Continuing Challenge Tabletop Exercise





2021 ONLINE TABLETOP (TTX) Scenarios for:

☐ Anhydrous Ammonia – Industry

- □ Propane Tank On-Site Transfer to New Tank
- □ Anhydrous Ammonia Truck Transfer of NH₃
- Chlorine Release Facility and Transport

Scenario Readiness

This Situation Manual (SitMan) provides exercise participants with all the necessary tools for their roles in the exercise. The Workbook will provide a step-by-step approach to addressing "Inject" messages that trigger a set of activities that the TTX participants will work on during the exercise. Each Inject is a bite-sized project that shows the importance of the scenario objectives.



Exercises are a critical component in the emergency management process to identify strengths and areas for improvement to achieve a greater level of collective preparedness.

The Tabletop Exercise (TTX) is designed to be enjoyable, interactive, and easy to follow. The scenario is broken down into bite-sized inject situations that ALL participants can experience and participate. engages during the first hours of the emergency event scenario.

The primary emphasis of the TTX is to ensure that local emergency response system participants demonstrate the ability to coordinate and communicate as an incident management team. The command team will demonstrate their command and control skills to develop team focus on key critical tasks that occur during the first hours of a catastrophic event.

- → Coordinate the local hazmat emergency planning and response between business, industry, and community.
- → Perform an incident hazard and damage assessment that would trigger recognition of escalating circumstances that would require regional, state, and federal resources.
- → Ensure that early notification of critical local, regional, state, and federal resources occur so that they respond in a timely way to arrive with a force that can control life, environment, and property loss before escalating circumstances cause disastrous losses.
- → Ensure that the command team is aware of the nuances of the local, state, and federal emergency management system so that coordination and communication between agencies and responders properly aligns with ICS, IMS, and the community, state, and federal emergency plans.

This Situation Manual (SitMan) provides exercise participants with all the necessary tools for their roles in the exercise.

Special Handling Instructions

The TTX local sponsoring agency will work with an EPA assigned TTX Facilitator and together they will develop an Exercise Design Team (EDT) to provide local information and participants to engage the TTX. They may decide to designate the materials as For Official Use Only (FOUO) so that sensitive information is not disclosed to unauthorized personnel.

If deemed FOUO by the EDT, all exercise participants should follow appropriate guidelines to ensure proper control of information within their areas and safeguard, handle, transmit, and store this material in accordance with current information security policies and directives.

Reproduction of the sensitive information, in whole or in part, is prohibited without prior approval from the EPA Region 9 TTX Coordinator (approval will be coordinated by the EPA assigned TTX Facilitator assigned to the local sponsoring agency by the EPA Region 9

Coordinator).

Agency Notifications – Transportation Incident

Incident Description:

Date Time Locat	ion Ty	pe:	
Agency	Time Notified	Time All Clear	Notes
General Agencies			
911 Call			
State OES			
Local OES			
NRC			
CST			
Other			
Transportation Mode(s)			
Highway (State/local)			
Water (Coast Guard)			
Rail (UP, CPS, local)			
Air - FAA airport flight			
route			
Other (US DOT, etc.)			
Local Agencies			
Fire			
Police			
State			
County			
City			
DOT County works			
Fish and Wildlife			
HazMat Response Teams			
Fire			
Law Enforcement			
OES			
Contractor			
Industry Contacts			
Shipper			
Carrier			
Chemical Manufacturer			
HazMat Teams			
Recovery Teams			
Tow trucks or crane			
Trade Associations (WPGA,			
etc)			
Clean up Services			



Interagency Modeling and Atmospheric Assessment Center

IMAAC Exercise Support Request

To request support, please submit a completed request form to <u>IMAAC@FEMA.DHS.gov</u> at least 30 days prior to the first exercise planning meeting for the IMAAC Director's review and approval. Within 14 days of IMAAC's receipt of this form you will receive notification as to whether your request has been approved and provided with the name and contact information for the IMAAC POC for this exercise, if appropriate.

1. CONTACT INFORMATION

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- Requesting organization: <u>Ammonia Safety & Training Institute</u>
- POC name: Gary W. Smith
- 2. REQUESTED LEVEL OF IMAAC SUPPORT
- Planning support

PVON+SHO

- Ground truth scenario development: Plume flank ammonia readings
- Data generation (specify type and level): Plume model based upon a roof-top release of ammonia aerosol - 115 psi from 1/2" pipeline
- Requested level of play by IMAAC Operations (live play, injects, none): Live play with a Plans Section Chief for an Incident that involves a downwind plume moving into a small community and nearby school.
 - Extent of live play (e.g., one hour, 24x7): 4 hours

3. EXERCISE INFORMATION

- Name of exercise: Pacific North West TTX and SERC meeting
- Type of exercise, (e.g. National Level Exercise-NLE, Special Event-NSSE/SEAR, single agency exercise, etc.): EPA Region 9 sponsored tabletop exercise TTX
- Federal/state/local agencies participating: Washington State SERC, Yakima Co. LEPC, Surinyside Fire District

— Date/time of start of release: ^{8:45} am

- Telephone number: ⁸³¹⁻²⁸⁸⁻⁰⁵⁷⁶ Email address: ^{gary.smith@ammonia-safety.com}
- Refinement of plots based on (estimated number of) field data injects: during a four hour scenario
- Product distribution method (live play will use standard distribution methods including email, HSIN, etc. unless otherwise specified): <u>Perfect</u>
- Requested level of play by National Watch Center (SimCell, live play, etc.): This experience will be a learning experience for the command team, so live play and personal exchanges are encouraged.
- Duration: ^{3 hours 9 am to Noon pacific time}
- Type of incident (spill, fire, explosion, or unknown):
 Electronic valve stem break for a 1/8" pipelne
- Specific material(s) (e.g., Chlorine, Cs-137, Anthrax): <u>Ammonia</u>
- Specific form or chemistry (e.g., gas, CsCl, % solution): Pressurized aerosol release of anhydrous ammonia (refrigeration)
- Amount released or at risk (e.g., release rate: 90 ton rail car, 1,000 Curies, 2 lbs): 5,000 lbs. of ammonia Released from a roof-top King valve as high pressure liquid.
- Release rate: ______68 degrees F 1/8" liquid 71# per minute
- Exercise meteorological conditions? Wind
- speed: 15 mph Wind direction (from): Northwest
- Stability: (Default is Neutral, D) moderate humidity 35%

4. WHEN IS THE FINAL PRODUCT NEEDED? First model by 9:15 and two followup sessions an hour apart

Please do not hesitate to contact IMAAC@FEMA.DHS.gov with questions.

Interagency Modeling and Atmospheric Assessment Center Exercise Request Form







EXERCISE EXERCISE EXERCISE

	INCIDENT BRIEFING	G (ICS 201)
I. Incident Name: HZ-I Compressor Room	2. Incident Number:	3. Date/Time Initiated: Date: Date Time: HHMM
4. Map/Sketch (include sketch areas, overflight results, trajec	n, showing the total area of operation tories, impacted shorelines, or othe assignment):	ons, the incident site/area, impacted and threatened or graphics depicting situational status and resource
. Situation Summary and Hea incident Health and Safety Ha equipment, warn people of the /ork outside of the IDLH while	alth and Safety Briefing (for briefin azards and develop necessary mea e hazard) to protect responders from securing the Isolation Zone and rep	ngs or transfer of command): Recognize potential sures (remove hazard, provide personal protective m those hazards. port life threats to Plant IC.
leview ICS 215a and do recon	naissance evaluation – nature of p	oblem, and opportunity to safely mitigate threats.
enort escalation risketthreate s	a di flach fire fact enreading dence	gas cloud trapped liquid hydraulic shock BLEVE
	10.0 Mail and an opposing dollar	gas store, a approximating interior of the contract
ommand & Responder PPE: 1	4G Gas Mask, full skin coverage, b	oots, communications, NH3 monitor, buddy system
AN report to Plant IC to report	life threats, incidental threat mitigat	tions that can be safely accomplished.
EVIEW THE BACK OF THE 3	0-MINUTE PLAN for more action p	an and ICS org. chart details.
. Prepared by: Name:	Position/Title:	Signature:
CS 201, Page 1	Date/Tir	ne: Date

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INCIDENT BRIEFING (ICS 201)

1. Incident Na	me:	2. Incid	dent Number:	3. Date/Time Initiated: Date: Date Time: HHMM			
7. Current and	I Planned Objectives:						
Referece: 30-MINUTE PLAN – (Front & Back pages) LANCE							
CAN do report	SIMPLE						
PLANS							
RECOVER							
8. Current and	Planned Actions, Stra	teaies	and Tactics:				
Time:	Actions:						
HHMM	LANCE - Isolation Zone	e and mo	ovement plan to Rall	point, Evac staging or, Protect-in-Place location			
HHMM	LANCE – Notification b	ased up	on Level of Concern				
HHMM	LANCE - Command Team CAN reports with Plant IC- Pef. All-Haz Quide pos. 12-26						
HHMM	LANCE – Command Team CAN reports with Flant IC– Ref. All-Flaz Guide pgs. 12-20						
ннмм	LANCE – Reconnaissance and 105 2 15a assessment – Ret. All-Haz Guide pgs. 2-12						
HHMM	ENVOL – Engage a ONVIEO plume model and assess eye-level wind impact – Playbook, References						
HHMM	CAN Depart Command team to Diant IC to Dublic Safety IC and Safety Officer						
HHMM	CAN Report - Command team to Plant IC, Plant IC to Public Safety IC, and Safety Officer						
			colating threat acco	amont Danid Densus chipstics developed			
HHMM	SIMPLE – Reconnaissa	ance – e	scalating threat asse	ssment – Rapid Rescue objective developed			
HHMM	SIMPLE – Engage the Emergency System Control Plan and Rapid Rescue objectives						
HHMM	MM SIMPLE – Engage Plume "flank-to-head" monitoring levels to ChemResponder						
HHMM Manage downwind and downstream risks and attain a status of on-site and off-site receptors.							
HHMM							
HHMM							
HHMM Safety Officer and Assitant Safety Officer for the hazmat operations assigned							
HHMM PLANS – Pre-Entry hazard assessment – 215a with Contain &Control Red Playbook Plans							
HHMM PLANS – IC review the IAP objectives and Operations safety briefing – Ref. All-Haz Guide pgs. 27-47							
HHMM	HHMM PLANS – PPE and Technical Information – Ref. All-Haz Guide pgs. 48-51 and PB Footer References						
HHMM							
HHMM							
HHMM							
HHMM			,				
6. Prepared by	y: Name:		Position/Title:	Signature:			
1. Incident Na	ime:	2. Inci	dent Number:	3. Date/Time Initiated: Date: Date Time: HHMM			
7. Current and	d Planned Obiectives:						
IC S 201, Page 2			Date/Time: Date				

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INCIDENT ACTION PLAN HAZARD ASSSESSMENT (ICS 215A)

		-					
1. Incident Name:		2. Incident No.					
3. Date/Time Prepared:	4. Operational Period: Date From: Date To:						
	Time From: Time To:						
5. Hazard Zone #: 1	6. Hazard Zone Name:						
7. General description of Hazard Zone: Engine Room #1 has 6 compressors that receive LP vapor and send hot gas at 125 to 175 psi to the condensers. The HP receiver supplies ammonia liquid to four MAC units, three pressure coolers within HZ-6. The engine room runs from 8 am to 6 pm when pre-cooling fruit. The total ammonia charge for HZ-1 is 15,000#'s. About half of that amount is out in the system when the system is running. The HP receiver can hold the total charge of the system if need be. The insulated accumulators generally are only filled with vapor.							
8. Hazard Topic	9. Hazard, Risk, and Threat Descriptions for Emergency Response	10. Protection Factors					
1. Chemical/Flammable	Haz. Topic#: Details Protect. Factor/ Ref. SOP	1. Detection Systems					
Toxic liquified gas	1. Chemical/Flammable Substances	Fire smoke Y or N					
Toxic solids	15,000 pounds of Anhydrous Ammonia.	Fire heat Y or N					
Flammable liquid	Neighboring storage of NH3 in HZ-2,4 and 5.	Chemical Y or N					
Flammable gas	 Plastic bins stored near HZ-1 for berry processing. 	First alert 25 ppm					
Flammable solids	2 Markaria I Cartan	Ventilation 150 ppm					
Oxidizer	2. Mechanical System	Shunt Trip 15,000 ppm					
Corrosive	compressors and can be stopped at the E-Stop.	Video Surveillance Y or N					
2 Machanical	Suction accumulator 1,2,3, and 4 all contain vapor return from the	2. Fire protection					
Z, Mechanical	evaporators in HZ-5 and 6.	Fire Extinguishers (ABC).					
High Side Components	in service and it has emergency shut-down controls at the outside	within 75 ft <u>4</u>					
Low Side Components	emergency control panel.	Fire sprinklers Y or N					
Gas-fired equipment	 Vented vapors (roof-top) may move towards the lunch room 	3. Pressure control					
Vented fugitive vapor	(Bravo-side) and depending on wind direction the Juicing room (Charlie-side).	Comp. Cut-outpsig					
Boiler or heaters		PRV psi					
3, Risks and Threats		4. Manage energy flow					
Flash fire/fire load	3. Risks and Threats	Evap coils - off					
Sources of Ignition	 All high-pressure releases and HP vapor cut-outs drain to a 6,000- collop water tank 	Condenser - on					
HP aerosol, gas, liquid	ganon water tank.	NH₃ pumps - <u>off</u>					
Hydrostatic pressure	 Sources of ignition - motor starters make/break hash (shunt trip occurs at 15,000 ppm. 	Compressors - off					
Hydraulic shock	 Floor drains go to wastewater sewerage. 	5. Emergency shutdown					
High voltage electrical		Compressors Y or N					
Failed cut-out or PRV		King valve Y or N					
Sewer/Storm Drains	4. Dangerous Conditions	Equalizer/diffuser Y or N					
Other	High forklift traffic traveling up/down roadway outside of HZ-1.	Ventilation Y or N					
	Key Deadinger Information	Remote control Y or N					
A Dangerous Conditions	Rey Readiness information	6. Emergency Equipment					
4. Dangerous Conditions	Excellent exiting - Exits on Sides A, B, and C and a roll-up door on Side A.	Full-face APR					
Slip and fall	All doors, including the roll-up have window view into the Engine	Escape hoods					
Silp and fail	Room.	SCBA					
Overnead fisks	 Stairwell leading to condensers is on the Side D. 	Entry suits:					
Open scuttles/skylights	Level						
Porkinutruck traffic		Level					
Accidental exposure		Portable Fan Y or N					
Other		Other					

1. Incident Name: 2. Incident No. 3. Date/Time 4. Operational Period: Date From: Date To: Prepared: Time From: Time To: 5. Hazard Zone 6. Hazard Zone Name: #:____ 7. Operations and activities in the Hazard Zone: 8. Hazard Topic 9. Hazard, Risk, and Threat Descriptions for Emergency Response **10. Protection Factors** 1. Chemical/Flammable 1. Chemical/Flammable Ref. **Detection Systems** SOP a. Toxic liquified gas a. Fire smoke Y or N b. Toxic solids b. Fire heat Y or N Flammable liquid c. Chemical Y or N c. First alert _ppm d. Flammable gas Flammable solids Ventilation ppm e. f. Oxidizer Shunt Trip _____ppm 2. Mechanical System Ref. Corrosive d. Video Surveillance Y or N g. SOP e. Over-press. alert _____psi 2. Mechanical Fire protection High Side a. f. Fire Extinguishers (ABC). Components within 75 ft.b. Low Side Components g. Fire sprinklers Y or N Gas-fired equipment с. Pressure control d. Vented fugitive vapor h. Equalizer/diffuser Y or N e. Boiler or heaters 3. Risks and Threats Ref. i. Comp. Cut-out ___ psig SOP **Risks and Threats** 3. j. PRV ____ psi a. Flash fire/fire load Emergency Equipment Sources of Ignition b. k. Full-face APR c. **BLEVE** or explosion I. Escape hoods - _____ HP aerosol, gas, liquid d. m. SCBA -Hydrostatic pressure e. n. Entry suits Level - ____ f. Hydraulic shock o. Portable Fan - Y or N 4. Dangerous Condition Ref. g. High voltage electrical **Emergency Mitigations** SOP Failed cut-out or PRV h. p. Control ignition sources Sewer/Storm Drains i. q. Manage energy flow j. Solar/Generator r. Evap coils - on or off power s. Condenser - on or off 4. Dangerous t. NH₃ pumps - on or off Conditions 5. Key Readiness Information assistance: u. Compressors - on or off Clear exit ways a. Hazmat transportation: DOT Response Guide v. Compressors Y or N b. Slip and fall www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/ERG2016.pdf w. King valve Y or N c. High piled stock SDS, bill of lading, or manifests, Chemtrec (800-467-4922) x. Pressure mgt. Y or N d. Overhead risks Hazmat fixed facility: WISER https://webwiser.nlm.nih.gov/, facility and y. Ventilation Y or N community shelter-In-Place, evacuation or staging areas: See facility ERP e. Open z. Remote controls Y or N and/or Google County name - hazmat area plan scuttles/skylights National Weather Service: <u>https://www.weather.gov/afc/hazmat</u> f. Forklift/truck traffic Hazmat Ref. Links: https://tools.niehs.nih.gov/wetp/index.cfm?id=2277 High-pile pallet g. storage

INCIDENT ACTION PLAN HAZARD ASSESSMENT (ICS 215A)

Time:

Site Safety a	and Control Pl	an					Perio	d:		am/pm		
			Section I. S	ite In	formation				I			
4. Incident Location:												
			Section II.	Orga	anization							
5. Incident Command	ler:		6. HM Group S	Super	visor:		7. Te	ch. Spec	cialist-HN	1 Referen	ce:	
8. Safetv Officer:			9. Entry Leade	er:			10. S	ite Acce	ss Contro	ol Leader:	:	
11 Asst Safety Office	or-HM·		12 decontami	natio	n Leader:		13 9	afe Refu		Mar		
				latio	13. Sale Reluge Area Mgr.			ivigi.				
14. Environmental He	15.			16.	16.							
17. Entry Team: (Bud Name:	ldy System) F	PE Leve	el: 18. HM Group Super				pervisor;	rvisor; decontamination Element: PPE Level:				
Entry 1					decon 1							
Entry 2					decon 2							
Entry 3					decon 3							
		5	Section III. Haz	ard/l	Risk Analys	sis						
19. Material:	Container type	Qty.	Phys. State	рН	IDLH	F.P. & B.P.	lgn. Temp.	Vapor Pres.	Vapor Den.	Sp. Grav.	LEL	UEI
Anhydrous Ammonia	High/ Low Receivers,	# s or ga	Aerosol, Dense	Aqua N	H ₃ IDLH 300PPM	F.P -N/A	1204° f	129 psia @	0.06 (air =1)	Liquid Gas = 0.6 @	15 to	25
	Pressure vessels, and/or	r	Gas, Vapor, liquid	11.6	-			70°F		32°F	16%	28%
									1		1	
PPM.			Section IV. Ha	azarc	I Monitoring	g						
20. LEL Instrument(s):							21. C	21. O₂ Instrument(s):				
22. Toxicity/PPM Inst	rument(s):						23. R	adiologi	cal Instru	ment(s):		
Comment: Monitor ammonia vapor to set limits for the protective action zone, PPE requirements, evacuation movement, and personnel accountability. Safety Plan should include reference to entry team checklist, safety checklist, decontamination, rehab, and the Technical Specialist - Planning checklist. Flammability concern starts at 1/4 of LEL (20,000 to 40,000 PPM) when the ammonia vapor is contained within a room or confined area where sources of ignition are present.												
		Sect	ion V. Deconta	amina	ation Proce	dures						
24. Standard deconta	mination Procedures	: YES:	NO:									
Comment: Vapor exposure (victim or responder has liqui is not an issue, remove cloth eyelids while performing wa warm (60°F to 70°F) shower	can be removed with an exl d or aerosol stream exposu ing immediately and then fl ter flush. Caution: flushing r unit when possible and be	haust fan (m ure that has lush with wa with unheat prepared to	onitor for signs of re absorbed into clothi ter for 15 to 30 minu ed tap water may ca treat for thermal sh	esidual ng. Use tes (de ause th lock or	ammonia withir e water to thaw epending on the ne victim extrem cardiac risk.	n clothing). potentially depth of sl ne discomf	Gross dec frozen clott kin tissue b fort and pot	ontaminatio hing (could urn). Eye ex ential thern	on using wa be frozen to xposure will nal health ri	ter is require o skin tissue require sup sk. Move the	ed when). If free: port to o e victim	the zing pen to a
		5	Section VI. Site	e Con	nmunicatio	ns						
25. Command Freque	ency: 2	6. Tactica	I Frequency:			27. Entr	y Freque	ency:				
29 Madiaal Manitaria		20.14	Section VII. Me	edica	A Assistance	Diese:	VES	NO:				
		29. M			i rranspoπ li	n Place:	152	NU:				
Plan and Entry Checklist fr support. Chemtrec - 800-42	arung tnermat and cardia or emergency medical an 4-9300; also see SDS or p	ic inreat; Ut id responder oison contro	mze ICS 206 Media r medical informati ol at 800-222-1222.	Jai on								

General Description of a Release: Ammonia contained in storage vessels is made up of both liquid and gaseous forms of ammonia. The gaseous ammonia collects in the top of the tank and builds pressure in accordance with the temperature of the liquid (see vapor pressure table below). Usually, only the gaseous form is withdrawn for industrial purposes. Industrial refrigeration systems circulate liquid NH₃ to absorb heat.

The liquid flashes to vapor to absorb heat in the evaporator and returns to the compressor as a vapor to become a high pressure gas. This gas transitions back to a high pressure liquid in the condenser, returning to the receiver to be pumped to the cold room evaporator. When the release point involves liquid under pressure, a sub-zero temperature aerosol that changes to a heavier-than-air dense gas cloud will roll along at ground level until ambient air thins it out and vaporizes it to the atmosphere. Ammonia is caustic and will create a high pH when mixed with water.

- A. Hazard Information: Pungent odor; aerosol and dense gas may look white because of condensation in the air
 - 1. Ammonia vaporizes at room temperature. It boils at -28°F, has a liquid to vapor expansion rate of 1:870, and a vapor density of 0.06 (air =1). Aerosol streams and dense gas clouds are extremely cold and will lay low until heated with ambient air.
 - CAS Registry No. 7664-41-7 and UN# 1005 2
 - NH₃ produces a relatively violent reaction with fluorine, chlorine, bromine, and iodine, especially when 3 liquid or dense gas mix.
 - Ammonia is a base that reacts exothermically when mixing in water and with all acids and has a 4 1:1300 water to vapor absorption rate.
 - 5. Ammonia is soluble in water (generates heat), creating ammonium hydroxide. Aqua solutions of ammonia will kill fish due to O₂ depletion.

B. Risk: Life, Environment, Facility/Equipment

- 1. Toxic gas irritates the respiratory system and damages skin tissue. Emergency medical care includes oxygen therapy for respiratory injury and at least 15 minutes of flushing with water to reduce impact of eye injury and for skin damage exposure.
- 2 Contain contaminated solutions and do not allow entry into storm drain system or to a live body of water.



Toxic Inhalation Hazard (2008 DOT ERG)

	SN	IALL SPIL	.L	LARGE SPILL			
Id# Material	First ISOLATE	Pro downwin	tect id (miles)	First ISOLATE	Protect downwind (miles)		
	(Feet)	day	Night	(Feet)	day	Night	
1005 Ammonia	100	0.1	0.1	500	0.5	1.4	
1017 Chlorine	200	0.3	1.0	2,000	2.2	5.0	
1052 Hydrogen Fluoride	100	0.1	0.3	1,000	1.1	2.2	
1079 Sulfur Dioxide	200	0.2	0.7	1,250	1.3	3.6	
2188 Arsine	600	0.7	2.5	3,000	4.4	9.5	

Threats: Fire, Overpressure, Release C.

- Anhydrous ammonia contained within a room or confined area has flash fire potential when mixtures reach 1. 15%-28%. Industrial refrigeration systems use compressor oil that may reduce the LEL significantly.
- Cylinders may burst when exposed to elevated temperatures (partially full cylinders are higher risks 2 than full or completely empty vessels). Minimum evacuation distances are 500 feet for a small cylinder (125#) to 2,000 feet for a large vessel (500 gallon).
- Evacuees that are sheltered-in-place with controls on outdoor air ventilation are generally safer from 3. the impact of dense gas and explosion than those who escape through dangerous levels (above AEGL 2) of vapor. ASTI recommends that flammability threat mitigation (control source of ignition and ventilate) begin at 40,000 when the ammonia cloud is contained within a room or confined area.

D. Response and Decontamination

Approach upwind with SCBA and appropriate PPE (fire turnouts Level B). Response threat increases (higher concern for skin damage) as the level of ammonia vapor exceeds 5,000 to 10,000 PPM. Always wear fully encapsulated entry suits (level A) when working in or near dense gas and aerosol releases. Cover or

contain the release until the source can be controlled; reduce pressure, if possible, by venting gas (not aerosol or liquid). Avoid applying water to liquid or aerosol/dense gas release. Water can be used to contain vapor (ahead of the dense gas cloud) while protecting downwind escape. Ventilation fans help move and dissipate vapor and are helpful in decontaminating those who have been exposed to vapor. Flush with water for aerosol or liquid exposure, being cautious with frozen clothing attached to skin: thaw before removing clothing.

Section VIII. Site Map

30. Site Map: use Field Operations Guide for a reference. Diagram the release pattern: fanning (stable - warming on the rise), conning (normal slow cooling on the rise), looping (unstable - fast cooling on the rise) and the downwind pattern (isolation zone and protective action zone). High wind speed (>12 mph) causes faster diffusion of gas plume than low wind speed (<6 mph); cold and wet = low cloud and longer time for plume diffusion.

Define the hot zone, initial isolation zone, command post location, staging area, control zones, evacuation gathering points, escape routes, etc.



Section IX. Entry Objectives

31. Entry objectives:

Section X. SOPs and Safe Work Practices

32. Modifications to documented SOPs or work practices: □ YES

Comment:

Section XI. Emergency Procedures

33. Emergency Procedures:

Section XII. Safety Briefing

34. Asst. Safety Officer-Hazmat Signature:

Safety Briefing Completion Time:

Comments:

35. Hazmat Group Supervisor Signature:

Comments:

36. Incident Commander Signature:

Comments:

ICS 208 11/10

LIFE SAFETY - AMMONIA CRITICAL TASK HAZARD READINESS (ICS 215A)

1. Incident Name:		2. Operational Period Date: T	ïme: IAP#				
4. Incident Commander:	5. Alarm (3 × Staffing)	6. Objective: □ Recon □ Rescue □ System Other:	shutdown □ Evac				
7. Haz Zone Location:		8. Terrain: Slope Water Vegetation Structures Canyon					
9. Isolation Zone:		10. Level of concern: Level 1 Low (Light ga aerosol/dense gas) Level 3 High (Out of con	10. Level of concern: Level 1 Low (Light gas) Level 2 Mod (Small aerosol/dense gas) Level 3 High (Out of control and growing)				
11. Wind Speed I low breeze I Moderate blowing paper I High whistling moving branches		Eye Level Wind: Swirl Backflow Variable Windsock Downwind plume movement					
12. Life Safety Priority: Escape: Exits	Situational Awareness D	Priority Stop Points: 2,500 and 5,000 ppm, den oint DAlternative _	se gas/aerosol, skin sting.				
PPE: SCBA Bunker	Level B D Level A Other:	Backup/PP	E				
Decon: Shower Hose	line 🗆 Fan 🗆 Secondary She	ower Option Medical: EMT Medic Ambu	Iance 🛛 Responder Rehab				
13. Hazards	14. Critical	Task Operational Readiness (back page)	15. Protection Factors				
 I. Chemical/Flammable a. Toxic liquified gas b. Toxic solids c. Flammable liquid d. Flammable gas e. Flammable solids f. Oxidizer g. Halogen h. Corrosive 2. Type of Release a. HP aerosol b. HP gas c. Dense gas d. Liquid 3. Mechanical Hazards a. Equipment operation b. High pressure c. Gas-fired equipment d. Vented fugitive vapor e. Boiler or heaters 4. Risks and Threats a. Flash fire/Arc flash b. Hydrostatic pressure c. Hydraulic shock d. High voltage electrical e. Failed emergency cut- 			1.Detection/Monitoring a. Fire □ smoke □ heat b. Chemical ppm c. Video surveillance d. Over-pressure alert 2. Fire protection a. Fire Extinguishers b. Fire sprinklers c. Fire wall d. Ventilation system 3. Pressure control a. Equalizer or diffuser b. Cut-out psi c. PRV psi 4. Manage energy flow a. Pressure Vessels: Release vapor Tarp cover Divert or diffuse Ventilate b. Refrigeration: Evap. coils - off Condenser fans - on NH₃ pumps - off Compressors - on/off c. 3-Cs: Confine to Isolation Zone; Contain within system				

14. Critical Task Operational Readiness

Rescue risk and benefit considerations

- Line of sight to victim check for movement or signs of life.
- 3/30 entry: 3 min. for victim down 30 min. if victims are mobile.
- Rescue: Rescue sled, victim cover and escape hood, tag line.
- Backup: RIC team, fan, hose line, technical advisor.
- Ammonia levels below 5,000 ppm victims may survive a short term (less than 5 min.) in levels greater than 10,000 ppm.
- System control fire threat controlled, pressure controls, ventilation, upstream/downstream liquid controlled.
- 3-C (confine, contain, control) measures system shutdown, manage energy flow, contain the liquid flow, control all hazards.
- 3-D (divert, diffuse, deflect) measures Tarp & cover, PPV fan ventilation, hydraulic ventilation, dense gas knock-down.

Stop points: 2,500 and 5,000 ppm, dense gas/aerosol, feeling skin sting,

3 min. SCBA air check, readiness after stabilizing victim (hood and tag line).

Safety Plan: ICS 208; A-HR pgs. 36-38, & 53; back of 30-Min. Plan

Dangerous Conditions	Situation Awareness			
Clear exits	Take 5 second to evaluate risks.			
Slip/fall hazards	Advance the alarm (3 X staffing)			
Overhead risks	 Communications hand signals, and escape alert. 			
Roof openings (skylights/shafts)				
Forklift/truck traffic	PPE Check - no skin showing and status of air supply			
Changing wind	■ Deadinoss to hand off victim to			
Escalating factors - fire, over	decon team.			
pressure, release changes	Rescue team decon and rehab.			

Homework: Explain the Fire Control as compared to refrigeration.



