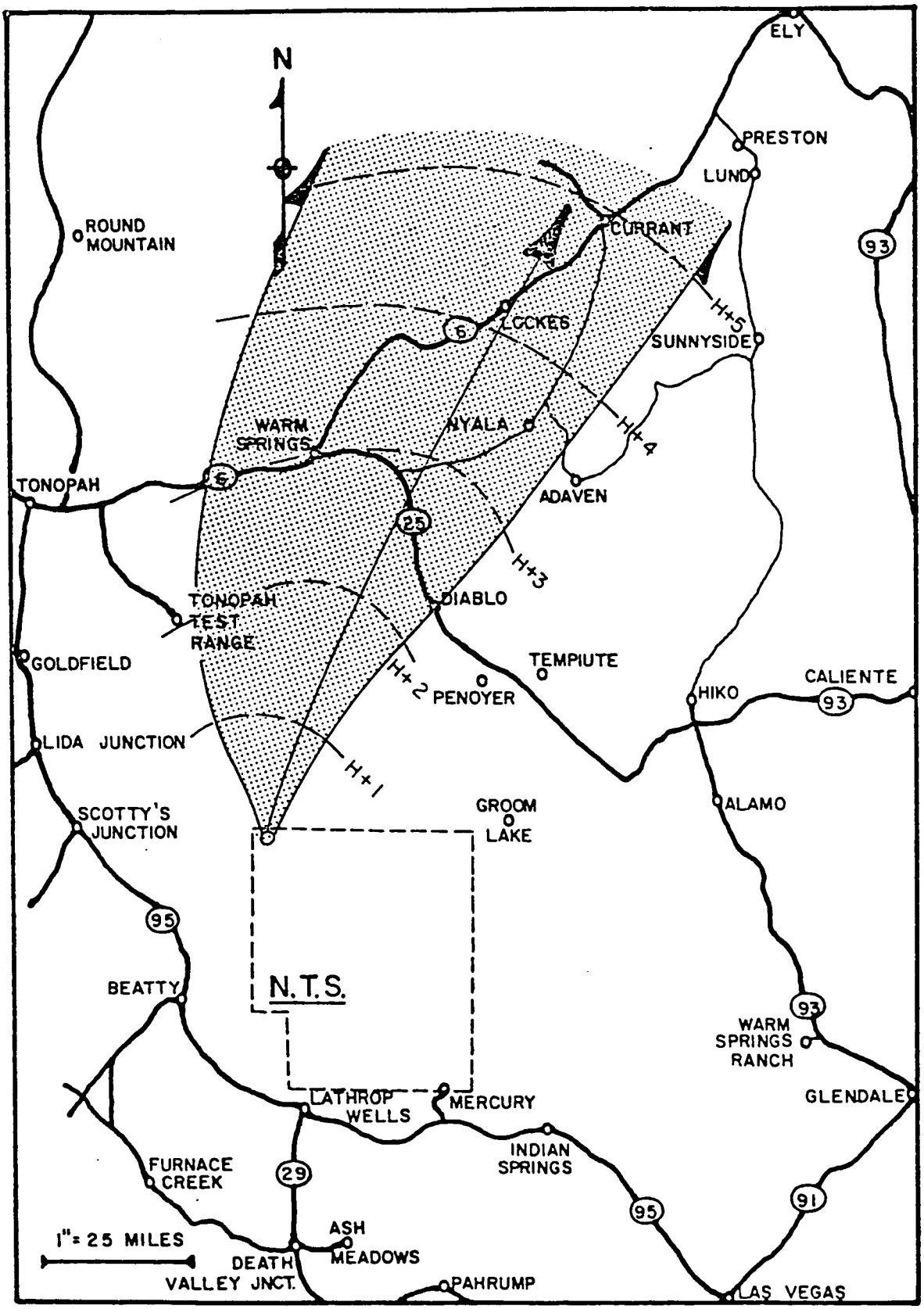
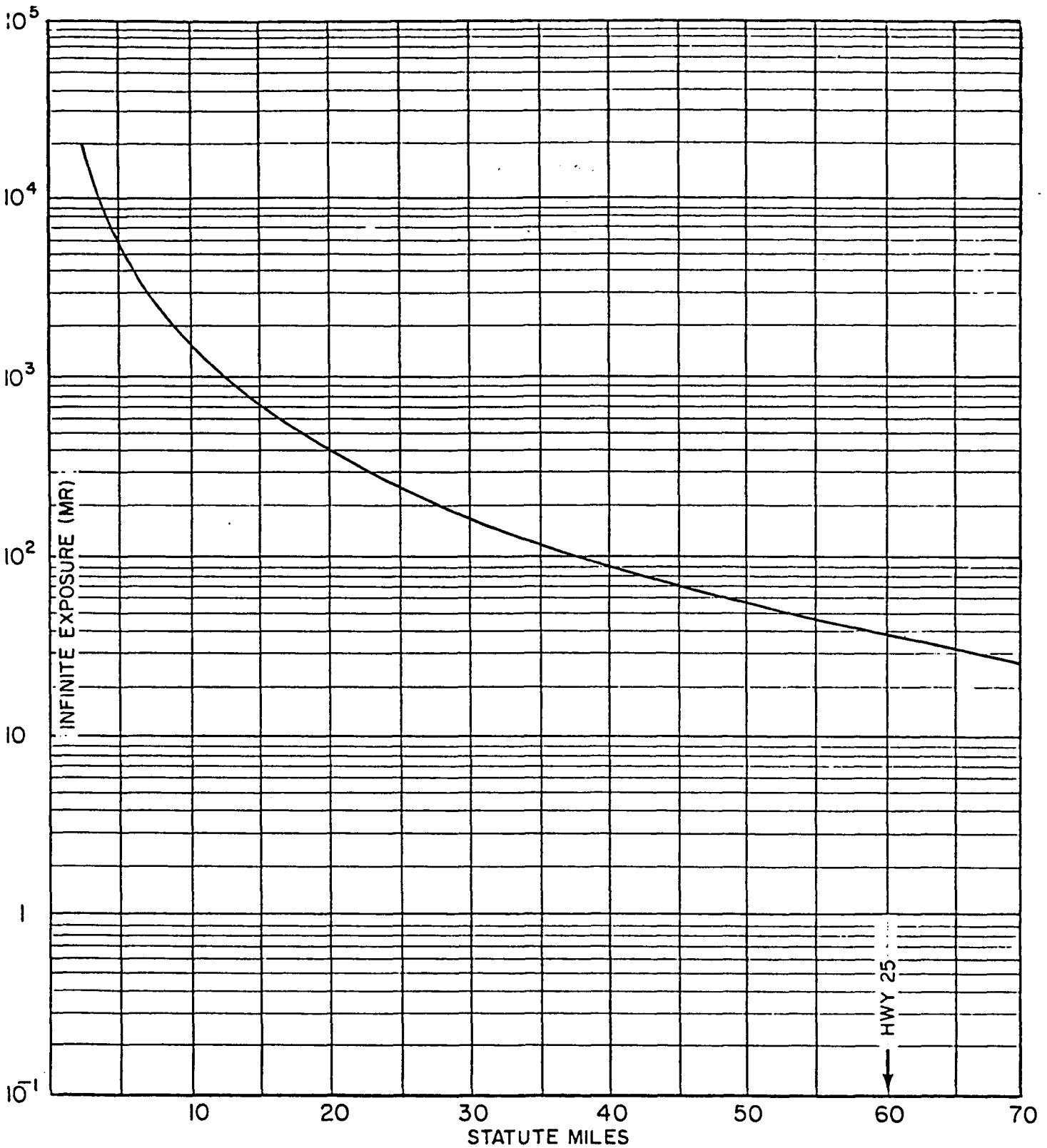



Figure 8.1. Fallout sector prediction (H-3) for CABRIOLET.




Firgure 8.2. Centerline deposition infinity exposure prediction (H-3) for CABRIOLET.

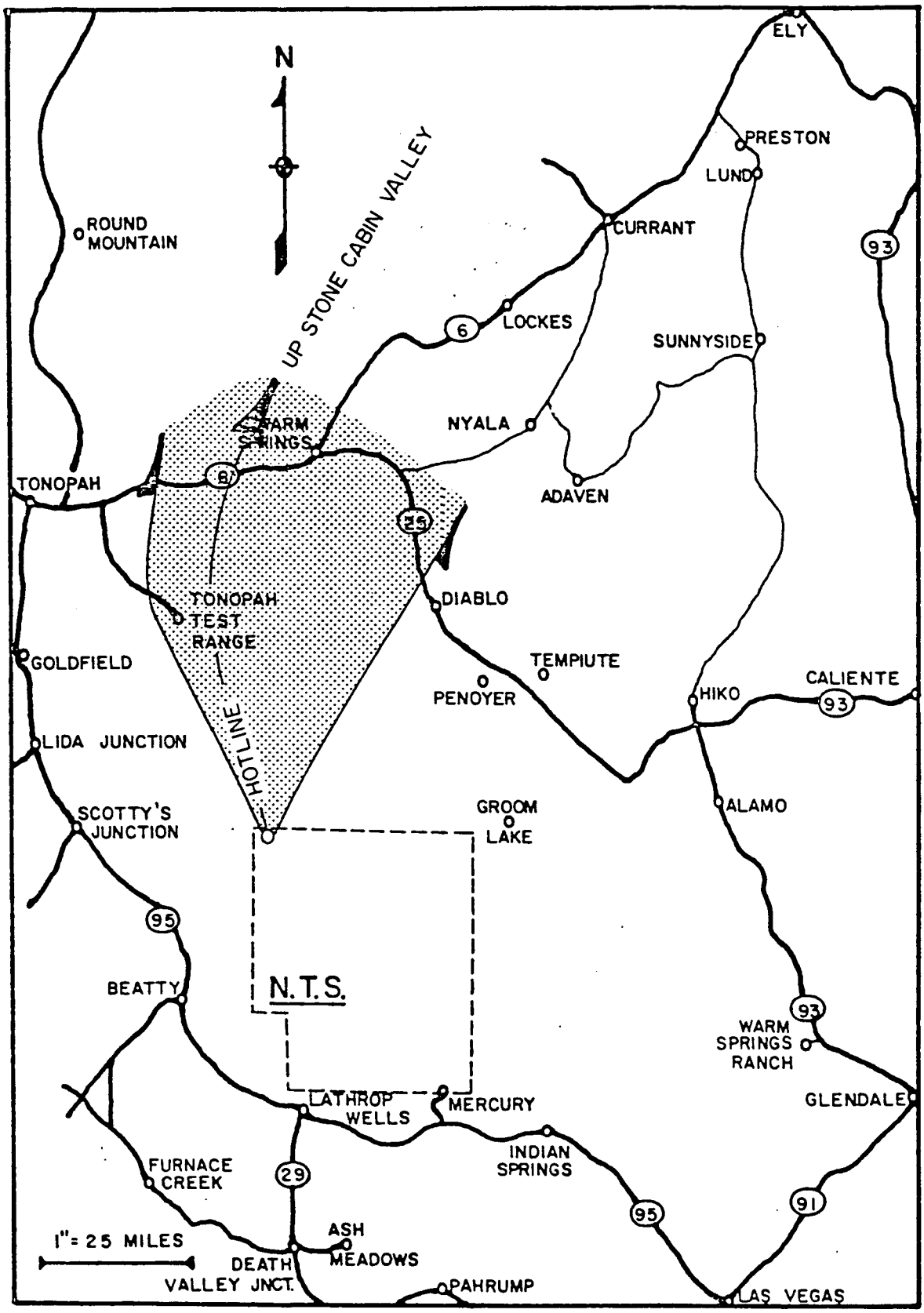



Figure 8.3. Fallout sector prediction (H- 1/2) for CABRIOLET.

some locations which made decay rate interpretation difficult for these locations. The results attained through the deposition decay analysis enabled normalization of exposure rate data to an H+1 hour value in those cases where the H+1 deposition exposure rate was not directly measured.

Figure 8.4, 8.5, and 8.6 present the H+1 hour fallout pattern analyses beyond the throw-out area for CABRIOLET. The fallout area enclosed within the 1 mR/hr (H+1) exposure-rate contour along with the associated hotline is depicted in Figure 8.4. Figures 8.5 and 8.6 present the fallout pattern analysis in greater detail. By integration techniques, the fraction of total activity produced which appeared as deposited activity was calculated. Figure 8.7 shows the observed deposition centerline H+1 exposure rate as a function of distance.

Based on optical photography, laser, and aircraft surveillance information, the vertical thickness attained by the CABRIOLET cloud at H+1 hour is estimated to have been 3,500 feet. By H+5 hours, vertical mixing of debris was through a 5,000-foot layer. Analyses of cloud passage exposure rate profiles show that the peak cloud activity was transported at 25 mph during the first hour and at 30 mph over the next hour. Figure 8.8 presents the peak centerline exposure rates evaluated for CABRIOLET cloud passage at downwind distances. In general, the fallout sector shear associated with the main debris cloud averaged between 20 and 30 degrees over the extent of the analyzed patterns.

Actual thyroid dose measurements were not available for direct evaluation of potential thyroid dose predictions. Also, a direct evaluation of the applicability of the Knapp (Reference 2) empirical relationship employed in the prediction of potential thyroid doses was not possible since peak concentrations of $^{131}I$ in cows' milk were not measured near the fallout hotline. However, integrated $^{131}I$ air concentrations were measured at two locations relatively near the fallout hotline at distances between 60 and 70 miles from GZ. In the next chapter, a discussion is made of these data as they pertain to the prediction of potential child's thyroid doses.

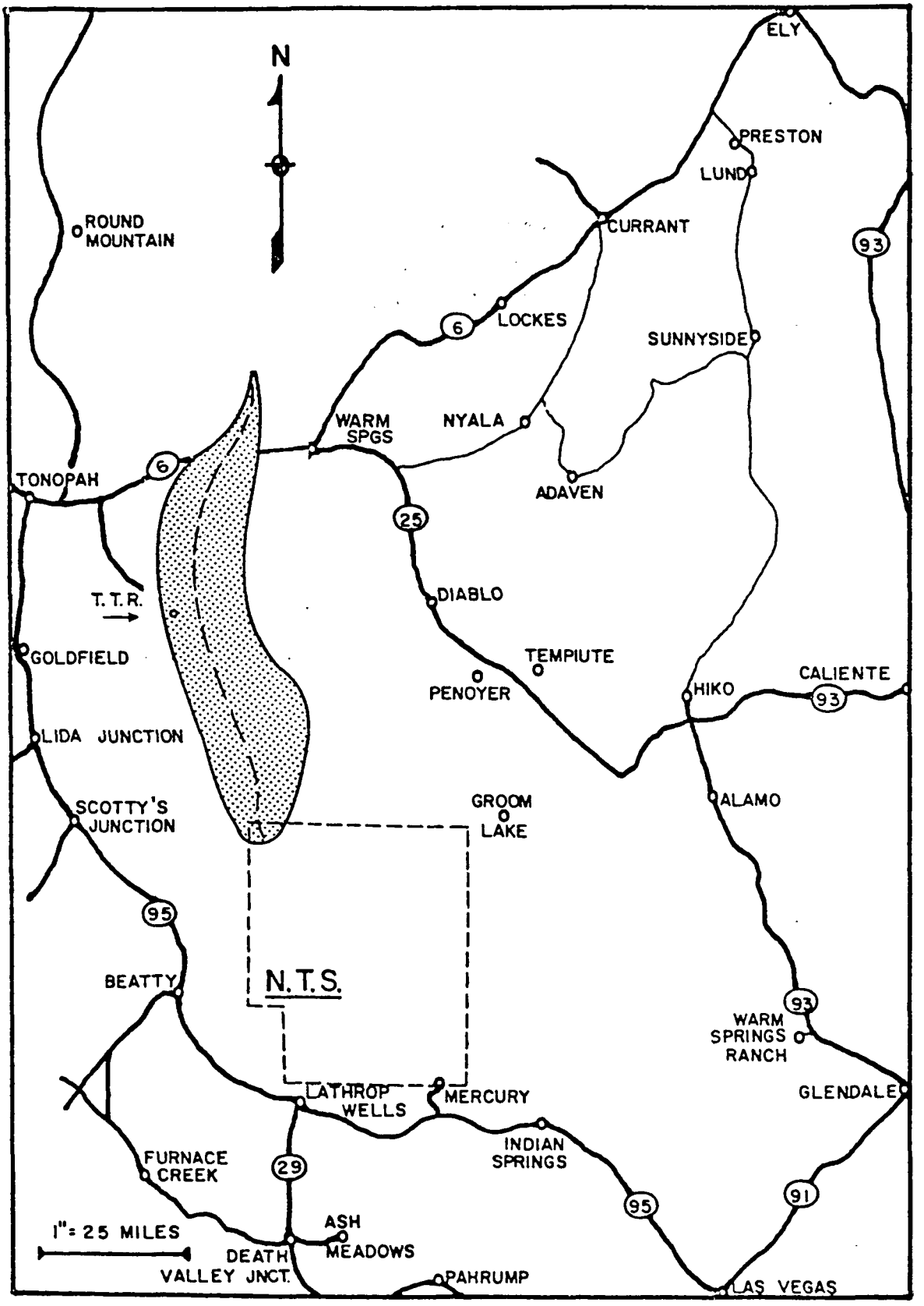



Figure 8.4. Observed CABRIOLET deposition pattern delineated by the 1 mR/hr exposure rate contour.

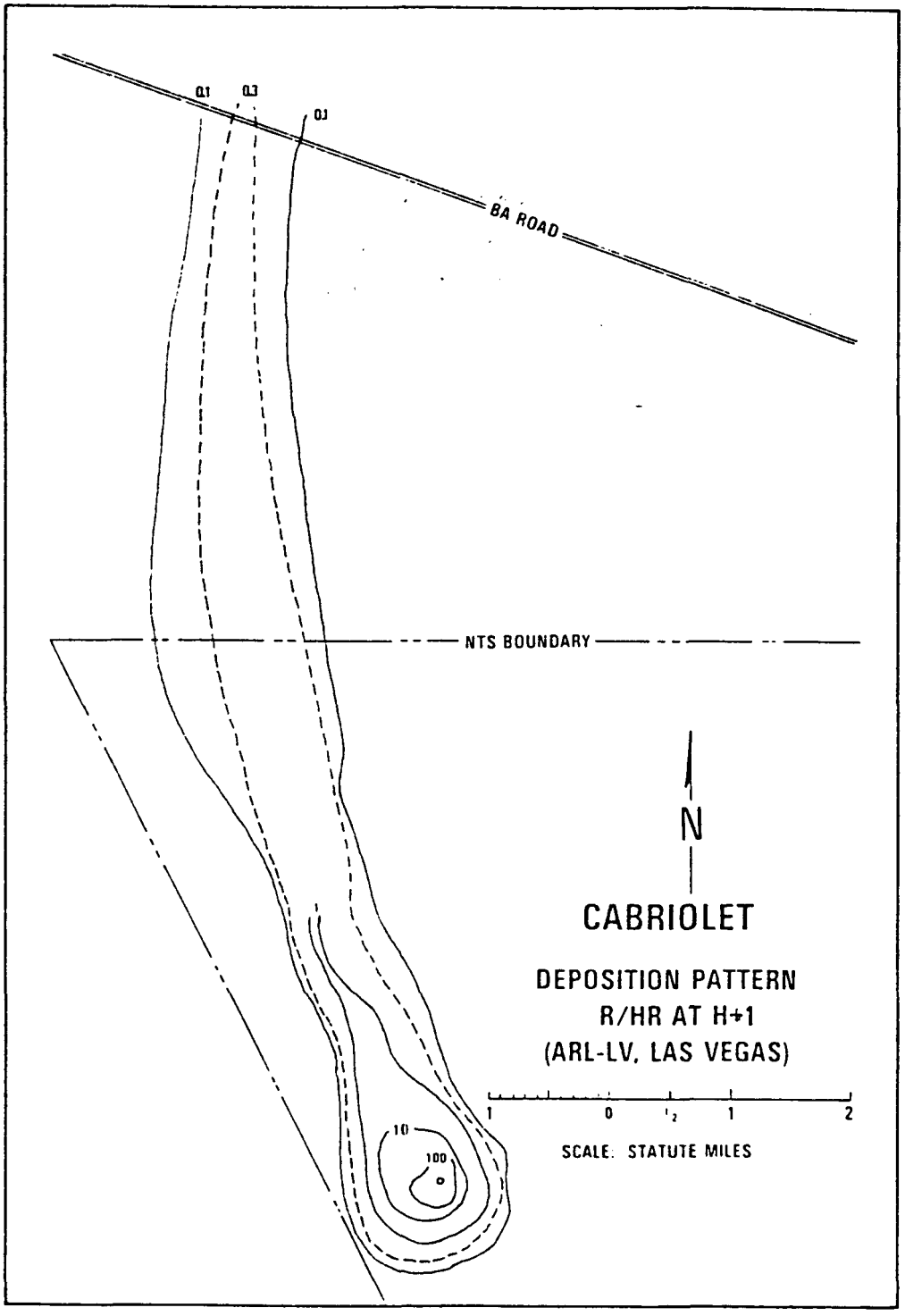



Figure 8.5. Observed CABRIOLET close-in deposition pattern.

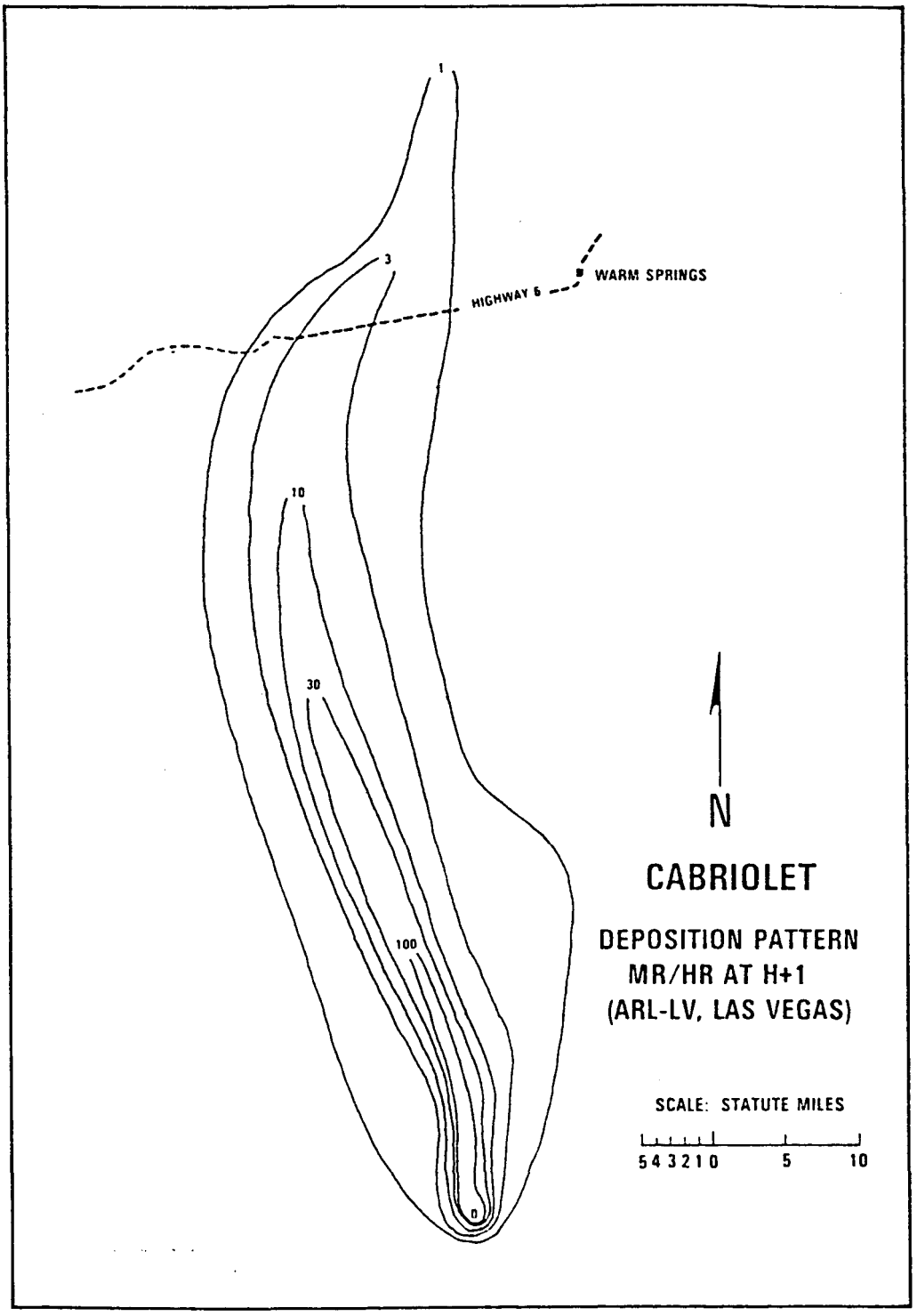



Figure 8.6. Observed CABRIOLET extended deposition pattern.

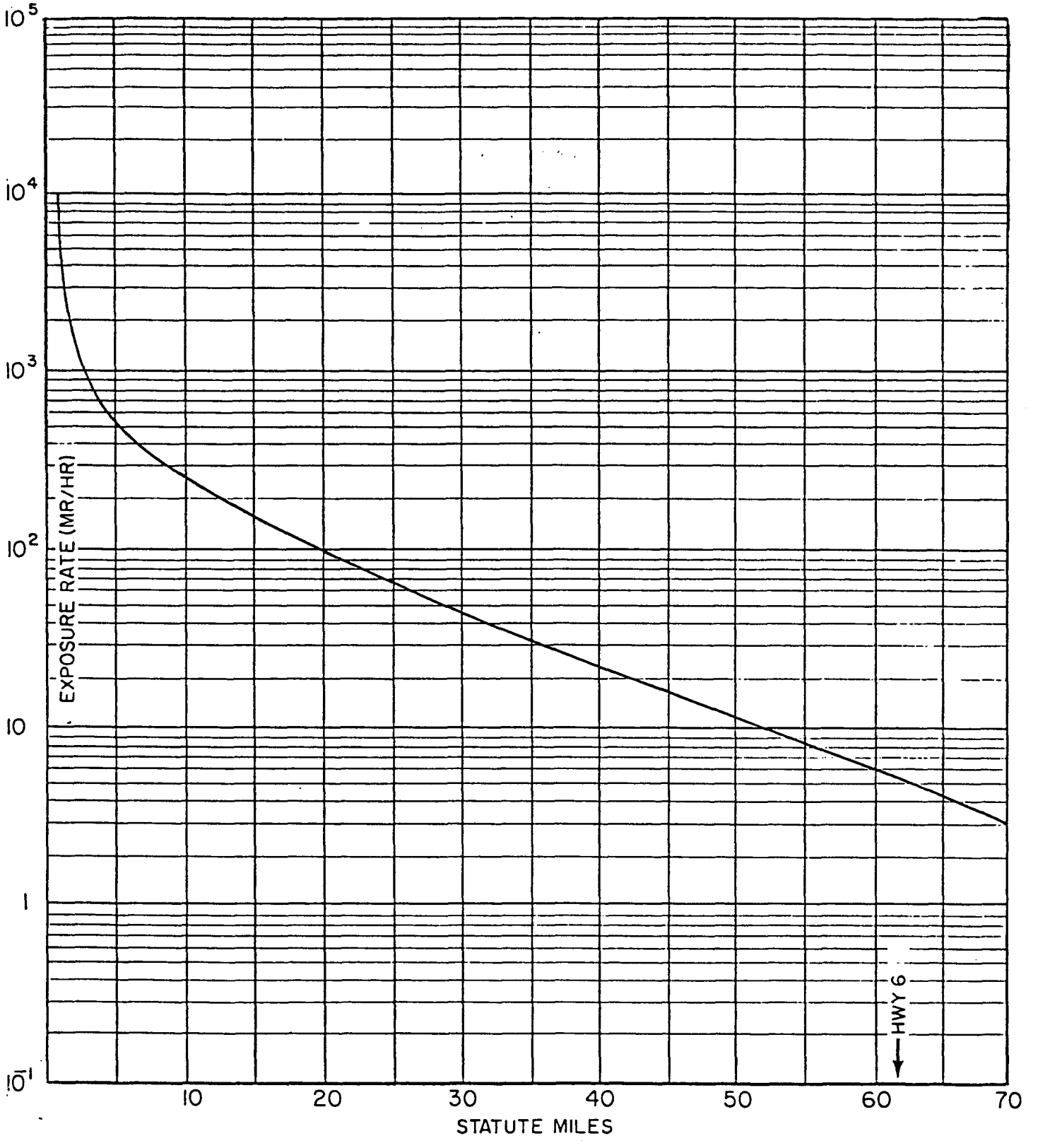



Figure 8.7. Observed CABRIOLET deposition centerline (H+1) exposure-rate curve.

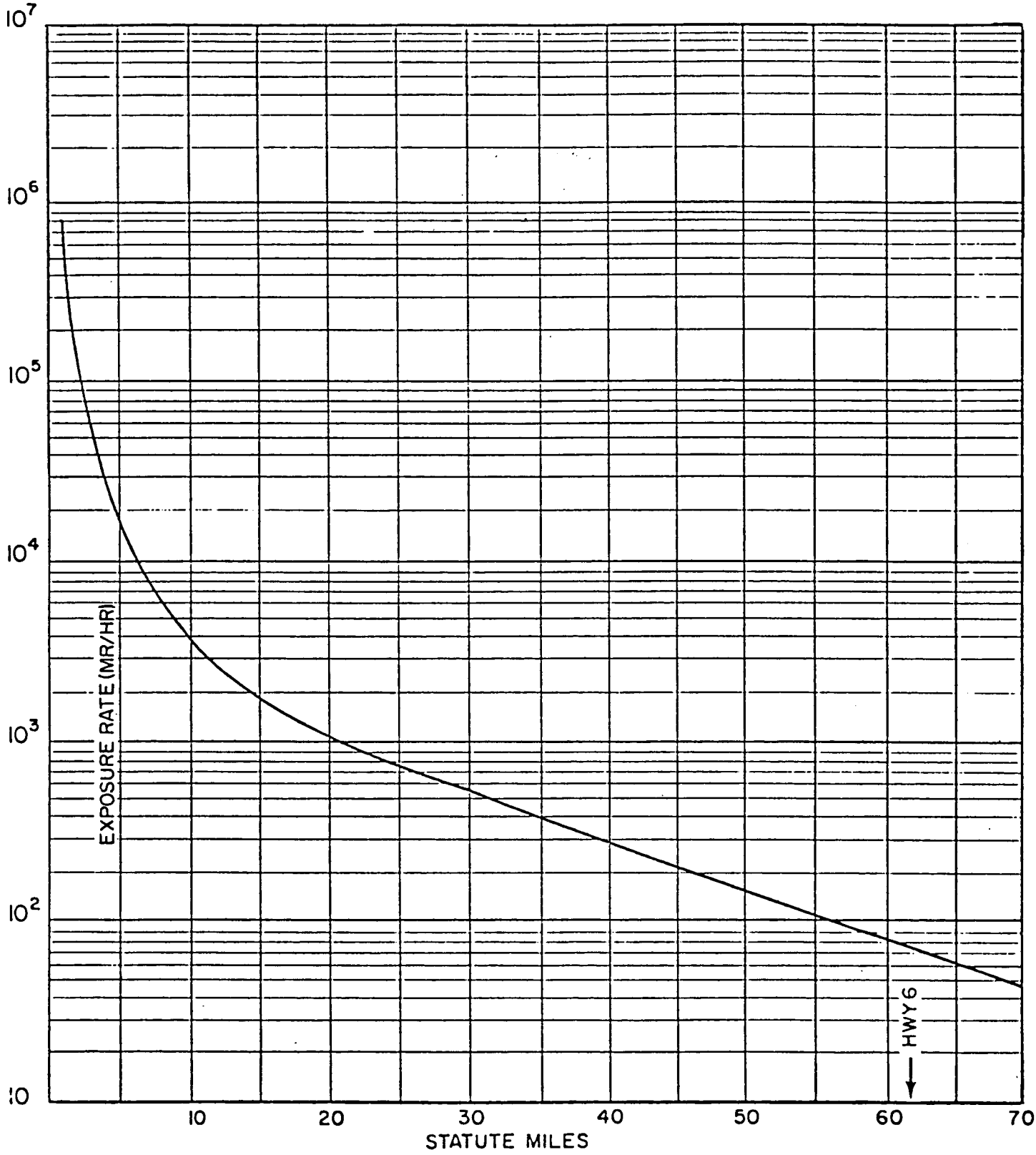



Figure 8.8. Observed CABRIOLET cloud passage centerline peak exposure-rate curve.

# CHAPTER 9

# DISCUSSION

## 9.1 RELIABILITY OF FALLOUT ANALYSIS

The CABRIOLET residual radiation field was most extensively monitored within the first 10 miles from GZ and along Highway 6. For the intervening distance, however, radiological ground measurements were extremely limited except in areas to the east of the fallout hotline. Construction of the western half of the fallout pattern over this 50-mile span was therefore considerably subjective. Because of the lack of hotline data over the same region, a high degree of confidence cannot be attached to the analyzed CABRIOLET fallout exposures along with 50-mile hotline distance. It is impossible to objectively assess the degree of uncertainty to be associated with the fallout pattern analysis, but errors in excess of 50 percent are possible.

## 9.2 COMPARISON OF OBSERVED AND PREDICTED FALLOUT

The predicted and observed fallout exposure curves are illustrated in Figure 9.1. Close agreement (factor of 2) exists between the two out to about 40 miles, beyond which the curves diverge. At 70 miles, approximately an order of magnitude overprediction of the exposure occurred.

Comparison of Figures 8.3 and 8.4 shows that the H-1/2 hour fallout sector prediction corresponds reasonably well with the observed 1 mR/hr (H+1) contour pattern. Excellent agreement exists between the predicted and observed fallout hotline position.

Total fallout activity estimated for CABRIOLET, assuming maximum device yield, was larger than that present in the analog model.

The forecast and observed meteorologically defined fallout scaling parameters are compared below:

| Forecast | Observed |
|---|---|
| Cloud Depth | Cloud Depth |
| H+1: 5,000 ft | H+1: 3,500 ft |
| H+3: 6,000 ft | H+3: 4,000 ft |
| Mean Speed | Mean Speed |
| H+1: 20 mph | H+1: 25 mph |
| H+3: 25 mph | H+3: 25 mph |
| Sector Shear | Sector Shear |
| 25 degrees | 20-30 degrees |

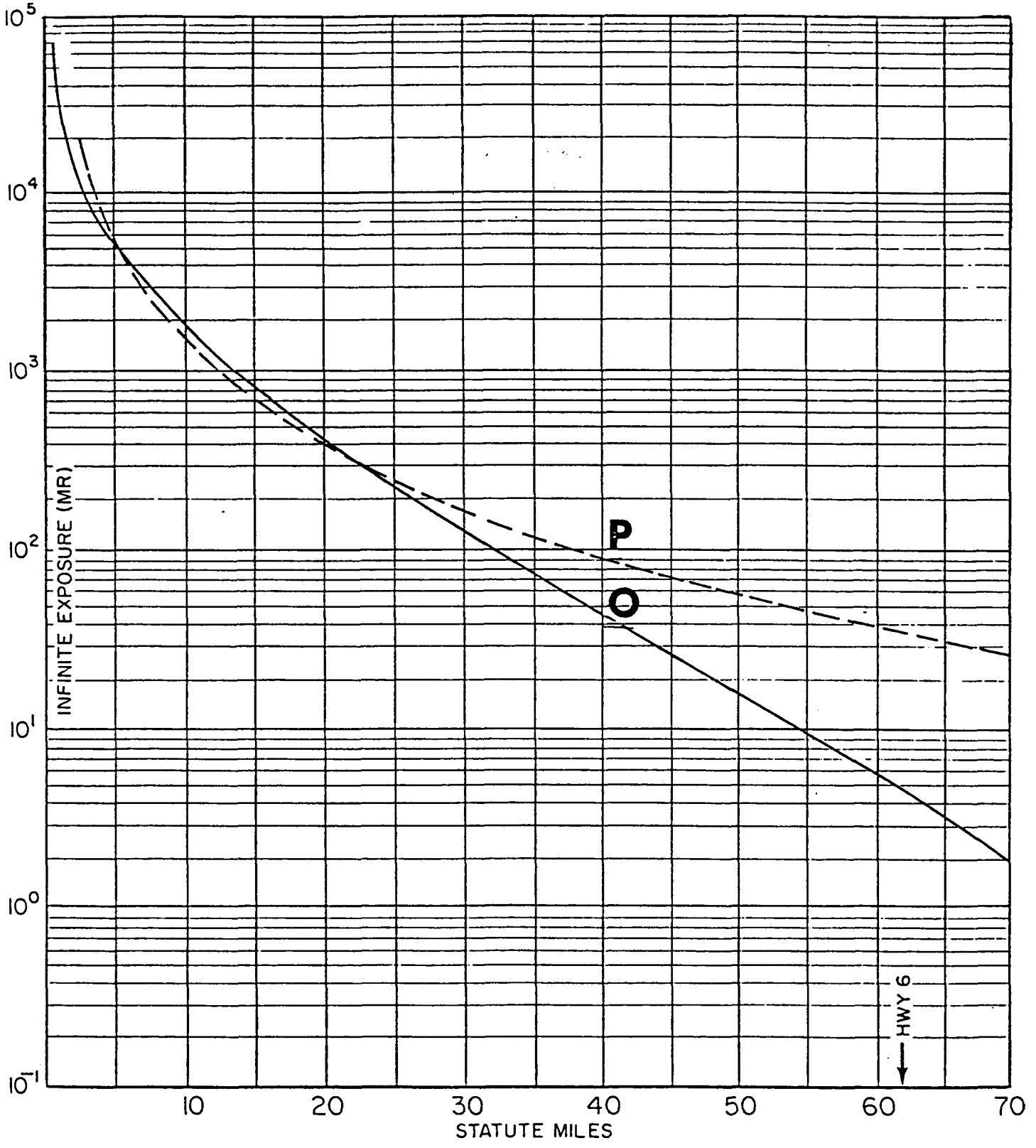



Figure 9.1. CABRIOLET predicted (P) and observed (O) deposition centerline infinity exposure curves.

The primary difference existing between predicted and observed values is associated with the cloud rise. Actual vertical cloud mixing was more limited than expected over the first three hours.

## 9.3 VERIFICATION OF FALLOUT PREDICTION METHOD

The methodology employed for CABRIOLET fallout predictions was subjected to a postevent evaluation. Centerline deposition exposure calculations were made by scaling the observed CABRIOLET parameters to the analog fallout model.

This postevent calculated centerline fallout curve of exposure versus distance is illustrated in Figure 9.2 along with the observed CABRIOLET curve. Less than a factor of 2 difference between the two curves exists out to about 60 miles. The greatest departure of calculated-from-observed values occurs at 70 miles where a factor of between 4 and 5 overprediction of the observed exposure appears. This close agreement between the calculated and observed exposure values apparently justified the use of the prediction methodology and the analog for CABRIOLET fallout predictions.

The method employed to predict maximum child's thyroid doses potentially resulting from the ingestion of $^{131}I$-contaminated cows' milk required a number of assumptions. Foremost was the assumed validity of the Knapp empirical relationship and its applicability to this event. Radioiodine data collected within the CABRIOLET fallout pattern did not permit direct verification of the assumed relationship, but an indirect evaluation was possible.

Total integrated $^{131}I$ air concentration data (USPHS) obtained during cloud passage at two locations relatively near the fallout hotline were applied for the indirect assessment. Total integrated $^{131}I$ air concentrations of $3.45 \times 10^6$ pCi-sec/m$^3$ and $4.9 \times 10^6$ pCi-sec/m$^3$ were measured at Clark Station (61 miles) and at Stone Cabin Ranch (65 miles), respectively. Conversion of these air concentrations to hypothetical $^{131}I$ concentrations in milk (Reference 3) gave peak levels of 1,380 pCi/l at Clark Station and 1,960 pCi/l at Stone Cabin Ranch. Knapp's range relationship between deposition gamma levels and maximum $^{131}I$ concentrations in milk ($I_{max}$ = 26,000 $r_o$ to 96,000 $r_o$) presented a range in peak levels of 1,350 to 5,000 pCi/l at Clark Station and 600 to 2,200 pCi/l at Stone Cabin Ranch. Here, $r_o$ represents the H+24 hour open field deposition dose rate (mR/hr) which was determined from the CABRIOLET fallout analysis. Both conversion techniques relate to green pasture forage.

Milk concentrations estimated on the basis of sampled $^{131}I$ air concentrations at the two locations both fall within the range of concentrations provided by Knapp's relationship. It is also noted that one station concentration verifies at the lower level of Knapp's range estimate and the other station concentration at the higher level. Thus, the comparative results, indirectly obtained, add some degree of credence to the empirical relationship reported by Knapp.

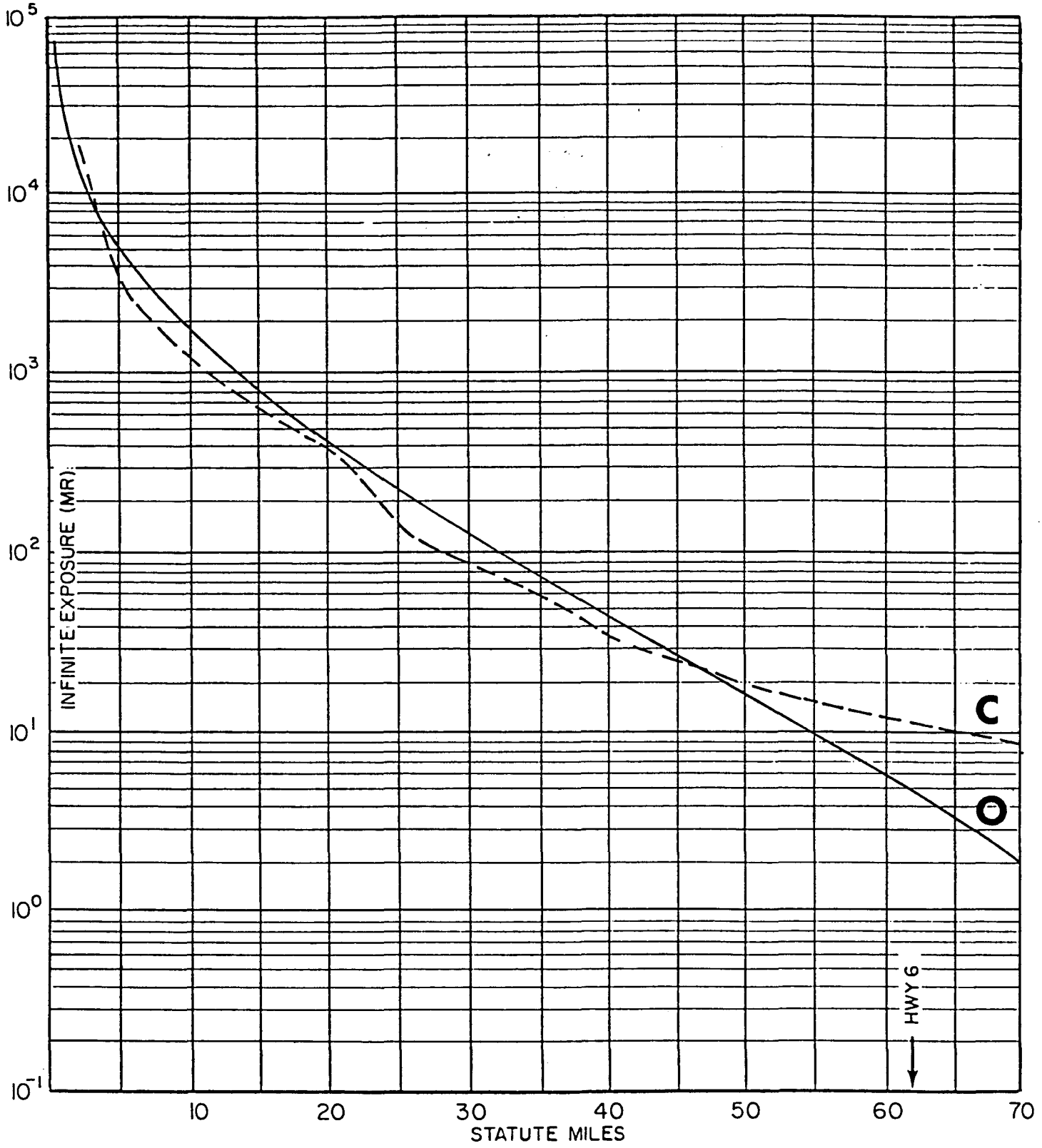



Figure 9.2. CABRIOLET observed (O) and post-event calculated (C) deposition centerline infinity exposure curves.

# CHAPTER 10

# CONCLUSIONS

Observed radiological and meteorological data were analyzed in order to document the CABRIOLET fallout pattern. This pattern provided the information necessary to compare the observed and predicted fallout and to verify the fallout prediction methodology.

Fallout predictions presented at the final readiness briefing were evaluated. The final fallout sector prediction corresponds fairly well to the observed pattern and the prediction of hotline location is in excellent agreement with that observed. Close agreement (factor of 2) between the predicted and observed fallout centerline infinity exposures is found out to a distance of about 40 miles, beyond which overprediction occurs. Predicted and observed meteorologically determined fallout scaling parameters, with the exception of nuclear cloud rise, agree very favorably. Nuclear cloud rise was overpredicted.

The methodology employed for CABRIOLET fallout predictions was evaluated. A comparison of postevent calculated and observed infinity exposures as a function of distance was made. Less than a factor of 2 difference between the two curves exists out to about 60 miles. A factor of between 4 and 5 is found at the distance of 70 miles. This close agreement between the calculated and observed exposure values apparently has justified use of the prediction methodology and the analog for CABRIOLET fallout predictions.

Radioiodine data collected within the CABRIOLET fallout pattern did not permit a direct evaluation of thyroid dose prediction methodology. However, an indirect evaluation indicates that hypothetical concentrations of $^{131}I$ in cows' milk, based on air concentration data, fall within the range of concentrations calculated by means of the Knapp empirical relationship. Thus, some justification can be made for the methodology employed for CABRIOLET potential thyroid dose predictions.

## REFERENCES


1. Cluff, F. D., and T. R. Palmer. "A Fallout Scaling Model for the Prediction of Gross Gamma Dose Rates from Earth Cratering Detonations." Unpublished manuscript, ESSA, ARFRO, Las Vegas, Nevada.

2. Knapp, H. A. "Iodine-131 in Fresh Milk and Human Thyroids Following a Single Deposition of Nuclear Test Fallout." TID-19266, U.S. Atomic Energy Commission, Division of Technical Information, 1963.

3. Bernhardt, D. E., et al., "NRDS Nuclear Rocket Effluent Program, 1959-1970." NERC-LV-539-6 (pp. 52-53). U.S. Environmental Protection Agency, Las Vegas, NV, June 1974.

# APPENDIX

This Appendix contains upper air and winds aloft data from the stations shown in Figure 2.2. Also, in this Appendix, are winds aloft data from Weather Bureau Airport Stations at Las Vegas, Ely, Reno, and Winnemucca, Nevada; Boise and Pocatello, Idaho; Medford, Oregon; and Salt Lake City, Utah. Wind data from the five SYSTRAC stations shown in Figure 2.1 and a 100-foot tower in Area 12 (Rainier Mesa) are at the end of this Appendix. Also, at the end of this Appendix, are temperature and relative humidity data from a hygrothermograph that was located near GZ.

# APPENDIX
# METEOROLOGICAL DATA

## CABRIOLET

SURFACE OBSERVATION AT : U20B - 37°15'N, 116°26'W, Elevation 6550 Ft. MSL.
0800 PST January 26, 1968

| | | |
|---|---|---|
| Weather | : | None |
| Sky Condition | : | Overcast with Altostratus |
| Visibility | : | Unrestricted |
| Atmospheric Pressure | : | 788.4 Millibars |
| Temperature | : | 0.4°C |
| Dew Point Temperature | : | -6.7°C |
| Relative Humidity | : | 59% |

SURFACE DATA (from RAOB) : 6187 Feet, MSL, 0800 PST, January 26, 1968

| | | |
|---|---|---|
| Atmospheric Pressure | : | *801 Millibars (Extrapolated data) |
| Temperature | : | *1.3°C " " |
| Dew Point Temperature | : | --°C |
| Relative Humidity | : | --% |

*G.Z. Height was below height at U20B

UPPER AIR DATA AT : U20B, 0800 PST, January 26, 1968

| | HEIGHT (Ft.MSL) | WIND (Deg/Kts) | PRESSURE (mb) | TEMPERATURE (°C) | DEW POINT (°C) | RELATIVE HUMIDITY (%) |
|---|---|---|---|---|---|---|
| SFC | 6550 | 160/10 | 789 | 0.4 | -6.7 | 59 |
| | 7000 | 160/20 | 777 | -0.9 | -4.4 | 77 |
| | 7230 | 160/20 | 770 | -1.6 | -9.3 | 56 |
| | 7780 | 180/20 | 754 | -1.1 | -10.8 | 48 |
| | 8000 | 190/20 | 748 | -1.2 | -11.4 | 46 |
| | 9000 | 210/19 | 719 | -1.9 | -13.4 | 41 |
| | 9800 | 240/23 | 696 | -2.4 | -15.1 | 37 |
| | 10000 | 250/25 | 691 | -2.7 | -16.1 | 35 |
| | 11000 | 250/20 | 664 | -4.6 | -19.2 | 31 |
| | 12000 | 240/16 | 639 | -6.4 | -21.1 | 30 |
| | 12600 | 240/19 | 624 | -7.6 | -23.0 | 28 |
| | 13000 | 250/22 | 615 | -8.6 | -23.1 | 30 |
| | 14000 | 240/22 | 592 | -11.3 | -23.1 | 37 |
| | 15000 | 250/25 | 568 | -14.2 | -23.8 | 44 |
| | 16000 | 240/23 | 546 | -16.1 | -22.1 | 60 |
| | 16500 | 240/25 | 536 | -17.0 | -21.8 | 66 |
| | 17000 | 250/30 | 525 | -18.1 | -22.9 | 66 |
| | 18000 | 250/30 | 503 | -20.3 | -24.9 | 67 |
| | 19000 | 260/30 | 482 | -22.5 | -26.8 | 68 |

| | | | | | |
|---|---|---|---|---|---|
| 20000 | 260/34 | 463 | -24.8 | -28.9 | 69 |
| 20400 | 250/34 | 454 | -25.6 | -29.6 | 69 |
| 21000 | 250/35 | 444 | -27.0 | -31.0 | 69 |
| 22000 | 240/36 | 425 | -29.7 | -33.5 | 70 |
| 23000 | 240/38 | 408 | -32.0 | -35.5 | 71 |
| 23430 | 240/39 | 400 | -33.2 | -36.7 | 71 |
| 24000 | -- | 386 | -35.4 | -39.0 | 70 |
| 25000 | 230/42 | 372 | -37.5 | -41.2 | 68 |
| 26000 | -- | 357 | -39.6 | -43.2 | 68 |
| 26120 | -- | 355 | -40.0 | -43.7 | 68 |
| 27000 | -- | 342 | -42.2 | -- | -- |
| 28000 | -- | 326 | -44.7 | | |
| 29000 | -- | 313 | -47.0 | | |
| 30000 | 230/45 | 298 | -49.5 | | |
| 30070 | -- | 297 | -49.8 | | |
| 31000 | -- | 284 | -51.7 | | |
| 32000 | -- | 272 | -53.9 | | |
| 32550 | -- | 264 | -55.0 | | |
| 33000 | -- | 258 | -55.6 | | |
| 34000 | | 246 | -57.4 | | |
| 35000 | 240/54 | 234 | -59.0 | | |
| 36000 | -- | 224 | -60.6 | | |
| 36500 | -- | 218 | -61.4 | | |
| 37000 | -- | 214 | -61.2 | | |
| 38000 | -- | 203 | -60.6 | | |
| 38470 | -- | 199 | -60.5 | | |
| 39000 | -- | 194 | -59.0 | | |
| 39640 | -- | 187 | -57.4 | | |
| 40000 | 230/45 | 184 | -57.4 | | |
| 41000 | -- | 175 | -57.3 | | |
| 42000 | -- | 167 | -57.2 | | |
| 42900 | -- | 160 | -57.1 | | |
| 43000 | -- | 159 | -56.9 | | |
| 44000 | -- | 152 | -52.2 | | |
| 45000 | 240/39 | 145 | -53.7 | | |
| 46000 | -- | 138 | -55.2 | | |
| 47000 | -- | 130 | -56.7 | | |
| 48000 | -- | 125 | -58.9 | | |
| 49000 | -- | 119 | -59.2 | | |
| 49720 | -- | 115 | -60.1 | | |
| 50000 | 250/24 | 113 | -59.6 | | |
| 50700 | -- | 110 | -58.4 | | |
| 51000 | -- | 108 | -58.9 | | |
| 52000 | -- | 103 | -60.3 | | |
| 52638 | -- | 100 | -61.2 | | |
| 53000 | -- | 98 | -61.1 | | |
| 54000 | -- | 93 | -60.5 | | |

| | | | |
|---|---|---|---|
| 55000 | -- | 89 | -59.3 |
| 56000 | -- | 85 | -58.0 |
| 56250 | -- | 84 | -57.7 |
| 57000 | -- | 81 | -58.5 |
| 58000 | -- | 77 | -59.6 |
| 59000 | -- | 74 | -60.2 |
| 59450 | -- | 72 | -60.7 |
| 60000 | 230/08 | 70 | -60.3 |
| 61000 | -- | 67 | -59.8 |
| 62000 | -- | 63 | -59.2 |
| 63000 | -- | 61 | -58.6 |
| 64000 | -- | 57 | -57.9 |
| 65000 | -- | 55 | -57.2 |
| 66000 | -- | 52 | -57.7 |
| 67000 | -- | 50 | -58.0 |
| 67726 | 250/02 | 48 | -58.4 |

## METEOROLOGICAL DATA

## CABRIOLET

| | | |
|---|---|---|
| SURFACE OBSERVATION AT | : | STS SITE "C" - 38°20'N, 116°16'W<br>Elevation 5242 Ft. MSL, 1030 PST, January 26, 1968 |
| Weather | : | Broken, Overcast |
| Sky Condition | : | 8/10 Altocumulus - 3/10 Cirrus |
| Visibility | : | Unrestricted |
| Atmospheric Pressure | : | 24.38 Millibars 825.6 |
| Temperature | : | 4.8°C |
| Dew Point Temperature | : | -4.7°C |
| Relative Humidity | : | 54% |
| SURFACE DATA (from RAOB) | : | 5242 Feet MSL, 1030 PST, January 26, 1968 |
| UPPER AIR DATA AT | : | STS SITE "C", 1030 PST, January 26, 1968 |

| | HEIGHT (Ft. MSL) | WIND (Deg/Kts) | PRESSURE (mb) | TEMPERATURE (°C) | DEW POINT (°C) | RELATIVE HUMIDITY (%) |
|---|---|---|---|---|---|---|
| SFC | 5242 | 190/04 | 826 | 4.8 | -4.7 | 54 |
| | 5600 | -- | 815 | 3.0 | -8.4 | 43 |
| | 6000 | 200/14 | 803 | 2.2 | -9.2 | 43 |
| | 7000 | 200/14 | 772 | 0.2 | -10.7 | 44 |
| | 8000 | 210/10 | 744 | -1.6 | -12.0 | 45 |
| | 9000 | 220/18 | 716 | -3.5 | -13.5 | 46 |
| | 9730 | 210/16 | 696 | -4.9 | -14.2 | 48 |
| | 10000 | 210/16 | 688 | -5.0 | -15.3 | 44 |
| | 11000 | 230/17 | 662 | -5.6 | -19.3 | 33 |
| | 11050 | 230/17 | 660 | -5.4 | -19.5 | 32 |
| | 12000 | 250/22 | 636 | -7.6 | -23.8 | 26 |
| | 12240 | 250/22 | 630 | -8.2 | -25.2 | 24 |
| | 13000 | 240/25 | 612 | -10.0 | MB | -- |
| | 14000 | 240/28 | 587 | -12.3 | MB | |
| | 15000 | 250/35 | 565 | -14.5 | MB | |
| | 16000 | 250/37 | 543 | -16.6 | MB | |
| | 17000 | -- | 522 | -19.0 | MB | |
| | 18000 | -- | 501 | -21.3 | MB | |
| | 18035 | -- | 500 | -21.5 | MB | |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : U20B - 37°15'N, 116°26'W, Elevation 6550 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0030 | 0100 | 0200 | 0300 | 0400 | 0500 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD |
| H Surface | | 200/15 | 150/16 | 150/15 | 150/20 | 140/18 | 170/19 |
| E 7000 | | 210/18 | 170/18 | 160/18 | 160/16 | 160/19 | 190/21 |
| I 8000 | | 220/18 | 190/21 | 180/18 | 190/21 | 190/18 | 190/18 |
| G 9000 | | 220/18 | 200/15 | 200/19 | 200/18 | 220/19 | 220/19 |
| H 10000 | | 220/22 | 220/17 | 230/21 | 220/18 | 240/17 | 240/19 |
| T 11000 | | 230/18 | 240/20 | 250/17 | 250/15 | 270/12 | 270/11 |
| 12000 | | 230/22 | 260/19 | 260/16 | 240/16 | 260/14 | 270/11 |
| 13000 | | 250/18 | 250/19 | 250/21 | 240/19 | 240/15 | 250/17 |
| (Ft.MSL) 14000 | | 250/17 | 250/20 | 250/17 | 250/21 | 240/20 | 250/17 |
| 15000 | | 260/19 | 250/18 | 250/19 | 250/21 | 240/17 | 250/20 |
| 16000 | | 250/19 | 250/18 | 240/17 | 250/21 | 260/21 | 250/25 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0600 | 0630 | 0700 | 0740 | 0800 | 0830 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD |
| H Surface | | 170/18 | 170/20 | 150/22 | 150/20 | 150/20 | 140/22 |
| E 7000 | | 180/20 | 170/20 | 160/23 | 160/22 | 160/20 | 160/18 |
| I 8000 | | 200/16 | 180/20 | 190/19 | 190/20 | 190/20 | 190/26 |
| G 9000 | | 230/16 | 210/19 | 260/15 | 230/16 | 210/19 | 200/17 |
| H 10000 | | 240/18 | 250/11 | 250/10 | 250/08 | 250/25 | 240/10 |
| T 11000 | | 260/10 | 250/08 | 270/08 | 260/10 | 250/20 | -- |
| 12000 | | 270/09 | 250/12 | 260/13 | 250/17 | 240/16 | |
| 13000 | | 270/17 | 260/13 | 250/19 | 250/19 | 250/22 | |
| (Ft.MSL) 14000 | | 260/20 | -- | 250/22 | 240/23 | 240/22 | |
| 15000 | | 250/21 | | 240/24 | 240/24 | 250/25 | |
| 16000 | | 240/27 | | 230/24 | 240/31 | 240/23 | |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : U20B - 37°15'N, 116°26'W, Elevation 6550 Ft. MSL

| | | | | | | |
|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 0930 | 1000 | 1030 | 1100 |
| *Type of Measurement | : | RD | RD | RD | RD | RD |
| H Surface | | 150/21 | 150/20 | 180/20 | 160/22 | 170/23 |
| E 7000 | | 160/23 | 170/23 | 180/19 | 170/22 | 170/26 |
| I 8000 | | 180/23 | 190/22 | 190/24 | 190/25 | 180/25 |
| G 9000 | | 210/17 | 210/21 | 200/24 | 200/27 | 200/26 |
| H 10000 | | 230/11 | 220/11 | 230/11 | 210/20 | 200/25 |
| T 11000 | | 250/09 | 240/10 | 240/12 | 230/20 | 230/17 |
| 12000 | | 250/12 | 250/11 | 240/15 | 240/22 | 240/20 |
| 13000 | | 240/21 | 250/19 | 240/20 | 240/23 | 240/22 |
| (Ft.MSL) 14000 | | 250/26 | 240/21 | 240/24 | 250/23 | 250/19 |
| 15000 | | 250/24 | 240/25 | 250/25 | 260/23 | 250/16 |
| 16000 | | 250/28 | 240/24 | 250/28 | 250/23 | 250/19 |

| | | | | |
|---|---|---|---|---|
| Time of Ob. (PST) | : | 1200 | 1300 | 1400 |
| *Type of Measurement | : | RD | RD | RD |
| H Surface | | 170/25 | 170/27 | 160/26 |
| E 7000 | | 170/27 | 180/31 | 160/32 |
| I 8000 | | 180/27 | 190/28 | 180/29 |
| G 9000 | | 200/31 | 200/39 | 200/32 |
| H 10000 | | 210/27 | 210/30 | 210/30 |
| T 11000 | | 220/22 | 210/29 | 230/25 |
| 12000 | | 230/23 | 220/21 | 230/24 |
| 13000 | | 240/23 | 240/17 | 260/15 |
| (Ft.MSL) 14000 | | 240/23 | 250/17 | 270/15 |
| 15000 | | 250/15 | 260/16 | 260/18 |
| 16000 | | 260/17 | 260/20 | 250/24 |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : SITE "C" - 38°20'N, 116°16'W, Elevation 5242 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD | RD |
| HEIGHT Surface | | CALM | 190/06 | 180/04 | 170/03 | 180/04 | 180/10 | 190/04 |
| 6000 | | 190/10 | 200/11 | 210/08 | 210/13 | 200/12 | 190/14 | 200/14 |
| 7000 | | 210/15 | 220/17 | 230/13 | 210/14 | 210/13 | 190/14 | 200/14 |
| 8000 | | 230/19 | 230/15 | 220/17 | 220/15 | 220/15 | 210/14 | 210/10 |
| 9000 | | 230/15 | 230/17 | 230/17 | 220/15 | 230/17 | 210/16 | 220/19 |
| 10000 | | 220/15 | 220/15 | 220/14 | 230/14 | 230/15 | 220/16 | 210/16 |
| 11000 | | -- | 240/14 | 240/17 | 250/15 | 250/17 | 240/15 | 230/17 |
| 12000 | | | 260/23 | 260/21 | 270/25 | 260/23 | 260/21 | 250/22 |
| 13000 | | | 260/23 | 260/28 | 260/23 | 250/24 | 260/27 | 240/25 |
| (Ft.MSL) 14000 | | | 250/23 | 250/26 | 240/23 | 250/27 | 250/23 | 240/28 |
| 15000 | | | 240/27 | 250/30 | 240/30 | 260/20 | 250/31 | 250/35 |
| 16000 | | | 230/30 | 230/29 | 230/32 | 250/31 | 250/34 | 250/37 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | RD | RD | PB | PB | PB | PB |
| HEIGHT Surface | | 180/13 | 180/12 | 160/05 | 140/03 | 160/07 | 180/15 |
| 6000 | | 180/20 | 180/15 | 180/12 | 180/12 | 180/23 | 190/28 |
| 7000 | | 190/15 | 180/16 | 200/12 | 180/19 | 190/22 | 190/21 |
| 8000 | | 210/08 | 200/14 | 200/11 | 180/18 | 190/17 | 210/24 |
| 9000 | | 220/18 | 220/13 | 190/12 | 190/20 | 190/17 | 220/17 |
| 10000 | | 220/19 | 210/18 | 200/17 | 210/17 | 200/21 | 210/22 |
| 11000 | | 240/17 | 220/19 | 210/23 | 220/29 | 210/29 | 210/29 |
| 12000 | | 250/23 | 220/19 | 220/25 | 220/24 | 220/28 | 220/23 |
| 13000 | | 240/22 | 230/20 | 230/25 | 220/27 | 220/32 | 220/32 |
| (Ft.MSL) 14000 | | 240/24 | 240/24 | 220/25 | 220/26 | 220/26 | 210/27 |
| 15000 | | 250/25 | 250/28 | 230/22 | 240/25 | 230/22 | 220/27 |
| 16000 | | 260/24 | 260/27 | 250/23 | 250/22 | 240/29 | 230/20 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : HIGHWAY 25 - 37°41'N, 115°48'W, Elevation 4800 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | RD | RD | RD | RD |
| H Surface | | 150/03 | 290/02 | CALM | CALM | CALM | CALM | 300/02 |
| E 5000 | | 160/06 | 280/04 | 180/03 | MSG. | 190/08 | 180/07 | 170/06 |
| I 6000 | | 210/15 | 200/16 | 180/14 | 200/21 | 200/15 | 190/18 | 180/19 |
| G 7000 | | 200/25 | 200/25 | 190/24 | 200/26 | 200/32 | 200/23 | 190/21 |
| H 8000 | | 200/26 | 200/27 | 200/27 | 210/27 | 200/31 | 200/30 | 190/32 |
| T 9000 | | 210/23 | 210/21 | 200/26 | 210/27 | 210/30 | 210/28 | 200/25 |
| 10000 | | 220/20 | 220/17 | 220/19 | 220/22 | 220/20 | 230/20 | 210/20 |
| 11000 | | 230/20 | 240/19 | 240/16 | 230/20 | 240/17 | 230/16 | 220/19 |
| (Ft.MSL) 12000 | | 240/19 | 250/22 | 260/15 | 250/18 | 250/17 | 240/15 | 230/17 |
| 13000 | | 240/21 | 250/24 | 260/22 | 260/20 | 260/18 | 250/14 | 230/21 |
| 14000 | | 250/23 | 240/24 | 250/24 | 250/22 | 260/21 | 250/21 | 240/19 |
| 15000 | | -- | 240/22 | 240/23 | 250/22 | 250/20 | 230/19 | 240/22 |
| 16000 | | | 240/23 | 240/23 | 250/27 | 250/22 | 240/23 | 230/27 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD |
| H Surface | | 170/07 | 180/05 | 180/18 | 190/20 | 190/20 | 180/23 |
| E 5000 | | 180/09 | 190/05 | 180/15 | 190/20 | 200/25 | 180/19 |
| I 6000 | | 180/17 | 190/15 | 180/21 | 190/28 | 200/29 | 180/31 |
| G 7000 | | 180/26 | 190/22 | 190/21 | 200/28 | 200/31 | 190/36 |
| H 8000 | | 190/32 | 190/24 | 190/30 | 190/29 | 190/28 | 190/32 |
| T 9000 | | 200/27 | 200/25 | 190/25 | 190/25 | 190/33 | 190/34 |
| 10000 | | 210/21 | 220/23 | 190/25 | 210/25 | 210/28 | 190/34 |
| 11000 | | 210/22 | 220/15 | 210/23 | 210/26 | 210/24 | 190/33 |
| (Ft.MSL) 12000 | | 230/15 | 230/18 | 210/21 | 220/24 | 220/25 | 210/33 |
| 13000 | | 230/20 | 240/20 | 230/22 | 210/22 | 220/32 | 210/32 |
| 14000 | | 240/21 | 240/22 | 230/25 | 230/29 | 220/27 | 210/28 |
| 15000 | | 250/27 | 240/24 | 230/27 | 230/28 | 230/30 | 220/30 |
| 16000 | | 250/28 | 250/26 | 230/33 | 240/32 | 230/30 | 230/28 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : TONOPAH TEST RANGE - 37°49'N, 116°45'W Elevation 5388 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0400 | 0500 | 0600 | 0700 | 0800 | 0900 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD |
| H Surface | | 150/03 | 140/03 | 140/04 | 140/05 | 130/10 | 125/12 |
| E 6000 | | 180/14 | 170/12 | 150/15 | 160/19 | 160/22 | 160/24 |
| I 7000 | | 180/14 | 180/13 | 170/16 | 180/18 | 180/18 | 180/24 |
| G 8000 | | 190/12 | 220/12 | 210/10 | 200/17 | 200/17 | 180/21 |
| H 9000 | | 220/07 | 240/10 | 230/08 | 230/08 | 210/10 | 200/15 |
| T 10000 | | 220/09 | 240/07 | 240/07 | 220/07 | 220/09 | 220/10 |
| 11000 | | 260/17 | 250/13 | 280/12 | 260/08 | 220/08 | 200/12 |
| 12000 | | 260/20 | 270/20 | 280/15 | 260/15 | 260/21 | 220/16 |
| 13000 | | 260/20 | 270/19 | 270/19 | 260/21 | 260/18 | 220/20 |
| (Ft.MSL) 14000 | | 250/24 | 250/24 | 250/23 | 250/24 | 250/19 | 250/18 |
| 15000 | | 250/24 | 240/27 | 240/30 | 250/25 | 260/21 | 270/23 |
| 16000 | | 230/28 | 240/29 | 230/29 | 240/29 | 270/27 | 260/23 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | RD | RD | RD | RD | RD |
| H Surface | | 150/12 | 170/14 | 145/20 | 170/20 | 180/20 |
| E 6000 | | 170/18 | 180/19 | 150/27 | 180/29 | 180/32 |
| I 7000 | | 190/19 | 170/19 | 160/23 | 170/30 | 180/29 |
| G 8000 | | 200/23 | 170/26 | 180/21 | 170/24 | 180/30 |
| H 9000 | | 210/14 | 200/24 | 190/26 | 170/29 | 180/29 |
| T 10000 | | 220/11 | 220/21 | 210/29 | 200/31 | 200/31 |
| 11000 | | 220/15 | 240/20 | 210/24 | 210/32 | 210/28 |
| 12000 | | 220/18 | 220/19 | 230/25 | 230/27 | 220/22 |
| 13000 | | 220/20 | 210/20 | 220/23 | 230/26 | 240/21 |
| (Ft.MSL) 14000 | | 230/18 | 200/17 | 220/17 | 230/27 | 240/20 |
| 15000 | | 250/19 | 230/19 | 230/19 | 250/28 | 240/23 |
| 16000 | | 270/20 | 260/28 | 250/28 | 250/28 | 250/23 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : YUCCA WEATHER STATION - 36°57'N, 116°03'W Elevation 3924 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0510 | 0600 | 0700 |
| *Type of Measurement | : | RD | RD | RD | RD | RD | RD |
| H Surface | | 310/03 | CALM | CALM | CALM | 310/04 | CALM |
| E 5000 | | 190/18 | 200/12 | 200/12 | 200/12 | 190/12 | 190/16 |
| I 6000 | | 190/22 | 200/23 | 200/25 | 190/20 | 190/19 | 190/23 |
| G 7000 | | 180/27 | 190/28 | 200/29 | 190/25 | 190/27 | 190/25 |
| H 8000 | | 190/28 | 190/30 | 200/27 | 200/26 | 190/27 | 190/24 |
| T 9000 | | 190/27 | 200/30 | 210/27 | 200/26 | 200/25 | 200/23 |
| 10000 | | 210/24 | 210/30 | 230/21 | 230/19 | 220/18 | 220/18 |
| 11000 | | 220/21 | 220/21 | 240/24 | 240/23 | 240/20 | 240/15 |
| 12000 | | 250/16 | 230/22 | 230/29 | 230/27 | 240/20 | 240/22 |
| 13000 | | 240/15 | 240/13 | 240/28 | 240/27 | 240/25 | 240/26 |
| (Ft.MSL) 14000 | | 250/16 | 250/17 | 240/27 | 250/28 | 240/21 | 240/28 |
| 15000 | | 260/17 | 250/15 | 250/22 | 260/23 | 250/21 | 240/30 |
| 16000 | | 260/19 | 250/25 | 250/23 | 260/22 | 250/20 | 240/25 |

| | | | | | |
|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0800 | 0900 | 1000 | 1100 |
| *Type of Measurement | : | RD | RD | RD | RD |
| H Surface | | CALM | CALM | 150/03 | 160/12 |
| E 5000 | | 190/20 | 190/15 | 190/18 | 180/15 |
| I 6000 | | 190/20 | 190/22 | 200/25 | 190/30 |
| G 7000 | | 190/31 | 190/30 | 200/24 | 190/21 |
| H 8000 | | 190/23 | 190/25 | 190/21 | 190/23 |
| T 9000 | | 210/17 | 210/18 | 190/15 | 190/24 |
| 10000 | | 230/13 | 240/15 | 200/18 | 210/27 |
| 11000 | | 260/11 | 230/15 | 220/17 | 220/20 |
| 12000 | | 240/12 | 230/21 | 220/15 | 230/19 |
| 13000 | | 240/20 | 240/23 | 260/15 | 230/22 |
| (Ft.MSL) 14000 | | 230/23 | 240/24 | 240/26 | 250/26 |
| 15000 | | 240/24 | 240/21 | 240/28 | 250/24 |
| 16000 | | 250/26 | 230/25 | 250/30 | 250/27 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : BEATTY - 36°52'N, 116°47'W, Elevation 3170 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 120/06 | 050/06 | 360/03 | 020/10 | 050/04 | 150/05 |
| E 4000 | | 130/07 | 140/07 | 090/04 | 050/06 | 100/05 | 150/08 |
| I 5000 | | 140/09 | 150/07 | 140/04 | 100/05 | 140/06 | 140/13 |
| G 6000 | | 150/09 | 160/07 | 160/06 | 140/07 | 150/17 | 150/13 |
| H 7000 | | 170/10 | 170/10 | 170/08 | 170/09 | 180/08 | 160/12 |
| T 8000 | | 170/12 | 170/13 | 180/10 | 170/11 | 200/10 | 170/11 |
| 9000 | | 190/12 | 190/13 | 210/14 | 200/12 | 230/12 | 200/11 |
| 10000 | | 200/13 | 210/18 | 220/17 | 220/16 | 260/11 | 230/11 |
| 11000 | | 210/15 | 220/18 | 230/12 | 230/12 | 260/09 | 270/11 |
| 12000 | | 220/14 | 240/14 | 240/10 | 250/10 | 240/10 | 270/11 |
| 13000 | | 220/15 | 240/13 | 250/12 | 240/11 | 230/12 | 260/10 |
| (Ft.MSL) 14000 | | 230/17 | 240/16 | 250/15 | 240/13 | 230/15 | 250/09 |
| 15000 | | 240/20 | 250/18 | 250/17 | 250/15 | 250/20 | 230/09 |
| 16000 | | 240/20 | 250/19 | 260/18 | 250/16 | 250/23 | 220/11 |

| | | | | | |
|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0800 | 0900 | 1000 | 1100 |
| *Type of Measurement | : | PB | PB | PB | PB |
| H Surface | | 090/03 | 220/10 | 180/13 | 150/20 |
| E 4000 | | 130/08 | 180/13 | 160/17 | 150/16 |
| I 5000 | | 150/14 | 150/16 | 160/17 | 160/12 |
| G 6000 | | 150/15 | 160/17 | 170/16 | 180/12 |
| H 7000 | | 160/14 | 170/17 | 180/16 | 190/14 |
| T 8000 | | 180/13 | 180/18 | 190/18 | 200/17 |
| 9000 | | 200/14 | 200/18 | 200/21 | 200/20 |
| 10000 | | 220/11 | 210/15 | 200/18 | 200/19 |
| 11000 | | 250/08 | 250/12 | 210/12 | 210/15 |
| (Ft.MSL) 12000 | | 270/11 | 260/14 | 220/10 | 230/12 |
| 13000 | | 270/14 | 250/24 | 240/14 | 250/16 |
| 14000 | | 270/12 | 260/15 | 250/18 | 250/22 |
| 15000 | | 240/12 | 260/17 | 260/25 | 250/25 |
| 16000 | | 230/16 | 260/15 | 260/28 | 250/24 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : ELDORADO - 39°22'N, 115°50'W, Elevation 5960 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0210 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB | PB |
| H Surface | | 190/10 | 220/10 | 230/08 | 240/09 | 240/10 | 260/12 | 230/15 |
| E 7000 | | 220/17 | 220/12 | 220/09 | 220/11 | 220/16 | 220/14 | 200/18 |
| I 8000 | | 230/16 | 230/12 | 220/12 | 210/17 | 210/20 | 210/17 | 200/21 |
| G 9000 | | 240/17 | 240/14 | 230/17 | 220/19 | 220/21 | 210/22 | 210/24 |
| H 10000 | | 250/22 | 250/20 | 240/22 | 230/22 | 230/21 | 220/27 | 220/26 |
| T 11000 | | 250/27 | 250/23 | 250/25 | 230/25 | 240/21 | 230/26 | 240/28 |
| 12000 | | 250/27 | 240/25 | 250/26 | 240/26 | 250/21 | 250/25 | 250/29 |
| 13000 | | 250/29 | 250/27 | 240/26 | 260/26 | 260/23 | 250/25 | 250/28 |
| (Ft.MSL) 14000 | | 250/31 | 240/30 | 250/25 | 260/27 | 270/27 | 250/26 | 250/29 |
| 15000 | | 250/32 | 240/31 | 240/23 | 260/25 | 260/27 | 250/28 | 250/30 |
| 16000 | | -- | 240/31 | 240/23 | 250/24 | 250/25 | 260/28 | 250/30 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 240/12 | 240/14 | 210/18 | 210/25 | 190/28 | 200/25 |
| E 7000 | | 210/15 | 210/28 | 200/23 | 210/26 | 200/35 | 200/23 |
| I 8000 | | 200/18 | 200/28 | 200/22 | 210/24 | 210/38 | 200/25 |
| G 9000 | | 200/23 | 200/24 | 210/25 | 210/23 | 210/42 | 210/33 |
| H 10000 | | 210/23 | 210/26 | 210/32 | 210/25 | 210/39 | 220/41 |
| T 11000 | | 220/25 | 220/26 | 220/38 | 220/20 | 220/30 | 220/41 |
| (Ft.MSL) 12000 | | 230/27 | 230/25 | 220/38 | 230/33 | 240/26 | 230/36 |
| 13000 | | 240/27 | 240/26 | 230/32 | 240/34 | 240/23 | 230/27 |
| 14000 | | 240/28 | 240/27 | 240/29 | 240/37 | 250/24 | 240/22 |
| 15000 | | 250/28 | 250/29 | 250/29 | 240/36 | 240/32 | 250/23 |
| 16000 | | 250/28 | 250/31 | 250/29 | 240/33 | 240/35 | 250/22 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT
DATA (Degrees and Knots) : January 26, 1968

Observational Point : PANACA - 37°47'N, 114°22'W, Elevation 4800 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H E I G H T (Ft.MSL) | Surface | CALM | CALM | CALM | CALM | CALM | 300/03 |
| | 5000 | 190/02 | 190/03 | 180/03 | 170/02 | 180/02 | 290/02 |
| | 6000 | 190/12 | 190/13 | 180/12 | 180/12 | 180/13 | 180/02 |
| | 7000 | 200/19 | 200/20 | 190/20 | 180/20 | 200/28 | 190/20 |
| | 8000 | 210/22 | 210/20 | 190/25 | 190/27 | 200/28 | 190/25 |
| | 9000 | 220/23 | 210/17 | 210/25 | 200/32 | 200/28 | 200/30 |
| | 10000 | 240/25 | 220/21 | 220/20 | 220/26 | 220/22 | 210/27 |
| | 11000 | 230/25 | 220/25 | 220/22 | 230/23 | 230/23 | 220/23 |
| | 12000 | 230/24 | 230/24 | 220/26 | 230/26 | 230/26 | 230/24 |
| | 13000 | 240/22 | 240/25 | 230/28 | 230/28 | 240/26 | 240/26 |
| | 14000 | 250/24 | 250/25 | 240/27 | 230/28 | 230/27 | 240/25 |
| | 15000 | 250/27 | 250/25 | 240/27 | 240/25 | 240/26 | 230/26 |
| | 16000 | 250/31 | 240/28 | 240/26 | 240/23 | 240/25 | 230/26 |

| | | | | | |
|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0800 | 0900 | 1000 | 1100 |
| *Type of Measurement | : | PB | PB | PB | PB |
| H E I G H T (Ft.MSL) | Surface | CALM | CALM | CALM | 190/09 |
| | 5000 | 180/02 | 180/02 | 190/02 | 190/09 |
| | 6000 | 180/08 | 180/09 | 190/13 | 190/14 |
| | 7000 | 190/16 | 190/20 | 190/21 | 190/16 |
| | 8000 | 200/24 | 190/27 | 190/22 | 190/19 |
| | 9000 | 200/31 | 190/33 | 200/29 | 200/22 |
| | 10000 | 210/27 | 200/36 | 210/29 | 220/24 |
| | 11000 | 230/25 | 210/32 | 220/26 | 220/26 |
| | 12000 | 240/27 | 230/27 | 230/26 | 220/28 |
| | 13000 | 240/29 | 230/31 | 240/27 | 230/30 |
| | 14000 | 230/29 | 230/36 | 240/30 | 240/30 |
| | 15000 | 230/30 | 230/38 | 240/32 | 240/29 |
| | 16000 | 230/29 | 230/36 | 230/31 | -- |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : ROUND MOUNTAIN TURNOFF - 38°44'N, 117°07'W
Elevation 5800 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB | PB |
| H Surface | | 180/10 | 180/08 | 180/10 | 200/12 | 190/12 | 180/08 | 190/12 |
| E 6000 | | 180/11 | 180/09 | 190/12 | 240/12 | 190/12 | 180/08 | 190/12 |
| I 7000 | | 200/16 | 200/17 | 200/15 | 190/18 | 200/20 | 190/17 | 190/22 |
| G 8000 | | 220/16 | 210/17 | 230/19 | 200/19 | 200/23 | 200/16 | 190/23 |
| H 9000 | | 220/19 | 220/19 | 240/21 | 220/23 | 210/26 | 230/22 | 200/27 |
| T 10000 | | 230/23 | 230/22 | 240/21 | 230/23 | 220/29 | 240/26 | 200/33 |
| 11000 | | 240/25 | 250/24 | 250/20 | 230/22 | 200/28 | 240/26 | 230/24 |
| 12000 | | 250/26 | 250/26 | 250/21 | 240/21 | 200/25 | 250/25 | 240/33 |
| 13000 | | 250/26 | 250/24 | 260/22 | 260/23 | 240/19 | 250/25 | 250/31 |
| (Ft.MSL) 14000 | | 240/25 | 250/22 | 260/23 | 270/25 | 270/23 | 250/27 | 250/30 |
| 15000 | | 250/28 | 250/24 | 250/26 | 270/26 | 270/26 | 260/28 | 250/33 |
| 16000 | | 250/34 | 250/31 | 260/33 | 260/26 | 260/28 | 260/32 | 250/37 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 210/12 | 180/18 | 200/20 | 150/20 | 180/24 | 180/22 |
| E 6000 | | 210/13 | 180/18 | 200/19 | 190/20 | 180/24 | 180/22 |
| I 7000 | | 200/22 | 200/32 | 200/21 | 190/20 | 190/20 | 180/26 |
| G 8000 | | 200/26 | 200/34 | 190/27 | 190/24 | 200/23 | 190/27 |
| H 9000 | | 210/32 | 200/33 | 190/34 | 200/32 | 210/25 | 200/26 |
| T 10000 | | 220/31 | 210/30 | 200/35 | 210/27 | 220/30 | 210/31 |
| 11000 | | 230/29 | 220/26 | 210/35 | 200/36 | 220/33 | 210/42 |
| 12000 | | 240/31 | 230/26 | 230/28 | 230/35 | 230/32 | 220/39 |
| 13000 | | 250/29 | 250/29 | 250/28 | 240/33 | 240/35 | 230/34 |
| (Ft.MSL) 14000 | | 250/30 | 250/29 | 250/29 | 250/26 | 240/36 | 240/35 |
| 15000 | | 250/32 | 240/32 | 250/33 | 250/26 | 240/34 | 240/40 |
| 16000 | | 250/33 | 240/36 | 250/35 | 250/30 | 240/34 | 240/47 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : ALAMO - 37 22'N, 115 12'W, Elevation 3719 Ft. MSL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 330/03 | CALM | CALM | CALM | CALM | CALM |
| E 4000 | | 350/05 | 160/03 | 160/05 | 170/02 | CALM | 150/01 |
| I 5000 | | 150/12 | 160/07 | 160/10 | 170/07 | 180/04 | 150/06 |
| G 6000 | | 170/12 | 160/12 | 170/14 | 160/13 | 190/13 | 150/15 |
| H 7000 | | 190/12 | 160/15 | 170/14 | 160/12 | 210/16 | 170/16 |
| T 8000 | | 190/14 | 180/13 | 180/11 | 190/08 | 230/14 | 190/14 |
| 9000 | | 200/15 | 210/10 | 210/10 | 220/13 | 240/11 | 210/13 |
| 10000 | | 210/18 | 220/11 | 220/15 | 210/17 | 220/12 | 210/16 |
| 11000 | | 220/20 | 220/20 | 220/19 | 210/22 | 220/14 | 210/24 |
| 12000 | | 230/21 | 220/24 | 220/22 | 220/27 | 230/18 | 230/27 |
| 13000 | | 230/21 | 220/19 | 220/20 | 230/23 | 230/22 | 230/26 |
| (Ft.MSL) 14000 | | 230/22 | 220/21 | 220/19 | 240/20 | 230/21 | 240/28 |
| 15000 | | 240/19 | 230/19 | 240/20 | 240/19 | 250/20 | 240/30 |
| 16000 | | 240/18 | 240/19 | 250/21 | 260/21 | 260/18 | 240/27 |

| | | | | | |
|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0800 | 0900 | 1000 | 1100 |
| *Type of Measurement | : | PB | PB | PB | PB |
| H Surface | | CALM | 360/02 | 160/03 | 160/15 |
| E 4000 | | 150/01 | 020/03 | 160/04 | 160/16 |
| I 5000 | | 150/09 | 140/10 | 170/17 | 160/23 |
| G 6000 | | 150/17 | 150/17 | 160/22 | 160/26 |
| H 7000 | | 170/15 | 170/17 | 170/19 | 160/24 |
| T 8000 | | 190/14 | 190/15 | 190/16 | 170/16 |
| 9000 | | 200/15 | 210/17 | 200/18 | 180/16 |
| 10000 | | 210/16 | 210/23 | 200/23 | 200/20 |
| 11000 | | 220/20 | 220/25 | 210/25 | 220/27 |
| (Ft.MSL) 12000 | | 230/26 | 230/23 | 240/29 | 220/31 |
| 13000 | | 240/29 | 230/23 | 240/31 | 220/27 |
| 14000 | | 240/25 | 230/27 | 240/30 | 220/21 |
| 15000 | | 220/24 | 230/30 | CLDS | 230/26 |
| 16000 | | 240/30 | 230/35 | -- | 230/33 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : COALDALE JUNCTION - 38°03'N, 117°54'W, Elevation 4900 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB | PB |
| H | Surface | CALM | 090/04 | 100/06 | 140/03 | 130/03 | 180/05 | 080/03 |
| E | 6000 | 300/02 | 010/02 | 130/05 | 150/05 | 130/09 | 140/06 | 100/04 |
| I | 7000 | 260/02 | 310/01 | 170/03 | 170/06 | 140/09 | 130/04 | 100/02 |
| G | 8000 | 250/02 | 250/02 | 220/04 | 200/05 | 150/07 | 150/03 | 100/04 |
| H | 9000 | 210/03 | 230/06 | 260/07 | 220/07 | 190/10 | 190/04 | 160/04 |
| T | 10000 | 220/07 | 240/12 | 260/16 | 240/15 | 230/16 | 220/11 | 210/16 |
| | 11000 | 240/14 | 250/18 | 250/19 | 250/20 | 240/18 | 230/20 | 240/16 |
| | 12000 | 250/20 | 250/19 | 250/20 | 260/20 | 260/23 | 240/24 | 240/24 |
| | 13000 | 250/21 | 250/19 | 250/22 | 250/20 | 260/23 | 250/27 | 250/29 |
| (Ft.MSL) | 14000 | 250/24 | 240/23 | 240/24 | 250/23 | 250/24 | 250/31 | 250/31 |
| | 15000 | 240/26 | 240/27 | 240/25 | 260/21 | 250/28 | 250/31 | 250/31 |
| | 16000 | 230/28 | 240/29 | 240/27 | 260/20 | 260/29 | 250/30 | 250/33 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H | Surface | 060/08 | 110/08 | 080/08 | 100/12 | 220/12 | 200/04 |
| E | 6000 | 100/06 | 110/06 | 100/11 | 100/10 | 160/04 | 250/04 |
| I | 7000 | 110/04 | 160/06 | 120/09 | 120/10 | 110/05 | 350/08 |
| G | 8000 | 140/05 | 170/08 | 140/10 | 140/10 | 130/05 | 070/08 |
| H | 9000 | 170/08 | 180/09 | 170/15 | 170/11 | 130/08 | 120/08 |
| T | 10000 | 190/10 | 210/12 | 180/17 | 190/15 | 210/13 | 190/09 |
| | 11000 | 220/13 | 230/19 | 200/14 | 210/14 | 220/13 | 220/12 |
| | 12000 | 240/23 | 240/27 | 230/19 | 230/15 | 230/13 | 230/15 |
| | 13000 | 250/31 | 250/30 | 240/23 | 230/23 | 230/25 | 230/19 |
| (Ft.MSL) | 14000 | 250/33 | 250/32 | 250/31 | 240/28 | 230/34 | 230/34 |
| | 15000 | 250/32 | 260/29 | 250/30 | 240/29 | 230/33 | 230/40 |
| | 16000 | 240/33 | 260/27 | 250/31 | 240/29 | 230/30 | 230/39 |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : CURRANT - 38°45'N, 115°28'W, Elevation 5200 Ft. MSL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0615 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB | PB |
| H | Surface | 100/05 | 150/05 | CALM | CALM | CALM | 080/10 | CALM |
| E | 6000 | 200/17 | 160/19 | 170/02 | 170/07 | 170/10 | 100/08 | 110/03 |
| I | 7000 | 200/16 | 180/13 | 190/08 | 190/13 | 190/15 | 160/09 | 160/05 |
| G | 8000 | 220/14 | 200/14 | 200/14 | 200/17 | 200/16 | 180/13 | 200/08 |
| H | 9000 | 230/14 | 200/18 | 210/17 | 210/18 | 210/17 | 190/18 | 200/13 |
| T | 10000 | 240/17 | 210/16 | 220/16 | 220/18 | 220/21 | 200/16 | 200/19 |
| | 11000 | 250/19 | 240/15 | 230/15 | 220/15 | 230/23 | 210/15 | 210/20 |
| | 12000 | 240/24 | 250/16 | 240/16 | 250/21 | 230/23 | 230/17 | 230/21 |
| | 13000 | 250/29 | 250/20 | 260/23 | 250/24 | -- | 240/22 | 240/23 |
| (Ft.MSL) | 14000 | 250/35 | 240/24 | 240/25 | 240/22 | | 240/28 | 240/28 |
| | 15000 | 250/41 | 230/27 | 230/28 | 240/23 | | 240/30 | 240/29 |
| | 16000 | 260/44 | 230/26 | 220/17 | 250/25 | | 240/28 | 240/29 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H | Surface | CALM | CALM | CALM | CALM | CALM | CALM |
| E | 6000 | 140/02 | 110/03 | 100/02 | 110/02 | 210/02 | 210/03 |
| I | 7000 | 150/03 | 140/05 | 150/04 | 120/02 | 190/06 | 200/06 |
| G | 8000 | 170/04 | 190/10 | 180/10 | 170/06 | 180/09 | 190/09 |
| H | 9000 | 200/12 | 200/16 | 200/15 | 180/14 | 180/12 | 190/14 |
| T | 10000 | 210/21 | 200/19 | 210/18 | 190/18 | 190/16 | 190/20 |
| | 11000 | 210/26 | 210/22 | 220/23 | 190/23 | 200/24 | 200/25 |
| (Ft.MSL) | 12000 | 210/25 | 230/24 | 230/24 | 200/28 | 210/31 | 210/31 |
| | 13000 | 240/24 | 230/25 | 230/26 | 200/28 | 210/33 | 210/31 |
| | 14000 | 250/26 | 230/27 | 260/26 | 210/24 | 220/35 | 210/37 |
| | 15000 | 250/28 | 230/25 | 240/24 | 200/22 | 220/37 | 210/36 |
| | 16000 | 260/34 | 240/21 | 240/22 | -- | 210/40 | 210/32 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : CEDAR PIPELINE RANCH - 37 45'N, 116 08'W, Elevation 5600 Ft.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0200 | 0300 | 0400 | 0500 | 0600 | 0700 | 0800 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB | PB |
| H Surface | | 170/05 | 230/10 | 250/05 | 230/05 | 210/08 | 200/08 | 215/07 |
| E 6000 | | 180/07 | 220/19 | 210/09 | 220/08 | 210/12 | 200/12 | 210/10 |
| I 7000 | | 200/19 | 200/18 | 210/21 | 210/14 | 220/18 | 200/17 | 200/15 |
| G 8000 | | 210/18 | 210/15 | 210/20 | 220/14 | 220/15 | 210/15 | 200/13 |
| H 9000 | | 210/18 | 220/12 | 210/13 | 220/14 | 220/12 | 220/15 | 220/11 |
| T 10000 | | 210/20 | 240/17 | 210/08 | 240/15 | 230/13 | 230/17 | 240/11 |
| 11000 | | 230/20 | 240/20 | 230/16 | 260/17 | 250/14 | 250/13 | 240/11 |
| 12000 | | 250/21 | 250/22 | 250/24 | 260/18 | 250/21 | 280/13 | 240/14 |
| 13000 | | 260/21 | 250/26 | 260/27 | 250/20 | 250/24 | 270/14 | 240/23 |
| (Ft.MSL) 14000 | | 250/24 | 250/27 | 260/30 | 250/22 | 240/26 | 240/16 | 250/26 |
| 15000 | | -- | 250/25 | -- | 240/24 | 230/30 | 240/25 | 240/25 |
| 16000 | | | 250/25 | | 240/22 | 230/36 | 240/32 | 250/21 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 195/12 | 200/14 | 175/10 | 170/15 | 185/18 | 170/15 |
| E 6000 | | 190/17 | 200/16 | 180/14 | 170/14 | 190/18 | 170/16 |
| I 7000 | | 190/20 | 200/18 | 200/14 | 180/17 | 190/18 | 190/15 |
| G 8000 | | 190/20 | 200/17 | 210/16 | 200/15 | 200/21 | 200/21 |
| H 9000 | | 200/19 | 200/18 | 210/19 | 220/12 | 200/23 | 200/26 |
| T 10000 | | 210/13 | 210/22 | 210/21 | 240/15 | 210/23 | 210/23 |
| 11000 | | 220/11 | 210/24 | 220/20 | 220/20 | 220/23 | 220/16 |
| 12000 | | 240/14 | 210/23 | 230/22 | 230/22 | 220/21 | 230/16 |
| 13000 | | 250/18 | 210/22 | 230/22 | 230/18 | 220/22 | 250/16 |
| (Ft.MSL) 14000 | | 250/19 | 220/23 | 220/22 | 240/21 | 240/26 | 240/22 |
| 15000 | | 240/21 | 220/23 | 220/23 | 240/25 | 240/30 | 240/28 |
| 16000 | | 240/23 | 230/23 | 230/22 | 240/25 | 240/30 | 230/31 |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 25 and 26, 1968

Observational Point : WBAS, LAS VEGAS, NEVADA

| | | Time of Ob. (PST) : | 2200 | 0100 | 0400 | 0500 | 0600 | 0700 |
|---|---|---|---|---|---|---|---|---|
| | | *Type of Measurement : | PB | PB | PB | PB | PB | PB |
| H | Surface | | 260/05 | 180/08 | 180/08 | 180/05 | 180/08 | 180/06 |
| E | 3000 | | 230/09 | 200/14 | 190/14 | 190/23 | 200/22 | 200/25 |
| I | 4000 | | 210/15 | 230/23 | 210/18 | 200/30 | 220/24 | 210/24 |
| G | 5000 | | 220/20 | 230/27 | 220/21 | 220/32 | 220/16 | 230/20 |
| H | 6000 | | 230/23 | 230/27 | 230/26 | 230/28 | 230/15 | 230/20 |
| T | 7000 | | 240/22 | 220/27 | 230/31 | 230/23 | 230/18 | 230/24 |
| | 8000 | | 240/19 | 220/28 | 220/34 | 230/21 | 220/21 | 220/26 |
| | 9000 | | 250/19 | 210/27 | 220/36 | 220/22 | 220/23 | 220/24 |
| | 10000 | | 240/19 | 210/24 | 210/36 | 220/24 | 220/25 | 230/21 |
| | 11000 | | -- | -- | -- | -- | -- | -- |
| | 12000 | | 220/28 | 220/22 | 220/28 | 240/18 | 230/23 | 240/24 |
| | 13000 | | -- | -- | -- | -- | -- | -- |
| (Ft. MSL) | 14000 | | 220/31 | 210/26 | 230/27 | 230/28 | 240/15 | 240/23 |
| | 15000 | | -- | -- | -- | -- | -- | -- |
| | 16000 | | 230/25 | 230/35 | 240/23 | 250/20 | 240/20 | 250/21 |
| | 17000 | | -- | -- | -- | -- | -- | -- |
| | 18000 | | -- | 240/29 | 240/24 | 240/22 | 240/24 | 250/20 |
| | 19000 | | -- | -- | -- | -- | -- | -- |
| | 20000 | | -- | 240/26 | -- | 250/21 | 240/26 | 240/26 |

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : WBAS, LAS VEGAS, NEVADA (Continued)

| | | Time of Ob. (PST) : | 0800 | 0900 | 1000 | 1100 |
|---|---|---|---|---|---|---|
| | | *Type of Measurement : | PB | PB | PB | PB |
| H | Surface | | 190/07 | 200/06 | 200/12 | 200/15 |
| E | 3000 | | 200/18 | 210/20 | 200/23 | 190/19 |
| I | 4000 | | 210/27 | 220/26 | 220/27 | 200/27 |
| G | 5000 | | 220/25 | 220/22 | 230/28 | 210/15 |
| H | 6000 | | 230/15 | 230/18 | 230/23 | 220/21 |
| T | 7000 | | 230/10 | 230/17 | 230/17 | 220/24 |
| | 8000 | | 230/15 | 230/19 | 230/15 | 220/28 |
| | 9000 | | 230/22 | 240/20 | 240/16 | 230/35 |
| | 10000 | | 230/25 | 240/20 | 240/25 | 230/41 |
| | 11000 | | -- | -- | -- | -- |
| | 12000 | | 240/16 | 240/19 | 240/46 | 250/37 |
| | 13000 | | -- | -- | -- | -- |
| (Ft.MSL) | 14000 | | 240/18 | 240/23 | 240/38 | 260/19 |
| | 15000 | | -- | -- | -- | -- |
| | 16000 | | 230/22 | 240/26 | 250/13 | 240/21 |
| | 17000 | | -- | -- | -- | -- |
| | 18000 | | 250/28 | 250/27 | 240/22 | -- |
| | 19000 | | -- | -- | -- | -- |
| | 20000 | | 240/33 | 250/31 | 250/31 | -- |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : WBAS, ELY, NEVADA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0100 | 0400 | 0600 | 0630 | 0700 | 0800 |
| *Type of Measurement | : | PB | RW | PB | PB | PB | PB |
| H Surface | | 230/14 | 200/14 | 210/13 | 190/11 | 170/16 | 180/13 |
| E 7000 | | 190/12 | 180/21 | 190/18 | 180/19 | 180/19 | 170/27 |
| I 8000 | | 190/15 | 190/17 | 190/20 | 200/20 | 200/20 | 180/22 |
| G 9000 | | 220/16 | 215/17 | 210/20 | 230/21 | 210/19 | 200/17 |
| H 10000 | | 240/21 | 220/18 | 230/19 | 240/23 | 230/24 | 210/22 |
| T 11000 | | 240/23 | -- | -- | 250/26 | 250/32 | 220/28 |
| 12000 | | 250/24 | 250/28 | | 250/30 | 250/33 | 230/32 |
| 13000 | | 250/28 | -- | | 250/32 | 250/34 | 240/31 |
| 14000 | | 250/33 | 245/34 | | -- | 240/36 | 240/30 |
| 15000 | | 240/35 | -- | | | 240/39 | 250/29 |
| (Ft.MSL) 16000 | | 240/39 | 235/37 | | | 240/39 | 240/31 |
| 17000 | | 240/41 | -- | | | 240/40 | 240/34 |
| 18000 | | 240/45 | 240/42 | | | 240/44 | 240/39 |
| 19000 | | 240/47 | -- | | | 240/46 | 240/47 |
| 20000 | | 240/49 | 245/48 | | | -- | 240/51 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Time of Ob. (PST) | : | 0900 | 1000 | 1100 | 1200 | 1300 | 1400 |
| *Type of Measurement | : | PB | PB | PB | PB | PB | PB |
| H Surface | | 170/15 | 180/16 | 160/24 | 150/22 | 160/24 | 160/20 |
| E 7000 | | 170/22 | -- | -- | 170/21 | 170/21 | 180/21 |
| I 8000 | | 170/22 | 170/22 | 180/41 | 190/18 | 190/15 | 200/17 |
| G 9000 | | 200/17 | 190/20 | 200/26 | 200/19 | 210/12 | 210/15 |
| H 10000 | | 220/20 | 210/41 | 210/28 | 220/23 | 220/17 | 220/18 |
| T 11000 | | 230/26 | 210/44 | 220/33 | 230/28 | 230/27 | 220/27 |
| 12000 | | 240/28 | 230/29 | 220/23 | 230/34 | 230/31 | 220/38 |
| 13000 | | 240/27 | 250/23 | 230/36 | 230/38 | 230/24 | 230/43 |
| 14000 | | 240/29 | 250/26 | 230/49 | 230/39 | 230/39 | 230/45 |
| 15000 | | 240/31 | 240/31 | 230/39 | 240/41 | 240/38 | CLDS |
| (Ft.MSL) 16000 | | 240/32 | 240/31 | 230/34 | 240/41 | 240/34 | -- |
| 17000 | | 240/32 | 240/31 | 250/31 | 250/39 | 240/35 | |
| 18000 | | 240/34 | 240/35 | 250/34 | 250/39 | 250/35 | |
| 19000 | | 250/37 | 240/38 | 240/36 | 250/33 | 250/35 | |
| 20000 | | 250/41 | 240/41 | 240/37 | 250/33 | 240/36 | |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

| | | | | |
|---|---|---|---|---|
| Observational Point | : | WBAS, ELY, NEVADA | | |
| Time of Ob. (PST) | : | 1515 | 1900 | 2130 |
| *Type of Measurement | : | RW | PB | PB |
| H Surface | | -- | 160/25 | 160/24 |
| E 7000 | | 190/25 | 160/29 | 170/29 |
| I 8000 | | 190/23 | 180/35 | 170/29 |
| G 9000 | | 200/22 | 190/35 | 180/25 |
| H 10000 | | 200/21 | 200/34 | 190/22 |
| T 11000 | | 210/24 | 210/38 | -- |
| 12000 | | 220/31 | 210/41 | |
| 13000 | | 230/39 | 220/41 | |
| (Ft.MSL) 14000 | | 230/37 | 220/51 | |
| 15000 | | 230/36 | 220/56 | |
| 16000 | | 240/33 | -- | |
| 17000 | | 240/33 | | |

| | | | | | |
|---|---|---|---|---|---|
| Observational Point | : | WBAS, SALT LAKE CITY, UTAH | | WBAS, RENO, NEVADA | |
| | | 1/25 | 1/26 | | |
| Time of OB. (PST) | : | 2200 | 0100 | 0100 | 0400 |
| *Type of Measurement | : | PB | PB | PB | PB |
| H Surface | | 035/04 | 240/02 | CALM | 230/05 |
| E 5000 | | 330/05 | 250/03 | 190/09 | 220/09 |
| I 6000 | | 280/06 | 230/10 | 200/12 | 220/07 |
| G 7000 | | 190/15 | 180/22 | 245/16 | 170/08 |
| H 8000 | | 180/26 | 180/33 | 255/19 | 220/19 |
| T 9000 | | 200/20 | 200/22 | 250/34 | 250/28 |
| 10000 | | 220/16 | 220/17 | 250/43 | 260/39 |
| 11000 | | 230/18 | 230/20 | 260/38 | 260/36 |
| (Ft.MSL) 12000 | | 230/22 | 230/23 | 270/31 | 260/37 |
| 13000 | | 240/27 | 240/25 | 280/28 | 270/36 |
| 14000 | | 240/33 | 230/30 | 260/35 | 270/40 |
| 15000 | | 230/38 | 230/36 | 260/27 | -- |
| 16000 | | 240/39 | 230/42 | 260/22 | |

## METEOROLOGICAL DATA

## CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : WBAS, WINNEMUCCA, NEVADA

| | | Time of Ob. (PST) : | 0030 | 1600 |
|---|---|---|---|---|
| | | *Type of Measurement : | PB | PB |
| H | Surface | | 050/04 | 360/12 |
| E | 5000 | | 100/06 | -- |
| I | 6000 | | 200/10 | 315/08 |
| G | 7000 | | 230/17 | 285/05 |
| H | 8000 | | 250/25 | 255/13 |
| T | 9000 | | 260/34 | 220/31 |
| | 10000 | | 250/36 | 225/29 |
| | 11000 | | 250/35 | -- |
| | 12000 | | 250/37 | 220/54 |
| | 13000 | | 260/41 | -- |
| | 14000 | | 260/41 | 220/51 |
| (Ft.MSL) | 15000 | | 260/41 | -- |
| | 16000 | | -- | 220/83 |

Observational Point : WBAS, MEDFORD, OREGON

| | | Time of Ob. (PST) : | 1600 | 1900 | |
|---|---|---|---|---|---|
| | | *Type of Measurement : | PB | PB | |
| H | Surface | | -- | 360/06 | 290/05 |
| E | 2000 | | 030/04 | 010/05 | 355/03 |
| I | 3000 | | 125/02 | 090/02 | 100/02 |
| G | 4000 | | 190/02 | 165/06 | 185/06 |
| H | 5000 | | 210/07 | -- | 200/10 |
| T | 6000 | | 050/10 | 195/19 | 220/17 |
| | 7000 | | 215/12 | 205/18 | 225/17 |
| | 8000 | | 240/15 | 210/16 | 225/18 |
| | 9000 | | 255/17 | 220/13 | 220/17 |
| | 10000 | | 265/18 | 220/13 | 225/17 |
| | 11000 | | 260/19 | -- | -- |
| (Ft.MSL) | 12000 | | 255/23 | 220/15 | 220/15 |
| | 13000 | | 255/24 | -- | -- |
| | 14000 | | 255/21 | 240/16 | 225/16 |
| | 15000 | | 250/21 | 240/15 | 220/17 |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS ALOFT DATA (Degrees and Knots) : January 26, 1968

Observational Point : WBAS, BOISE, IDAHO

| | | Time of Ob. (PST) : | 1300 | 1600 | 1900 | 2200 |
|---|---|---|---|---|---|---|
| | | *Type of Measurement : | PB | RW | PB | PB |
| H | Surface | | 130/05 | 300/06 | CALM | CALM |
| E | 4000 | | 120/02 | 300/05 | CALM | 170/03 |
| I | 5000 | | 165/02 | 305/04 | CALM | 170/05 |
| G | 6000 | | 130/02 | 215/07 | 155/09 | 180/12 |
| H | 7000 | | 100/03 | 190/15 | 170/12 | 190/13 |
| T | 8000 | | 055/02 | 210/16 | 195/09 | 200/11 |
| | 9000 | | 300/06 | 235/19 | 230/12 | 215/12 |
| | 10000 | | 300/17 | 245/20 | 235/15 | 220/14 |
| | 11000 | | -- | -- | -- | -- |
| | 12000 | | 235/43 | 225/41 | 230/44 | 230/37 |
| | 13000 | | -- | -- | -- | -- |
| | 14000 | | 235/43 | 210/50 | 210/45 | 220/56 |
| | 15000 | | 240/57 | -- | 200/48 | 210/64 |
| (Ft.MSL) | 16000 | | 235/54 | 210/58 | -- | 205/68 |
| | 17000 | | 235/55 | -- | -- | -- |
| | 18000 | | 240/67 | | | 200/64 |
| | 19000 | | 240/69 | | | -- |
| | 20000 | | 245/68 | | | 210/79 |
| | 24000 | | 240/69 | | | -- |

Observational Point : WBAS, POCATELLO, IDAHO

| | | Time of Ob. (PST) : | 1600 | 1900 | 2200 |
|---|---|---|---|---|---|
| | | *Type of Measurement : | PB | PB | PB |
| H | Surface | | 020/10 | 205/06 | 230/08 |
| E | 5000 | | 180/20 | 180/13 | 245/19 |
| I | 6000 | | 185/30 | 180/32 | 210/25 |
| G | 7000 | | 200/30 | 200/33 | 175/21 |
| H | 8000 | | 210/30 | 205/35 | 170/17 |
| T | 9000 | | 210/29 | 215/28 | 160/16 |
| | 10000 | | 215/26 | 210/26 | -- |
| | 11000 | | -- | -- | |
| (Ft.MSL) | 12000 | | 215/30 | | |
| | 13000 | | 215/31 | | |

METEOROLOGICAL DATA

CABRIOLET

SUPPLEMENTARY WINDS DATA
(Degrees/M.P.H.)
(**Degrees/Knots) : January 26, 1968

| TOWER | | : | U20b (#5) | AREA-12 | U19h (#3) | GOLD FLATS (#2) | GROUND ZERO (#1) | GROUND ZERO (#4) |
|---|---|---|---|---|---|---|---|---|
| TOWER Ht.(Ft.Abv.Sfc) | | : | **30' | **100' | **30' | **30' | **30' | 9' |
| T | 0600 | | 160/12 | 220/11 | 170/14 | MSG/05 | 170/16 | 165/17 |
| | 0630 | | 160/14 | 210/09 | 170/14 | " /08 | 160/15 | 160/20 |
| I | 0645 | | 160/15 | 210/10 | 170/14 | " /06 | 165/15 | 160/19 |
| | 0700 | | 160/15 | 210/10 | 175/13 | " /03 | 165/16 | 160/18 |
| M | 0715 | | 150/14 | 210/08 | 175/12 | " /02 | 160/17 | 150/18 |
| | 0730 | | 145/13 | 205/11 | 170/14 | " /02 | 160/17 | 140/18 |
| E | 0745 | | 150/13 | 200/12 | 175/12 | " /05 | 165/17 | 145/23 |
| | 0800 | | 160/19 | 190/08 | 170/12 | " /08 | 170/19 | 150/23 |
| | 0815 | | 160/18 | 200/13 | 170/13 | " /12 | 165/22 | 155/23 |
| | 0830 | | 160/17 | 200/12 | 160/13 | " /14 | 165/23 | 160/25 |
| | 0845 | | 150/18 | 190/11 | 170/14 | " /15 | 165/18 | 150/27 |
| | 0900 | | 165/18 | 185/10 | 170/18 | " /16 | 160/20 | 155/26 |
| | 0930 | | 160/15 | 195/07 | 180/19 | " /17 | 160/22 | 150/30 |
| P | 1000 | | 160/15 | 210/09 | 170/19 | " /16 | 160/21 | 155/28 |
| S | 1030 | | 185/13 | 200/10 | 170/22 | " /15 | 185/19 | 155/28 |
| T | 1100 | | 180/16 | 210/12 | 175/18 | " /13 | 180/28 | 170/29 |
| | 1130 | | 165/21 | 210/15 | 180/22 | " /18 | 175/23 | 170/28 |
| | 1200 | | 165/22 | 225/17 | 175/20 | " /21 | 175/24 | 180/29 |
| | 1300 | | 190/19 | 210/19 | 160/27 | " /16 | 180/24 | 180/27 |
| | 1400 | | 180/20 | 210/18 | 175/22 | MSG/21 | 170/25 | 180/28 |

*PB - Pibal
DT - Double Theodolite
RW - Rawin
RD - Radar

## METEOROLOGICAL DATA

## CABRIOLET

Hygrothermograph Data. (approximately 2500 feet northwest of Ground Zero, elevation 6200 feet).

January 26, 1968

| Time (PST) | Temperature (°F) | Relative Humidity (%) |
|---|---|---|
| 0400 | 32 | 92 |
| 0500 | 31 | 94 |
| 0600 | 30 | 96 |
| 0700 | 31 | 97 |
| 0800 | 33 | 97 |
| 0900 | 34 | 95 |
| 1000 | 36 | 93 |
| 1100 | 36 | 88 |
| 1200 | 37 | 89 |
| 1300 | 38 | 86 |
| 1400 | 38 | 86 |
| 1500 | 39 | 85 |
| 1600 | 37 | 86 |
| 1700 | 34 | 96 |
| 1800 | 34 | 100 |
| 1900 | 33 | 100 |
| 2000 | 32 | 100 |

## PROJECT CABRIOLET REPORTS

| Report | Agency | Author | Title |
|---|---|---|---|
| PNE-950 | LRL | | Cabriolet Summary |
| PNE-951 | Sandia | L. Vortman | Close-In Air Blast |
| PNE-952 | Sandia | J. Reed | Long-Range Air Blast |
| PNE953 | LRL | L. D. Ramspott<br>R. T. Stearns<br>G. L. Meyer | Preshot Geophysical Studies of Cabriolet Nuclear Crate Site |
| PNE-954 | EG&G | R. L. Lynn<br>D. G. Crandall | Spectroradiometric Detection of Effluents |
| PNE-955 | LRL | J. J. Cohen | Special Cloud Content Studies |
| PNE-956 | EG&G | W. A. Rhoads<br>R. B. Platt<br>R. A. Harvey<br>E. M. Romney | Ecological and Environmental Effects from Local Fallout from Cabriolet |
| PNE-958 | ERG | R. W. Klepinger<br>R. A. Mueller | Analysis of Ground Motion |
| PNE-959 | EPA | | Report of Off-Site Surveillance for Project Cabriolet |
| PNE-963 | LRL | R. F. Rohrer | Cabriolet Surface - Motion and Vented - Gas Temperature Measurements |
| PNE-964 | LRL | R. E. Marks | Measurements of Subsurface and Close-In Surface Dynamic Effects |
| PNE-966 | WES | R. W. Hunt<br>D. M. Bailey<br>L. D. Carter | Preshot Geological Engineering Investigation for Project Cabriolet, Pahute Mesa, NTS |

## TENTATIVE REPORTS

| | | | |
|---|---|---|---|
| | LRL | T. Gibson | Ground Radiation Survey |
| | LRL | R. Rohrer | Cloud and Surface Measurements |
| | NCG | | Crater Topography |