Health Risk Assessment – Phase 3 Report

To: Citizens Alliance for Government Integrity (CAGI) and the concerned citizens of York County, SC

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DEP – and for the team

Subject: Results from intensity analyses of accidental chemical release using ALOHA for silane, anhydrous ammonia, hydrochloric acid (37%), hydrofluoric acid (50%), and nitrous oxide.

Date: 23 December 2025

Introduction: This report is a companion to our previous reports for phases 1 and 2 in response to the co-location of nearby population with the Silfab Solar manufacturing site in Fort Mill, SC, specifically, the planned zoning for more than 1,500 students for Flint Hill Elementary in 2025 (921 students) and Flint Hill Middle in 2026 (618 students)[1]. This report expands upon the previous reports with a focus on the intensity of accidental chemical releases, while the previous reports focused on the range (distance) of said releases. Specifically, this update includes estimates of accidental chemical release using ALOHA (Areal Locations of Hazardous Atmospheres) modeling of known chemicals of concern to be stored and used at the site (silane, anhydrous ammonia, hydrochloric acid (37%), hydrofluoric acid (50%), and nitrous oxide (not included in phases 1 & 2)). This report also provides health summaries for toxic exposure impacts on children for each chemical of concern.

Note: This Health Risk Assessment (including the previous reports) should be considered as distinct but complementary to the specific regulatory permitting responsibilities of the South Carolina Department of Environmental Services (SC DES). The SC DES has regulatory responsibilities to review and assess normal operating conditions as outlined in the permit application. Further, SC DES does not have a regulatory basis for performing modeling scenarios other than for normal operating conditions. This is a salient distinction as this report and its companion reports provide increased elements of consideration of what the zoning efforts and land use practices of local jurisdictions should be required to investigate prior to development.

Methods: Large quantities of hazardous chemicals pose an inherent risk to the surrounding populous and environment. Accidents, terrorism, or vandalism causing a chemical release at the Silfab Solar SC facility (Silfab), coupled with damage to (or complete failure of) the facility's safety systems (scrubbers, sumps,

[1] Which students will Fort Mill district send to the new schools beside solar panel site? Retrieved from: https://www.heraldonline.com/news/local/education/article293316374.html on December 5, 2024.

high level alarms, etc.), can lead to catastrophic consequences. Further, accidents or terrorist attack during delivery of bulk chemicals on nearby roadways where safety systems are not in place can also lead to catastrophe.

Silfab officials have listed 21 chemicals, most of them known to be hazardous in the quantities indicated, on its Slug Discharge Control Plan. However, this report investigated only the following chemicals to be delivered/stored at the Silfab facility: ammonia, nitrous oxide, silane, hydrochloric acid, and hydrofluoric acid. Furthermore, it is important to note that there are several additional hazardous effects not considered in this report, such as: the adverse effects of other bulk chemicals stored at the Silfab facility, chemical reactions and chemical mixing, particulates, hazardous fragments, and cascading events, the latter where one hazard initiates another and potentially another. An example of cascading events is an explosion that breaches containment vessels and the facility's façade and leads to the release of one or more toxic chemicals to the environment.

This report is based largely on ALOHA runs, physical security expertise, and general engineering experience. ALOHA (5.4.7) was developed for emergency responders and planners by the Office of Emergency Management, EPA and the Emergency Response Division, NOAA. The program estimates threat zones and the threat at a point associated with hazardous chemical releases that can cause toxic gas plumes, fires, and explosions. The hazard types are toxicity (concentration), flammability, thermal radiation, and overpressure. The adverse effects reflected in the analyses reported herein are based on the much higher short-term exposure limits (higher concentrations) as opposed to long-term exposure limits (lower concentrations) associated with pollution.

Results: Table 1 lists the five chemicals/compounds analyzed in this report, including the amount of each that corresponds to a one-tank release, the hazard type (toxicity) and source type, and the established hazard Levels of Concern (LOC); footnotes under the table provide additional information such as the definition of acronyms and LOCs. A red LOC indicates life-threatening effects or death if exceeded; an orange LOC indicates serious, irreversible, long-lasting health effects if exceeded; and a yellow LOC indicates discomfort or transient health effects if exceeded.

Table 1: Chemical/Compound for Analysis

Chemical/Compound	Amount	Hazard Type[1]; Source Type	Hazard Level of Concern (LOC)[2]
Ammonia	22,000 lbs	Toxicity; direct source	Red: AEGL-3[3]=1100 ppm Orange: AEGL-2=160 ppm Yellow: AEGL-1=30 ppm
Nitrous Oxide	31,680 lbs	Toxicity; direct source	Red: PAC-3[4]=20,000 ppm Orange: PAC-2=10,000 ppm Yellow: PAC-1=910 ppm
Silane	13,228 lbs	Toxicity; direct source	Red: AEGL-3=270 ppm Orange: AEGL-2=130 ppm Yellow: AEGL-1=100 ppm
Hydrochloric acid (37%)	5547.5 gal	Toxicity; evaporating puddle	Red: AEGL-3=100 ppm Orange: AEGL-2=22 ppm Yellow: AEGL-1=1.8 ppm
Hydrofluoric acid (49%)	8717.5 gal	Toxicity; evaporating puddle	Red: AEGL-3=44 ppm Orange: AEGL-2=24 ppm Yellow: AEGL-1=1 ppm

[1]Hazard types are: toxicity, flammability, thermal radiation, and overpressure

[2]Hazard Level of Concern:

Red=life-threatening effects or death
Orange=serious, irreversible, long-lasting health effects
Yellow=discomfort, transient health effects

Toxic LOCs include: AEGL (Acute Exposure Guideline Levels), PAC (Protective Action Criteria), ERPG (Emergency Response Planning Guidelines), IDLH (Immediately Dangerous to Life or Health)

LOCs are for 60 minutes

[3]Acute Exposure Guideline Levels, developed by the Environmental Protection Agency (National Research Council of the National Academies)

AEGL-3: Red: life-threatening effects or death
AEGL-2: Orange: serious, irreversible, long-lasting health effects
AEGL-1: Yellow: discomfort, transient health effects

[4]Protective Action Criteria for chemicals, compiled and maintained by the US Department of Energy; indicates the toxicity levels of chemicals

PAC 3: Red: life-threatening effects or death
PAC 2: Orange: serious, irreversible, long-lasting health effects
PAC 1: Yellow: discomfort, transient health effects

ALOHA runs were performed for three weather conditions, denoted as Runs 1–3, for each of the five chemicals/compounds analyzed.

Run 1 simulated a daytime release in mid-May with the following conditions.
air temperature: 85 degree F
relative humidity: 75%
wind speed: 3.4 mph
stability classification: D

Run 2 simulated a hot, calm, nighttime release in August with the following conditions.
air temperature: 85 degree F
relative humidity: 75%
wind speed: 3.4 mph
stability classification: F

Run 3 simulated a cool, calm, nighttime release in May with the following conditions.
air temperature: 65 degree F
relative humidity: 75%
wind speed: 3.4 mph
stability classification: F

The ALOHA runs produced Red, Orange, and Yellow toxicity zones that are presented as radial distances from the Silfab Facility in tabular form. Some of these results are also presented in toxicity zones overlaid on a local map of the region surrounding the Silfab Facility. These toxicity zones correspond to the LOCs for each chemical/compound in the rightmost column of Table 1.

Ammonia, nitrous oxide, and silane were modeled as direct sources, and hydrochloric acid and hydrofluoric acid were modeled as evaporating puddles.

Anhydrous Ammonia (AA)

Tables 2, 3, and 4, respectively, summarize the results for the three runs corresponding to the three weather conditions defined above. Figure 1 is a map displaying the results of table 2, showing the intensity distances (radii) of AA around the site and throughout the area of Fort Mill for Run 1 (daytime

release in May). It is observed in the tables that the red toxicity radius varies from 0.83 miles to 2.1 miles from the Silfab Facility, depending on the weather conditions. Similarly, the yellow toxicity radius varies from 4.6 to over 6 miles from the Facility. Further, ammonia has an IDLH of 300 ppm. A toxicity zone exceeding this concentration extends well over 2.1 miles from the Facility, where IDLH denotes Immediately Dangerous to Life or Health as established by the National Institute for Occupational Safety and Health (NIOSH). This represents a significant threat to public safety in this sizeable zone.

Table 2. Run 1
DAY; wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: D

Anhydrous Ammonia (22,000 lbs), Release rate: 2200 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	4362 [0.83]	AEGL-3 = 1100 ppm
Orange	12,144 [2.3]	AEGL-2 = 160 ppm
Yellow	24,288 [4.6]	AEGL-1 = 30 ppm

[1]Toxicity zones:
Red: life-threatening effects or death
Orange: serious, irreversible, long-lasting health effects
Yellow: discomfort, transient health effects
[2]Source is located at 0 ft [0 miles]; values are radii in feet [miles] from source
[3]Type of LOC that corresponds to toxicity zone

Table 3. Run 2
NIGHT (HOT); wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: F

Anhydrous Ammonia (22,000 lbs), Release rate: 2200 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	11,088 [2.1]	AEGL-3 = 1100 ppm
Orange	29,040 [5.5]	AEGL-2 = 160 ppm
Yellow	>31,680 [> 6]	AEGL-1 = 30 ppm

Same footnotes as the table above.

Table 4. Run 3
NIGHT (COOL); wind speed: 3.4 mph; air temp.: 65 deg. F; RH: 75%; Stability Class: F

Anhydrous Ammonia (22,000 lbs), Release rate: 2200 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	11,088 [2.1]	AEGL-3 = 1100 ppm
Orange	27,984 [5.3]	AEGL-2 = 160 ppm
Yellow	>31,680 [> 6]	AEGL-1 = 30 ppm

Same footnotes as the table above.

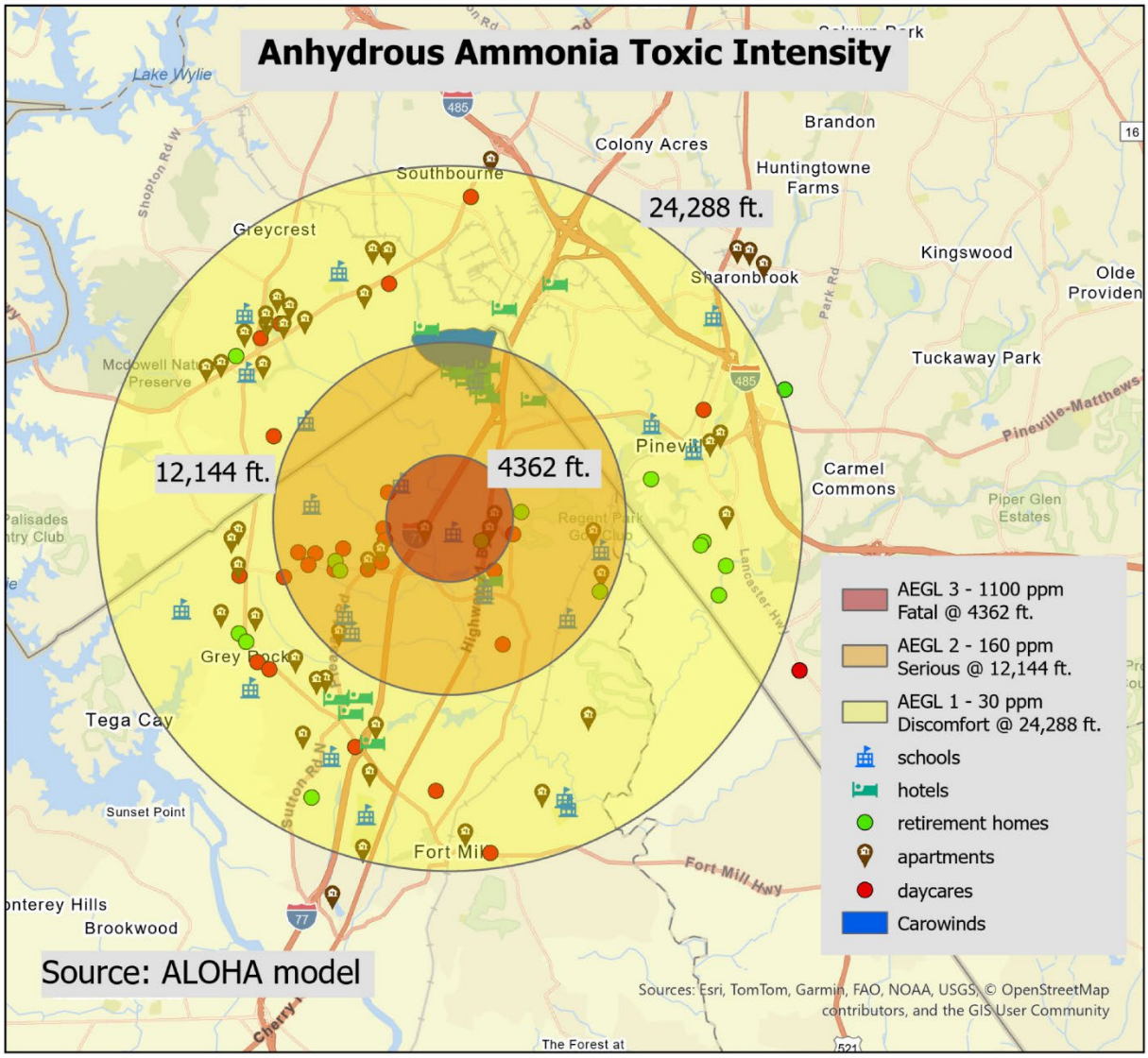

Figure 1. Toxicity Intensity Dispersion Distances for Anhydrous Ammonia

Nitrous Oxide (N_20)

Tables 5, 6, and 7, respectively, summarize the results for the three runs corresponding to the three weather conditions defined above. Figure 2 is a map displaying the results of table 5, showing the intensity distances (radii) of N_2O around the site and throughout the area of Fort Mill. It is observed in the tables that the red toxicity radius varies from 0.23 miles to 0.26 miles from the Silfab Facility, depending on the weather conditions. Similarly, the yellow toxicity radius varies from 0.97 to 1.0 mile from the Facility.

Table 5. Run 1

DAY; wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: D

Nitrous Oxide (31,680 lbs), Release rate: 12,672 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1239 [0.23]	PAC-3 = 20,000 ppm
Orange	1854 [0.35]	PAC-2 = 10,000 ppm
Yellow	5106 [0.97]	PAC-1 = 910 ppm

[1]Toxicity zones (heavy gas):

Red: life-threatening effects or death

Orange: serious, irreversible, long-lasting health effects

Yellow: discomfort, transient health effects

[2] Source is located at 0 ft [0 miles]; values are radii in feet [miles] from source

[3]Type of LOC that corresponds to toxicity zone

Table 6. Run 2

NIGHT (HOT); wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: F

Nitrous Oxide (31,680 lbs), Release rate: 12,672 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1356 [0.26]	PAC-3 = 20,000 ppm
Orange	1995 [0.38]	PAC-2 = 10,000 ppm
Yellow	5280 [1.0]	PAC-1 = 910 ppm

Same footnotes as the table above.

Table 7. Run 3

NIGHT (COOL); wind speed: 3.4 mph; air temp.: 65 deg. F; RH: 75%; Stability Class: F

Nitrous Oxide (31,680 lbs), Release rate: 12,672 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1332 [0.25]	PAC-3 = 20,000 ppm
Orange	1959 [0.37]	PAC-2 = 10,000 ppm
Yellow	5280 [1.0]	PAC-1 = 910 ppm

Same footnotes as the table above.

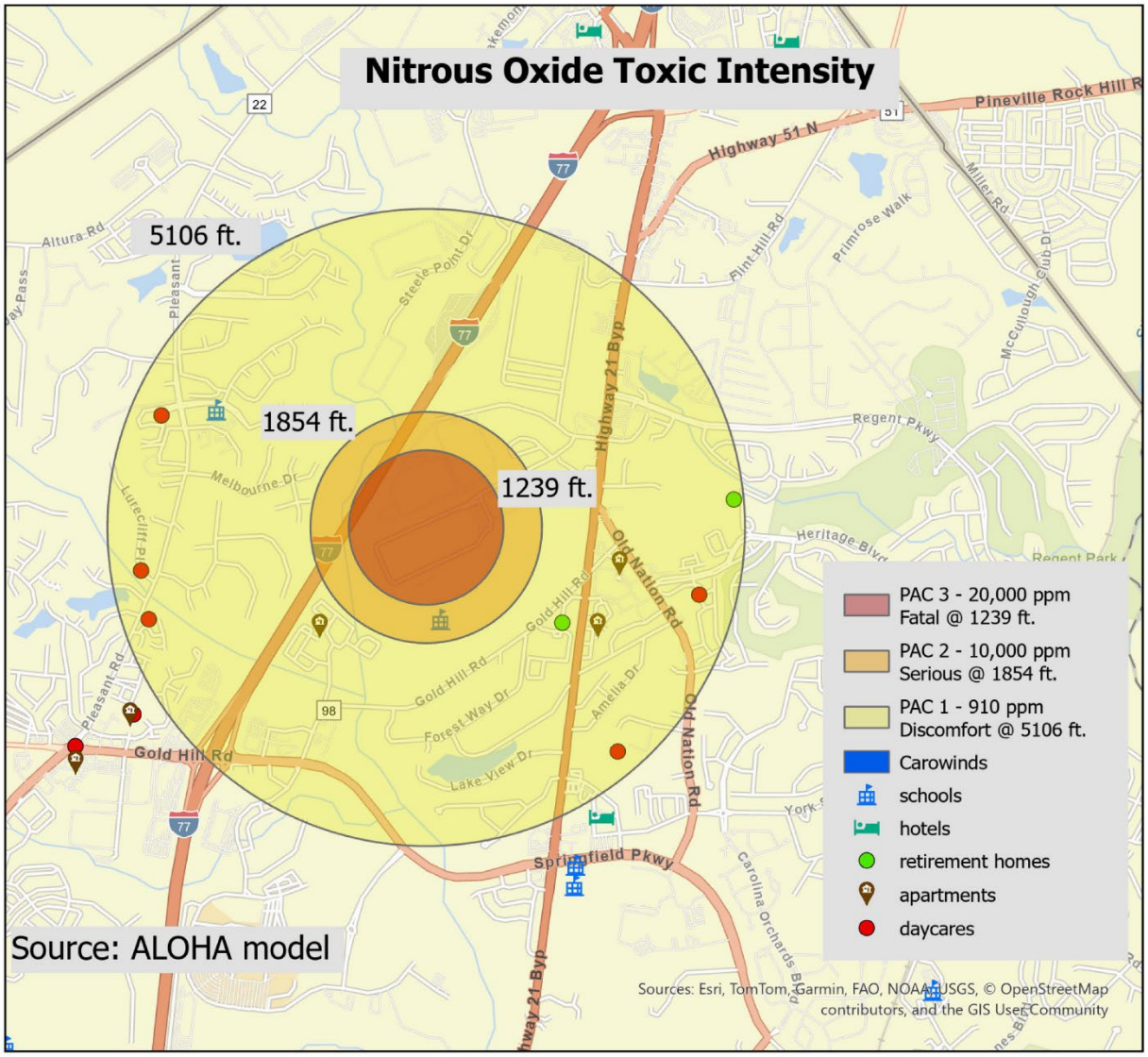

Figure 2. Toxicity Intensity Dispersion Distances for Nitrous Oxide

Silane

Tables 8, 9, and 10, respectively, summarize the results for the three runs corresponding to the three weather conditions defined above. Figure 3 is a map displaying the results of table 8 showing the intensity distances (radii) of silane around the site and throughout the area of Fort Mill. It is observed in the tables that the red toxicity radius varies from 1.1 miles to 1.3 miles from the Silfab Facility, depending on the weather conditions. Similarly, the yellow toxicity radius varies from 2.0 to 2.2 miles from the Facility.

Table 8. Run 1

DAY; wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: D

Silane (13,228 lbs), Release rate: 1322.8 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	5808 [1.1]	AEGL-3 = 270 ppm
Orange	8976 [1.7]	AEGL-2 = 130 ppm
Yellow	10,560 [2.0]	AEGL-1 = 100 ppm

[1]Toxicity zones (heavy gas):

Red: life-threatening effects or death

Orange: serious, irreversible, long-lasting health effects

Yellow: discomfort, transient health effects

[2] Source is located at 0 ft [0 miles]; values are radii in feet [miles] from source

[3]Type of LOC that corresponds to toxicity zone

Table 9. Run 2

NIGHT (HOT); wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: F

Silane (13,228 lbs), Release rate: 1322.8 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	6864 [1.3]	AEGL-3 = 270 ppm
Orange	10,032 [1.9]	AEGL-2 = 130 ppm
Yellow	11,616 [2.2]	AEGL-1 = 100 ppm

Same footnotes as the table above.

Table 10. Run 3

NIGHT (COOL); wind speed: 3.4 mph; air temp.: 65 deg. F; RH: 75%; Stability Class: F

Silane (13,228 lbs), Release rate: 1322.8 lbs/min		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	6864 [1.3]	AEGL-3 = 270 ppm
Orange	10,032 [1.9]	AEGL-2 = 130 ppm
Yellow	11,616 [2.2]	AEGL-1 = 100 ppm

Same footnotes as the table above.

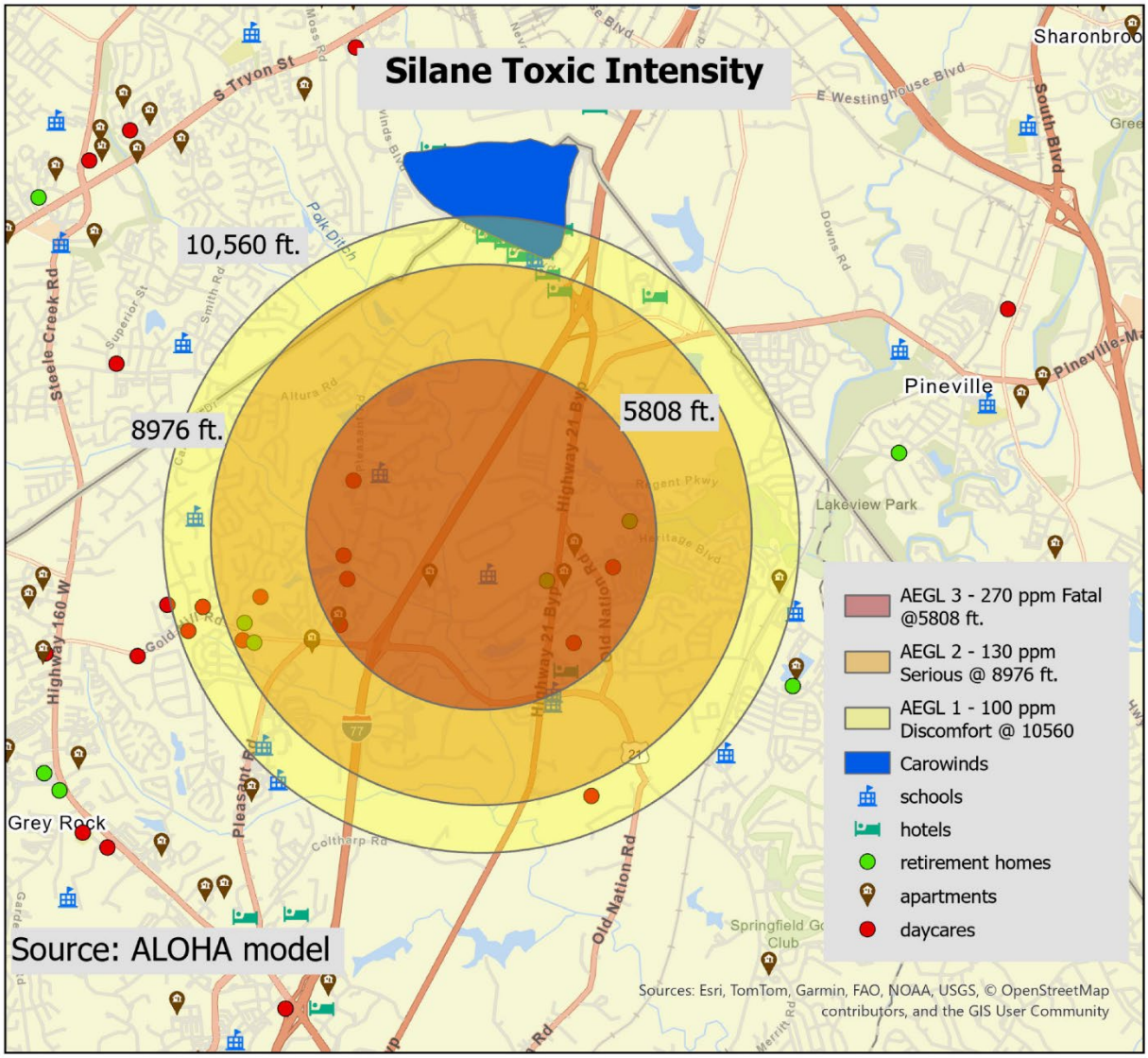

Figure 3. Toxicity Intensity Dispersion Distances for Silane

Hydrochloric Acid (HCL)

Tables 11, 12, and 13, respectively, summarize the results for the three runs corresponding to the three weather conditions defined above. Figure 4 is a map displaying the intensity of the results of table 11, showing distance (radii) of HCL around the site and throughout the area of Fort Mill. It is observed in the tables that the red toxicity radius varies from 0.29 miles to 0.37 miles from the Silfab Facility, depending on the weather conditions. Similarly, the yellow toxicity radius varies from 2.2 to 3.5 miles from the Facility.

Table 11. Run 1

DAY; wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: D

Hydrochloric Acid (37%, 5547.5 gal), Release rate: 37.9 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1551 [0.29]	AEGL-3 = 100 ppm
Orange	3531 [0.67]	AEGL-2 = 22 ppm
Yellow	11,616 [2.2]	AEGL-1 = 1.8 ppm

[1]Toxicity zones (heavy gas):

Red: life-threatening effects or death

Orange: serious, irreversible, long-lasting health effects

Yellow: discomfort, transient health effects

[2] Source is located at 0 ft [0 miles]; values are radii in feet [miles] from source

[3]Type of LOC that corresponds to toxicity zone

Table 12. Run 2

NIGHT (HOT); wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: F

Hydrochloric Acid (37%, 5547.5 gal), Release rate: 42.1 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1971 [0.37]	AEGL-3 = 100 ppm
Orange	5124 [0.97]	AEGL-2 = 22 ppm
Yellow	18,480 [3.5]	AEGL-1 = 1.8 ppm

Same footnotes as the table above.

Table 13. Run 3

NIGHT (COOL); wind speed: 3.4 mph; air temp.: 65 deg. F; RH: 75%; Stability Class: F

Hydrochloric Acid (37%, 5547.5 gal), Release rate: 22.3 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1422 [0.27]	AEGL-3 = 100 ppm
Orange	3828 [0.73]	AEGL-2 = 22 ppm
Yellow	14,256 [2.7]	AEGL-1 = 1.8 ppm

Same footnotes as the table above.

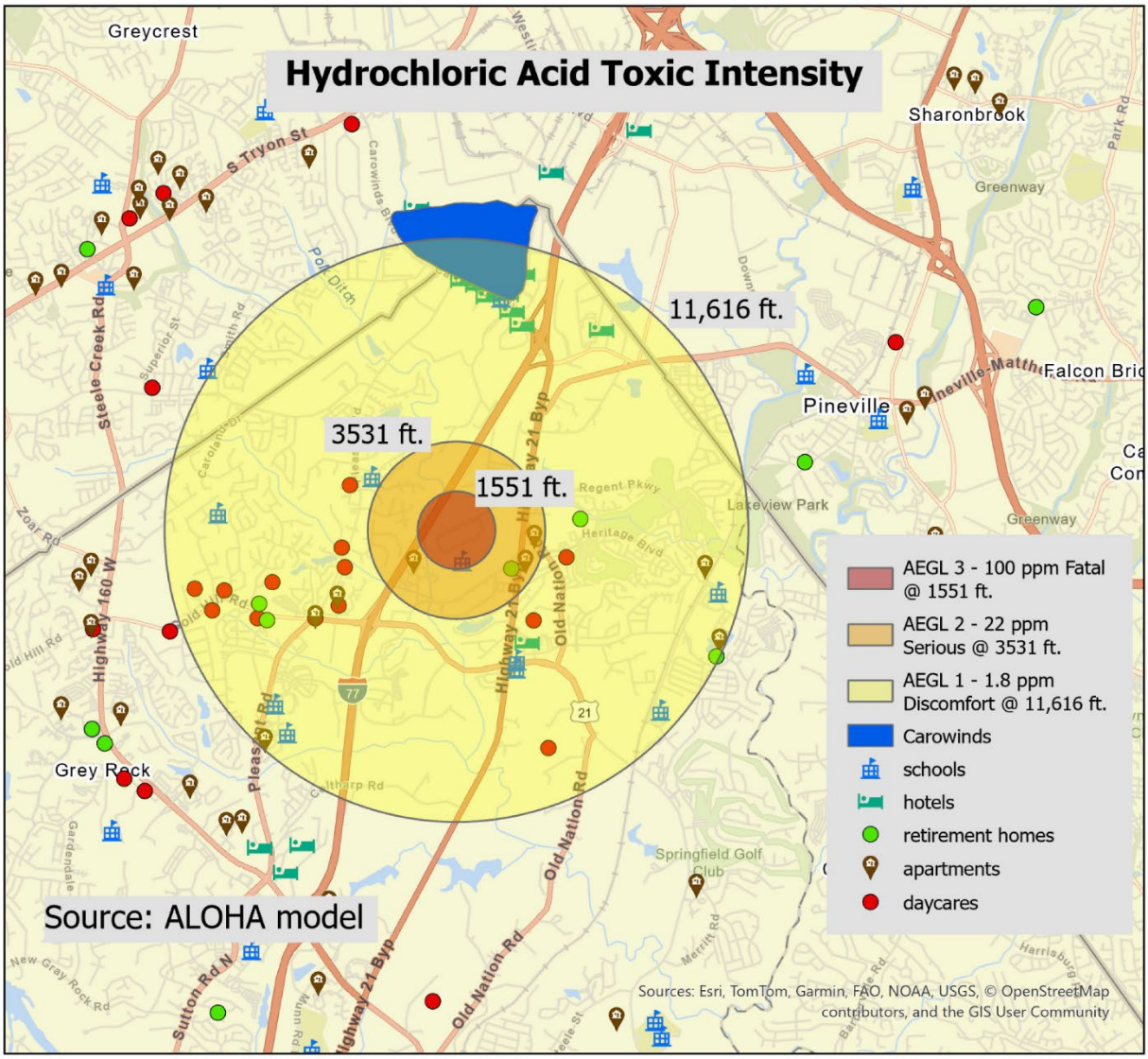

Figure 4. Toxicity Intensity Dispersion Distances for HCL

Hydrofluoric Acid (HF)

Tables 14, 15, and 16, respectively, summarize the results for the three runs corresponding to the three weather conditions defined above. Figure 5 is a map displaying the results of table 14, showing the intensity distance (radii) of HF around the site and throughout the area of Fort Mill. It is observed in the tables that the red toxicity radius varies from 0.076 miles to 0.23 miles from the Silfab Facility, depending on the weather conditions. Similarly, the yellow toxicity radius varies from 0.67 to 2.3 miles from the Facility.

Table 14. Run 1

DAY; wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: D

Hydrofluoric Acid (49%, 8717.5 gal), Release rate: 1.65 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	402 [0.076]	AEGL-3 = 44 ppm
Orange	567 [0.11]	AEGL-2 = 24 ppm
Yellow	3513 [0.67]	AEGL-1 = 1 ppm

[1]Toxicity zones:

Red: life-threatening effects or death

Orange: serious, irreversible, long-lasting health effects

Yellow: discomfort, transient health effects

[2] Source is located at 0 ft [0 miles]; values are radii in feet [miles] from source

[3]Type of LOC that corresponds to toxicity zone

Table 15. Run 2

NIGHT (HOT); wind speed: 3.4 mph; air temp.: 85 deg. F; RH: 75%; Stability Class: F

Hydrofluoric Acid (49%, 8717.5 gal), Release rate: 1.85 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	1224 [0.23]	AEGL-3 = 44 ppm
Orange	1716 [0.33]	AEGL-2 = 24 ppm
Yellow	12,144 [2.3]	AEGL-1 = 1 ppm

Same footnotes as the table above.

Table 16. Run 3

NIGHT (COOL); wind speed: 3.4 mph; air temp.: 65 deg. F; RH: 75%; Stability Class: F

Hydrofluoric Acid (49%, 8717.5 gal), Release rate: 1.04 lbs/min (max. average sustained)		
Toxicity Zone[1]	Distance from Source[2] ft [miles]	Level of Concern (LOC)[3]
Red	858 [0.16]	AEGL-3 = 44 ppm
Orange	1212 [0.23]	AEGL-2 = 24 ppm
Yellow	7920 [1.5]	AEGL-1 = 1 ppm

Same footnotes as the table above.

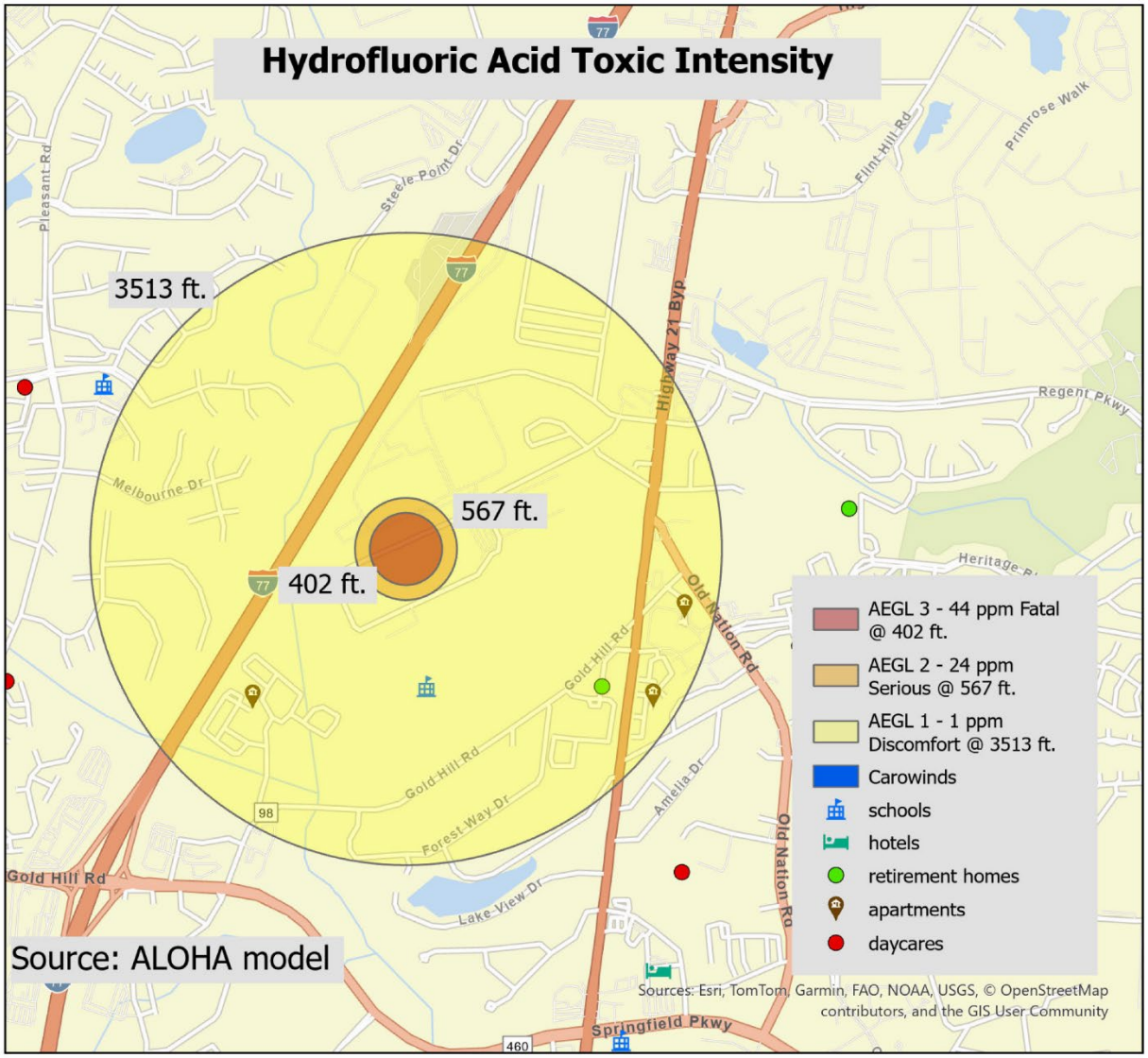

Figure 5. Toxicity Intensity Dispersion Distances for HF

Toxic Exposure Summaries for Children

Healthy adults are vulnerable to death or injury as defined within the three (red, orange, and yellow) hazard zones described in this report. However, children are inherently more susceptible to the toxic impacts of chemical exposures due to a variety of factors. Each chemical was investigated for its known toxic impact(s) on children and what factors contribute to this. The findings from this review are provided in table 17 below.

Table 17. Childhood Toxicity Summaries for Chemicals of Concern.

Chemical	Why dangerous to children	References
Anhydrous Ammonia	• Children are especially susceptible due to their developing respiratory systems, higher breathing rates, and reduced ability to recognize or escape hazardous conditions.	Cohen Hubal et al. (2000). Dasarathy et al. (2017).

	• AA has been found to contribute to seizures in epileptic children.	Welch (2006). Yamamoto et al. (2013).
Nitrous Oxide	• Short term effects in children include dizziness, headache, nausea, confusion, or difficulty breathing, especially at high concentrations or in poorly ventilated spaces. • Children breathe more rapidly than adults and have developing nervous systems, thus they can be more sensitive to oxygen (O_2) displacement caused by N_20, which can reduce O_2 levels in the blood and lead to hypoxia. • Prolonged or repeated exposure may interfere with vitamin B12 metabolism, potentially affecting nerve function and blood cell production. • Acute exposure can be especially dangerous and, in some cases, may cause loss of consciousness or serious injury.	Cleveland Clinic (2023). Lin et al. (2011). Dunn-Russell et al. (1993).
Silane	• Children are especially susceptible due to smaller body size, faster breathing rates, and developing respiratory systems. • Inhalation of high concentrations may displace O_2 in the air, leading to breathing difficulties, dizziness, or loss of consciousness. • The greatest danger to children comes from silane's extreme flammability; it can ignite spontaneously when released, creating a risk of fires, explosions, and severe burns. • Children with asthma or other respiratory conditions may be at increased risk of respiratory irritation from combustion byproducts or smoke. • As silane is primarily used in industrial settings, the risk to children is highest during accidental releases near manufacturing, storage, or transport areas. Prevention and mitigation through land use planning are warranted; rapid emergency response, and clear community notification are also essential to protect child health and safety.	Choudhurry et al. (2021). Cohen Hubal et al. (2000). Faustman et al. (2000). Xu et al. (2017).
Hydrochloric Acid	• Children exposed to HCL face a heightened risk of acute respiratory injury, chemical burns to the skin and eyes, and severe gastrointestinal damage if ingested. • With higher breathing rates, smaller airways, and thinner skin, children can experience serious health effects at lower exposure levels than adults, including asthma exacerbation, airway inflammation, and potential long-term respiratory or vision impairment following significant exposure.	Abrams (2001). Colunga Biancatelli et al. (2021). DHHS-ATSDR. (2014). Gorguner and Akgun (2010). Sen (2017). Davis and Kercsmar (2000). Yin (2017).

Hydrofluoric Acid	• High skin permeability: HF penetrates skin deeply and rapidly. • Systemic toxicity: Fluoride ions bind calcium and magnesium in the body, disrupting vital functions. • Smaller body size: Children reach toxic doses much faster than adults. • Delayed symptoms: Serious injury can occur hours after exposure, even if pain is minimal at first.	Bajraktarova-Valjakova et al. (2018). DHHS-ATSDR. (2003). Ozcan et al. (2012)

Conclusions: Accidents, terrorism, or vandalism causing a chemical release at Silfab, coupled with damage to or failure of the facility's safety systems would pose a significant threat to public health and safety within 6 miles from the facility. Whereas 21 bulk chemicals and compounds would be regularly stored and used at Silfab, this report demonstrates the significant risks associated with only five of them: ammonia, nitrous oxide, silane, hydrochloric acid, and hydrofluoric acid. Further, this report does not consider potential hazardous effects associated with chemical reactions and mixing, particulates, hazardous fragments, synergetic effects, and cascading events.

All five of the modeled chemicals/compounds produced toxic clouds from direct sources or evaporating puddles. Ammonia and silane were estimated to produce large red toxicity zones extending for more than a mile from the Silfab Facility. Of particular concern, ammonia would likely pose an immediate danger to life or health (IDLH) for well over 2.1 miles from the Facility. The largest yellow toxicity zones were estimated to be produced by ammonia and the two acid compounds. The radius produced by ammonia was estimated to be greater than 6 miles; and the hydrochloric acid and the hydrofluoric acid, could produce radii of approximately 3.5 and 2.3 miles, respectively.

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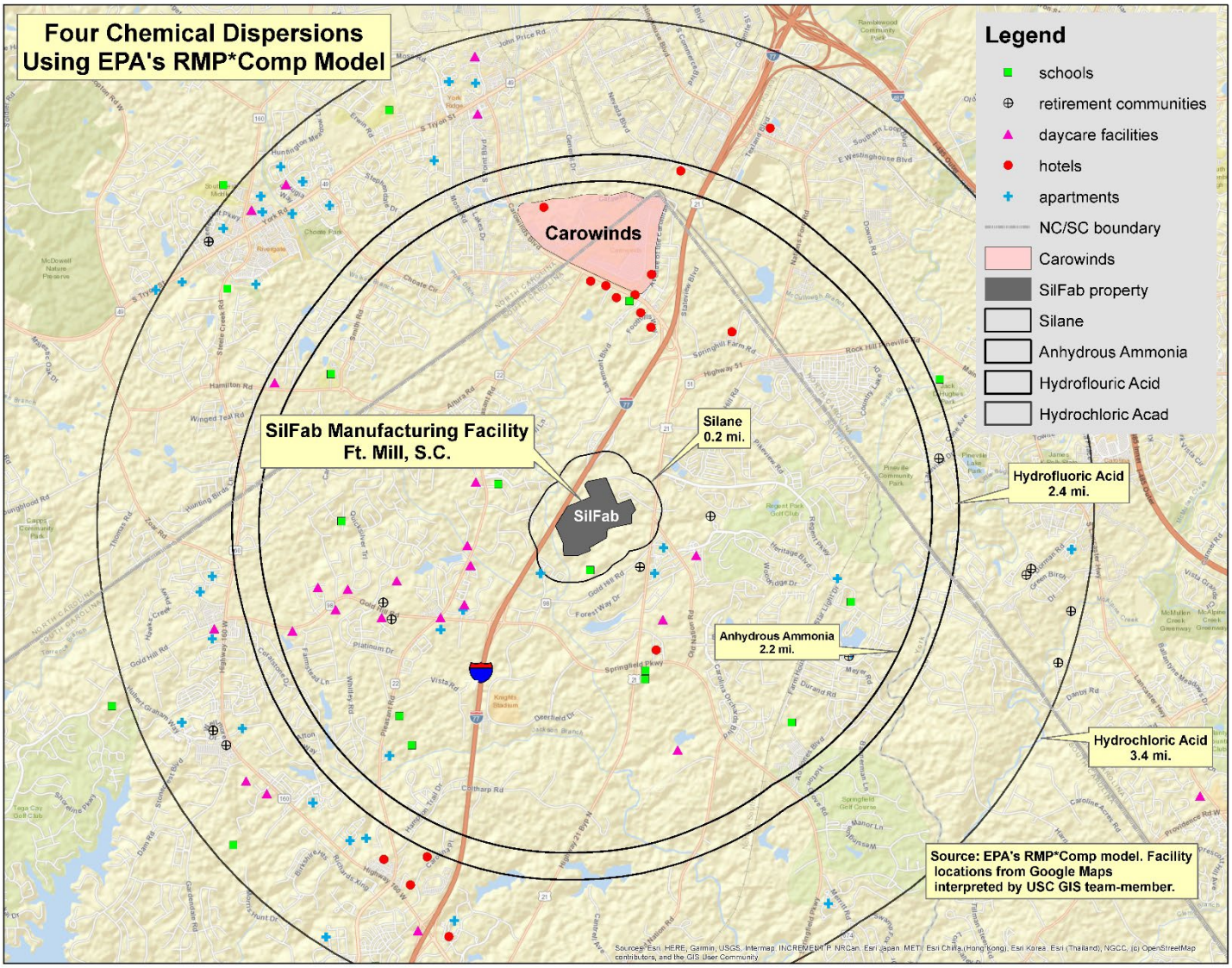
Appendix A – RMP*Comp Tool Results from Phase 2

Chemical	Quantity[2]	Worst case scenario (Rural)
Anhydrous Ammonia	22,000 lbs	22,000 lbs, Released over 10 min Distance = **2.2 miles**
Hydrochloric acid (37%)	2 storage tanks, 5,280 gallons each (multiplying with density, 5,280 gallons x 9.93 lbs/gal = 52,430.4 pounds)	52,430.4 lbs, Release rate of 262 lbs/min Distance = **3.4 miles**
Hydrofluoric acid (50%)	2 storage tanks, 7,925 gallons each (multiplying with density, 7,925 gallons x 9.59 lbs/gal = 75,982.75 pounds)	75,982.75 lbs, release rate of 61.1 lbs/min Distance = **2.4 miles**
Silane	13,228 lbs	13,228 lbs, Vapor Cloud Explosion, Distance = **0.2 miles**

[2] Chemical quantities sourced from Silfab RMP Appendix D and SC DES AIR-construction permit

Appendix B – Expanded View of Chemical Dispersion Map from Phase 2



Appendix C – RMP*Comp Tool Output from Phase 2

Estimated Distance Calculation

Estimated distance to toxic endpoint: 2.2 miles (3.5 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Ammonia (anhydrous)
CAS number:	7664-41-7
Threat type:	Toxic Gas
Scenario type:	Worst-case
Quantity released:	22000 pounds
Release duration:	10 min
Release rate:	2200 pounds per minute
Mitigation measures:	NONE
Surrounding terrain type:	Rural surroundings (terrain generally flat and unobstructed)
Toxic endpoint:	0.14 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Estimated Distance Calculation

Estimated distance to toxic endpoint: 3.4 miles (5.5 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Hydrochloric acid
Initial concentration:	37 %
CAS number:	7647-01-0
Threat type:	Toxic Liquid
Scenario type:	Worst-case
Liquid temperature:	72 F
Quantity released:	52430.4 pounds
Mitigation measures:	NONE
Release rate to outside air:	262 pounds per minute
Surrounding terrain type:	Rural surroundings (terrain generally flat and unobstructed)
Toxic endpoint:	0.03 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Estimated Distance Calculation

Estimated distance to toxic endpoint: 2.4 miles (3.9 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Hydrofluoric acid
Initial concentration:	50 %
CAS number:	7664-39-3
Threat type:	Toxic Liquid
Scenario type:	Worst-case
Liquid temperature:	72 F
Quantity released:	75982.75 pounds
Mitigation measures:	NONE
Release rate to outside air:	61.1 pounds per minute
Surrounding terrain type:	Rural surroundings (terrain generally flat and unobstructed)
Toxic endpoint:	0.016 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Estimated Distance Calculation

Estimated distance to 1 psi overpressure: 0.2 miles (0.3 kilometers)

This is the distance to the overpressure endpoint of 1 pound per square inch specified for this regulated substance under the RMP Rule.

Scenario Summary

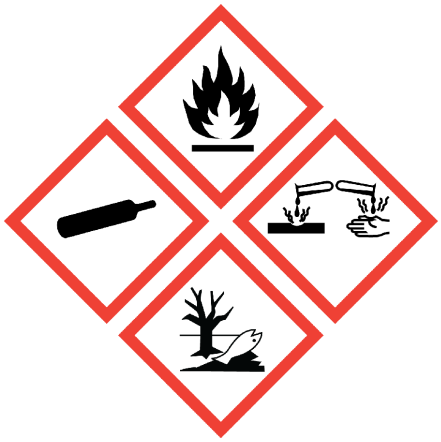
Chemical:	Silane
CAS number:	7803-62-5
Threat type:	Flammable Gas
Scenario type:	Worst-case
Quantity released:	13228 pounds
Release type:	Vapor Cloud Explosion

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Appendix D – Globally Harmonized System (GHS) Label Snapshots for 5 Chemicals of Concern

AMMONIA, ANHYDROUS



DANGER

Causes damage to organs
Causes severe skin burns and eye damage
Contains gas under pressure; may explode if heated
Extremely flammable gas
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause damage to organs through prolonged or repeated exposure
Suspected of causing genetic defects
Toxic if inhaled
Very toxic to aquatic life
Very toxic to aquatic life with long lasting effects

Do not handle until all safety precautions have been read and understood
Do not breathe
dust/fume/gas/mist/vapours/spray
Do not eat, drink or smoke when using this product
Obtain special instructions before use
Wear protective gloves/protective clothing/eye protection/face protection
In case of inadequate ventilation wear respiratory protection
Use personal protective equipment as required
Keep away from heat, hot surfaces, sparks,
open flames and other ignition sources. No
smoking.
Wash ... thoroughly after handling
Use only outdoors or with adequate ventilation.
Keep container tightly closed
Avoid release to the environment

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER/doctor/...
Do NOT induce vomiting
IF ON SKIN (or hair): Take off immediately all contaminated clothing, Rinse skin with water/shower
Wash contaminated clothing before reuse
Rinse skin with water/shower
IF IN EYES: Rinse cautiously with water for several minutes, Remove contact lenses, if present and easy to do. Continue rinsing
Get Medical advice/attention if you feel unwell
Collect spillage
Protect from sunlight
Store locked up

HYDROCHLORIC ACID 37%

Danger

Causes severe skin burns and eye damage
May be corrosive to metals
May cause respiratory irritation

Keep only in original packaging
Do not breathe
dust/fume/gas/mist/vapours/spray
Wash … thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or with adequate ventilation.
Wear protective gloves/protective clothing/eye protection/face protection
IF SWALLOWED: Rinse mouth, Do NOT induce vomiting
IF ON SKIN (or hair): Take off immediately all contaminated clothing, Rinse skin with water/shower
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes, Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER/doctor/…
Wash contaminated clothing before reuse
Absorb spillage to prevent material damage.
Store in a well-ventilated place., Keep container tightly closed
Store locked up
Store in a corrosive resistant/… container with a resistant inner liner
Dispose of contents/container to …

HYDROFLUORIC ACID, 47% - 51%

Danger

Causes severe skin burns and eye damage
Fatal if inhaled
Fatal if swallowed
Fatal in contact with skin

Do not breathe
dust/fume/gas/mist/vapours/spray
Do not get in eyes, on skin, or on clothing
Wash ... thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or with adequate ventilation.
Wear protective gloves/protective clothing/eye protection/face protection
In case of inadequate ventilation wear respiratory protection
IF SWALLOWED: Immediately call a POISON CENTER/doctor/...
IF SWALLOWED: Rinse mouth, Do NOT induce vomiting
IF ON SKIN: Wash with plenty of water.
IF ON SKIN (or hair): Take off immediately all contaminated clothing, Rinse skin with water/shower
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes, Remove contact lenses, if present and easy to do. Continue rinsing
Immediately call a POISON CENTER/doctor/...
Specific treatment is urgent (see ... on this label)
Specific treatment (see ... on this label)
Specific measures (see ... on this label)
Rinse mouth
Take off immediately all contaminated clothing, And wash it before reuse
Wash contaminated clothing before reuse

SILANE

Danger

Catches fire spontaneously if exposed to air
Contains gas under pressure; may explode if heated
Extremely flammable gas
Flammable gas
Harmful if inhaled

Do not handle until all safety precautions have been read and understood
Keep away from heat, hot surfaces, sparks,
open flames and other ignition sources. No
smoking.
Do not allow contact with air
Avoid breathing dust/fume/gas/mist/vapours/spray
Use only outdoors or with adequate ventilation.
Wear protective gloves/protective clothing/eye protection/face protection
IF ON SKIN:
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes, Remove contact lenses, if present and easy to do. Continue rinsing
IF exposed or concerned: Get medical advice/attention
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
In case of leakage, eliminate all ignition sources.
Store in a well-ventilated place.
Dispose of contents/container to ...

NITROUS OXIDE

Danger

Contains gas under pressure; may explode if heated
May cause drowsiness or dizziness
May cause or intensify fire; oxidizer

Do not handle until all safety precautions have been read and understood
Keep/Store away from clothing/…/combustible materials
Keep valves and fittings free from oil and grease
Avoid breathing dust/fume/gas/mist/vapours/spray
Do not get in eyes, on skin, or on clothing
Use only outdoors or with adequate ventilation
IF ON SKIN:
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor/physician if you feel unwell
Get immediate medical advice/attention
Thaw frosted parts with lukewarm water. Do no rub affected area
In case of fire: Stop leak if safe to do so
Store in a well-ventilated place
Store locked up
Dispose of contents/container to …

Air Liquide