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Sandia Administrative Micrographics Facility Building 802 Hazard Assessment Document

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Prepared by
Sandia National Laboratories
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Albuquerque, New Mexico 87185

Sandia Contract No. AJ-5463

Abstract

The Department of Energy Order 5500.3A requires facility-specific hazards assessments be prepared, maintained, and used for emergency planning purposes. This hazards assessment document describes the chemical and radiological hazards associated with the Sandia Administrative Micrographics Facility, Building 802. The entire inventory was screened according to the potential airborne impact to onsite and offsite individuals. The air dispersion model, ALOHA, estimated pollutant concentrations downwind from the source of a release, taking into consideration the toxicological and physical characteristics of the release site, the atmospheric conditions, and the circumstances of the release. The greatest distance at which a postulated facility event will produce consequences exceeding the Early Severe Health Effects threshold is 33 meters. The highest emergency classification is a Site Area Emergency. The Emergency Planning Zone is 75 meters.

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EXECUTIVE SUMMARY

This hazards assessment provides an evaluation of the chemical and radiological hazards at the Sandia Administrative Micrographics Facility (Building 802) as mandated by the Department of Energy (DOE) Order 5500.3A, Planning and Preparedness for Operational Emergencies.

The hazards assessment process developed scenarios and estimated consequences for those chemical and radiological materials determined to be hazardous. The results were used to develop the following information for use in Sandia National Laboratories/New Mexico (SNL/NM) Emergency Management Program for Sandia's Administrative Micrographics Facility.

- The greatest distance at which a postulated facility event will produce consequences exceeding the Early Severe Health Effects threshold is 33 m. This event involves the release of 1 cylinder weighing 2 pounds of Anhydrous Ammonia.
- The highest emergency classification is a Site Area Emergency.
- The recommended protective response actions for a release of Anhydrous Ammonia in the Administrative Micrographics Facility are evacuation and accounting for personnel.
- The Emergency Planning Zone is 75 meters.

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KEY to ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ALOHA	Aerial Locations of Hazardous Atmospheres
Blvd	Boulevard
CAMEO	Computer-Aided Management of Emergency Operations
CFR	Code of Federal Regulations
CHEM	Chemical
CRD	Confidential Restricted Data
CTF	Coyote Test Field
DESHE	Distance at which Early Severe Health Effects are reached
DOE	Department of Energy
DOT	Department of Transportation
EAL	Emergency Action Level
EMG	Emergency Management Guide
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERPG	Emergency Response Planning Guidelines
ESHE	Early Severe Health Effects
FEMA	Federal Emergency Management Agency
g	Gram
gal	Gallon
GVW	Gross Vehicle Weight
HWMF	Hazardous Waste Management Facility
KAFB	Kirtland Air Force Base
kg	Kilogram
l	Liter
lb	Pound
LEPC	Local Emergency Planning Committee
LOC CODE	Location Code
MQTY	Maximum Quantity
MSDS	Material Safety Data Sheets
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Agency
NOAA	National Oceanic and Atmospheric Administration
oz	Ounce (avoirdupois)
ozd	Dry Ounce (avoirdupois)
ozf	Fluid Ounce (avoirdupois)
PAG	Protective Action Guide
PHA	Preliminary Hazard Assessment
PHYS STATE	Physical State
ppm	Parts Per Million
QTY UNIT	Quantity Unit
SCR CRIT	Screening Criteria
SIH	Standard Industrial Hazard
SNL/NM	Sandia National Laboratories/New Mexico
SOP	Safety Operating Procedures

TA-I	Technical Area-I
TA-II	Technical Area-II
TA-III	Technical Area- III
TA-IV	Technical Area-IV
TA-V	Technical Area-V
TLV	Threshold Limit Value
TWA	Time Weighted Average

1.0 INTRODUCTION

The purpose of the hazards assessment process is to document the impact of the release of Ammonia, from Sandia National Laboratories, Albuquerque, New Mexico (SNL/NM) Printing, Photography, Electronic Imaging Department (Print Shop) Administrative Micrographics facility located in Building 802, significant enough to warrant consideration in Sandia National Laboratories' operational emergency management program. This hazards assessment is prepared in accordance with the Department of Energy Order 5500.3A¹ requirement that facility-specific hazards assessments be prepared, maintained, and used for emergency planning purposes.

This hazards assessment provides an analysis of the potential airborne release of chemicals associated with the operations and processes within Building 802. The Administrative Micrographics facility provides historical archival documentation of Sandia publications in compliance with DOE Order 1324.4. The focus of the hazards assessment is the airborne release of materials because this requires the most rapid, coordinated emergency response on the part of Print Shop personnel, SNL/NM, collocated facilities, and surrounding jurisdictions to protect workers, the public, and the environment.

A key objective of DOE's emergency management program is to ensure that all DOE facilities and operations develop and maintain emergency planning, preparedness and response capabilities, as well as effective public and interagency communications; to minimize consequences to workers and the general public from events involving the release of hazardous materials. If planning and preparedness for emergencies is to be adequate and appropriate, then the hazards that are specific to each facility and operation must first be identified and understood. The hazards assessment herein provides the technical basis for such planning.

Sandia National Laboratories' Print Shop is located in the basement of Building 802 within the Technical Area I (TA-I) fence. The Print Shop occupies the east wing and approximately one third of the south wing of Building 802's basement. This constitutes approximately one third of the total space in 802's basement. The Administrative Micrographics process is located in room B10 on the west side of the hall in the basements south wing.

All chemical and radioactive materials within 802 have been identified. The entire inventory was screened according to the potential to affect onsite and offsite individuals. The material which was determined hazardous was fully characterized, accident scenarios developed, and consequences estimated. The resultant consequences were utilized to determine the appropriate emergency planning zone, emergency classes, and emergency action levels.

2.0 SITE AND FACILITY DESCRIPTION

2.1 SNL/NM Site

Sandia National Laboratories/New Mexico (SNL/NM) is located approximately 10 kilometers east of downtown Albuquerque, New Mexico, in the foothills of the Manzano Mountains (see Illustrations 2.1-1 and 2.1-2). SNL/NM is surrounded by Kirtland Air Force Base (KAFB) and has co-use agreements on some portions of Air Force property. KAFB is located on two broad mesas that are bisected by the Tijeras Arroyo, an east-west trending canyon. These mesas are bounded by the Sandia and Manzano Mountains (Cibola National Forest) to the east and the Rio Grande to the west. Regional elevations range from a low of 1,500 meters at the Rio Grande to a high of 3,255 meters at Sandia Crest. KAFB is at a mean elevation of 1,630 meters.

SNL/NM is operated for the Department of Energy (DOE). It consists of five technical areas (TAs) and remote test areas situated in the eastern half of the 210-square-kilometers KAFB military reservation (see Illustration 2.1-3). Adjacent to and physically combined with the KAFB installations is the Albuquerque International Airport, in what constitutes a large joint military and commercial transportation complex. Landing and takeoff patterns for the various runways at the airport facilities are not expected to affect SNL/NM operations. The runway of most concern is the east-west runway.

2.2 Weather and Climate

SNL/NM temperatures are characteristic of high-altitude, dry, continental climates. Sunshine is a predominant feature of SNL/NM and occurs approximately 75 percent of daylight hours. Maximum daytime temperatures during the winter of 1988 averaged near 10°C (50°F); summer daytime maximum temperatures averaged less than 32°C (90°F) except in July when the maximum average reached 34°C (93°F).² Temperature extremes below -27°C (-17°F) or above 41°C (105°F) occur infrequently.³

The average annual precipitation for SNL/NM is 21 centimeters; half of this precipitation occurs from July through September in the form of convective thundershowers. Winters are typically dry with less than 5 cm of precipitation normally recorded in a given month. This includes occasional snowstorms with accumulations of 20-to-30 centimeters of snow. The maximum observed precipitation in 24 hours occurred in September, 1983, when 5.7 centimeters of rain was recorded. The total annual precipitation of 33 centimeters for 1988 was 12 centimeters above the 30-year average of 21 centimeters. The average annual relative humidity recorded from 1951 to 1980 was about 43 percent, with the average humidity dropping to less than 20 percent in April, May, and June.

Strong winds, often accompanied by blowing dust, occur mostly in late winter and early spring. Wind speeds reach a maximum velocity of 28 knots on an average of 46 days per year. Every two years, a one-minute duration gust of 52 knots is expected.⁴ The average hourly wind velocity at the Albuquerque International Airport recorded from 1951 to 1980 ranged from 6.7 knots in December to 9.6 knots during April.⁵ The annual surface wind speed and direction for SNL/NM Technical Area I are depicted in Illustration 2.2-1. Rapid nighttime ground cooling produces strong temperature inversions as well as drainage winds that flow out of the mountains during evening hours.⁶

Illustration 2.1-1 General Location Map, Sandia National Laboratories, Albuquerque, NM

Illustration 2.1-2 Location Map for Sandia National Laboratories/New Mexico

Illustration 2.1-3 SNL/NM Technical Areas

AVERAGE ANNUAL WIND SPEED

Illustration 2.2-1 Annual Surface Wind Speed and Direction, Technical Area I

Tornado occurrences within the state of New Mexico vary from a minimum annual frequency of 0.2 to a maximum of 1.1.⁷ Statistically, the highest frequency has been observed in the eastern half of the state. For the western half of the state, generally demarcated by the Rio Grande and the mountain ranges that parallel it on the east side, tornado frequencies are 0.3 or less. In the Albuquerque area, which lies west of the Sandia and Manzano Mountains, only two tornadoes have been reported in more than a 20-year span. These occurred within the center of the city of Albuquerque in the years 1985 and 1987 and are officially listed in the climatological records of the National Weather Service as "small tornadoes." Damage was light and no official wind readings are available.

In addition, one funnel cloud has been observed in the same 20-year period. This was reported in the Four Hills area of Albuquerque about 2 kilometers to the east of Technical Area I on KAFB, but it was not observed to touch down and accordingly, it did not cause any reported damage. Based on the climatological records available, Albuquerque can be classified as a region of low occurrence with an annual frequency of 0.1 or less.

2.3 Air Quality

The air quality at SNL/NM is strongly influenced by the presence of the Albuquerque metropolitan area to the north and west.

SNL/NM is situated in the Rio Grande Valley, which is flanked by the Sandia and Manzano Mountains on the east and the Puerco Plateau on the west. This protects the Rio Grande Valley from many passing storms and reduces much of the air flow that would carry air pollution away from the metropolitan area.⁸ During many winter nights, the air in the metropolitan area becomes very stable and still, creating a temperature inversion which traps the pollutants emitted into the colder air at ground level. During the winter months, Albuquerque occasionally exceeds the ambient standards for carbon monoxide. Air quality has been improving, with fewer violations of the standards being reported over the past few years basically because of implementation of the Albuquerque/Bernalillo Air Pollution Control Program.⁹

2.4 Geology: Surface and Subsurface Features

SNL/NM is located in the Rio Grande Rift Valley of the Basin and Range physiographic province. The Rio Grande Rift is a structural feature that trends north-south from southern Colorado to El Paso, Texas.¹⁰ The SNL/NM area is situated on the East Mesa in the east-central portion of the Albuquerque-Belen basin segment of the rift (Illustration 2.4-1). The basin is bounded on the east by the fault-block Sandia and Manzano Mountains, which consist of Precambrian granites, schist, gneisses, quartzite, and metavolcanics; on the west by the Lucero uplift and Puerco plateau; on the north by the Nacimiento uplift; and on the south by the Socorro Channel.

Large-scale faulting, deepening of the basin and tilting of the mountains in the late Miocene period have resulted in a differential vertical movement of 6,000 to 7,000 meters on the eastern basin border.¹¹ Both concurrent with and subsequent to the structural changes, the basin began to fill due to a complex mixture of eolian, channel, debris flow, levee, and flood plain-type mechanisms¹² resulting in a complex sequence of gravel, sand, silt, clay, and caliche deposits known as the Santa Fe Formation. The basin, which consists primarily of Tertiary and Quaternary deposits, is estimated to be 1,200 to 1,500 meters thick (Illustration 2.4-2).

Modified from Woodward, 1982.

Illustration 2.4-1 Tectonic Map of the Middle Rio Grande Depression

Illustration 2.4-2 The Basin, SNL/NM

The East Mesa is characterized by alluvial and colluvial deposits formed due to runoff from the mountains onto alluvial fans or stream channels. The soils are the Embudo gravel, fine, sandy loam and the Wink fine, sandy loam, both of which are part of the Maurez-Wink Association.¹³ The Embudo soils are deep, moderately alkaline, well-drained soils that formed in alluvium derived from decomposed, coarse-grained, granitic rocks on old alluvial fans.¹⁴ The Wink soils are deep, calcareous, and moderately alkaline, well-drained soils that formed in old, unconsolidated alluvium modified by wind.¹⁵ Runoff from both these soils is medium with moderate water erosion hazard and the shrink-swell potential for both is low.¹⁶

The Rio Grande Rift between Albuquerque and Socorro is the most seismically active area in New Mexico. Seismic records date back to 1849, when the first reported earthquake occurred in Socorro; however, complete instrumental records are available only after 1962.¹⁷ Instrumental data since 1960 indicate a maximum probable local magnitude shock (M_L) within a 100-year period of 4.2 to 4.9 on the Richter scale.¹⁸ SNL/NM seismic activity research is being conducted as mandated by DOE Order 5480.28, Natural Phenomena Hazards Mitigation.¹⁹

The SNL/NM area is located in Seismic Risk Zone 2B (Illustration 2.4-3) in which moderate damage from earthquakes (corresponding to Intensity VII of the Modified Mercalli Intensity Scale of 1931) may be expected to occur.

The largest recorded earthquakes in the Albuquerque-Socorro area have been measured at 4.7 on the Richter scale. An earthquake of this magnitude occurred on January 4, 1971, with the epicenter in the Albuquerque area. Minor damage to buildings was reported by the University of Albuquerque (now St. Pius High School); however, no damage to SNL/NM buildings was reported.

Two other earthquakes with magnitudes of approximately 4.7 on the Richter scale occurred on November 28, 1970, and January 4, 1990, near the town of Bernardo, New Mexico, 104 km south of Albuquerque. Damage to the Bernardo area was the only damage reported.

The fault zones along the eastern and western sides of the Albuquerque-Belen Basin were active in Miocene times and appear to have become stable since the mid-Pleistocene. Present seismic activity shows little correlation with the Albuquerque area fault zones, but is concentrated more with the mountains west of Socorro, 120 kilometers south of KAFB.

Numerous small volcanic centers occur along a line paralleling the axis of the Albuquerque basin to the west of the metropolitan area. The volcanoes include five small cones and 13 nubbins, the largest of which protrude about 54.5 m above the ground surface. At least eight flows (andesite and basalt) occurred in the volcanic field, which was active only for a short period approximately 190,000 years ago.

2.5 Water Resources

2.5.1 Surface Water

The East Mesa has a generally west-southwestward ground surface slope ranging from about 47 meters per kilometer near the mountains to 3.8 meters per kilometer near the river. The distance from the foot of the mountains to the river varies from 4.8 kilometers in the northern part of the mesa to 14.5 kilometers in the southern part of the mesa.²⁰

Zones are established from recorded earthquake activity within the United States, where zone 0 - little or no earthquake activity and zone 4 - highest occurrence of earthquake activity

Illustration 2.4-3 SNL/NM Seismic Risk Zones

From UBC, 1988.

Tijeras Arroyo, the major drainage of the East Mesa area, originates in the mountains and joins the Rio Grande at approximately 16 kilometers south of Albuquerque, cutting across the eastern part of KAFB. In addition, numerous small drainages emerge from the mountains onto the mesa. In general, very little of this surface water reaches the Rio Grande²¹ because most surface water runoff enters the permeable deposits of the Quaternary-Tertiary alluvium or is evaporated or transpired.

During heavy precipitation, the elevated interfluvial regions drain by sheet flow into small gullies and rivulets. This water is carried by natural or artificial flow paths into Tijeras Arroyo and eventually reaches the Rio Grande. Occasional flooding is likely within these gullies and arroyos. The Army Corps of Engineers has estimated that a 100-year flood will reach a crest of 1,588 m. The 24.2 m walls of the Tijeras Arroyo are adequate to protect SNL/NM against flooding.

2.5.2 Subsurface Water

The major subsurface reservoir beneath the Albuquerque area (including SNL/NM) is composed of basin fill material of the Rio Grande (for deposits and alluvial material of Quaternary and Tertiary age) with a depth to bedrock of nearly 1.6 kilometers throughout most of the basin (Illustration 2.4-2). The alluvial aquifer is bounded on the west by the Lucero uplift and on the east by the Sandia-Manzano Mountains.²²

Groundwater in the alluvial aquifer generally occurs under unconfined conditions and flows in a southward direction under an overall gradient of approximately two meters per kilometer. The transmissivity of the alluvial aquifer is estimated to be 2,480 square meters per day (200,000 gallons per day per foot), and storativity (quantity of water that the aquifer will release from or the quantity that will be taken into storage per unit surface area of the aquifer per unit of head) is approximately 0.2. The groundwater flow velocity is approximately six meters per year.²³ The water table beneath SNL/NM on the East Mesa is approximately 150 meters beneath the surface, and groundwater generally flows in a southwestern direction towards the axis of the Rio Grande alluvial basin.

The alluvial aquifer is recharged principally by the Rio Grande. The aquifer also receives recharge at the base of the mountains where small canyons open onto alluvial fans and the alluvium is relatively coarse. Relatively little water percolates into the aquifer through the unsaturated zone, as most runoff from precipitation ultimately flows into drainages and into the Rio Grande, or is lost through evapotranspiration.

The greatest water level changes from 1960 to 1978 in the Albuquerque area were recorded on the east side of the Rio Grande. In the future, water levels will continue to decline on both the east and west sides of Albuquerque due to increased population. Total decline of the water table by the year 2000 will probably not exceed 37 meters of fresh-water saturation in the aquifer beneath the Albuquerque area.²⁴

2.6 Flora and Fauna

The vegetation in this area is typical of an arid grassland. While more than 50 grasses may be found within this grassland association and the surrounding area, only a small number of species are abundant. The homogeneous nature of the vegetation does not support a high diversity of wildlife. Small mammals, reptiles, and birds are the most abundant species found. No species of federally listed endangered or threatened plants or animals have been observed at SNL/NM. The New Mexico Energy, Minerals and Resources Department²⁵ lists two state endangered species of cacti as potentially occurring in the area—the grama grass cactus and Wright's fish-hook cactus. The New Mexico Game and Fish Department's *Handbook of Species Endangered in New Mexico* lists four animal species that may occur

in Bernalillo County. However, these species are not expected to reside at SNL/NM because of specific habitat requirements.

2.7 Demography

SNL/NM is on KAFB, which is located in Bernalillo County, New Mexico. The population of Bernalillo County in 1990 was 480,577.²⁶ KAFB is bordered on the north and west by densely populated residential areas of the City of Albuquerque. To the east of KAFB is the Four Hills residential area of Albuquerque. Albuquerque had a population of 384,736 in 1990.²⁷ To the south of KAFB is the Isleta Indian Reservation, which had a population of 2,915 in 1990,²⁸ and Valencia County. Valencia County is a rural and sparsely populated area. The most recent population figure for Valencia County is 45,235.²⁹ KAFB itself houses up to 7,830 residents in barracks and detached or semi-detached family houses. As of 1990, the residential population of KAFB was 5,761. The total estimated population within a 80 kilometer radius of SNL/NM is 632,500.

2.8 Description of Building 802's Facility and Site Boundaries

Building 802, is located at the southwest corner of "G" Blvd. and 7th street. The building is located entirely within TA-I (a DOE security area). TA-I is a limited access area that shares 908 acres of land owned by DOE with TA-II and TA-IV. The only way access can be gained into TA-I is through one of several Mardix Booths or a manned gate. The TA-I fence prevents casual pedestrian traffic near potentially hazardous facilities within TA-I such as chemical or radiological storage areas. TA-I is secure at all times. One must have a DOE security clearance or an escort to enter TA-I.

Building 802's first, second and third floors consist primarily of general office activities. Sandia's Print Shop is located in the basement of Building 802. The remaining basement space is shared with Security and Safeguards, Computer Information Systems, Facilities, and Classified Information in the form of vaults. Over half of the south wing is vacant.

Sandia has employed a conservative 30 meter facility boundary for all facilities analyzed in the hazard assessment process. This 30 meter facility boundary is utilized in Section 6.0 for determining the emergency classification.

Building 802's site boundary is defined as a radial 75 meters and is also used in Section 6.0 for determining the emergency classification (Illustration 2.8.1). This was established in consonance with emergency planning practices. As stated in the Emergency Management Guide, areas subject to access by the general public must be considered offsite unless it is assured that those areas can be evacuated and access control can be established within (1) hour of any emergency declaration.³⁰ The conservative 75 meter site boundary allows for such an evacuation and controlled access in the time required.

2.9 Facility Mission

The Administrative Micrographics facility within Building 802 provides historical archival documentation of Sandia publications in compliance with DOE Order 1324.4.

2.10 Description of Building 802's Print Shop and its' Administrative Micrographics Facility

The Print Shop occupies the east wing and approximately one third of the south wing of Building 802's basement. This constitutes approximately one third of the total space in 802's basement. The Print Shop's Administrative Micrographics process is located in room B10, a secure vault on the west side of the hall in the basements south wing.

2.11 Sandia's Print Shop's Processes and Operations

Sandia's Print Shop is charged with the duplication and creation of various documents at SNL/NM. These activities can range from simple copying of memos and archiving published reports for historical reference to creating Sandia and DOE specific cover pages for controlled or classified information. In addition, Still Photography is conducted in the studio, the MP-4 room within the photographer's office area, and on location anywhere on or off Sandia property, to document activities or projects related to Sandia's Mission. Within the Print Shop, operators utilize cameras, duplicators, printers, and collators in the normal course of business.

3.0 IDENTIFICATION AND SCREENING OF HAZARDS

This section outlines the processes used to identify both onsite and offsite hazards significant enough to warrant consideration in the SNL/NM emergency management program for Building 802 and to screen out those hazards that pose minimal risk to the health and safety of the onsite worker and the general public. Those hazards identified by the screening process that pose a significant risk are further evaluated in Section 4.0.

3.1 Identification and Screening of Onsite Hazards

For the purpose of emergency planning, onsite hazards of primary concern are those hazardous materials that if released to the environment may:

- immediately threaten those who are in close proximity to the release,
- have the potential for dispersal beyond the immediate vicinity in quantities which threaten the health and safety of onsite personnel or the public in collocated facilities and/or offsite; and, have a rate of transport and dispersion sufficient to require time-urgent emergency response to implement protective actions.

The process of identifying the onsite hazards in 802 consisted of the following steps: (a) reviewing the most current Preliminary Hazard Assessments (PHAs), (b) reviewing past chemical inventories to determine the maximum historical quantities, (c) reviewing the most recent chemical inventories, and (d) conducting walkthroughs of the facility to verify that the current inventory was complete and accurate.

The following primary sources of information were used to complete the hazard identification and screening process. Based on this information, a comprehensive list of hazardous materials was compiled for 802. The complete list was then screened to determine which hazards required further evaluation.

- Preliminary Hazard Assessments
- Standard Operating Procedures (SOPs)
- Chemical Inventories
- Material Safety Data Sheets (MSDSs)

3.1.1 Screening Criteria

The Emergency Management Guide (EMG) for Hazards Assessments states, in part, "... screening quantities or thresholds should be used to eliminate the need to analyze insignificant hazards."³¹ Using this guidance from the EMG and other applicable documents, the following screening criteria were developed and utilized to screen chemical and radiological hazards.

3.1.1.1 Chemical Hazards

Standard Industrial Hazard (SIH)

In accordance with 40 CFR, Part 355.20, "Any substance used for personal, family, or household purposes, or is present in the same form and concentration as a product packaged for distribution and use by the general public" is not considered a hazardous chemical.³² Therefore, for the purpose of hazards assessments, such chemicals can be eliminated from further evaluation.

Quantity of Material

The quantity at which a chemical does not require evaluation is one pound or 500 grams. This was established based upon 40 CFR Part 302, the Hazardous Substances and Reportable Quantities³³ and 40 CFR Part 355, Appendix A, the Extremely Hazardous Substances and Threshold Planning Quantities³⁴ in which no chemical had a quantity greater than one pound or 500 grams.

Toxicity of Material

For those chemicals exceeding one pound or 500 grams, the MSDS and/or the Hazardous Chemical Desk Reference³⁵ are reviewed to determine if a chemical is hazardous due to its toxicity. Occupational exposure limits are reviewed to determine the toxicity. Those chemicals determined to be non-toxic are screened from further evaluation.

Dispersibility

A chemical is removed from further evaluation if it is determined to be non-dispersible. In order for the chemical to be non-dispersible, it must meet at least one of the following criteria:

- have a boiling point of greater than 100° C,
- be a powder of greater than 10 microns, or
- cannot conceivably be involved in a high energy event such as a fire or explosion.

Dispersion Modeling

Dispersion modeling allows chemicals to be analyzed to determine toxicity levels at various distances. This hazards assessment is primarily concerned with Emergency Response Planning Guidelines (ERPGs) published by the American Industrial Hygiene Association (AIHA). The ERPG levels in ascending order of severity are ERPG-1, ERPG-2, and ERPG-3. The level of concern used in the screening criteria is an ERPG-1. The ERPGs are discussed in detail in Section 6.2.1 of this document.

A chemical is removed from further evaluation if it does not exceed an ERPG-1 at 30 meters. The distance of 30 meters was selected because it represents the minimum facility boundary at SNL/NM. The minimum facility boundary of 30 meters was determined in accordance with the Emergency Management Guide which states that a 200 meter radius may be utilized as the facility boundary if this area does not encompass a significant number of other site workers and does not include areas routinely accessible to the general public. In such a case, a smaller facility boundary is appropriate. Because SNL/NM has densely populated areas accessible to the general public, a conservative 30 meter facility boundary was determined and is utilized in dispersion modeling to determine toxicity levels at a definitive distance. An ERPG-1 at 30 meters or greater would constitute a minimum of an alert emergency classification. Emergency classifications are described in Section 6.2.2 of this document.

The dispersion modeling is performed through the Areal Locations of Hazardous Atmospheres (ALOHA) model. ALOHA allows two types of dispersions: heavy gas and gaussian. If unsure which dispersion type should be used, ALOHA gives the option to let the model decide. The infiltration building parameter that should be used in the screening process is 60 air changes per hour. In addition, "worst case" meteorological conditions should be employed for the purpose of modeling (i.e., wind speed of 1 m/s, 10% cloud cover, F stability, 50% humidity, a 500 m inversion layer, and 20° C/68° F).

3.1.1.2 Radiological Hazards

For radioactive materials, the screening criteria is based on 10 CFR, Part 30.72, Schedule C³⁶ which lists radioactive materials that require consideration for emergency planning. Any radioactive materials that exceed the quantity in curies in 10 CFR, Part 30.72, Schedule C, are kept for further evaluation and characterization. All other radioactive materials are considered insignificant hazards and are removed from further evaluation.

3.2 Identification and Evaluation of Offsite Hazards

The objective of the hazards assessment is to determine the type and extent of planning and preparedness that is appropriate for each facility and site. Hazards originating outside the DOE facility and site that could impact the health and safety of onsite personnel or other DOE interests are identified and examined. Offsite facilities, airways, highways, railroads, and utility transportation arteries (i.e. pipelines) are considered as possible locations of hazardous material accidents.

The Local Emergency Planning Committee (LEPC) for the City of Albuquerque, on which Sandia is represented, is headquartered in the Albuquerque Fire Department, with an assistant Fire Chief being the chairman of the committee. The assistant Fire Chief was consulted to provide assistance in identifying nearby facilities in the City of Albuquerque that have hazardous material inventories that could potentially impact the Sandia Albuquerque site. Railroads, highways, and other transportation arteries near the facility or site were considered as possible locations of hazardous material transportation accidents. The effects on the facility of hazardous material events originating offsite were estimated and used as the basis for determining whether specific arrangements should be made with offsite authorities for notification of releases and joint response.

3.2.1 Offsite Facilities

The following offsite facility with a hazardous materials inventory large enough and within a reasonable distance of SNL/NM that could have a negative impact on the operation of SNL/NM has been identified.

- The City of Albuquerque water treatment plant is located approximately 10 km from the SNL/NM Site Boundary. This facility has the capacity to store up to 45,454.5 kg of liquid chlorine in two 22,727.3 kg capacity tanks.³⁷ Chlorine is used to treat the municipal water system for biological contaminants prior to distribution. In the event of a significant airborne chlorine release to the environment, the LEPC would contact the SNL/NM Emergency Operations Center (EOC). The EOC would then implement protective actions, as needed.
- Additional facilities are currently being researched as part of the City of Albuquerque's Emergency Preparedness program. Several individuals from SNL/NM Emergency Planning and Risk Management and NEPA Department are members of the LEPC. The identification of offsite facilities that could potentially impact SNL/NM is a continuous process.

3.2.2 Airways

Due to the close proximity of the Albuquerque International Airport to SNL/NM, an airplane crash scenario is postulated and considered an offsite hazard. Extensive research concerning an airplane crash at SNL/NM was performed and the results of this analysis are summarized below.³⁸

A significant fraction of the more than 225,000 annual operations at the airport could pass over SNL/NM facilities. SNL/NM is also located about 25 km from Coronado Airport. However, since the general aviation aircraft using this facility would, in general, avoid the Albuquerque International Airport traffic area and based on the relatively long distance to Coronado Airport and the altitude that such aircraft will have if they happen to pass over Sandia, such aircraft are not a significant factor in determining the crash probability. Therefore, they are not considered to pose a significant risk to SNL/NM facilities.

3.2.2.1 Event Frequency Estimation

Several low-and high-altitude airways pass over or in the vicinity of SNL/NM. Because of nearby high terrain, the minimum en route altitudes of these airways are relatively high, about 1,400 meters or more above ground level. Although the frequency of flights using these airways is unknown, the crash frequency resulting from on-airways (or in-flight) through traffic would not be significant relative to the crash probability resulting from landings and takeoffs at the Albuquerque International Airport. The contribution of in-flight or airways traffic to the crash probability is therefore not considered for this evaluation.

The Albuquerque International Airport is utilized by commercial air carriers, the military, and general aviation aircraft. The commercial air carrier aircraft are jet transports, of which the largest currently in use at the airport is the Lockheed 1011. The military aircraft are primarily jet fighters but also include other aircraft ranging from small helicopters to the Lockheed C-5. General aviation aircraft include light single and twin engine airplanes. In this analysis, three types of aircraft are considered: air carrier jets typified by jet transports of the Boeing 737 through the DC-8 and 9; military aircraft typified by the A7; and air taxi (commuter) airlines and general aviation aircraft typified by light twin-engine aircraft.

Since only data on the total aircraft movement at the Albuquerque International Airport is available and because of the lack of specific data on the number of take-offs and landings, it will be assumed that the number of landings and takeoffs are the same.

Due to safety and noise abatement considerations, the preferred directions for takeoffs and landings is to the south, east, and west of the airport. If it is assumed that these directions are equally likely to be used for both landings and takeoffs, the east end of the East-West runway will have approximately 34% of the total aircraft movement. The movement of aircraft west of the East-West runway or south of the South-North runway are assumed not to contribute to the probability or number of crashes. In other words, the fraction of movements (landings and takeoffs) at the east end of the runway will be 0.34 for all types of aircraft. Table 3.2.2.1-1 presents aircraft movement data at Albuquerque International Airport for the calendar year 1990. This data was provided by the Albuquerque Airport Manager's Office.

Table 3.2.2.1-1 Total Aircraft Movement at Albuquerque International Airport (1990)	
Aircraft Type	Operations
Air Carriers	70,108
Military	35,792
General Aviation/Air Taxi	119,991
Total	225,891

This movement has been steadily increasing each year. Therefore, to ensure conservatism in aircraft movement in the future, an average increase of 100% is assumed over the life of the facility (assuming on the average, a growth rate of 2.5% per year for an assumed facility life of 40 years). Thus, the total number of movements (landings or takeoffs) at the east end of the runway per year for each of the categories of aircraft is assumed to be

$$\begin{aligned}
 N_{\text{carrier}} &= N_1 = 140,216 \\
 N_{\text{military}} &= N_2 = 71,584 \\
 N_{\text{general}} &= N_3 = 239,982,
 \end{aligned}$$

for a total of 451,782 movements. The probability of a crash per aircraft movement (landing or takeoff), P_i , for all types of aircraft is given in Table 3.2.2.1-2.

Table 3.2.2.1-2 Crash Probability (P_i) per Aircraft Movement and Type of Aircraft			
Movement	Air Carrier	Military	General Aviation
Landing	$2.3E^{-6}$	$3.1E^{-6}$	$2.3E^{-6}$
Takeoff	$6.0E^{-6}$	$1.6E^{-6}$	$6.0E^{-7}$

3.2.2.2 Airway Summary

In the unlikely event of an airplane crash at SNL/NM, the SNL/NM, KAFB, and the City of Albuquerque emergency response teams would jointly respond. For the purpose of hazards assessments, the airplane crash scenario could serve as a possible initiating event which fails all mitigative barriers.

3.2.3 Highways

Two major transportation routes are proximal to the NL/NM site. These are U.S. Interstate 40, approximately 4.0 km to the North, and U.S. Interstate 25, approximately 4.0 km to the West of the KAFB site boundary.

Truck accident statistics (1989-1990) from the Motor Carrier Division of the National Highway Safety Council indicate the average accident rate for medium to heavy vehicles ($>10,000$ lb/4545.5 kg Gross Vehicle Weight) to be one accident per 3.52 million km.³⁹

The accident rate may appear to be statistically quite low. However, because of the size of the transportation routes surrounding SNL/NM and the high volume of truck traffic on the roads, the potential for a vehicle accident involving hazardous materials is considered to be a credible scenario.

The New Mexico State Police maintains responsibility for response to a hazardous materials accident on local transportation routes. In compliance with the Federal Emergency Management Agency (FEMA) and the State and Local Exercise Requirements, the Albuquerque/Bernalillo LEPC conducts exercises relating to emergency response. The LEPC has conducted exercises relating to a hazardous materials accident to test the Emergency Response Plan. The Emergency Response Plan includes a provision for notifying SNL/NM in the event of an offsite transport transportation accident. SNL/NM can then take the necessary protective actions to ensure the safety and integrity of onsite personnel and their respective operations.

3.2.4 Railways

The Atchison Topeka and Santa Fe, which is a class 1 railroad, has a line that runs parallel to Interstate 25 through the city of Albuquerque, approximately 4.0 km from the western boundary of the site. The inventory of materials transported along this stretch of track for calendar year 1993 was provided by the Director of Environmental Quality and Hazardous Materials.⁴⁰ This data indicates that the majority of hazardous material is either flammable liquid or gas, or corrosive material.

Hazardous materials shipments comprise only 14% of the total car loads on the Sante Fe Railway.⁴¹ The shipments are most likely mixed loads containing sizeable amounts of nonhazardous material within the same trailer or container. Even though the percentage of hazardous materials is low, the potential for a railway accident remains a credible scenario.

In the event of a hazardous materials accident involving a rail car, a joint response between local responders, the State Police, and the railroad would be initiated. The railroad employs a team of security personnel to secure the hazmat spill site until arrangements can be made for cleanup and disposal. Federal law requires the notification of the LEPC in the event of a hazardous materials accident. Under the Emergency Response Plan, SNL/NM would then be notified. SNL/NM can then take the necessary protective actions to ensure the safety and integrity of onsite personnel and their respective operations.

3.2.5 Pipelines

Natural gas is supplied to 802, it was installed to code, and is a hazard that society generally accepts as a routine hazard associated with a twentieth century life style.

3.3 802 Chemical Hazards Summary

As a result of screening the chemical hazards in 802, one chemical (Anhydrous Ammonia) was kept for further evaluation. This evaluation is performed in Section 4.0, Hazard Characterization.

3.4 802 Radiological Hazards Summary

No radiological hazards were found to exist within 802.

3.5 Offsite Hazards Summary

SNL/NM provides representatives to the LEPC, and a strong working relationship with the offsite Emergency Response community has been established. Development of local plans is in progress, and the contemplation of both SNL/NM hazards to the city, and city hazards to SNL/NM are being incorporated in this planning development process. Therefore, no offsite hazards were considered for characterization or further evaluation.

4.0 HAZARD CHARACTERIZATION

The screening process described in the preceding section identified 1 chemical hazard (Ammonia) that exceeded the screening criteria. This hazard is fully characterized (i.e. physical properties, storage, and use) in this section to support the development of accident scenarios and analysis of possible airborne releases.

4.1 Anhydrous Ammonia

Ammonia is a clear, colorless gas, extremely pungent odor, liquified by compression.

Inventory

- One 2 lb/0.91 kg cylinder serving the duplication equipment
- One 2 lb/0.91 kg cylinder in the storage cabinet

Properties

• Density	0.90
• Melting Point	-77° C/-25° F
• Boiling Point	-33.35° C/-0.75° F
• ERPG-1 for Ammonia	25 ppm
• ERPG-2 for Ammonia	200 ppm
• ERPG-3 for Ammonia	1000 ppm

Conditions of Storage and Use

The Administrative Micrographics Facility rarely has two cylinders of Anhydrous Ammonia each weighing two pounds/0.91 kilograms each within the vault at one time. The Administrative Micrographics Facility sub-contracts most of its historical archival reproduction work to groups outside Sandia. Only documents that are controlled or classified are reproduced onsite. This constitutes approximately 5% of the total work required by DOE Order 1324.4. Because of this fact a bottle of Ammonia lasts about a year. When a bottle gets low the facility will order a new bottle. The new bottle is stored, secured by a chain, in a properly marked cabinet in a separate room at the opposite end of the facility. When the bottle is empty the valve is closed and the line is disconnected via a common quick release connector. The line is then bled by operating the duplicating equipment. The replacement bottle is then connected and the valve is then opened.

Safety Profile

A human poison by an unspecific route. Poison experimentally by inhalation, ingestion, and possibly other routes. An eye, mucous membrane, and systemic irritant by inhalation. Mutation data reported. A common air contaminant. Difficult to ignite. Explosion hazard when exposed to flame or in a fire. NH_3 + air in a fire can detonate. Potentially violent or explosive reactions on contact with interhalogens. In addition it forms sensitive explosive mixtures with air + hydrocarbons. To stop fire stop the flow of gas.⁴²

5.0 EVENT SCENARIOS

The barriers that maintain control over the hazardous material described in Section 4.0 have been analyzed, and the possible failure modes have been considered. The initiating events, barrier analyses, and release scenarios are described in the following section. Each scenario is identified by a release designation.

5.1 Chemical Event Scenarios

The chemical event scenarios described below are chemical releases from DOT approved pressurized cylinders. The scenarios below represent the maximum possible consequences, therefore, scenarios involving malevolent acts will also address the possibility of random bullets, as mandated in DOE Order 5480.16, Fire Arms Safety.⁴³

Due to modeling limitations, identified in the "Technical Guidance for Hazards Analysis"⁴⁴, gaseous releases from a direct source must be released over a period of ten minutes rather than instantaneously. This provides the most accurate dispersion of an airborne chemical when utilizing a computer model.

5.1.1 Ammonia Anhydrous

The release of Anhydrous Ammonia, characterized in Section 4.0, from the Administrative Micrographic Facility is described in the postulated scenarios below.

Failure of the Primary Barrier

Anhydrous Ammonia is stored and employed via a two pound DOT approved pressurized cylinder. The cylinder walls and its respective valve represent the primary barrier. The cylinder or its valve could fail by one of many possible modes, a few of those failure modes or initiating events are described below. Regardless of the initiating event it is assumed that the entire contents of the cylinder will be released. This fact is due to the material being in a gaseous state and under pressure.

Puncture: Puncture due to an incident while transporting the cylinders is a credible scenario.

Fracture: Fracture by impact or metal defect in a cylinder is a credible scenario.

Embrittlement or Corrosion: Embrittlement or corrosive attacks on the cylinder weakening or breaching the cylinder could lead to leakage of Anhydrous Ammonia.

Misoperation or Damage to a Cylinder Stop Valve: Mis-operation or damage to a cylinder stop valve whether by accident or an act of sabotage would conceivably lead to the release of Anhydrous Ammonia.

Damage from Random Gun Fire in the Area: A cylinder struck by random bullets during a security incident is a credible scenario.

Effects of Other Barriers

The cylinders are shipped and stored, when not in use, in a cardboard box. However, no barriers exist that would prevent or mitigate the release of Anhydrous Ammonia.

Range of Possible Releases

Table 5.1
Anhydrous Ammonia Scenarios

Scenario	Source Term Parameter	Meteorological Conditions	Release Designation
Anhydrous Ammonia Release	Direct 0.2 lb/0.09 kg per min.	Worst Case	AA-1
2 pounds/0.91 kilograms	Direct 0.2 lb/0.09 kg per min.	Average	AA-2

5.2 Radiological Event Scenarios

No radiological scenarios are postulated because no sources of radiation were identified in 802.

6.0 EVENT CONSEQUENCES

The consequences from the airborne release scenarios described in Section 5.0 are estimated to determine the area potentially affected, the need for personnel protective actions, and the time available to take those actions. This section describes computer codes, calculational techniques, input data used for dispersion modeling, and consequence criteria. The results of the dispersion modeling are summarized at the end of this section for each previously identified release designation. The dispersion model data sheets for each release designation are included in Appendix B.

6.1 Calculational Models and Methods

Event consequences are estimated using calculational models and methods that are most appropriate to the physical and atmospheric conditions of the site and the material released.

6.1.1 Calculational Models

The chemical model CAMEO and its air model, ALOHA, were utilized for estimating the movement and dispersion of gases.⁴⁵ CAMEO was designed by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) to help emergency planners, facility operators, and first responders plan for and safely handle chemical accidents. The air model estimates pollutant concentrations downwind from the source of a release, taking into consideration the toxicological and physical characteristics of the release site, the atmospheric conditions, and the circumstances of the release.

6.1.2 Calculational Methods

The transport of hazardous materials in the atmosphere from 802 to both onsite as well as offsite locations during an accident is a significant concern. Several factors affect the downwind calculations. These factors include the source term (quantity of the material available for release and the size of the puddle, if applicable), release and evaporation rates, duration, mixture, and transport, diffusion, deposition, and stability.

Six classes of atmospheric stability are used to indicate mixing in the atmosphere. These classes are referred to as the Pasquill-Gifford Stability Classes.

Pasquill-Gifford Stability Classes

- A - Extremely unstable (bright, sunny days)
- B - Moderately unstable
- C - Slightly unstable (cloudy, low wind speed)
- D - Neutral (heavy overcast, day or night)
- E - Slightly stable (night, low winds)
- F - Moderately stable (very low wind, night or just before dawn)

As shown in Table 5.1, two meteorological conditions were utilized: worst case and average. The meteorological conditions provided a range of accident scenarios for input into ALOHA. The worst case meteorological conditions are Pasquill-Gifford Stability Class F, a 1 m/s wind speed, and a 500 meter inversion. The average Albuquerque meteorological conditions were obtained from the *Technical Guidance for Siting Criteria*,⁴⁶ by selecting data from four months (one from each season). This data

provided a range of daily meteorological conditions. The calculations used to determine the average Albuquerque meteorological conditions can be found in the *1994 TA-V Hazards Assessment Document*.⁴⁷ The average meteorological conditions analysis resulted in the following conclusions: the average Albuquerque wind speed is 4 m/s with an average stability class of C which is slightly unstable.

6.2 Consequence Thresholds

The consequence thresholds are based upon the ERPGs published by AIHA.⁴⁸

6.2.1 ERPGs

The ERPG values are intended to provide estimates of concentration ranges above which one could reasonably anticipate adverse effects as a consequence of exposure to a specific substance. ERPG-1, ERPG-2, and ERPG-3 are defined below.

- The ERPG-1 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor.
- The ERPG-2 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action.
- The ERPG-3 is the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

6.2.2 Application of ERPGs

The ERPGs are used to classify the operational emergency events. The three classes of operational emergencies in ascending order are: alert, site area emergency, and general emergency. The ERPGs that result in the various levels of operational emergencies are described below.

- The ERPG-1 value is used as a screening criterion, as explained in Section 3.1.1.1, Dispersion Modeling. The ERPG-1 is also used to determine the low end of the emergency classification spectrum (i.e., alert). For example, if an ERPG-1 is exceeded at 30 meters, the event would constitute a minimum of an alert emergency classification.
- The ERPG-2 value is compared with the maximum toxicity concentration at the facility and site boundaries to determine the appropriate emergency class. If the ERPG-2 is exceeded within the site boundary, the event is considered a site area emergency. If the ERPG-2 is exceeded beyond the site boundary, the event is considered a general emergency.
- The ERPG-3 value is a consideration in defining the Emergency Planning Zone. The ERPG-3 value represents the Early Severe Health Effects (ESHE) value. The distance at which ESHE is reached is determined for each scenario. This distance is the minimum distance at which an EPZ can be established.

6.3 Receptor Locations

Consequences of the hazardous material releases were quantitatively evaluated for various onsite and offsite receptor locations. The demarcation between the onsite and offsite receptors is the radial 75 meter site boundary. These receptor locations include emergency response facilities and those areas that could potentially be impacted by an accident in 802's Administrative Micrographic Facility. The following distances are measured from the approximate location of Room B10 in the basement of 802.

6.3.1 Onsite Receptors

The following onsite receptors include facilities within the 75 meter 802 site boundary.

- Building 801, ~ 12 m (SNL/NM's EOC)
- Building 800, ~ 30.5 m
- Building 804, ~ 30.5 m
- Building 800A, ~ 45.5 m
- Gate 1, ~ 53 m
- Building 803, ~ 74 m

6.3.2 Offsite Receptors

The following offsite receptors include those facilities and areas outside the 75 meter 802 site boundary.

- Building 831, (Medical), ~ 190 m
- KAFB Fire Station, ~ 190 m
- National Atomic Museum, ~ 320 m
- Child Dev. Center, E Annex, ~ 545 m
- KAFB Housing (N. of "F" Blvd.), ~ 485 m
- Wherry Elementary School, ~ 1.3 km
- Sandia Base Elementary School, ~ 685 m
- Wilson High School, ~ 2.9 km
- Veterans Hospital, ~ 2.9 km
- Albuquerque Int'l Airport Terminal, ~ 6.1 km

Table 6.1
Summary of Consequences

Event Consequences for Building 802						
Release Designation	Maximum Concentration at		Maximum Distance to		Possible/Probable EAL(s) *	Emergency Event Classification
	Facility Boundary at 30 m (ppm)	Site Boundary at 75 m (ppm)	ERPG-2 (meters)	ESHE (meters)		
AA-1	1,190	194	74	33	1 NH ₃ cylinder valve misoperated	Site Area
AA-2	21.6	3.47	<10	<10	1 NH ₃ cylinder valve misoperated	Alert

* EALs form the link between the severity of an emergency situation, as reflected in the event classification system and the facility specific indicators of the event.

7.0 THE EMERGENCY PLANNING ZONE

The results of the consequence analysis performed in section 6.0 were used to propose an Emergency Planning Zone (EPZ). An EPZ is an area within which special planning and preparedness efforts are warranted, as a means of apportioning preparedness resources to the areas where they are most needed.

7.1 The Minimum EPZ Radius

As can be seen from the data in Table 6.1, the highest facility emergency class is a Site Area Emergency, and the greatest distance at which a postulated facility event will produce consequences exceeding the Early Severe Health Effects (D_{ESHE}) threshold is 33 meters (Release Designation AA-1). In accordance with Figure 4.1 of the EMG which states that if the D_{ESHE} and the site boundary are not greater than 2 km, then the "minimum EPZ radius" (EPZ_{min}) is equal to the minimum distance to the site boundary. Therefore, the EPZ_{min} for 802 is 75 meters. The nominal 75 meter EPZ follows jurisdictional and physical boundaries and is depicted in Illustration 7-1.

7.1.1 Tests of Reasonableness

The EPZ meets the following five tests of reasonableness:

1. Are the maximum distances to Protective Action Guide (PAG)/ERPG-level impacts for most of the analyzed accident scenarios equal to or less than the EPZ radius selected?

Yes. All of the ERPG 2 impacts are less than the 75 meter EPZ. As shown in table 6.1, the maximum distance for the ERPG-2 is <74 meters.

2. Is the selected EPZ radius large enough to provide a credible basis for extending response activities outside the EPZ if conditions warrant?

Yes. Lines of communication and decision processes involving KAFB, as well as city and county response agencies, have been established and practiced. In exercises, as well as actual events, the offsite agencies have demonstrated the flexibility to adapt and extend pre-planned response actions to different areas, depending upon the conditions of the particular event. This process is facilitated through the use of the Incident Command Structure.

3. Is the EPZ radius large enough to support an effective response at and near the scene of the emergency?

Yes. The nominal 75 meter EPZ encompasses most of 802 while all direct routes leading to it can be controlled via TA-I access points. From previous incidents at 802, responders acting within this zone have effectively precluded interference from uninvolved people and activity, facilitated onsite protective actions, and optimized on-scene command, control, and mitigation efforts.

4. Does the proposed EPZ conform to natural and jurisdictional boundaries and are other expectations and needs of the offsite agencies likely to be met by the selected EPZ?

Yes. The EPZ conforms to jurisdictional boundaries and physical street boundaries. By utilizing where reasonable, streets and physical boundaries for portions of the EPZ, access within the EPZ can be adequately controlled as needed by offsite agencies. Although 802 is entirely within the confines of TA-I and the entire EPZ is within DOE owned property, the need for offsite agencies may exist if there is a significant event or multiple events which may require offsite assistance. In this situation, the established EPZ would appropriately meet the needs of offsite agencies.

5. What enhancements of the facility and site preparedness stature would be achieved by increasing the selected radius?

The proposed EPZ radius ensures the involvement and integration of any required response organizations in the planning process. It is not obvious that any increase in the proposed EPZ boundary will provide significant improvement in the level of facility or site preparedness.

8.0 EMERGENCY CLASSES, PROTECTIVE ACTIONS, AND EALS

The correlation of event scenarios and estimated consequences developed in Sections 5.0 and 6.0 are used to determine the emergency classes and protective actions that are appropriate to the scenarios, as well as the observable indications (i.e. EALs) to trigger emergency declarations and protective actions. The following EALs are general by design as Sandia's Emergency Planning Department is implementing the full EAL Process for each hazard identified in the hazard assessment process as part of their emergency planning efforts.

8.1 Emergency Classes

As mentioned in section 6.0, the three classes of operational emergencies in ascending order of severity are alert, site area emergency, and general emergency. These classes are differentiated by severity for the purpose of specifying appropriate emergency actions, including required response activities and notifications, commensurate with the degree of hazard presented by the event. The three classes of emergencies are defined below.

8.1.1 Alert

An alert represents events in progress or have occurred which involve an actual or potential substantial reduction for the level of facility safety and protection. An environmental release of hazardous materials is expected to be limited to small fractions of the appropriate PAG or ERPG-2 onsite. An alert represents an event that is noteworthy; the potential impacts are not expected to be serious; and a negligible long-term supply is anticipated. Declaration of an Alert requires the availability of personnel and resources to:

- Provide continuous assessment of pertinent information for DOE decision makers, offsite authorities, the public, and other appropriate entities;
- Conduct appropriate assessments, investigations, or preliminary or confirmatory sampling and monitoring;
- Mitigate the severity of the occurrence or its consequences; and
- Prepare for other response actions should the situation become more serious.

8.1.2 Site Area Emergency

A Site Area Emergency represents events which are in progress or have occurred involving actual or likely major failure(s) of facility safety or safeguards systems needed for the protection of onsite personnel, the public health and safety, the environment, or national security. An environmental release of hazardous materials is not expected to exceed the appropriate PAG or ERPG-2 levels offsite. A Site Area Emergency represents an event in which a substantial supply impact is anticipated. Declaration of a Site Area Emergency requires initiation of predetermined protective actions for onsite personnel and the notification and assembly of emergency response personnel and equipment to activate response centers to provide:

- Continuous assessment of pertinent information for DOE decision makers, offsite authorities, the public, and other appropriate entities;

- Establish communications, consultation, and liaison with offsite authorities;
- Provide information to the public through offsite authorities and the media;
- Conduct or assist in any evacuations and sheltering;
- Conduct appropriate assessments, investigations, or sampling and monitoring;
- Mitigate the severity of the actual or potential consequences; and
- Mobilize appropriate emergency response groups or security forces for immediate dispatch should the situation become more serious.

8.1.3 General Emergency

A General Emergency represents events which are in progress or have occurred that involve actual or imminent catastrophic failure of facility safety systems with potential for loss of confinement integrity, catastrophic degradation of facility protection systems, or catastrophic failure in safety or protection systems threatening the integrity of a weapon or test device which could lead to substantial offsite impacts. Any environmental release of hazardous materials can reasonably be expected to exceed the appropriate PAG or ERPG-2 levels offsite. Declaration of a General Emergency requires the notification, mobilization, and dispatch of all appropriate emergency response personnel and equipment including appropriate DOE national response assets to:

- Activate the response centers and other emergency assets to provide continuous assessment of information;
- Establish communications, consultation, and liaison with offsite authorities and recommend predetermined protective actions for the public;
- Provide information to the public through offsite authorities and the media;
- Conduct or assist evacuations and sheltering;
- Conduct appropriate assessments, investigations, or sampling and monitoring;
- Mitigate the severity of the actual or potential consequences; and
- Mobilize and dispatch appropriate emergency response groups or security forces.

8.2 Anhydrous Ammonia Release Events and EALs

The consequence analysis performed in Section 6.0 identified the following conditions which could precipitate an alert or a site area emergency involving chemicals inside 802. The EAL involves:

- Any condition which could jeopardize the integrity of a cylinder or cylinder stop valve employed or stored in Room B10 in Building 802 that would result in the release of Anhydrous Ammonia.

Basis: All chemicals analyzed in 802 are appropriately stored in hazardous material cabinets. If these chemicals are inadvertently released, the EAL is the puncture, fracture, embrittlement, or corrosion of a cylinder, misoperation or damage of a stop valve, or possible damage to a cylinder or its stop valve due to random gun fire in the area as indicated by a direct observation.

8.3 Protective Actions

The recommended protective action involving the release of Anhydrous Ammonia inside 802 is evacuation. Building 802 occupants should be made aware of the hazards associated with the release of Ammonia employed in the Administrative Micrographics Facility.

In the event of an Anhydrous Ammonia release, fire drill procedures should be followed for evacuation purposes with assembly areas located at points outside the 75 meter EPZ.

Note: Placement of a pull alarm near the entrance of the Administrative Micrographics Facility is recommended for the quickest and most effective response.

9.0 MAINTENANCE AND REVIEW

The Risk Management and NEPA Department is responsible for ensuring that Hazards Assessment Documents are regularly reviewed and maintained.

It is the responsibility of the Facility Managers to periodically review Hazards Assessment Documents applicable to their facilities and insure that they accurately reflect any changes in facility design, operations, safety features, inventories of hazardous materials, and features of the surrounding area.

The responsible line organizations should provide information relative to changes in facility design, operation, safety features, inventories of hazardous materials, and features of the surrounding area to the Facility Manager.

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<i>Appendix A</i>	
<i>ChemMaster Inventory</i>	
Building 802	

KEY to ABBREVIATIONS FOR CHEMMASTER

BD. FT	Board Feet
CHEM	Chemical
CYL	Cylinder
G	Gas
g	Gram
gal	Gallon
HA	Hazard Assessment
kg	kilogram
L	Liquid
l	Liter
LOC_CODE	Location Code
MQTY	Maximum Quantity
ml	Milliliter
oz	Ounce (avoirdupois)
ozd	Ounces Dry (avoirdupois)
ozf	Fluid Ounce (U.S. liquid measure)
PHYS_STATE	Physical State
pt	Pint
qt	Quart
QTY_UNIT	Quantity Unit
S	Solid
SCR_CRIT	Screening Criteria
SIH	Standard Industrial Hazard
SQ. FT	Square Feet

SNL/NM Hazards Project

HA Required : YES

Number of Chemicals: 51

Chemical Inventory

CHEM	LOC CODE	PHYS STATE	QTY UNIT	MQTY	SCR CRIT
ANHYDROUS AMMONIA	802/B10	G	(lbs)	2	KEEP
KODAK PROSTAR DEVELOPER	802/B10		(g)	15	SIH
KODAK PROSTAR FIXER	802/B10		(g)	15	SIH
KODAK TYPE 55 DEVELOPER	802/B10	L	(g)	15	SIH
PADDING ADHESIVE FANAPART	802/B10	S	(qt)	10	NON-DISPERSIBLE
KONICA COLOR 7 BLEACH/FIX	802/B20	L	(l)	6	SIH
KONICA COLOR 7 DEVELOPER	802/B20	L	(l)	6	SIH
KONICA COLOR 7 STABILIZER	802/B20	L	(l)	6	SIH
DEVELOPER 5090	802/B45	S	(lb)	13	SIH
DRY INK 5090	802/B45	S	(lb)	31	SIH
FUSER AGENT	802/B45	L	(l)	12	SIH
PLC REPLENISHER TONER BLACK	802/B45	S	(kg)	9	NON-DISPERSIBLE
PLC REPLENISHER TONER CYAN	802/B45	S	(kg)	9	NON-DISPERSIBLE

Chemical Inventory

CHEM	LOC CODE	PHYS STATE	QTY UNIT	MQTY	SCR CRIT
PLC REPLENISHER TONER YELLOW	802/B45	S	(kg)	9	NON-DISPERSIBLE
PLC STARTER DEVELOPER (MAGENTA,CYAN,YELLOW,BL ACK)	802/B45	S	(kg)	7	NON-DISPERSIBLE
REPLENISHER TONER MAGENTA	802/B45	S	(oz)	9	NON-DISPERSIBLE
SKTAPRINT L TONER	802/B45	S	(kg)	20	NON-DISPERSIBLE
EKTAPRINT L TONER	802/B45	S	(lb)	2	NON-DISPERSIBLE
BLENDER CONCENTRATE SOLUTION NO.1	802/B53	L	(ct)	20	SIH
BLENDER CONCENTRATE SOLUTION NO.2	802/B53	L	(ct)	20	SIH
BLENDER CONCENTRATE SOLUTION NO.3	802/B53	L	(ct)	3	SIH
COPY PROOF LONG LIFE ACTIVATOR	802/B53	L	(gal)	15	SIH
DYNAMARK 8500 DEVELOPER	802/B53	L	(qt)	8	SIH
ONYX DEVELOPER	802/B53	L	(gal)	12	SIH
ONYX STABILIZER	802/B53	L	(gal)	12	SIH
RAPID FIXER, PART A	802/B53		(gal)	12	SIH
RAPID FIXER, PART B	802/B53	L	(gal)	12	SIH

Chemical Inventory

CHEM	LOC CODE	PHYS STATE	QTY UNIT	MQTY	SCR CRIT
VIKING 2-IN-1 DEVELOPER-GUM	802/B53	L	(gal)	2	SIH
VIKING DEVELOPER	802/B53	L	(pl)	3	SIH
VIKING GUM	802/B53	L	(pl)	3	SIH
VIKING MAKE-UP SOLUTION	802/B53	L	(pl)	3	SIH
BELT DRESSING DEMKOTE	802/B55	L	(ozf)	100	SIH
FOUNTAIN CONCENTRATE	802/B55	L	(gal)	5	SIH
HIDROLIC OIL	802/B55	L	(gal)	2	SIH
INK READY	802/B55	S	(ozf)	128	NON-DISPERSIBLE
IPI RUBBER BASE INK	802/B55	S	(lb)	35	NON-DISPERSIBLE
ISOPROPYL ALCOHOL	802/B55	L	(gal)	20	< ERPG-1 AT 30 M.
LPS 2 LUBRICANT	802/B55	L	(ozf)	220	SIH
LPS CLEANER/DEGREASER	802/B55	L	(ozf)	310	SIH
LUBRICANT 30W	802/B55	L	(gal)	5	SIH
MICRODUSYER OS	802/B55	L	(pt)	4	SIH
OIL BASE INK (BLACK)	802/B55	L	(lb)	45	SIH
OIL BASE INK (MULTI COLOR)	802/B55	L	(lb)	95	SIH

Chemical Inventory				
CHEM	LOC CODE	PHYS STATE	QTY UNIT	QTY
SCR CRIT				

ONYX FOUNTAIN CONCENTRATE 1	802/B55	L	(qt)	20	SIH
ONYX IMAGE DELETION FLUID	802/B55	L	(ozt)	40	SIH
PADDING ADHESIVE FANAPART	802/B55	L	(qt)	12	SIH
PLC S-20SILICONE OIL	802/B55	L	(l)	20	SIH
PRO 3 FOUNTAIN SOLUTION	802/B55	L	(gal)	4	SIH
R SCRATCH REMOVER	802/B55	L	(qt)	12	SIH
RUBBER BASE INK	802/B55	S	(lb)	100	NON-DISPERSIBLE
VARN V-120 WASH	802/B55	L	(gal)	10	SIH

Appendix B

ALOHA Dispersion Model Printouts

Release Designation AA-1	
Anhydrous Ammonia	
2 Pounds, 10 Minute Release Worst Case Conditions	

Distance to ERPG-1 Concentrations

Anhydrous Ammonia

Concentration: 25 ppm
Distance: 214 meters

*2 Pounds, 10 Minute Release
Worst case meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO

Building Air Exchanges Per Hour: 60 (User specified)

Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS

Molecular Weight: 17.03 kg/kmol

TLV-TWA: 25.00 ppm

IDLH: 500.00 ppm

Footprint Level of Concern: 25 ppm

Boiling Point: -33.43° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1 meters/sec from 0° true

Inversion Height: 500 meters

Stability Class: F

Air Temperature: 68° F

Relative Humidity: 50%

Ground Roughness: Open country

Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min

Source Height: 0

Release Duration: ALOHA limited the duration to 1 hour

Release Rate: 90.7 grams/min

Total Amount Released: 5.44 kilograms

Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian

User specified LOC: 25 ppm

Max Threat Zone for LOC: 214 meters

Max Threat Zone for IDLH: 47 meters

Chemical Name: AMMONIA, ANHYDROUS
Model Run: Gaussian
Wind: 1 meters/sec from 0° true

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 214 meters
Max Threat Zone for IDLH: 47 meters

meters

Distance to ERPG-2 Concentrations.

Anhydrous Ammonia

Concentration: 200 ppm
Distance: 74 meters

*2 Pounds, 10 Minute Release
Worst case meteorological conditions*

*2 Pounds, 10 Minute Release
Worst case meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 200 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: F Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 200 ppm
Max Threat Zone for LOC: 74 meters
Max Threat Zone for IDLH: 47 meters
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

Distance to ERPG-3 Concentrations	
<p style="text-align: center;">Anhydrous Ammonia</p> <p style="text-align: center;">Concentration: 1,000 ppm Distance: 33 meters</p>	
<p style="text-align: center;"><i>2 Pounds, 10 Minute Release Worst case meteorological conditions</i></p>	

Concentration: 1,000 ppm
Distance: 33 meters

B-7

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 1000 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: F Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 1000 ppm
Max Threat Zone for LOC: 33 meters
Max Threat Zone for IDLH: 47 meters
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

<i>Concentrations at the Facility Boundary</i>	
<div data-bbox="553 827 1021 888" data-label="Section-Header"><p><i>Anhydrous Ammonia</i></p></div> <div data-bbox="638 978 941 1047" data-label="Text"><p>Concentration: 1,190 ppm Distance: 30 meters</p></div> <div data-bbox="555 1644 1044 1726" data-label="Text"><p><i>2 Pounds, 10 Minute Release Worst case meteorological conditions</i></p></div>

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 25 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: F Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 214 meters
Max Threat Zone for IDLH: 47 meters

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:
Downwind: 30 meters
Off Centerline: 0 meters
Max Concentration:
Outdoor: 1,190 ppm
Indoor: 1,190 ppm
Note: Indoor graph is shown with a dotted line.

Chemical Name: AMMONIA, ANHYDROUS
Model Run: Gaussian
Building Air Exchanges Per Hour: 60 (User specified)

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:

Downwind: 30 meters

Off Centerline: 0 meters

Max Concentration:

Outdoor: 1,190 ppm

Indoor: 1,190 ppm

Note: Indoor graph is shown with a dotted line.

ppm

Concentrations at the Site Boundary

Anhydrous Ammonia

Concentration: 194 ppm
Distance: 75 meters

*2 Pounds, 10 Minute Release
Worst case meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 25 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 1 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: F Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 1 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.
Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 214 meters
Max Threat Zone for IDLH: 47 meters

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:
Downwind: 75 meters
Off Centerline: 0 meters
Max Concentration:
Outdoor: 194 ppm
Indoor: 194 ppm
Note: Indoor graph is shown with a dotted line.

Chemical Name: AMMONIA, ANHYDROUS
Model Run: Gaussian
Building Air Exchanges Per Hour: 60 (User specified)

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:

Downwind: 75 meters

Off Centerline: 0 meters

Max Concentration:

Outdoor: 194 ppm

Indoor: 194 ppm

Note: Indoor graph is shown with a dotted line.

ppm

Release Designation AA-2	
Anhydrous Ammonia	
2 Pounds, 10 Minute Release Average Conditions	

Distance to ERPG-1 Concentrations

Anhydrous Ammonia

Concentration: 25 ppm
Distance: 28 meters

*2 Pounds, 10 Minute Release
Average meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 25 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 4 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: C Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 28 meters
Max Threat Zone for IDLH: less than 10 meters (10.9 yards)
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

Distance to ERPG-2 Concentrations

Anhydrous Ammonia

Concentration: 200 ppm
Distance: <10 meters

*2 Pounds, 10 Minute Release
Average meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 200 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 4 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: C Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 200 ppm
Max Threat Zone for LOC: 10 meters
Max Threat Zone for IDLH: less than 10 meters (10.9 yards)
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

Distance to ERPG-3 Concentrations

Anhydrous Ammonia

Concentration: 1,000 ppm
Distance: <10 meters

*2 Pounds, 10 Minute Release
Average meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 1000 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 4 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: C Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 1000 ppm
Max Threat Zone for LOC: less than 10 meters(10.9 yards)
Max Threat Zone for IDLH: less than 10 meters(10.9 yards)
Note: Footprint was not drawn because
effects of near-field patchiness make plume
presentation unreliable for short distances.

Concentrations at the Facility Boundary

Anhydrous Ammonia

Concentration: 21.6 ppm
Distance: 30 meters

*2 Pounds, 10 Minute Release
Average case meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 25 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 4 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: C Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 28 meters
Max Threat Zone for IDLH: less than 10 meters (10.9 yards)
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:
Downwind: 30 meters
Off Centerline: 0 meters
Max Concentration:
Outdoor: 21.6 ppm
Indoor: 21.6 ppm
Note: Indoor graph is shown with a dotted line.

Chemical Name: AMMONIA, ANHYDROUS
Model Run: Gaussian
Building Air Exchanges Per Hour: 60 (User specified)

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:

Downwind: 30 meters

Off Centerline: 0 meters

Max Concentration:

Outdoor: 21.6 ppm

Indoor: 21.6 ppm

Note: Indoor graph is shown with a dotted line.

ppm

<i>Concentrations at the Site Boundary</i>	
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Anhydrous Ammonia

Concentration: 3.47 ppm
Distance: 75 meters

*2 Pounds, 10 Minute Release
Average case meteorological conditions*

*2 Pounds, 10 Minute Release
Average case meteorological conditions*

SITE DATA INFORMATION:

Location: ALBUQUERQUE, NEW MEXICO
Building Air Exchanges Per Hour: 60 (User specified)
Date and Time: Using computer's internal clock

CHEMICAL INFORMATION:

Chemical Name: AMMONIA, ANHYDROUS
Molecular Weight: 17.03 kg/kmol
TLV-TWA: 25.00 ppm IDLH: 500.00 ppm
Footprint Level of Concern: 25 ppm
Boiling Point: -33.43° C
Vapor Pressure at Ambient Temperature: greater than 1 atm
Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC INFORMATION: (MANUAL INPUT OF DATA)

Wind: 4 meters/sec from 0° true
Inversion Height: 500 meters
Stability Class: C Air Temperature: 68° F
Relative Humidity: 50% Ground Roughness: Open country
Cloud Cover: 5 tenths

SOURCE STRENGTH INFORMATION:

Direct Source: .2 pounds/min
Source Height: 0
Release Duration: ALOHA limited the duration to 1 hour
Release Rate: 90.7 grams/min
Total Amount Released: 5.44 kilograms
Note: This chemical may flash boil and/or result in two phase flow.

Use both dispersion modules to investigate its potential behavior.

FOOTPRINT INFORMATION:

Dispersion Module: Gaussian
User specified LOC: 25 ppm
Max Threat Zone for LOC: 28 meters
Max Threat Zone for IDLH: less than 10 meters (10.9 yards)
Note: Footprint was not drawn because effects of near-field patchiness make plume presentation unreliable for short distances.

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:
Downwind: 75 meters
Off Centerline: 0 meters
Max Concentration:
Outdoor: 3.47 ppm
Indoor: 3.47 ppm
Note: Indoor graph is shown with a dotted line.

Chemical Name: AMMONIA, ANHYDROUS

Model Run: Gaussian

Building Air Exchanges Per Hour: 60 (User specified)

TIME DEPENDENT INFORMATION:

Concentration Estimates at the point:

Downwind: 75 meters

Off Centerline: 0 meters

Max Concentration:

Outdoor: 3.47 ppm

Indoor: 3.47 ppm

Note: Indoor graph is shown with a dotted line.

ppm

Distribution List

1	MS	9018	Central Technical Files, 8523-2
5	MS	0899	Technical Library, 13414
1	MS	0619	Print Media, 12615
2	MS	0100	Document Processing, 7613-2 for DOE/OSTI
2	MS	1037	Risk Management, Al Bendure, 7258
6	MS	1037	Risk Management, Zeferino Banda, 7258
3	MS	0407	Emergency Planning, Steve Ross, 7259
4	MS	0104	Printing and Still Photography, Bruce Fetzer, 13418
3	MS	1037	Risk Management, Arlan Swihart, 7258
2	MS	1113	Protective Force Department, Sam Ortega, 7435
2	MS	1113	Protective Force Department, Matt Umstead, 7435
1	MS	1054	Safety and Health, William Burnett, 7701