BY ORDER OF THE COMMANDER
30TH SPACE WING

30TH SPACE WING INSTRUCTION 91-106

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Safety

TOXIC HAZARD ASSESSMENTS

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This publication establishes the criteria, procedures, and responsibilities for development, usage, and control of Toxic Hazard Zones (THZ). This publication applies to all operations that involve toxic propellants or toxic combustion byproducts, and to facilities that store, handle or transfer unconventional propellants. THZ procedures and controls used to support the release of other hazardous materials will be consistent with the policies described in 30th Space Wing (30 SW) Plan 32-4002, *Hazardous Materials Emergency Response Plan*, Appendix 2, Section B, *Toxic Hazard Corridor Plan*. The procedures described herein, when implemented, will provide the appropriate safety clear areas for storing, handling and transferring of unconventional propellants, and will provide for protecting workers and the general public during vehicle processing and launch operations. Refer recommended changes and questions about this supplement to 30 SW/SE, 806 13th Street VAFB 93437-5230 using AF Form 847, *Recommendation for Change of Publications*. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 37-123 (will convert to AFMAN 33-363), *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located at **https://afrims.amc.af.mil/**.

SUMMARY OF CHANGES

Throughout the publication, changes to office symbols were made and specific acronyms were updated (e.g, EOC for DCG and SLCC for SCMDR). **Table 1.**, Exposure Criteria on which Toxic Hazard Zones are based, has been updated. Cold and Hot Spill roles have been clarified (paragraph **4.1.**). All references to vapor protected shelters or VPS have been deleted – determined by discussion amongst 30 MDOS/SGOAB and 30 SW/SE. A bar (|) indicates changes since last revision.

1. Responsibilities. Responsibilities detailed in this instruction vary depending upon the type of operation and the resulting toxic hazard zone. Those responsibilities are described in detail in the appropriate sections. Responsibilities for implementing this instruction are:

1.1. 30 SW Safety Office (30 SW/SE). Ensures procedures described herein meet safety standards for all applicable operations.

1.2. Base Bioenvironmental Engineer (BEE) (30 MDOS/SGOAB). Provides guidance on the exposure criteria and protective measures described herein.

1.3. Users (e.g., 4th Space Launch Squadron (4 SLS), commercial launch contractors, etc.). Incorporates the user requirements described herein into governing operating procedures and provides funding for unique requirements.

1.4. Other Agencies (e.g., Command Post, 30th Security Forces Squadron (30 SFS), 30th Weather Squadron (30 WS), 30th Civil Engineer Squadron (30 CES), 2d Range Operations Squadron (2 ROPS)). Ensures resources are available and procedures are in place to meet their requirements described herein.

2. Sheltering Requirements. The following defines acceptable mission essential personnel sheltering for each zone for Cold Spill and Hot Spill Potential Hazard Zones (PHZ). These definitions apply across all propellant types.

2.1. Zone 1. Sheltering is recommended only for individuals especially sensitive to low levels of industrial odors.

2.1.1. Immediately enter any vehicle or structure if breathing discomfort is noticed.

2.1.2. Close all windows.

2.1.3. Close all air intake vents.

2.1.4. Await “all clear” from On-Scene Commander or his/her representative before leaving the site unless an emergency situation requires immediate evacuation.

2.2. Zone 2. If an individual notices breathing discomfort or skin irritation, they will be directed to take shelter or evacuate by the LST Chief pre-launch, and by the Emergency Operations Center (EOC) Director post-disaster. Protective actions would include taking shelter indoors or moving out of the zone.

2.2.1. Shelter must be fully enclosed with no open areas. Motor vehicles with engines off and windows and vents closed do qualify as adequate sheltering.

2.2.2. Close all windows.

2.2.3. Turn off all air recirculation devices.

2.2.4. Close all air intake vents.

2.2.5. If exiting a Zone 2 in a vehicle, emergency egress Personnel Protective Equipment (PPE) (i.e., Emergency Life Support Apparatus (ELSA)) should be worn only if safe to do so while driving since PPE can obscure vision and limit motor skills. Also, their limited air supply may necessitate the removal of the hood while in motion. For these reasons, while driving, PPE should only be worn to escape an immediate threat to life (Zone 3) that requires a traverse through noticeable toxic clouds.

2.2.6. If in a vehicle and not in an emergency situation, the vehicle is to be kept stationary to prevent inadvertent transit of a Zone 3.

2.2.7. Await "all clear" from EOC Director or designated representative before leaving the site unless an emergency situation requires immediate evacuation.

2.3. Zone 3. Wearing approved PPE, or having approved PPE readily available is mandatory for persons in Zone 3 PHZ. During a launch countdown, it is recommended that personnel be evacuated from a Zone 3 PHZ. Personnel may be allowed to remain in a Zone 3 PHZ only if they have approved PPE, their risks are acceptable, and their evacuation would impact the mission (e.g., LST has no back-up position to support the launch). Wearing of approved PPE is mandatory for persons in an Operational Hazard Zone (OHZ).

2.3.1. Personnel must wear approved PPE or have approved PPE readily available as specified in the governing operation procedure.

2.3.2. Await “all clear” from the EOC Director or designated representative before leaving the site unless in an emergency situation.

3. Toxic Hazard Zone (THZ) Development Criteria.

3.1. Exposure Limits. **Table 1.** lists the exposure limit criteria to be used in computing all forms of THZs. These values have been derived from the expert elicitation study conducted in FY99 and FY00. The expert elicitation study was performed by a panel of nationally recognized toxicologists, including Air Force representatives, wherein upper and lower bound exposure thresholds were recommended for HCl, NO2 and HNO3. Any variances to these limits must have the prior approval of 30 MDOS/SGOAB and 30 SW/SE before their use in an operational THZ. Where two exposure criteria are listed for one of the tiers, the one producing the longer THZ will be used.

3.2. Potential Hazard Zone (PHZ) Valid Times. The valid time for cold spill PHZs must not exceed two hours.

3.3. Updates. Cold spill Emission Hazard Zone (EHZ), OHZ, and PHZs must be updated as source strengths or meteorological conditions change, at intervals not to exceed 45 minutes for EHZs and 90 minutes for PHZs. OHZs must be updated at intervals not to exceed 15 minutes, or until emergency conditions are terminated by the EOC Director or Launch Support Team (LST) for OHZs.

3.4. Toxic Hazard Zone (THZ) Computation Timelines. As a baseline, operation decisions based upon THZs are to be made with cold spill PHZs computed and given to the requester at T-150 minutes; and hot spill PHZ and OHZs at T-105 minutes, and T-45 minutes for launch operations. Computations based on T-0 weather data will be made and used as an OHZ if an accidental release occurs. These timelines are specified in the Range Safety Operation Requirements (RSOR) and can change based upon operation requirements.

Table 1. Exposure Criteria on which Toxic Hazard Zones are Based

EXPOSURE CRITERIA ON WHICH TOXIC HAZARD ZONES ARE BASED				
	PHZ/OHZ			EHZ
	Tier 1 (Zone 1 boundary)	Tier 2 (Zone 2 boundary)	Tier 3 (Zone 3 boundary)	TLV/PEL
HCl(1)	4 ppm	20 ppm	35 ppm	5 ppm (OSHA-C -15 min)
N_2H_4(2)	N/A	2 ppm (4)	50 ppm (30 min)	0.01 ppm (TLV-8 hr)
UDMH(2)	N/A	5 ppm (4)	15 ppm (30 min)	0.01 ppm (TLV-8 hr)
A-50(2)	N/A	2 ppm (4)	15 ppm (30 min)	0.01 ppm (TLV-8 hr)
MMH(2)	N/A	2 ppm (4)	20 ppm (30 min)	0.01 ppm (TLV-8 hr)
HNO_3(1)	0.5 ppm	4 ppm	10 ppm	2 ppm (TLV-8 hr) 4 ppm (STEL15 min)
NO_2(1)(3)	1 ppm	6ppm	15 ppm	1 ppm (OSHA-STEL - 15 min)

All values to be treated as ceiling limits (1 minute or less) unless an averaging time is specified

1-Governing criteria by Expert Elicitation

2-Governing criteria is NIOSH 1/2 IDLH (Tier 3), SPEGL or EPA LOC (Tier 2)

3-NO_2 is the measurable result and breakdown product in nitrogen tetroxide (N_2O_4)

4-Averaging time of 30 minutes for cold spill computation, 60 minutes for hot spill computation

4. Cold Spill THZ (e.g., Propellant Transfer or Handling Operations).

4.1. Responsibilities.

4.1.1. 30th Weather Squadron (30 WS). The duty forecaster will compute the cold spill THZ for all zones and provide them to the requester, Command Post (30 SW/CP) and all other users by telephone and or the New Tactical Forecast System (NTFS). THZs will be provided in terms of azimuth and crossrange/downrange dimensions (in feet).

4.1.2. The user is responsible for the following:

4.1.2.1. Requesting cold spill THZs from the 30 WS no later than 30 minutes prior to starting the operation, then plotting THZs on Base Disaster Grid maps or equivalent. The Readiness

Flight (30 CES/CEX, Bldg. 11165, ext. 606-4024) is the office of primary responsibility (OPR) for base maps.

4.1.2.2. No later than 24 hours prior to starting the operation the user shall:

4.1.2.2.1. Schedule Hazardous Operations Support (HOS), with 2 ROPS (via operations directive (OD)) or appropriate scheduling agency if necessary. Verify scheduled resources and support agencies through Scheduling (2 ROPS/DOS) as needed.

4.1.2.2.2. Review all evacuation instruction and notification procedures.

4.1.2.2.3. Prioritize list of facilities to be evacuated should a mishap occur. Prioritization will be based upon the number of personnel at the facility and the distance between the facility and the operation location. Points of contact for affected facilities can be obtained from CE Customer Service (30CES/CEOCP) at 606-0010.

4.1.2.2.4. Notify personnel in potentially affected facilities and areas (i.e., personnel inside PHZs 2 and 3).

4.1.2.3. Ensuring personnel performing HOS duties are fully trained (as of this publication) by UPC/PEMO.

4.1.3. The Command Post (30 SW/CP) is responsible for the following:

4.1.3.1. Monitoring any activity that has any zone over the base cantonment area, outside the base land boundary or over offshore oil platforms.

4.1.3.2. Notifying applicable on-base and non-base agencies of the OHZ/EHZ if a release occurs. Specifically, when 30 SW/CC or his/her official representative directs activating the Vandenberg's Integrated Communication Telephone Evacuation Routes (VICTER) system and the Giant Voice/Public Address system (if available).

4.1.3.3. Notifying 30 OSS/OSA (606-5570) to alert aircraft flying in the local area to remain clear of the OHZ/EHZ.

4.1.3.4. Contacting the trainmaster to be apprised of current train schedules if a Zone 2 or 3 encompasses Union Pacific railroad tracks. Current numbers for trainmaster, as of this publication: Mr. Marvin Fisher (805-748-0066), Guadalupe office (805-343-1841 or 800-873-3749, ext. 5860).

4.1.4. 30 MDOS/SGOAB is responsible for the following:

4.1.4.1. Acting as the Wing point of contact on toxic chemical exposure criteria.

4.1.4.2. Coordinating on sheltering requirements.

4.1.4.3. Providing guidance on neutralizing propellants.

4.1.4.4. Approving and/or recommending the use of health related PPE.

4.1.5. The 30 SW Safety Office (30 SW/SE) is responsible for the following:

4.1.5.1. Approving all modifications to and replacements of cold spill and hot spill prediction models for adequacy of personnel protection prior to their operational use.

4.1.5.2. Approving the use of safety related PPE.

4.1.5.3. Evaluating and approving user requests for set evacuation distances for EHZs.

4.1.5.4. Updating this instruction as needed.

4.1.6. The Range Scheduling office (2 ROPS/DOS) will schedule applicable resources per the governing OD and user input to support planned or potential propellant release.

4.1.7. The HOS Supervisor is responsible for maintaining control of Zones 2 and 3 by posting HOS personnel at directed checkpoints during propellant operations.

4.2. Operations Requiring Cold Spill PHZs. The following operations require cold spill PHZs to be determined (other operations may require PHZs if deemed necessary after analyzing planned operation):

4.2.1. Transferring propellants, where more than 5 gallons may be released, from one storage, missile or spacecraft vessel to another, at tank farms, launch complexes, or servicing or maintenance facilities.

4.2.2. Initial pressurization of propellant systems that contain more than 5 gallons.

4.2.3. Transporting or mechanical handling (e.g., lifting) propellants in quantities exceeding 5 gallons.

4.2.4. Propellant system maintenance (unless engineering analysis confirms PHZ will not exceed local control area or system is leak free).

NOTE: For paragraphs **4.2.3.** and **4.2.4.**, the following requirements do not apply: sheltering requirements in paragraph **2.**; notification requirements in paragraph **4.1.**; responsibility requirements in paragraph **4.4.**

4.3. Cold Spill PHZ Input Data Requirements. 30 WS requires the following data to compute the PHZ:

4.3.1. Time, location and altitude above ground level of potential release location.

4.3.2. Propellant type.

4.3.3. Source strength, in gaseous emissions of pounds per minute, wetted area in square feet, or total pounds or gallons of liquid released if the wetted area is unknown.

4.3.3.1. Source strengths must be determined for all modes of use, storage, transportation and venting of propellants on Vandenberg AFB. They must be based on the worst-case credible cold spill release scenarios or worst-case emission rates for venting.

4.3.3.2. Source strength determinations, assumptions, calculations, and test data must be documented in the Missile System Prelaunch Safety Package (MSPSP), Launch Complex or Facility Safety Plan, or Ground Operations Plan. Each facility will provide worst-case credible release strength information to the 30 WS for planning purposes. This information is subject to 30 SW/SE review and approval.

4.3.3.3. For minor releases, source strengths may be used to determine set evacuation distances in lieu of calculating EHZs if approved by 30 SW/SE and coordinated with 30 MDOS/SGOAB. Supporting rationale and determined evacuation distance must be documented in the MSPSP, Launch Complex or Facility Safety Plan, or Ground Operations Plan. Any limitations

(wind speed, wind direction, etc.) which invalidate the determined evacuation distance must be documented in the procedure governing the release operation.

4.4. Actions Required for Cold Spill PHZs. The requester of the cold spill PHZ has the following responsibilities:

4.4.1. Maintain positive control of personnel within Zone 3 during an operation. These personnel must either wear PPE, have emergency egress PPE readily available and be able to safely evacuate outside the Zone 3. They must be briefed on the operation in progress and on evacuation routes. The governing operation procedures will specify how the above conditions will be satisfied.

4.4.2. Ensure personnel within Zone 2 have:

4.4.2.1. An emergency evacuation route. If the evacuation route passes through Zone 3 or approaches the source location, PPE must be readily available.

4.4.2.2. The means to be immediately notified of an unplanned propellant release.

4.4.3. Ensure adequate communication is available to all personnel in Zones 2 and 3. Planners may use telephone notification, public address, HOS, etc., to comply.

4.4.4. Inform 30 SW/CP if Zone 2 crosses the airfield flight path, railroad right-of-way, or offshore oil platforms, and if Zone 2 extends beyond base land boundary.

4.4.5. Hold the operation if Zone 2 extends, or is predicted to extend, over the base cantonment area, outside the base land boundary or over offshore oil platforms until risk assessment and acceptance (RA) can be performed. If the operation is in progress and updated PHZ extends over these areas, secure the operation at a safe point or perform a RA (see paragraph **4.6.**) and obtain 30 SW/CC's or designated representative's acceptance of risk. Notify the Command Post if the operation is in progress and the updated PHZ extends over these areas.

4.4.6. Pre-position HOS (Hazardous Operations Support) in the most advantageous location to control access to Zone 3 and evacuate personnel, if necessary. HOS will possess emergency egress PPE and will have the ability to be contacted directly by the task supervisor.

4.4.7. Once the operation begins, allow only essential personnel to enter Zone 3. These personnel must be briefed on the operation in progress and evacuation routes. They must have emergency egress PPE readily available.

4.4.8. Hold the operation if Zone 3 extends over the Union Pacific railroad tracks until risk assessment and acceptance (RA) can be performed.

4.4.9. Controls on personnel transiting Zone 1 are not necessary.

4.4.10. Personnel transiting Zone 2 must be informed that they are in a PHZ. This may be accomplished via roadblocks, signs, or other notification procedure as approved by 30 SW/SE.

4.5. Cold Spill EHZ Requirements. The EHZ will be based on the applicable EHZ criteria in **Table 1.** Tiered exposure criteria are not applicable. The requester of the EHZ is responsible for doing the following:

4.5.1. Hold the operation if the EHZ extends, or is predicted to extend, over the base cantonment area, outside the base land boundary or over offshore oil platforms. If the EHZ encompasses Union Pacific railroad tracks, the user will request 30 SW/CP to contact the trainmaster in Guada-

lupe to determine current train schedules. If railroad traffic inside the EHZ is expected during the operation, the operation will be held until the train has cleared the area.

4.5.2. Only essential personnel may remain within the EHZ. These personnel will be protected as follows:

4.5.2.1. Required to wear 30 SW/SE and 30 MDOS/SGOAB approved PPE.

4.5.3. Notify 30 SW/CP and 30 WS at least 30 minutes prior to beginning the operation and at the conclusion of the operation.

4.5.4. Inform 30 SW/CP if the EHZ crosses the airfield flight path.

4.5.5. Do not allow personnel to enter or exit the EHZ once the operation begins unless they are in 30 SW/SE and 30 MDOS/SGOAB approved SCAPE or other PPE.

4.6. Facility Cold Spill Engineering Controls and Risk Acceptance for PHZs.

4.6.1. If the worst-case credible source strength Zone 2 for a facility extends beyond the base land boundary, over the base cantonment, or over offshore oil platforms, then one of the following must be done:

4.6.1.1. Implement engineering controls (foam suppression system, covered release containment system, etc.) to eliminate or reduce the size of Zone 2.

4.6.1.2. Limit operation to weather conditions which will keep Zone 2 within the base land boundary away from the base cantonment, and away from offshore oil platforms.

4.6.1.3. If mission need dictates and paragraphs **4.6.1.1.** and **4.6.1.2.** cannot be followed, perform a RA. If Zone 2 goes over the base cantonment or off-base and over a populated area (see **Figure 1.** for general locations), 30 SW/CC or his/her designated representative will make a risk assessment and decide whether or not to proceed with the operation. If Zone 2 goes off base but does not overlay a populated area, this RA may be delegated by 30 SW/CC.

NOTES:

The requester must have a database of nearby off-base population areas (houses, ranches, commercial facilities, etc.). 30 SW/SE can provide geographic coordinates of populated areas upon request.

If the user requests delegation of authority to act upon the risk assessment, he or she should request it in writing from 30 SW/CC prior to starting the operation.

4.6.2. Procedures to request RA must be defined in the Launch Complex or Facility Safety Plan, or Ground Operations Plan.

4.6.3. The user must brief all commanders required to make risk acceptance decisions, or their designated representatives, on the following minimum information:

4.6.3.1. Propellant operation requiring THZ.

4.6.3.2. Engineering and operating controls.

4.6.3.3. THZ forecasts.

4.6.3.4. Populated areas at risk. If the Union Pacific railroad tracks are at risk, the latest train schedule must be briefed.

4.6.3.5. Disaster response procedures.

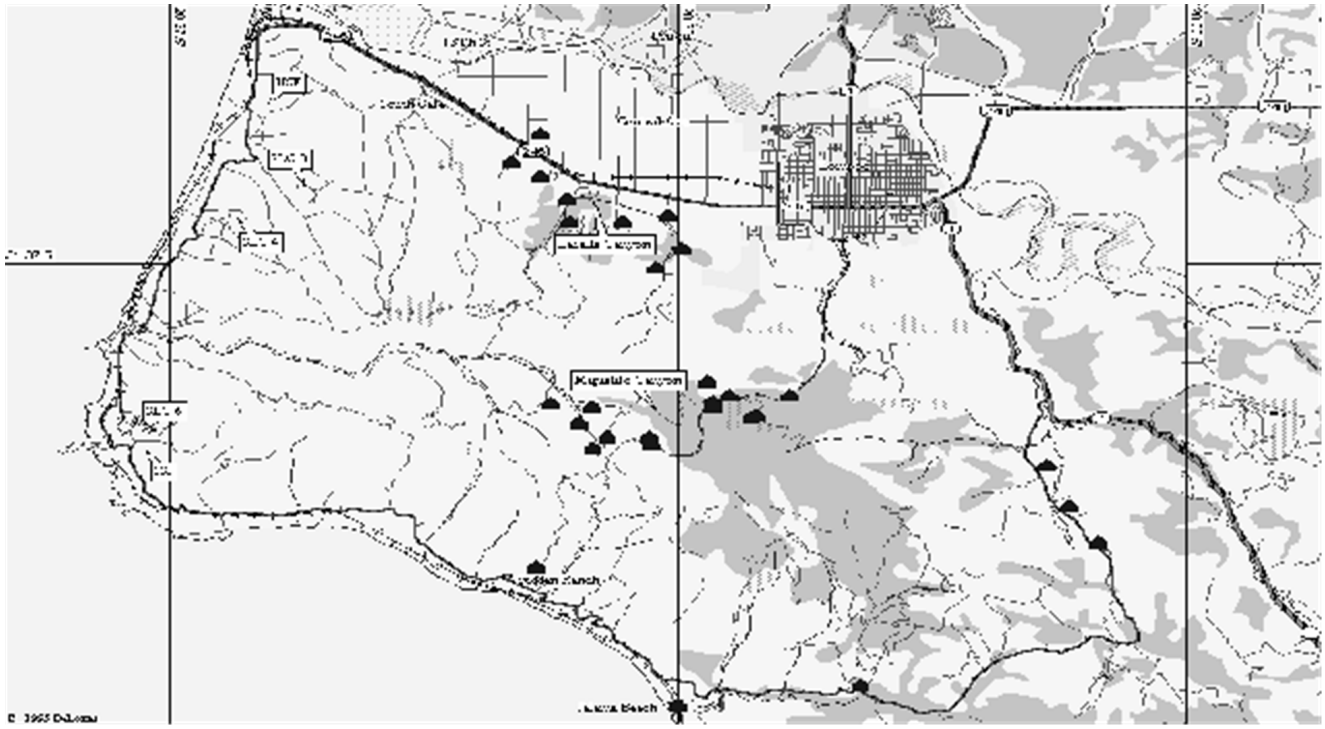
4.6.3.6. Mission impact if the operation is held.

4.6.3.7. Extended meteorological forecast.

4.6.4. New facilities at which unconventional propellants will be stored, processed or used will be designed to meet AFSPCMAN 91-710 requirements. Worst-case credible releases will be evaluated and containment systems will be designed to reduce the source strength values where possible and to prevent Zone 2 from exceeding the base land boundary for specific weather conditions. These values will be updated as project design changes or modifications occur.

4.6.5. Modifications to facilities at which unconventional propellants will be stored, processed or used will be designed to meet AFSPCMAN 91-710 requirements in addition to the normal approval process. Worst-case credible releases will be evaluated and containment systems will be designed so the original facility design source strength values are reduced where possible, and/or not exceeded by the modification. These values will be updated as project design changes or modifications occur.

Figure 1. Offbase Population Centers



4.6.6. All facilities where unconventional propellants are processed or stored will develop a THZ Plan (may be contained in the Launch Complex Plan, Facility Safety Plan, or Ground Operations Plan) which will address all applicable portions of this instruction. 30 SW/SE must approve this plan.

4.7. Actions to Take After Accidental Release. If an accidental release were to occur, personnel supervising the operation are responsible for stabilizing the situation as follows:

4.7.1. Initiate evacuation procedures. Acceptable sheltering requirements for each Zone are given in paragraph **2.**

4.7.1.1. The PHZs will become the OHZs until more timely information is available on the source strength of the actual release or on meteorological conditions. If there is a release when a propellant operation is not taking place, the facility worst-case credible source strength will be used to calculate the OHZ until more specific information is available.

4.7.1.2. Task supervisors will direct security forces evacuation.

4.7.2. Obtain OHZs from 30 WS. 30 WS will disseminate key parameters on the New Tactical Forecast System (NTFS).

4.7.3. Notify Security Forces/Fire Department (call 911 or 734-4117 if calling by cell phone, 606-3911 when calling from base extension) using the "Reporting Upon Release Discovery" procedure outlined in 30 SW Plan 32-4002, *Hazardous Materials (HAZMAT) Emergency Response Plan*, Chapter 4, Section A, Paragraph 2.

4.7.4. Notify 30 SW/CP of the OHZ Zone 2 and 3 dimensions and specify if either crosses the airfield flight path, offshore oil platforms or railroad tracks.

4.7.5. If the OHZs Zones 2 or 3 extend off base, 30 SW/CP will notify civilian authorities of the release and provide information on the potential public exposure effects and sheltering recommendations.

4.7.6. EOC response will be per 30 SW OPLAN 10-2, *Comprehensive Emergency Management Plan*.

5. Hot Spill THZ (e.g., Launch Operations).

5.1. Responsibilities:

5.1.1. 30 WS will be responsible for the following:

5.1.1.1. Scheduling necessary resources required to provide forecast meteorological data to 30 SW/SE.

5.1.1.2. Delivering forecast data at times specified in the Range Safety Operation Requirements (RSOR) vehicle peculiar annex. A forecast delivery timeline may vary depending upon the launch vehicle.

5.1.1.3. Toxics Forecaster products will be made available on Range Safety processors when requested.

5.1.2. 30 SW/SE will be responsible for the following:

5.1.2.1. Determining the need for hot spill THZ.

5.1.2.2. Providing Zone 1, 2, and 3 PHZs and OHZs for both normal flight and catastrophic abort scenarios.

5.1.2.3. Making a GO/NO GO recommendation to Spacelift Commander (SLCC) based upon the toxic risk assessment.

5.1.2.4. Directing actions to mitigate unacceptable toxic exposure risks. Possible actions include sheltering or evacuation of personnel.

5.1.2.5. Providing 30 SW/CP the coordinates of the catastrophic abort Zone 1 PHZ if any portion of it lies outside the base boundary.

5.1.2.6. Providing the Launch Support Team (LST) Chief the Catastrophic Abort (PHZ) and Normal Launch (OHZ) Zones 2 and 3 (if applicable) coordinates.

5.1.2.7. Providing the Aerospace Control Officer (ACO) the coordinates of the toxic exclusion areas (PHZ or OHZ) for ship and support aircraft and railroad and oil platform protection requirements, the vertical depths of the areas for aircraft protection, and the length of time during which a Zone 2 exists (operationally referred to as a time-to-clear (TTC)).

5.1.2.8. Approving the use of safety related PPE.

5.1.3. 30 SW/CP will monitor the launch progress and notify any applicable non-base agencies of Zone 1 if a catastrophic abort occurs during the first sixty seconds of flight.

5.1.4. The LST Chief will do the following:

5.1.4.1. Monitor personnel inside all Zones 2 and 3.

5.1.4.2. Ensure no one is allowed in Zones 2 or 3 unless they are equipped with a proper breathing apparatus.

5.1.5. 30 MDOS/SGOAB will be responsible for the following:

5.1.5.1. Recommending tier exposure criteria.

5.1.5.2. Approving the use of health related PPE.

5.1.6. The ACO will be responsible for the following:

5.1.6.1. Clearing Zones 2 and 3, as necessary, over the ocean.

5.1.6.2. Keeping aircraft clear of Zones 2 and 3.

5.1.6.3. Holding trains outside the required railroad protection per 30 SWI 91-103, *Train Hold Criteria*.

5.1.6.4. Notifying and confirming oil platform operators have accomplished personnel protection requirements.

5.2. Actions to Take After a Catastrophic Abort. If there is a catastrophic abort within the first sixty seconds of flight, the following emergency actions will be taken:

5.2.1. 30 SW/CP will relay the location of Zone 1 to the Santa Barbara County Sheriff Dispatcher.

5.2.2. The ACO will, upon request from the Mission Flight Control Officer (MFCO), notify offshore oil platforms within Zone 2 or 3 to take appropriate emergency response actions per 30 SWI 13-210, *Evacuating or Sheltering of Personnel on Offshore Oil Rigs*.

5.2.3. 30 WS will provide the Safety Office immediate weather data, and provide one hour Hot Spill forecast data (surface to 10,000 ft atmospheric profile) at 15 minute intervals until notified to discontinue.

5.2.4. The Safety Office is responsible for the following:

5.2.4.1. Requesting the ACO to notify oil platforms.

5.2.4.2. Requesting immediate data from 30 WS.

5.2.4.3. Performing risk assessments on revised weather forecast data and relay the appropriate footprints to the LST, ACO and 30 SW/CP (pre-launch), and to the DCG (post anomaly).

5.2.4.4. Apprising SLCC of each risk assessment.

5.2.5. The EOC will respond per 30 SW OPLAN 10-2, *Comprehensive Emergency Management Plan*.

STEPHEN M. TANOUS, Colonel, USAF
Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

30 SW OPLAN 10-2, *Comprehensive Emergency Management Plan*

30 SWI 13-210, *Evacuating or Sheltering of Personnel on Offshore Oil Rigs*, 2 October 2006

30 SW Plan 32-4002, *Hazardous Materials Emergency Response Plan*

30 SWI 91-103, *Train Hold Criteria*, 15 September 2005

AFSPCMAN 91-710, *Range Safety User Requirements*, 1 July 2004

Abbreviations and Acronyms

A-50—Aerozine 50

ACO—Aerospace Control Officer

ACGIH—American Conference of Governmental Industrial Hygienist

AFSPC—Air Force Space Command

AFSPCMan—Air Force Space Command Manual

AWDS—Automated Weather Distribution System

BEE—Base Bioenvironmental Engineer

C—Ceiling

DoD—Department of Defense

EHZ—Emission Hazard Zone

ELSA—Emergency Life Support Apparatus

EOC—Emergency Operations Center

EPA—Environmental Protection Agency

HAZMAT—Hazardous Materials

HCl—Hydrochloric Gas

HOS—Hazardous Operations Support

IDLH—Immediately Dangerous to Life or Health

LOC—Level of Concern

LST—Launch Support Team

MFCO—Mission Flight Control Officer

MMH—Monomethylhydrazine

MSPSP—Missile System Prelaunch Safety Package

N2H4—Hydrazine

N2O4—Nitrogen Tetroxide

NO2—Nitrogen Dioxide

NASA—National Aeronautical and Space Administration

NIOSH—National Institute for Occupational Safety and Health

OD—Operations Directive

OHZ—Operational Hazard Zone

OPR—Office of Primary Responsibility

OSHA—Occupational Safety and Health Administration

PEL—Permissible Exposure Limits

PHZ—Potential Hazard Zone

PPE—Personal Protective Equipment

RA—Risk Assessment and Acceptance

RSOR—Range Safety Operation Requirements

SCAPE—Self-Contained Atmospheric Protective Ensemble

SLCC—Spacelift Commander

STEL—Short-Term Exposure Limit

THZ—Toxic Hazard Zone

TLV—Threshold Limit Value

TWA—Time Weighted Average

UDMH—Unsymmetrical Dimethly1-Hydrazine

VICTER—Vandenberg's Integrated Communication Telephone Evacuation Routes

Terms

All Clear—When the On-Scene Commander, using all necessary resources, including physical monitoring by 30 MDOS/SGOAB, ensures that ambient concentrations of the released propellant are below the associated tier value.

Base Cantonment—The base cantonment encompasses the areas marked in **Figure A1.1.**

Ceiling (C)—A worker's exposure level which shall not be exceeded for any length of time.

Cold Spill—Release of toxic propellants in liquid or vapor form from a propellant transfer or vent operation. Propellant combustion does not occur.

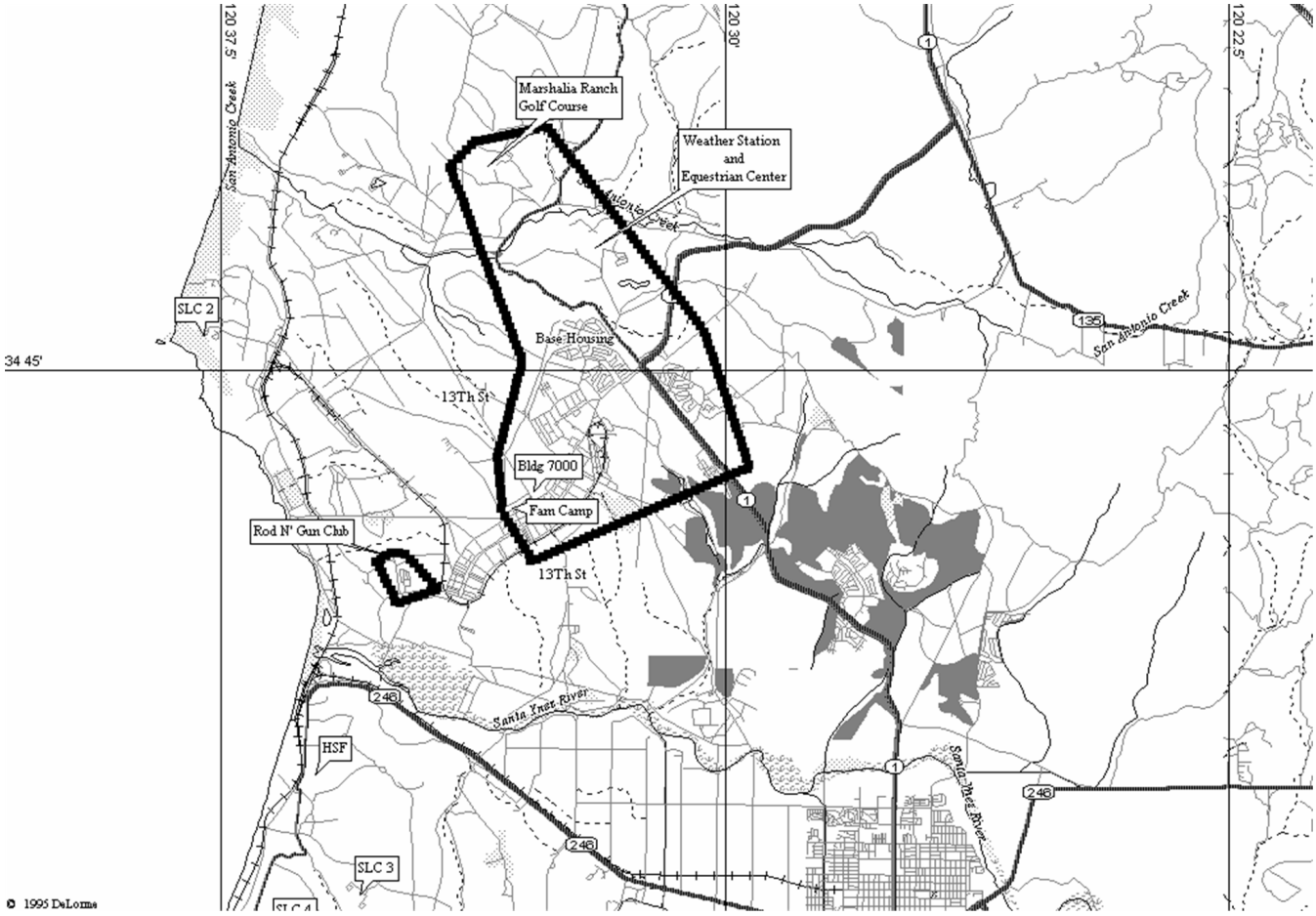
Environmental Protection Agency Level of Concern (EPA LOC)—EPA term defining the concentration of an extremely hazardous substance in the air above which there may be serious irreversible health effects or death as a result of a single exposure for relatively short periods of time.

Emission Hazard Zone (EHZ)—The toxic hazard zone established before a planned release of propellants into the atmosphere; e.g., propellant tank venting or scrubber venting. An EHZ is based upon the worst-case credible emission rate or source strength.

Emergency Operations Center (EOC)—The command and control element responsible for directing, monitoring, and supporting the installation's actions and supporting activities through an incident's life cycle.

Giant Voice/Public Address System—Public address system for North and South Vandenberg AFB. Completion date is to be determined.

Figure A1.1. Base Cantonment



Hot Spill—Release of toxic propellants through propellant combustion, such as a launch operation.

Immediately Dangerous to Life or Health (IDLH)—The current National Institute for Occupational Safety and Health (NIOSH) definition for IDLH is "a condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment." The level of exposure for the IDLH "is to ensure the worker can escape from a given contaminated environment in the event of failure of the respiratory protection equipment." The effects at these levels are based on an exposure time of 30 minutes

to add a safety margin. However, this does not mean workers should stay in that environment any longer than necessary. Evacuation should take place immediately.

Launch Support Team (LST)—Formed to support launch operations. In the event of a launch mishap or anomaly, the LST assists the On-Scene Commander (OSC) as 30 SW Safety, Security, and Health Representatives by providing real time consultation to the OSC per 30 SW OPLAN 10-2.

Hazardous Operations Support (HOS)—Contractor or government personnel charged with providing hazardous propellant operations security support as directed by the Operations Directive (OD).

Operation-Essential Personnel—The minimum number of personnel required to accomplish a specific operation.

Operations Directive (OD)—The single formal document designed to consolidate host-base support for missile and space operations. The OD serves as a combination of support and notification checklist.

Operational Hazard Zone (OHZ)—The toxic hazard zone established following an accidental cold spill, unplanned liquid or gaseous release, or normal launch or catastrophic launch abort, based upon actual or worst-case credible source strength. Zones 1, 2, and 3 are established for an OHZ, as appropriate.

Permissable Exposure Level (PEL)—Defined by NIOSH as the time weighted average concentration that must not be exceeded during any 8-hour work shift of a 40-hour workweek.

Personal Protective Equipment (PPE)—Breathing apparatus such as Emergency Life Support Apparatus (ELSA) or Self-Contained Atmospheric Protective Ensemble (SCAPE) designed to protect individuals from exposure to hazardous chemicals or provide supplemental sources of oxygen. 30 MDOS/SGOAB and 30 SW/SE will approve all PPE and determine when it is required.

Potential Hazard Zone (PHZ)—Planning zone established prior to a specific operation to assess risk should an accidental cold spill or unplanned release, or a hot spill catastrophic abort occur. The zones are based upon the worst-case credible emission rate or source strength for a specific operation. A PHZ may have a Zone 1, 2 or 3 for nitrogen tetroxide/nitrogen dioxide vapor ($N_2O_4/N0_2$) and hydrochloric gas (HCl). A PHZ may have a Zone 2 or 3 for hydrazine-family propellants.

Short-Term Exposure Limit (STEL)—A short term exposure limit averaged over a 15-minute period (unless another time limit is specified in a parenthetical notation below the limit).

Short-Term Public Emergency Guidance Level (SPEGL)—The exposure limit expressed in parts per million (ppm) related to an unplanned single exposure normally lasting 60 minutes or less and never more than 24 hours, and whose occurrence is expected to be rare.

Threshold Limit Value (TLV)—Refers to airborne concentrations of substances and represents conditions under which the American Conference of Governmental Industrial Hygienists (ACGIH) believes nearly all workers may be occupationally exposed day after day without adverse effect. TLVs are published by the ACGIH. The Occupational Safety and Health Administration (OSHA) publishes similar values called Permissible Exposure Limits (PELs). The most conservative of the OSHA or ACGIH values must be used.

Tier 1—An airborne exposure level (maximum concentration) which poses no hazard to the general population but which may affect certain sensitive individuals (e.g., asthmatics, individuals with emphysema, and certain other lung diseased people). Tier 1 separates Zone 1 from the area where no controls are required. See **Table 1.** for Tier 1 exposure level values.

Tier 2—An airborne exposure level (maximum concentration) which may cause short term symptoms but which most individuals could endure without experiencing or developing irreversible or other serious health effects or symptoms which could impair their ability to take protective action. Tier 2 separates Zone 2 from Zone 1. See **Table 1.** for Tier 2 exposure level values.

Tier 3—An airborne exposure level (maximum concentration) based on the NIOSH IDLH values. Tier 3 separates Zone 3 from Zone 2. See **Table 1.** for Tier 3 exposure level values.

Time Weighted Average (TWA)—A worker's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded.

Toxic Combustion Byproducts—During a planned burn of a rocket engine or an unplanned combustion of propellants, toxic byproducts can be created and/or released which pose a hazard to downwind areas. The significant toxic byproduct of solid propellant combustion is hydrogen chloride (HCl). Unplanned combustion, such as an explosion of a vehicle burning hypergolic propellants during flight, can release toxic vapors. These vapors include hydrazine (N_2H_4), unsymmetrical dimethyl-hydrazine (UDMH), monomethylhydrazine (MMH), and nitrogen dioxide (NO_2). The combustion byproducts of aerozine-50 (A-50) released from an explosion of a vehicle fueled by this propellant are N_2H_4 and UDMH.

Toxic Hazard Zone (THZ)—A generic term which describes an area in which predicted concentration of propellant or toxic byproduct vapors or aerosols may exceed acceptable tier levels. Predictions are based on analyzing potential source strength, applicable exposure limit, and prevailing meteorological conditions. THZs are plotted for potential, planned and unplanned propellant releases, and launch operations. OHZs, PHZs, and EHZs are types of THZs.

Unconventional Propellants—A propellant fuel based upon chemical reactions, unlike combustion of fossil or hydrocarbon materials. Typical unconventional propellants at Vandenberg AFB are an oxidizer (e.g., nitrogen tetroxide) and a fuel (e.g., Aerozine-50) which spontaneously ignite when mixed together, which is known as a hypergolic reaction.

User—30 SW clients, such as Department of Defense (DoD), National Aeronautical and Space Administration (NASA), civilian commercial companies, etc., that use 30 SW facilities and test equipment, or conduct prelaunch and launch operations on the Western Range.

Vandenberg's Integrated Communication Telephone Evacuation Routes (VICTER)—An emergency telephone notification system the Command Post manages. The system is primarily designed to protect personnel on Vandenberg AFB from unplanned propellant releases. Vandenberg AFB is divided into seven zones based upon building occupancy, proximity to hazardous facilities, prevailing winds, etc. VICTER is a preset tele-conference net (similar to a Secondary Crash Net) that includes certain buildings on Vandenberg AFB. Additions to this list only occur when the owner/user of a facility contacts the Command Post and the 30th Communications Squadron and requests to be added. In case of an emergency, the Command Post will plot THZ information on maps containing numbered buildings, facilities, etc. The net is activated and personnel at risk are directed to a specified evacuation route and a rendezvous location for a Security Forces head count.

Worst-Case Credible Release Strength—Used to facilitate prediction of a cold spill THZ. The responsible engineer (user) should determine the worst-case credible failure mode, then determine the associated liquid or vapor release rate (in pounds per minute), or the wetted area (in square feet).

Zone 1—An area where the airborne concentrations of any toxic product are equal to or exceed Tier 1 levels, but are less than Tier 2 levels. This zone can result from either a hot or cold spill. Within Zone 1,

sheltering is recommended only for sensitive mission essential individuals and no controls are required to monitor or prevent personnel from transiting the zone. See **Figure A1.2.** below.

Zone 2—An area where the airborne concentrations of any toxic product are equal to or exceed Tier 2 levels, but are less than Tier 3 levels. This zone can result from either a hot or cold spill. Within Zone 2, sheltering is required if an individual notices breathing discomfort or skin irritation. *(**Note**: exposure to some chemicals (e.g. nitrogen dioxide) at Zone 2 concentration levels may not be immediately irritating but can have delayed adverse health effects. For these chemicals, depending on the circumstance, a delay in the operation or evacuation will be required)*. To protect the general public, an operation is required to be delayed or ceased at a safe point in the procedure if a Zone 2 region extends beyond base boundaries, extends over designated public areas on base, or extends over off-shore oil platforms. Certain exemptions may be permitted under proper authorization if an off-base Zone 2 lies within an uninhabited area. See **Figure A1.2.** below.

Zone 3—An area where the airborne concentrations of any toxic product range from a low defined by Tier 3, to an unknown high. This zone can result from either a hot or cold spill. Within Zone 3 personnel must either evacuate or wear appropriate personal protective equipment (PPE) or have such equipment close at hand. In the event of an actual release it is mandatory that personnel wear PPE. Operations are subject to hold for Zone 3 in the same manner as Zone 2 with the additional requirement that if a Zone 3 region infringes on the Union Pacific railroad tracks the operation is required to hold until a risk analysis indicates it is safe to proceed or winds shift to move the Zone 3 away from the tracks. See **Figure A1.2.** below.

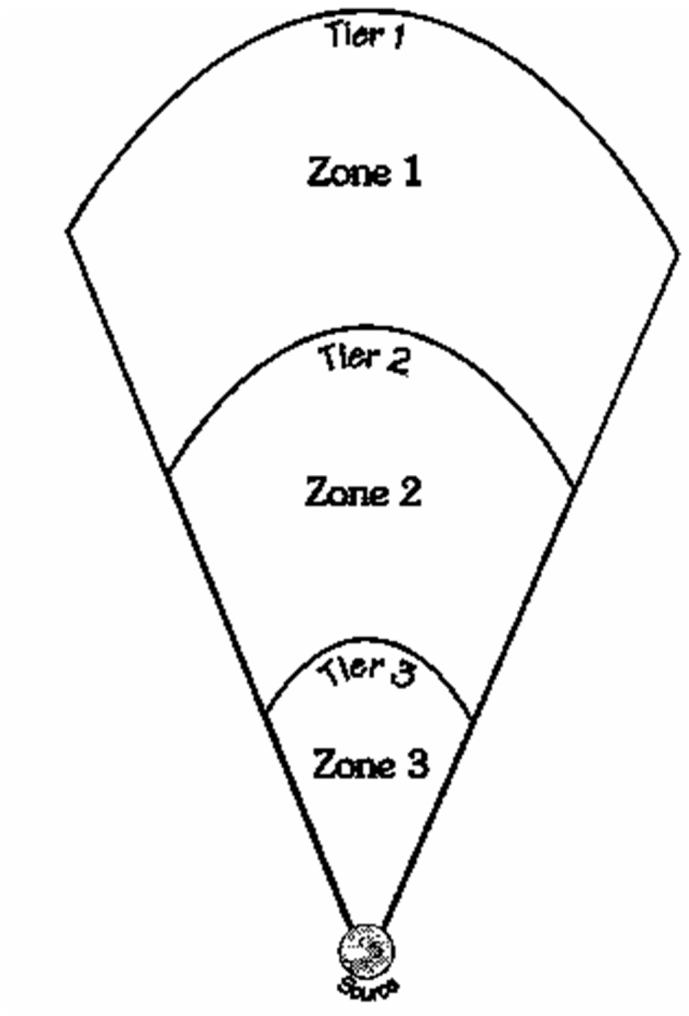



Figure A1.2. Zone Development