# Appendix E
## Inland Star Risk Assessment

ESA

**Inland Star Distribution Systems**
**Risk Assessment Report**
**January 29, 2019**

Introduction

This report prepared by Inland Star responds to the request by the City of Carson ("City") for a comprehensive analysis of the risks associated with Inland Star Distribution Center's ("Inland Star") chemical warehouse at 2132 E. Dominguez Street. Among other things, this report seeks to respond to the issues and concerns that have been identified by the City, including in written correspondence dated August 31, 2018 and in further discussions with staff. This analysis is provided to assist the City in its preparation of an environmental assessment under the California Environmental Quality Act ("CEQA"), the purpose of which is to identify any potentially significant effects on the environment and identify feasible alternatives and mitigation to avoid or lessen any such effects. Pub. Res. Code §21002(a).

In order to provide sufficient context for the analysis, Section I of this report contains an overview of relevant hazardous materials regulation, and Section II describes relevant features of the Inland Star facility and its operations. Section III discusses the assessment and modeling of accidental release scenarios.

## I. Hazardous Materials Regulation

### A. Unified Program

Californians are protected from hazardous waste and hazardous materials by a Unified Program that ensures consistency throughout the state in regard to administrative requirements, permits, inspections, and enforcement.[1] Under state law, six state environmental programs have been consolidated into one program under the authority of a Certified United Program Agency known as a "CUPA." The CUPA is a local agency (such as a county or a city) that has been certified by Cal/EPA to implement the six state environmental programs within the local agency's jurisdiction. The Los Angeles County Fire Department applied and was appointed by the State of California as the CUPA for an area that includes the City of Carson.[2]

CUPAs were established by state law in 1994 in order to eliminate duplicate inspections, permits and regulations. CUPAs unify six regulatory programs (including the administration, permit, inspection, and enforcement activities):

- Hazardous Materials Release Response Plans and Inventories (Business Plan)
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs

[1] https://calepa.ca.gov/cupa/

[2] Answers to Your Questions About the Certified Unified Program Fees Fiscal Year July 1, 2018- June 30, 2019.

- Underground Storage Tank Program
- Aboveground Petroleum Storage Act (ASPA) Program
- California Accidental Release (CalARP) Program
- Area Plans for Hazardous Materials Emergencies
- Hazardous Material Management Plan (HMMP) and Hazardous Material Inventory Statements (HMIS)(California Fire Code)

CUPAs are accountable for carrying out responsibilities previously handled by approximately 1,300 different state and local agencies.[3]

Inland Star is permitted by LA County Fire, as the CUPA, for the Hazardous Materials Disclosure Program and the Hazardous Waste Generator Program.[4]

B. Hazardous Materials Business Plan ("HMBP")

Among other things, Inland Star is required to prepare and submit to the Los Angeles County Fire Department, Health Hazardous Materials Division, a Hazardous Material Business Plan ("HMBP"), which provides basic information necessary for use by first responders in order to prevent or mitigate damage to public health and safety and/or to the environment from release of a hazardous material. Any business that handles a hazardous material and/or hazardous waste of quantities at any one time during a year equal to, or greater than a total volume of 55 gallons, a total weight of 500 pounds, or 200 cubic feet of a compressed gas is a hazardous materials handler and must report submit a HMBP, which consists of the following: Owner/Operator, Business Activities, Inventory, Site Map, and Emergency Response and Contingency Plan and Employee Training Plan information in the California Environmental Reporting System ("CERS").[5]

The primary purpose of CERS is to ensure that first responders have the information they need to safely respond to emergencies. Since 2009, all regulated businesses and all CUPAs are required to electronically report and submit required Unified Program information previously recorded on paper forms. This includes facility data regarding hazardous material regulatory activities, chemical inventories, underground and aboveground storage tanks, and hazardous waste generation. It also includes CUPA data such as inspections and enforcement actions. Electronic reports provide an easy and convenient reporting method that automatically notifies the CUPA of

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[3] https://calepa.ca.gov/cupa/about/

[4] Inland Star's Unified Permit also reflects a permit for the California Accidental Release Program (CalARP). However, this is a vestige from its previous submittal and approval for the CalARP program in 2015. Inland Star does not propose to store any CalARP regulated substances.

[5] Hazardous Material Business Plan FAQ http://www.caloes.ca.gov/FireRescueSite/Documents/HMBP%20FAQ%20-%20Feb2014.pdf

updates, and allows emergency responders to electronically access current hazardous materials inventories and after hours contact information.

Inland Star is required to submit the HMBP annually. Most recently, Inland Star's 2018 HMBP was approved by Los Angeles County Fire in October 2018. The HMBP includes an Emergency Action Plan which was developed to assist in determining appropriate response procedures and in accordance with Title 40 Code of Federal Regulations (CFR) Part 262, Title 29 CFR Section 1910.120 and 191.38 and the California Environmental Protection Agency (EPA). The Emergency Action Plan includes, among other things, procedures for internal and external notification, employee training and drills, and procedures for specific emergencies, including fires, accidental release and earthquakes. As noted in its Emergency Action Plan, Inland Star is a "non-responding facility," which means that in the event of an emergency Inland Star's primary action is the notification of outside response agencies (see Section I.D.1 below) which have the relevant expertise and are designated as first responders for emergencies involving hazardous materials.

C. CalARP Program

CUPA's are also responsible for administration and enforcement of the California Accidental Release Prevention (CalARP) program. "The main objective of the [CalARP] program is to prevent accidental releases of those substances determined to potentially pose the greatest risk of immediate harm to the public and the environment."[6] Inland Star's proposed use does not include the receipt or storage of any substances regulated by the CalARP program.

D. Response to Hazardous Materials Incidents

1. First Responders

The Health Hazardous Material Division ("HHMD") of LA County Fire provides 24-hour emergency services in response to hazardous materials spills or releases and abandonment that occur in areas of HHMD CUPA jurisdiction, which includes the City of Carson.

Any spill or unauthorized release of a hazardous material or hazardous waste that poses a threat to life, health (workers, residential, schools, parks, etc.), property or the environment must be reported immediately to the following agencies:

- The Local Emergency Response Agency (911 or the local fire department)
- Los Angeles County Fire Department's Health Hazardous Materials Division (HHMD) as the Certified Unified Program Agency (CUPA) (323) 890-4317 (business hours) / (323) 881-2455 (after hours);
- The California Emergency Management Agency, California State Warning Center (800) 852-7550; and if applicable

[6] Health Hazardous Material Division, Los Angeles County Certified Unified Program website https://www.fire.lacounty.gov/hhmd/cal-arp-program/.

- The National Response Center, if the release exceeds federal reportable quantities (800) 424-8802)

The HHMD and other agencies utilize a facility's Hazardous Materials Business Plan, which is submitted and reviewed on an annual basis, and is available electronically to the CUPA HHMD, to obtain necessary information regarding the substances stored at the site, evaluate the specific circumstances of the incident, and respond accordingly. Inland Star's HMBP is in place and has been accepted by the CUPA as meeting applicable requirements.

Emergency and disaster response is addressed at the agency level, and is an integral part of state law, implemented locally by the HHMD, which provides 24-hour emergency services in response to hazardous materials spills or releases or emergency incidents involving hazardous materials.

2. Area Plan

The CUPA is also responsible for the Area Plan, a program established in 1986 as a planning tool for local government agencies to respond to and minimize the impacts from a release or threatened release of a hazardous material. It requires the CUPA to create an Area Plan that:

- Identifies the hazardous materials which pose a threat to the community,
- Develops procedures and protocols for emergency response,
- Provides for notification and coordination of emergency response personnel,
- Provides for public safety including notification and evacuation,
- Establishes training for emergency response personnel,
- Identifies emergency response supplies and equipment, and
- Provides for the critique and follow-up after a major incident.

CUPAs use information collected from the Hazardous Materials Business Plan (HMBP) and California Accidental Release Prevention (CalARP) programs to identify hazardous materials in their communities. This information provides the basis for the Area Plan and is used to determine the appropriate level of emergency planning necessary to respond to a release.

The Area Plans must include provisions for multi-agency notification, coordination, and emergency response. These agencies may include law enforcement, fire services, medical and public health services, poison control centers, and care and shelter services.[7]

[7]http://www.caloes.ca.gov/for-governments-tribal/plan-prepare/hazardous-materials/area-planning

Thus, there is a comprehensive response system in place for emergencies. Inland Star's facility would not interfere with the performance of first responders but is in compliance with the HMBP and other requirements designed to facilitate timely and effective response by state and local agencies.

## II. Inland Star Facility and Operations

Inland Star receives, stores, and ships various Department of Transportation regulated and non-regulated packaged chemicals and industrial materials for third party manufacturers and distributors. All chemicals and industrial materials arrive at the Inland Star facility in packaging approved by the federal Department of Transportation ("DOT"), and remain in their original packaging while stored at the facility. Various package types (e.g. totes, drums, bags, boxes) of chemicals are transported to and from the facility via an open-air loading dock. Material is stored in pallet racking or floor stack configurations. Inland Star does not engage in the blending, mixing, or formulating of chemicals. It does not repackage any chemicals or materials, transfer materials from one container to another or open containers for any purpose.

Containers delivered to and stored at the facility are required to meet federal DOT durability requirements, which include surviving the types of severe trauma that might be encountered on a freeway or other high-speed thoroughfare. Among other things, DOT compliant containers must undergo a "drop-test" as required by 49 CFR 178.603. The drop-test requires that packing be tested to withstand drops from specified heights without leaking. The height specified for the drop-test based on the DOT Packing Group category (5.9 feet for Packing Group I, 3.9 feet for Packing Group II and 2.6 feet for Packing Group III). All chemicals arrive at the facility in the DOT compliant containers and remain in the DOT compliant containers at all times. Inland Star does not open, repackage or otherwise alter the containers, and does not transfer, mix or otherwise utilize the chemicals contained therein. Design and operating measures within the facility minimize the likelihood or extent of a chemical release as discussed further below.

### A. Building Design

The Inland Star facility was designed for the segregated storage of Group S-1, Group H-3 and Group H-4 occupancies in accordance with all applicable requirements of the 2013 Editions of the California Building Code, California Fire Code and the California Mechanical Code, and has received all required building and fire code permits for such uses. The approximately 188,495-square foot facility is comprised of a series of distinct, segregated storage areas, each with design and operational features specific to the class of chemicals or materials stored in each area. The four segregated areas in the facility are considered by the California Building Code to be four distinct stand-alone buildings.

The California Fire Code and City of Carson Fire Code include specific and detailed regulations for the storage of hazardous materials. For each class of product stored, these codes regulate, among other things, the manner of storage for hazardous materials, including the size of the storage area, the maximum storage height, maximum pile size, and minimum aisle separation, among others. Specific fire detection and suppression requirements are dictated by the type of product and manner of storage. In 2014 Inland Star performed substantial upgrades to meet all applicable requirements of the 2013 California Building Code, California Fire Code and

California Mechanical Code. Prior to occupancy by Inland Star, compliance with applicable code provisions was reviewed in detail with the Los Angeles County Fire Department, and compliance is evidenced by the County Fire Department's issuance on December 30, 2015 of permits for (1) the storage of hazardous materials; (2) the storage of flammable and combustible liquids; and (3) high-pile (combustible) storage (both hazardous and non-hazardous). Each of these permits currently remain in place. Final building permits were issued reflecting inspection and sign off by the Department of Building and Safety.

The existing building was constructed in 1989 in accordance with then-applicable building codes, and, in 2007, the property owner conducted a voluntary seismic upgrade consisting of new wall anchorage and continuity ties, which spread the load of seismic impact across a larger area. Fire-proof casings were applied to these systems in connection with Inland Star's improvements to the building in 2014. In addition, Inland Star performed a comprehensive renovation of the building in 2014 in order to equip it for hazardous materials storage, and all improvements were built in accordance with current building code requirements. For example, the new three (3) hour rated fire walls constructed to create the four separate buildings within the facility meet the current earthquake bracing requirements of the California Building Code, and the fire suppressions systems comply with all applicable codes, which include requirements such as seismic bracing for the sprinkler system. In addition, Inland Star's product is stored in racking systems which Inland Star installed in 2014 in accordance with all applicable building codes. The racking systems meet current seismic requirements, as demonstrated in the December 1, 2014 report by Structural Concepts Engineering, a copy of which was submitted to and reviewed by both the Building and Safety Department and Los Angeles County Fire (as CUPA). The racking systems received all required building permit approvals, which included inspection and sign off by or on behalf of the City of Carson.

B. Fire Suppression Systems

The facility is designed with customized fire suppression systems that include the following features:

- Each of the facility's four segregated areas have a distinct fire suppression system specific to the types of materials stored in that area. Each area is a separate fire area/building with containment dikes and doors designed to drop in the event of fire to contain and prevent the spread of a fire from one area to another.
- Group H-3 areas are protected with a foam-water sprinkler system, and Group H-4 areas are protected with Early-Suppression Fast-Response (ESFR) sprinkler systems
- Racking in Group H-3 areas are equipped with in-rack sprinklers providing protection at each of the five storage levels.
- Each area is separated from the other by three (3) hour rated fire walls and are constructed in accordance with CBC Section 706, which regulates the design and construction of fire walls.
- All wall openings for employee and product passage are provided with automatic-closing Underwriters Laboratories Listed fire doors in accordance with CBC Section 716, which regulates the design and construction of opening protectives.

- Other safety measures include a 2,500 gallons per minute (gpm) firewater booster pump, a second water service line to provide a redundant water service to the facility in the event the main service line and/or the supplemental water pressure pump fails, and fire suppression/extinguishing sprinkler systems throughout the building.
- The fire protection schemes meet the applicable requirements of the 2015 Edition of the National Fire Protection Association (NFPA) Standard 30 (Flammable and Combustible Liquids Code).
- Sprinkler systems are designed to suppress a fire with minimal manual fire-fighting involvement from public fire-fighters
- The fire suppression systems are integrated to on-site and off-site alarm systems and are tested and inspected regularly. If the fire suppression system is triggered Inland Star's off-site alarm system automatically and directly alerts the Los Angeles County Fire Department as first responder.

C. Operating Plans and Procedures

In addition to the HMBP and Emergency Action Plan referenced above, Inland Star complies with OSHA Standards, which are maintained via sections 1910.106, 1910.120, Hazardous Materials Waste Operations and Emergency Response; and 1910.1200 – Hazard Communication.

Inland Star also has existing procedures for responding to potential accidental releases. Inland Star's standard operating procedures include a step-by-step leak response procedure as follows:

- Evacuate the area and alert lead personnel of the release (communicate with 2-way radio for immediate response time)

- Lead personnel obtains the Safety Data Sheet for the releasing material in order to identify relevant information

- Lead personnel respond to the area and contain leak as needed. This includes positioning the releasing drum, pail, Jerrican, etc. in such a manner so that the release is stopped or minimized (e.g., rolling and stabilizing the drum so that the puncture is positioned up), and simultaneously using absorbent materials such as litter, pads or pig tails in order to prevent the material from spreading.

- If appropriate the cracked or punctured area is sealed or patched with a material known as "Pig Putty" (a two part multi-purpose epoxy that bonds to any surface and cures within seconds once mixed)

- Once the area of leak has been sealed/patched the package and any used absorbent material are placed in an over-pack container

- The damaged material is then disposed of or transferred as directed by the customer

These procedures minimize the amount of chemical released in case of an accident and minimize the fraction of spilled material that would be emitted into the air. These procedures, along with the use of appropriate personal protective equipment, are part of the employee safety training program and are reinforced routinely through weekly safety meetings.

Inland Star implements standards set by the American Chemistry Council's Responsible Care Management System process, the Chemical Process Safety Institute of Chemical Engineers, and the National Association of Chemical Distributors for Responsible Distribution. Inland Star was the first – and for many years the only – 3PL warehousing company to be American Chemistry Council (ACC) Responsible Care Management System (RCMS) certified.

## III. Accidental Release Assessment

Responding to the City's request to prepare a risk assessment to evaluate activities at the Inland Star facility, Inland Star retained GSI Environmental ("GSI"), a recognized human health risk assessment leader. GSI worked with Inland Star to design and perform modeling protocols to respond to the City's concerns. A summary of the risk assessment modeling is provided below; the technical risk assessment report is attached hereto as **Appendix A**.

### A. Methodology

#### 1. Chemicals Evaluated

As requested by the City, GSI began by identifying the five chemicals in Inland Star's inventory having the highest likelihood of causing adverse effects to offsite populations following a hypothetical accidental release. GSI reviewed 393 chemicals/products actually or potentially[8] stored at the facility. Two classes of chemicals at the facility were identified for evaluation, and five chemicals from each class were chosen (toxics and flammable/combustibles). The chemicals listed below were selected based on the size of the potential release, volatility of the chemical/product, and the acute toxicity of the product/chemical.

***Toxic Class Chemicals Chosen for Modeling:***

1. 810 Metal Stripper 20 (a mixture of 70% sodium cyanide and 30% sodium hydroxide) (NaCN CAS# 143-33-8, NaOH CAS# 1310-73-2)[9]
2. N, N-dimethylaniline (CAS# 121-69-7)
3. Methylene Chloride (synonym – Dichloromethane) (CAS# 75-09-2)
4. Perchloroethylene (CAS# 127-18-4)
5. Methyl Amyl Ketone (synonym - Amyl Methyl Ketone) (CAS# 110-43-0)

***Flammable Class Chemicals Chosen for Modeling:***

1. Anhydrous Acetonitrile (synonym- Acetonitrile) (CAS# 75-05-8)
2. Methyl Acetate (CAS# 79-20-9)

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[8] In an effort to ensure a comprehensive data set, Inland Star's "inventory" includes items that may not be present on site at all times, or that may at times be present in lower quantities than stated on the inventory.

[9] This was not modeled because it turned out to exist in a solid, pelletized form with no potential to evaporate and migrate offsite if spilled.

3. Tetrahydrofuran (CAS# 109-99-9)
4. Trans-1,2-Dichloroethylene (synonym - 1,2-Dichloroethylene, trans isomers) (CAS# 156-60-5)
5. Methyl Alcohol (synonym Methanol) (CAS# 67-56-1)

2. Sensitive Receptors

GSI used the following five sensitive receptor locations identified by the City of Carson for the evaluation.

Table 1: List of City identified receptor locations

| Receptor Locations | | Distance from Loading Dock (ft) |
|---|---|---|
| R1 | Houses West of Wilmington Avenue | 2082 |
| R2 | Houses East of Alameda St | 2518 |
| R3 | Dolphin Park | 2664 |
| R4 | Del Amo Elementary School | 2388 |
| R5* | City of Carson Corporate Yard[10] | 2033 |

*This was the site nearest to the source; it was used as the primary exposure-risk receptor location

3. Model Overview

GSI modeled hypothetical accidental release scenarios using the Areal Locations of Hazardous Atmospheres (ALOHA™) model. ALOHA estimates the downwind concentration of chemicals released into the environment under common scenarios such as leaks, spills, punctures, etc. These estimates are then compared to a database of health protective standards. ALOHA has a very conservative modeling approach providing a close upper bound risk estimate. The model will err in favor of overestimating rather than underestimating threat distances, as reported in the technical documentation (Jones et al, 2013).

4. Modeling Assumptions

To guide the exposure-risk modeling, GSI employed guidance recommendations from CalARP for modeling "worst-case" scenarios. It should be noted, however, that the Inland Star facility does not use or store any chemicals regulated under CalARP, and thus the modeling conservatively utilized guidance intended for chemicals in a higher risk category than those modeled. Details of these assumptions are presented in the technical report (Appendix A:Table 1). They include parameters outlining meteorological conditions, model type and spill/release characteristics.

[10] The City's Corporate Yard (Receptor 5) house staff from the departments of Public Works and Parks and Recreation, although approximately 80% of these staff members are in the field for the majority of the day. The Corporate Yard is also used for parking and fueling City buses, and as a staging area for setup and tear down for park events.

5. Health-Based Concentration Limits

Modeled air concentrations were compared to Protective Action Criteria (PAC) developed by a variety of government agencies. The criteria include: Acute Exposure Guideline Levels (AEGLs), Emergency Response Planning Guidelines (ERPGs), and Temporary Emergency Exposure Limits (TEELs). Each of the PACs are effectively defined the same across all of the different PACs for a given severity of health effect, over an exposure period. They are defined as follows:

- **AEGL/ERPG/TEEL-1**: is a concentration of a substance above which the general population, if exposed for more than one hour, could experience notable discomfort, irritation, or certain asymptomatic, nonsensory effects. However, these symptoms are not disabling and are transient and reversible upon cessation of exposure.
- **AEGL/ERPG/TEEL-2**: is a concentration of a substance above which the general population, if exposed for more than one hour, could experience irreversible, long-lasting, adverse health effects or an impaired ability to escape.
- **AEGL/ERPG/TEEL-3**: is a concentration of a substance above which, if exposed for more than one hour, it is predicted that the general population could experience life-threatening adverse health effects or death.

B. Accidental Release Scenarios

For purposes of the human health risk assessment, consideration was given to three accidental release scenarios. The three hypothetical release scenarios of stored materials include evaluation of a release associated with a forklift puncture at the loading dock, containers falling off a forklift at the loading dock, and release associated with a roof collapse due to a major seismic event. These hypothetical release scenarios are summarized below; details of these scenarios are discussed in Appendix A.

1. Modeling Scenarios

Inland Star identified a forklift puncture at the loading dock as a reasonable “worst case” scenario for purposes of evaluating the extent of an inadvertent release. A puncture at the loading dock would cause a greater release to the environment than one in the building where the release would be partially or completely contained within the building. The City requested an evaluation of a scenario involving a release due to multiple drums falling from a forklift at the loading dock and spilling outside the building. All substances received and stored by Inland Star arrive and remain in DOT-approved containers, which are required to undergo testing to ensure that a fall from a distance typical of loading dock conditions would not leak.[11] As such, a fall off of a forklift would not be expected to result in a release from the container. The City also asked Inland Star to evaluate an accidental release in the event of collapse of the building’s wooden roof due to a major seismic event, such as a magnitude 7 earthquake. It is unlikely that the roof or other structural elements of the building would collapse in the event of an earthquake, given the building design, seismic upgrades, and other improvements (e.g., reinforced storage

[11] Inland Star’s loading dock is approximately 3.9 feet from the ground.

shelving structures). The DOT-approved packaging of individual containers would further mitigate the likelihood or size of any release.

2. Combined Modeling Results

These three scenarios were modeled under two release conditions. First, the forklift puncture was modeled as a leaking rectangular hole near the bottom of the container. Second, the earthquake scenario was modeled as a near instantaneous release of one full container of a given chemical. Concentration estimates were modeled at the nearest receptor location to the Inland Star Distribution facility (the Carson City Corporate Yard, 2033 feet away from the dock). Both models assumed that the release occurred outdoors without any obstructions that may attenuate potential exposures. Table 2 summarizes results of the modeling for both release conditions (forklift puncture and instantaneous full container release) which show that none of the PAC standards were exceeded at the nearest receptor, and hence would not be expected to be exceed at receptors further away.

**Table 2**: Summary of Protective Action Criteria (PAC) exceedance for puncture and full container release scenarios, against 60-minute PAC standards. Did modeled estimates exceed any of the PAC standards (yes or no [which one, which scenario])?

| | Sensitive Receptor Locations | | | | |
|---|---|---|---|---|---|
| **Chemical** | **R1*** | **R2*** | **R3*** | **R4*** | **R5** |
| Acetonitrile | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| N,N-Dimethylalanine | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Methylene Chloride | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Perchloroethylene | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Methyl Amyl Ketone | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| 1,2-Dichloroethylene | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Methyl Acetate | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Tetrahydrofuran | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |
| Methanol | No [--,--] | No [--,--] | No [--,--] | No [--,--] | No [--,--] |

*non-exceedance at these receptors is implied by a result of non-exceedance at the nearest receptor, R5 (City of Carson Corporate Yard)

Conclusion

The Inland Star facility is designed to avoid and minimize risk of an accidental release or fire, including as a result of seismic activity. The Inland Star facility complies with all applicable building and fire code requirements for the specific occupancy categories that correspond to its inventory, completed a voluntary seismic upgrade in 2007, and utilizes racking systems installed in 2014 in full compliance with applicable building and fire code requirements. All hazardous substances are stored at all times in federal DOT-approved packaging, which is designed and tested for resiliency. The buildings are designed to minimize risk from fire, including without limitation through the construction of four buildings within the facility separated by three (3) hour rated fire walls in accordance with the California Building Code. Inland Star's fire suppression system is custom designed for each of the occupancy areas, meets all applicable code requirements and has been approved by the Los Angeles County Fire Department. Inland Star is in full compliance with all applicable laws regulating hazardous materials, has all required hazardous materials permits, and has a current HMBP and Emergency Action Plan to assist the CUPA and other first responders. Inland Star has standard operating procedures that are designed to avoid releases and respond immediately to minimize any leaks or spills.

The modeling performed by GSI indicates that the types of releases that are reasonably foreseeable would not result in impacts to the identified sensitive receptors, and further indicates that an instantaneous release of a full container of the most potentially harmful substances (which is not reasonably foreseeable under expected circumstances) also would not result in adverse impacts. Because no significant health risks are identified as a result of modeling using the conservative methodology and assumptions described above, one can be confident that releases of other chemicals stored at the facility similarly would not result in adverse effects.

Accordingly, for all the reasons discussed above, the Inland Star facility would not pose a significant risk of harm.

# REPORT

**TO:** Michael O'Donnell, President & CEO, Inland Star Distribution Centers

**FROM**: Robert Scofield and Bernard Beckerman

**RE**: Report of ALOHA modeling results

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## INTRODUCTION

This technical report has been prepared in response to the City of Carson's (the City) request to prepare a risk assessment to assist in evaluating Inland Star's proposed chemical warehouse use. GSI worked with Inland Star to design appropriate modeling protocols to respond to the City's concerns and performed the modeling as discussed below. This report addresses the potential release of identified chemicals under three potential release scenarios at the Inland Star Distribution facility. The release of chemicals was evaluated against five sensitive receptor locations that were identified by the City.

## METHODOLOGY

### Chemicals Evaluated

As requested by the City, GSI began by identifying the five chemicals in Inland Star's inventory having the highest likelihood of causing adverse effects to offsite populations following a hypothetical accidental release. The idea behind this approach was that if none of the selected chemicals posed a health risk to offsite receptors, it would not be necessary to perform chemical-specific evaluation of additional chemicals. The reasoning behind the selection process and the results of the selection process were described in a report provided to the City on October 31 2017, and the selection was approved by the City.

As described in the October 31, 2017 report to the City, the first step of the chemical selection process entailed placing the 393 chemicals/products actually or potentially[1] stored at the Facility into seven Department of Transportation (DOT) chemical hazard classes, including explosive, flammable, combustible, oxidizing, toxic, radioactive, and corrosive. The Facility does not handle any explosive or radioactive materials and the chemicals in the oxidizer, and corrosive categories were solids, which would not create an offsite exposure if accidentally released at the Facility. Combustible and flammable materials were combined in a single category for purposes of the chemical selection process, leaving the two hazard categories; flammable and toxic.

Although the chemical selection process was originally envisioned to select five chemicals from the overall inventory for further evaluation, a decision was made during the evaluation to select five chemicals from both the toxic and flammable groups of chemicals. The chemicals listed below were selected based on consideration of a) the size of the potential release b) volatility of the chemical/product; and c) the acute toxicity of the product/chemical.

[1] In an effort to ensure a comprehensive data set, Inland Star's "inventory" includes items that may not be present on site at all times, or that may at times be present in lower quantities than stated on the inventory.

GSI ENVIRONMENTAL

Toxic Class Chemicals Chosen for Modeling:

1. 810 Metal Stripper 20 (a mixture of 70% sodium cyanide and 30% sodium hydroxide) (NaCN CAS# 143-33-8, NaOH CAS# 1310-73-2)
2. N, N-dimethylaniline (CAS# 121-69-7)
3. Methylene Chloride (synonym – Dichloromethane) (CAS# 75-09-2)
4. Perchloroethylene (CAS# 127-18-4)
5. Methyl Amyl Ketone (synonym - Amyl Methyl Ketone) (CAS# 110-43-0)

Flammable Class Chemicals Chosen for Modeling:

1. Anhydrous Acetonitrile (synonym- Acetonitrile) (CAS# 75-05-8)
2. Methyl Acetate (CAS# 79-20-9)
3. Tetrahydrofuran (CAS# 109-99-9)
4. Trans-1,2-Dichloroethylene (synonym - 1,2-Dichloroethylene, trans isomers) (CAS# 156-60-5)
5. Methyl Alcohol (synonym Methanol) (CAS# 67-56-1)

One of the five “Toxic” class of chemicals—810 Metal Stripper 20—was ultimately not modeled because it turned out to exist in a solid, pelletized form with no potential to evaporate and migrate offsite if spilled.

**Sensitive Receptors**

GSI utilized the following five sensitive receptor locations identified by the City for evaluation (Table 1).

**Table 1: List of City identified receptor locations**

| **Receptor Locations** | | **Distance from Loading Dock (ft.)** |
|---|---|---|
| R1 | City of Carson Corporate Yard | 2033 |
| R2 | Houses West of Wilmington Avenue | 2082 |
| R3 | Del Amo Elementary School | 2388 |
| R4 | Houses East of Alameda St | 2518 |
| R5 | Dolphin Park | 2664 |

The City’s Corporate Yard (Receptor 1 or R1)[2] houses staff from the departments of Public Works and Parks and Recreation, although approximately 80% of these staff members are in the field for the majority of the day. The Corporate Yard is also used for parking and fueling City buses, and as a staging area for setup and tear down for park events. This is the closest receptor and all evaluations were first assessed at a distance to this receptor (2033 feet). Risks associated with receptors further away (>2033 feet) will be lower because they will experience lower peak exposure concentrations for shorter durations. As all of the modeling was assumed to take place

[2] Receptor locations will be referred to in the report as R1, R2, R3, R4 and R5 coinciding with names receptor locations listed in Table 1.

in a "open urban field" without specific obstruction, if any of the modeling indicated that elevated risks were present at 2033 feet away from the source, additional modeling would need to be conducted to evaluate risk at receptors further away.

## THE ALOHA MODEL

GSI modeled accidental release scenarios and associated risks using the Areal Locations of Hazardous Atmospheres (ALOHA™) model. ALOHA is the air hazard modeling program developed jointly by the National Oceanic and Atmospheric Administration (NOAA) and the United States Environmental Protection Agency (USEPA). The modeling software contains a database of chemicals, their properties, and many of the health-related Protective Action Criteria (PAC) that are commonly used to assess potential risks associated with specific chemical exposures. ALOHA produces simulations of how quickly chemicals escape from a vessel, puddle, or pipeline and form a gas cloud, and how the release rates change over time. It then models how a gas cloud travels downwind—including both neutrally buoyant and heavy gas dispersion. The model will identify where a particular substance is predicted to exceed a user-specified threshold level at various times following the occurrence of an accidental release and model the concentration—over time—at a user specified location.

The ALOHA model provides a conservative/health-protective estimate of potential exposure based on an input spill scenario. The technical documentation for the modeling software states, "ALOHA is designed to provide a close upper bound to the threat distances associated with chemical spills. Where uncertainty is unavoidable, ALOHA will err in favor of overestimating rather than underestimating threat distances. In some cases, ALOHA will significantly overestimate threat zones." (Jones et al, 2013).

### Model Assumptions

The ALOHA model requests a number of inputs that include city/location, date-time of release, chemical released, atmospheric conditions, and type of source. The city/location parameter helps to define the amount of solar radiation that is expected during a specific date-time of year. Here, Los Angeles, CA was used as it is the nearest city in the ALOHA database to Carson, CA. The differences between solar irradiance in Los Angeles versus Carson are negligible. These parameters help to inform the atmospheric conditions, which include wind-speed, wind-direction, ground roughness, cloud cover, ambient temperature, stability class, inversion height, and relative humidity. Within the model, many of the parameters are used internally to calculate default atmospheric parameters. Overall, the main parameters that affect the dispersion of a release are ground roughness, ambient temperature, stability class, and wind speed. While ALOHA can calculate many of these parameters based on some basic input, the model allows users to override default parameters to model specific or atypical scenarios.

California Code of Regulations Title 19, Sections 2750.1-2750.3 define scenarios for modeling the release of chemicals that are regulated under CalARP. GSI reviewed these regulations to assist in the risk assessment modeling. It should be noted that the Inland Star Facility does not contain any chemicals regulated by CalARP, but GSI has used these regulations in order to conservatively estimate releases under what these regulations refer to as a "worst-case scenario." GSI has provided the parameters specified by CalARP as guidance, which were used here (Table 2), so others can reproduce the reported exposure modeling.

**Table 2: Modeling parameters for ALOHA**

| Parameter | Regulation Guidance | Value |
|---|---|---|
| Wind Speed | Directly specified | 1.5 m/s |
| Stability Class | Directly specified | F |
| Ambient Temperature | Highest daily maximum temperature, based on data for the previous three years appropriate for the stationary source (Note: instead used 5 years of met data Jan. 2012 – Dec. 2016). The daily maximum is 105 degrees F, but this is above the boiling temperature of dichloromethane. The temperature used for modeling was reduced to 100 degrees F, which ultimately creates a more conservative estimate due to the dispersion of a mist cloud vs dispersion of an evaporating puddle. | 105 degrees F |
| Relative Humidity | Average humidity, based on data for the previous three years appropriate for the stationary source (Note: instead used 5 years of met data Jan. 2012 – Dec. 2016) | 63% |
| Height of release | Directly specified | 0 feet (ground level) |
| Surface Roughness | Use either urban or rural topography, as appropriate | Urban = 1 meter |
| Dense/neutrally buoyant gas | Use appropriate model | ALOHA assigned by default, based on chemical |
| Temperature of substance | Highest daily maximum temperature, based on data for the previous three years appropriate for the stationary source (Note: instead used 5 years of met data Jan. 2012 – Dec. 2016) | 105 degrees F<br>(Note: Dichloromethane Boiling Point is 102.8 F. As a boiling fluid will not form a puddle in ALOHA, the temperature of the fluid was set to 100 F) |
| Spill type for worst-case scenario | Directly specified (ALOHA may ask for average depth; as implemented) | Instantaneous puddle of 1 cm depth |
| Puddle depth | Directly specified | 1 cm |
| Volume of puddle | Conversion | 85 gal = 321760 $cm^3$<br>55 gal = 208198 $cm^3$<br>2 gal = 7570 $cm^3$ |
| Area of puddle<br>(maximum area under any scenario as implied by CalARP definitions for worst-case scenario) | Calculated | 85 gal = 32.176 $m^2$<br>55 gal = 20.820 $m^2$<br>2 gal = 0.757 $m^2$ |

| Parameter | Regulation Guidance | Value |
|---|---|---|
| Size of container | Not specified (Note: Used standard sizes) | 85 gal = 3.1’ (H) x 2.16’ (D)<br>55 gal = 2.9’ (H) x 1.8’ (D) |

GSI modeled the location of the spill as happening outside on the loading dock. This area provided the least obstruction to dispersion of the chemical. The impact of spills happening inside of the facility would be attenuated by the walls, roof, or any other overlying debris or materials. These factors would suggest that an outdoor spill scenario would produce the most conservative/health-protective estimate of potential risk, when compared to an indoor spill.

The meteorology of the site (e.g., wind speed, direction, temperature, humidity, etc.) was characterized by a standard meteorology dataset developed by the South Coast Air Quality Management District for this kind of modeling (SCAQMD, 2018). Wind data was used from the Long Beach Airport, which is the closest location where this kind of meteorological data is available. Figure 1 illustrates general wind patterns (windspeed and direction) over the time period Jan. 2012 through Dec. 2016. In contrast to the windspeed specified by CalARP regulation 19 CCR § 2750.2 of 1.5 m/s, winds of this speed or slower occur 27.5% of the time. While higher windspeeds allow higher concentrations to travel further, they are more transient, unlike slower wind conditions which allow a chemical to remain resident at a location for longer.

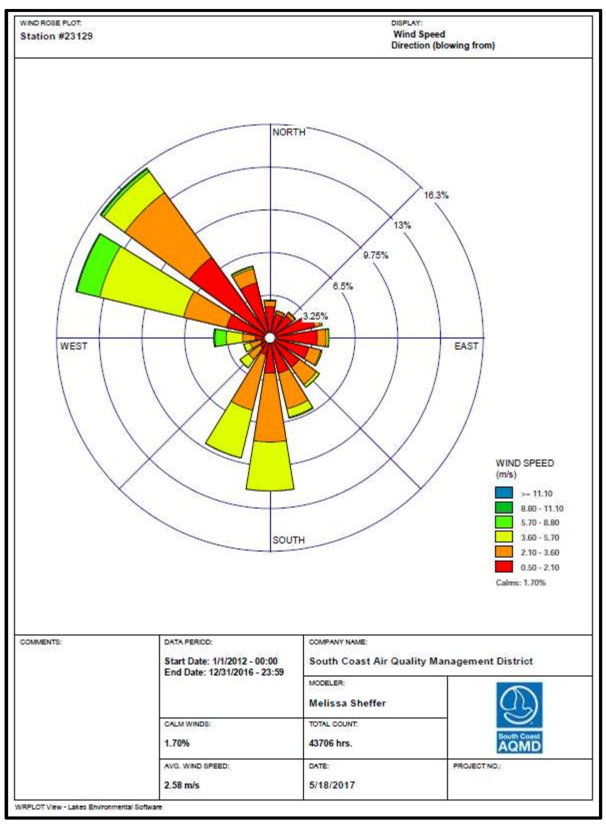


Figure 1: Wind speed and data from Long Beach Airport Jan. 2012 thought Dec. 2016.

## Risk Criteria

Modeling outputs were evaluated against Protective Action Criteria (PAC), which include: Acute Exposure Guideline Levels (AEGLs), Emergency Response Planning Guidelines (ERPGs), and Temporary Emergency Exposure Limits (TEELs). AEGLs are defined for exposure periods that range from 10 minutes to 8 hours. ERPGs and TEELs are only defined for one-hour exposures. PACs are exposure guidelines—not legally enforceable limits. They are meant to assist emergency planners and responders in dealing with chemical releases. They were designed to include conservative assumptions that would provide health protection even to particularly vulnerable receptors such as the elderly, children, and other individuals who may be especially susceptible. Each of the PACs have graded severity levels (-1, -2, and -3) based on exposure concentration thresholds maintained over a specified period of time. Definitions across each severity levels are fundamentally the same for each of the three PAC's, and are defined as follows:

- **AEGL/ERPG/TEEL-1**: is a concentration of a substance above which the general population, if exposed for more than a predefined time period, could experience notable discomfort, irritation, or certain asymptomatic, non-sensory effects. However, these symptoms are not disabling and are transient and reversible upon cessation of exposure.
- **AEGL/ERPG/TEEL-2**: is a concentration of a substance above which the general population, if exposed for more than one hour, could experience irreversible, long-lasting, adverse health effects or an impaired ability to escape.
- **AEGL/ERPG/TEEL-3**: is a concentration of a substance above which, if exposed for more than one hour, it is predicted that the general population could experience life-threatening adverse health effects or death.

## Modeling Scenario: Forklift Puncture

Inland Star identified a forklift puncture at the loading dock as a reasonable "worst case" scenario for purposes of evaluating the extent of an inadvertent release. In selecting this scenario for evaluation, Inland Star considered events that could be reasonably foreseeable given the nature of its operations. Because Inland Star is a warehouse operation that stores substances in their existing containers and does not open containers or utilize their contents, most activity involving containers would occur at the loading dock. However, while it is possible that containers could be dropped or fall during the transfer process, the nature of the containers themselves makes it unlikely that such activity would result in a release. All substances stored at Inland Star arrive in DOT-compliant transportation containers, which are required to be designed and tested to withstand certain circumstances that may occur during transportation. Among other things, DOT-compliant containers must undergo a "Drop-test" as required by 49 CFR 178.603. The Drop-test requires that packing be tested to withstand drops from specified heights without leaking. The height specified for the Drop-test is determined based on the DOT Packing Group category. The DOT-compliant containers afford such a high level of protection against spills from dropped containers that release is unlikely to occur as the result of a fall or collision at the loading dock. A more likely accidental release scenario would be a puncture of a container (e.g., a drum) by a forklift during the course of loading or unloading a truck. Accordingly, GSI has modeled the release associated with a forklift puncture at the loading dock for each of the chemicals analyzed.

Inland Star's standard operating procedures include a step-by-step leak response procedure, and thus, in the event of a forklift puncture, Inland Star's release response procedures would significantly limit the rate and duration of a release. Nevertheless, GSI adopted a conservative approach and did not assume the full benefit of these response procedures, thereby assuming a larger release than would realistically be expected. GSI assumed that a single fork of a forklift created a 1-inch by 4-inch hole in the side of a drum, resulting in contents spilling out on the ground creating a spreading/evaporating puddle. The puncture occurs at a distance of 5% from the bottom of the container (55 or 85-gallon drum). Note that methanol is stored in a two-gallon container. A forklift puncture of a container this size would result in a near instantaneous release of the chemical. The release of methanol is only modeled as an instantaneous puddle release, which models the release of the entire volume as a puddle with an average depth of 1 cm. Modeled estimates were evaluated against 60-minute guidelines as the releases of chemicals from the drum puncture would create a constant source over a 60-minute period. Concentration estimates were modeled first at a distance based on the distance between the nearest receptor location and the loading dock at the Inland Star Distribution facility (2033 feet).

Table 3 reports the PAC guideline values[3] used for each of the chemicals in the release scenarios; it also reports the maximum volume of individual containers used to store the chemicals.

**Table 3: 60-minute PAC criteria values used for risk assessment of release scenarios**

| Chemical | Container Size (gal) | PAC-1 (ppm) | PAC-2 (ppm) | PAC-3 (ppm) |
|---|---|---|---|---|
| N,N-Dimethylaniline | 55 | 10 | 330 | 2000 |
| Dichloromethane | 55 | 200 | 560 | 6900 |
| Perchloroethylene | 55 | 35 | 230 | 1200 |
| Methyl Amyl Ketone | 55 | 150 | 670 | 4000 |
| Acetonitrile | 85 | 13 | 50 | 150 |
| Methyl Acetate | 55 | 280 | 1000 | 1700 |
| Tetrahydrofuran | 55 | 250 | 1700 | 10000 |
| Trans-1,2-Dichloroethylene | 55 | 100 | 500 | 5000 |
| Methanol | 2 | 530 | 2100 | 7200 |

Figures 2 through 13 report time dependent concentration curves for a receptor directly downwind of a forklift puncture source under conditions suggested by CalARP as a worst-case scenario

[3] The PAC values for acetonitrile is an AEGL. AEGLs are defined for 10- and 30-minute exposure windows in addition to 1-, 4- and 8- hour periods. The EPA recommends that when using AEGLs you consult the support documentation to determine if a particular AEGL applies to a situation (EPA, 2018). The technical support documentation reports that the AEGL-1 was developed from a study exposing volunteers to acetonitrile for four hours at a concentration of 40 ppm (NRC, 2014; Pozzani et al., 1959). One of the volunteers experienced slight tightness in the chest that night, and a cooling sensation in the lungs the following day, which resolved within 24 hours. Two subjects that did not report symptoms were then exposed for four hours to a concentration of 80 ppm; no symptoms were reported. Because no symptoms were reported in the two of the subjects exposed to 80 ppm, the mild effects seen in the one subject at 40 ppm were considered to have occurred in a sensitive subject. From this result, a modifying factor of three was applied to the concentration of 40 ppm because of the small size of the study; this resulted in a derived 4-hour AEGL-1 value of 13 ppm. The 4-hour AEGL-1 value was then held constant across the shorter duration levels (10-, 30-, and 60-minute) because no human data exist for periods less than 4-hours. However, it would logically follow from the study results and the derived 4-hour AEGL-1, which was based on human data, that an exposure that exceeded 13 ppm (but below the AEGL-2) for up to 4-hours would not be expected to result in an adverse health effect. For this reason, the 10-, 30- and 60-minute AEGL-1 values are tacitly overly conservative, and unlikely to provide additional protection over a 4-hour time period. While the research suggests that less than 4-hour exposure in excess of 13ppm (but below the AEGL-2) is sufficiently health protective, for the ease of interpretation and for an additional layer of health protection, the 60-minute AEGL-1 for acetonitrile is used as the reference standard when evaluating the release scenarios.

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(See Table 1) using a leaking drum with a 1-inch by 4-inch hole near the bottom of the drum instead of an instantaneous release. The figures may also report the three PAC criteria values as colored threshold lines for the chemicals (if reasonable, as dictated by their magnitude compared to modeled estimates). For a given chemical, results are reported for receptor distances until a modeled result indicates that ambient concentrations do not exceed the PAC guidelines' threshold concentration. In the case of Dichloromethane, the temperature of the chemical was reduced to 100 degrees F, as 105 degrees F is above its boiling point and the ALOHA model was unable to model the release as a leak into a puddle. Had GSI allowed the temperature of Dichloromethane to remain at 105F, the release would have been interpreted by ALOHA as a mist pool; this would have produced lower modeled concentration estimates than a standard puddle. By doing this, GSI introduced additional conservative assumptions into the model estimates.

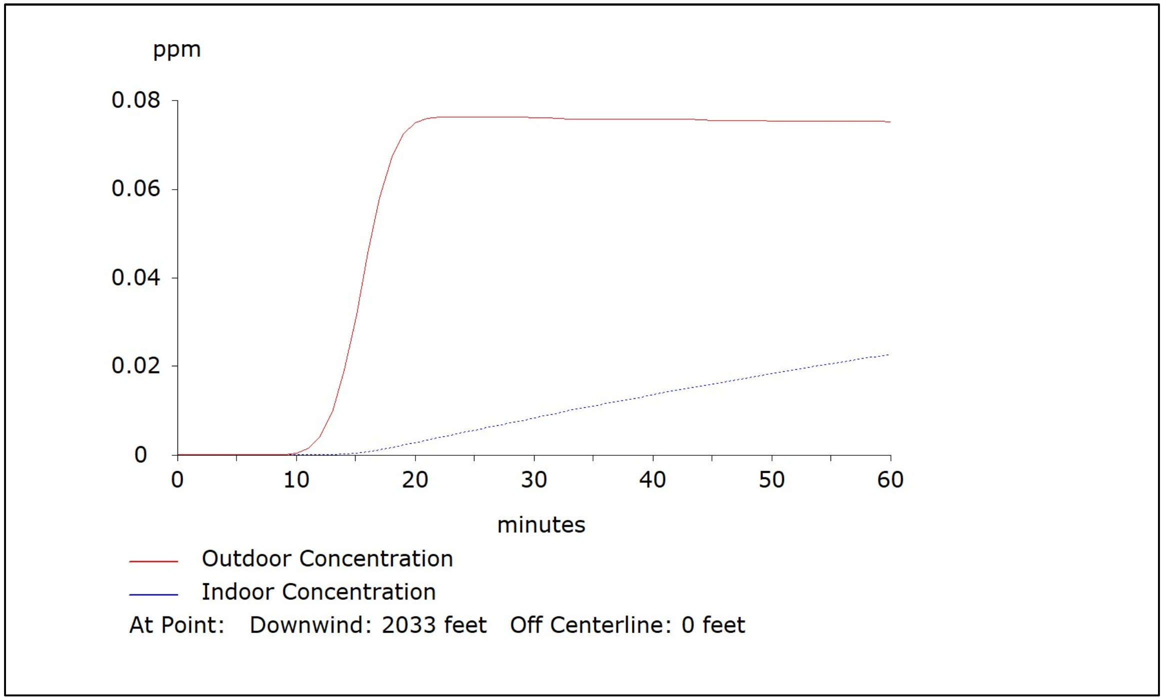


Figure 2: Model estimates for N,N-Dimethylaniline for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

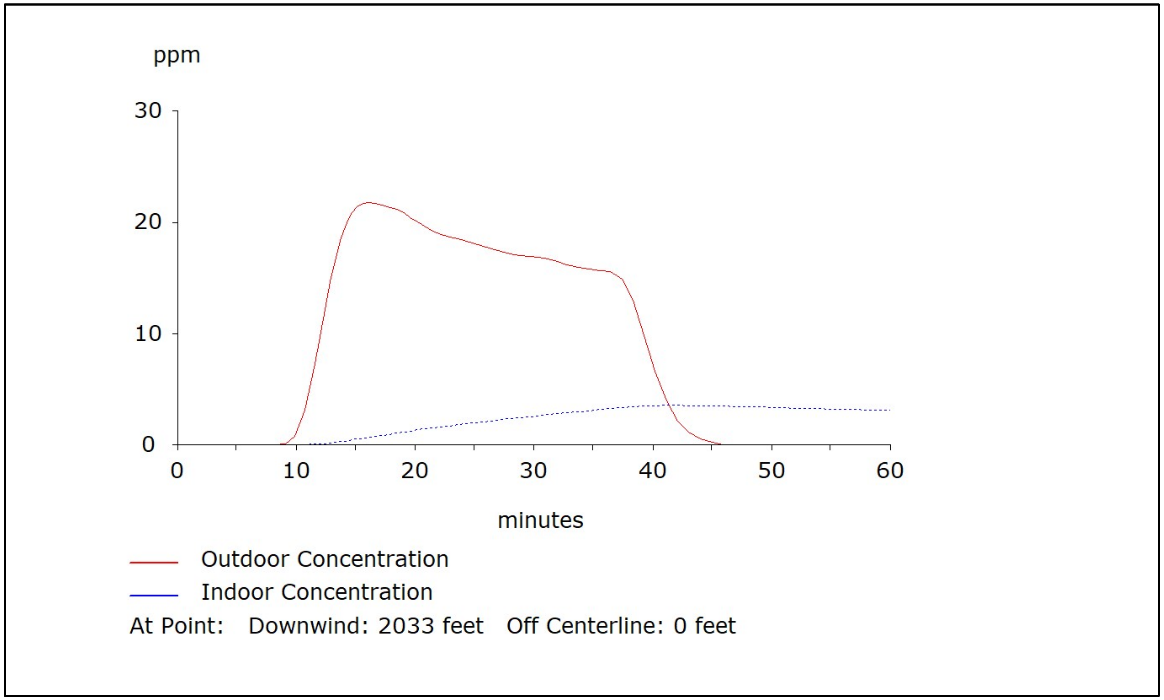


Figure 3: Model estimates for Dichloromethane for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

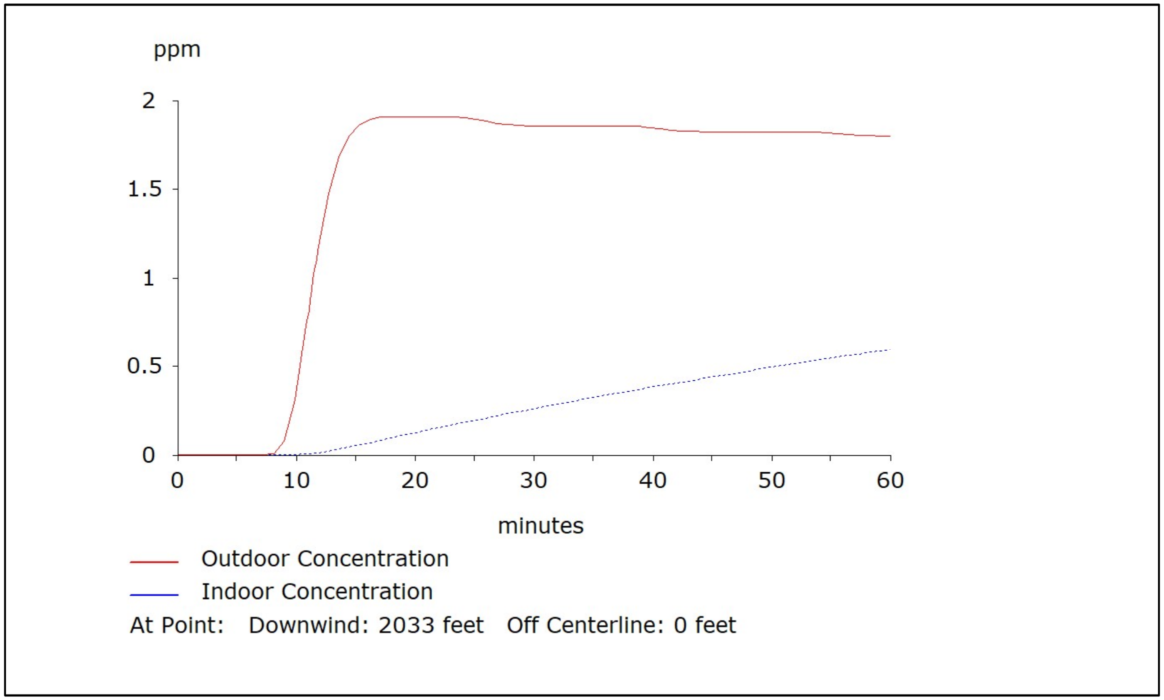


Figure 4: Model estimates for Perchloroethylene for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

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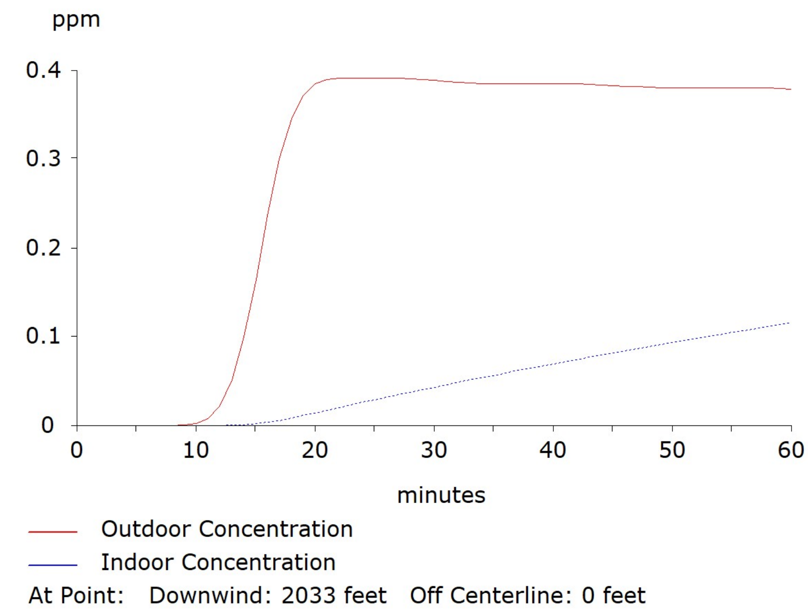


Figure 5: Model estimates for Methyl Amyl Ketone for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

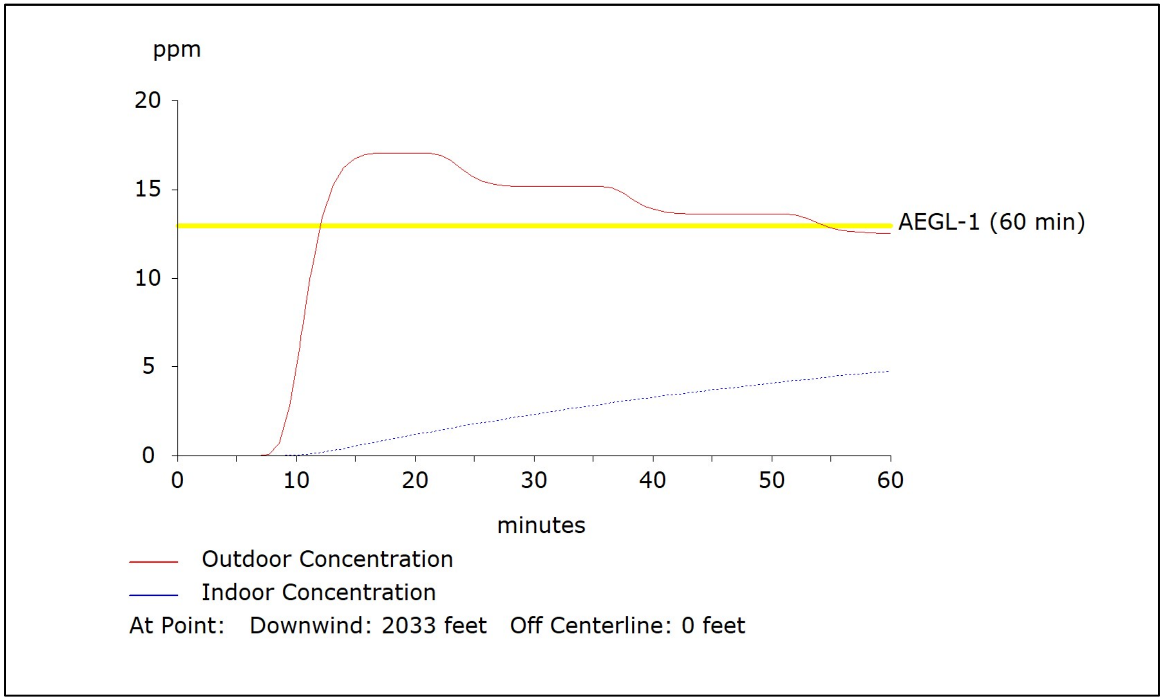


Figure 6: Model estimates for Acetonitrile for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

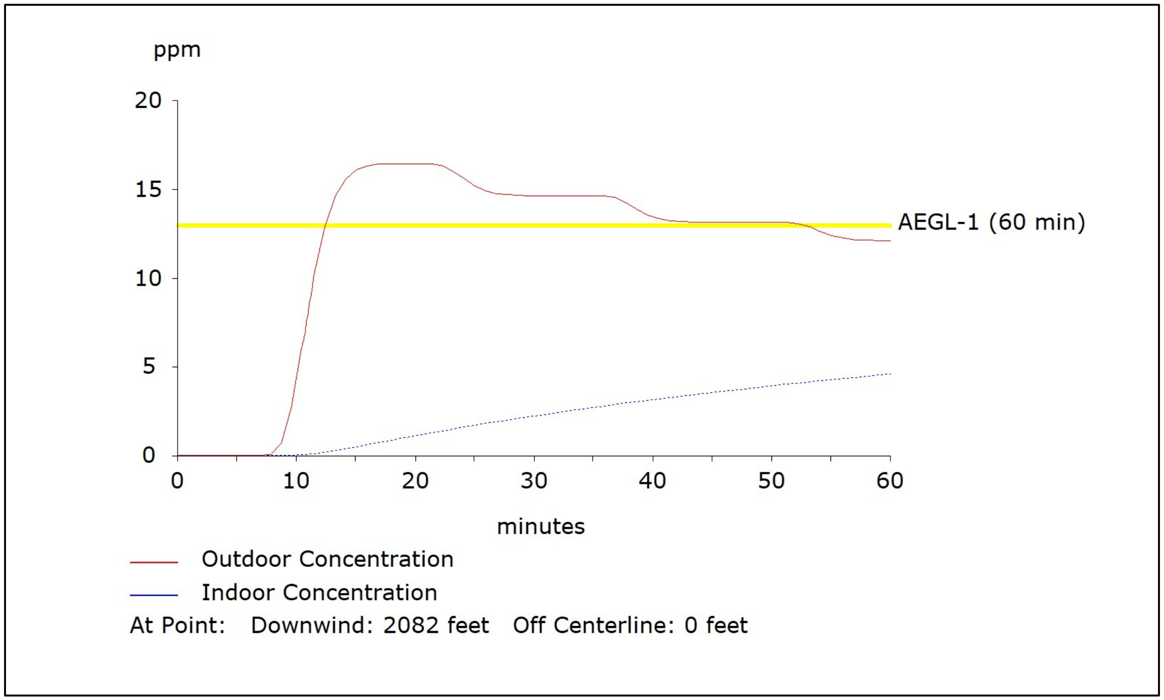


Figure 7: Model estimates for Acetonitrile for punctured drum at distance of 2082 feet from the source, equivalent to the distance between the Inland Star loading dock and the houses West of Wilmington Avenue (R2)

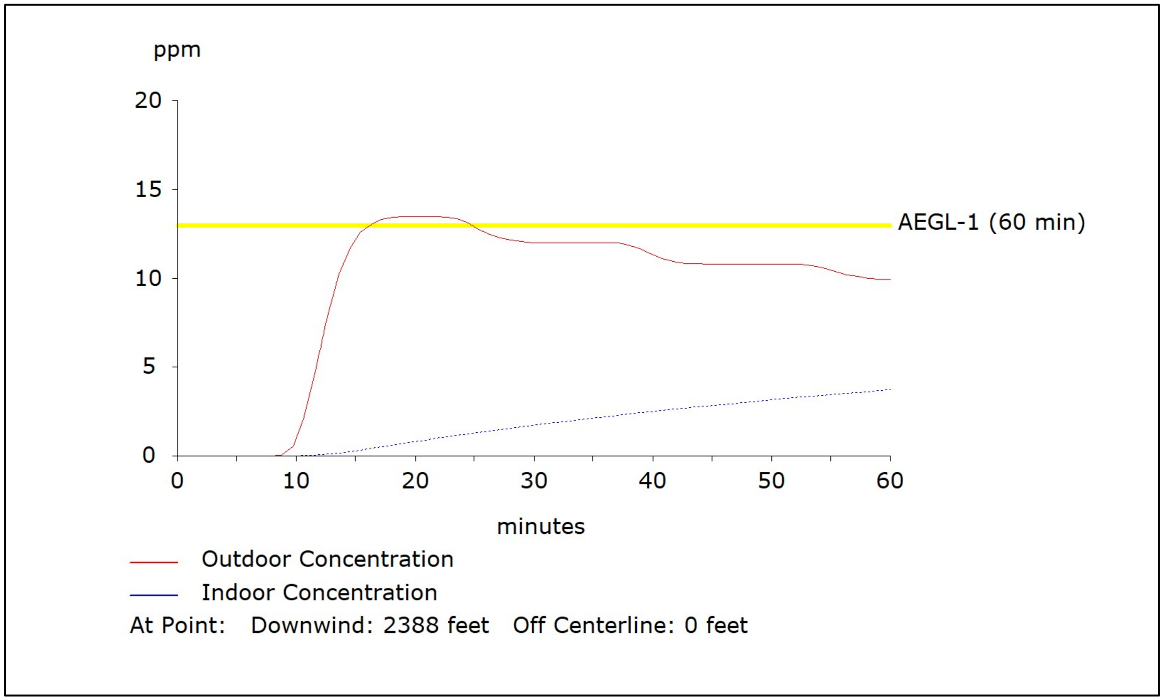


Figure 8: Model estimates for Acetonitrile for punctured drum at distance of 2388 feet from the source, equivalent to the distance between the Inland Star loading dock and Del Amo Elementary School (R3)

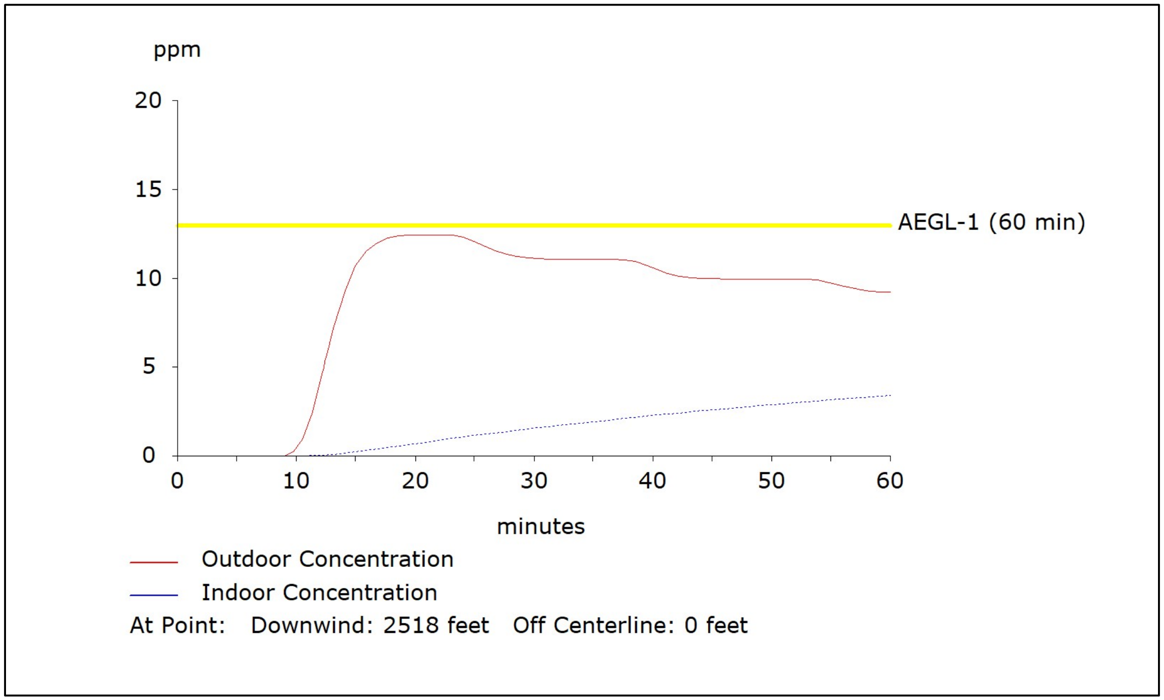


Figure 9: Model estimates for Acetonitrile for punctured drum at distance of 2518 feet from the source, equivalent to the distance between the Inland Star loading dock and the House East of Alameda Street (R4)

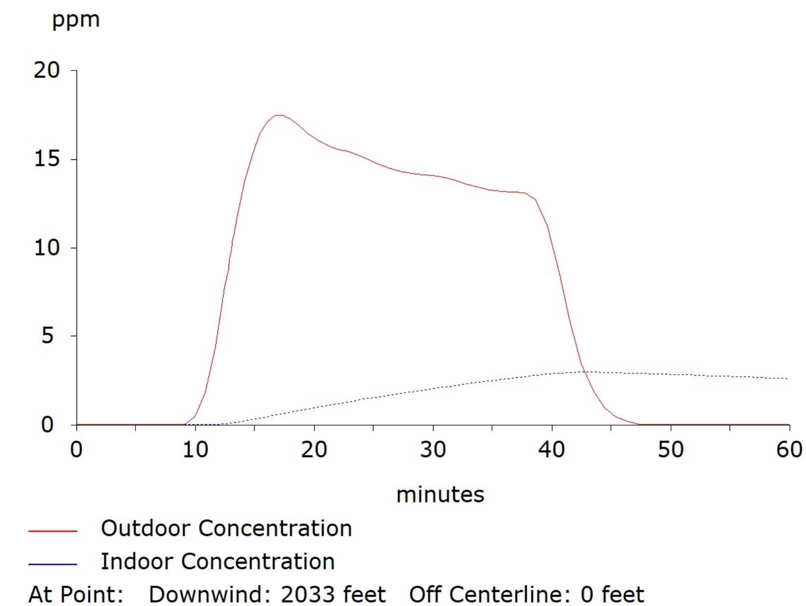


Figure 10: Model estimates for 1,2-Dichloroethylene Trans Isomer for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

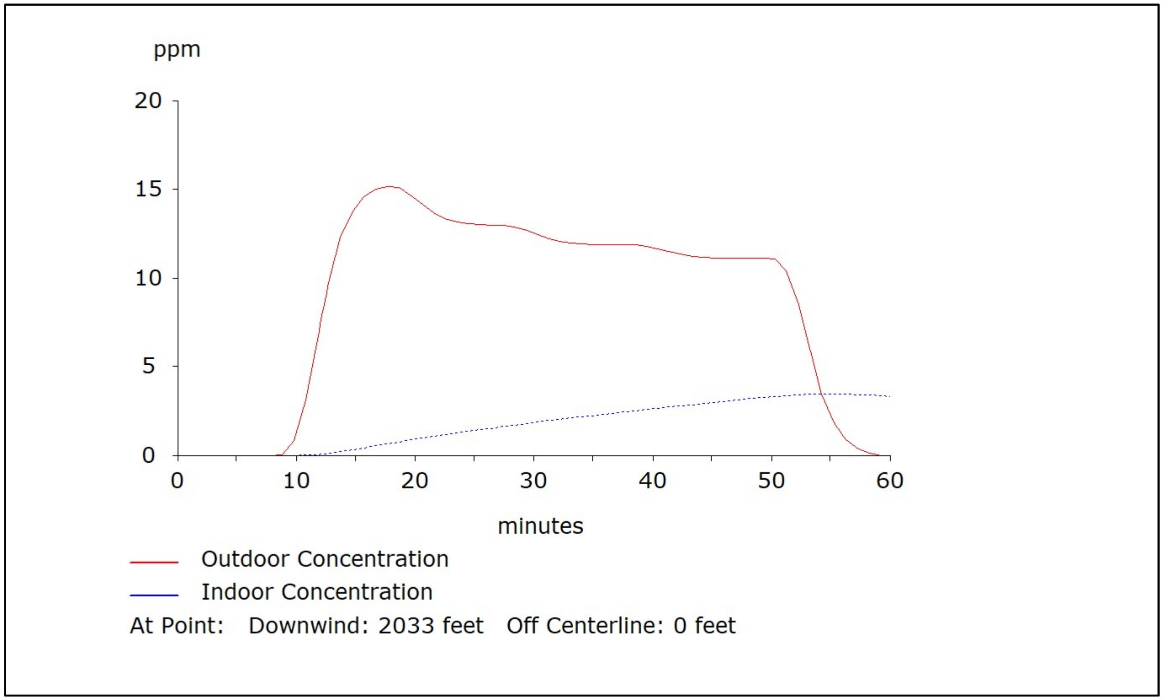


Figure 11: Model estimates for Methyl Acetate for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

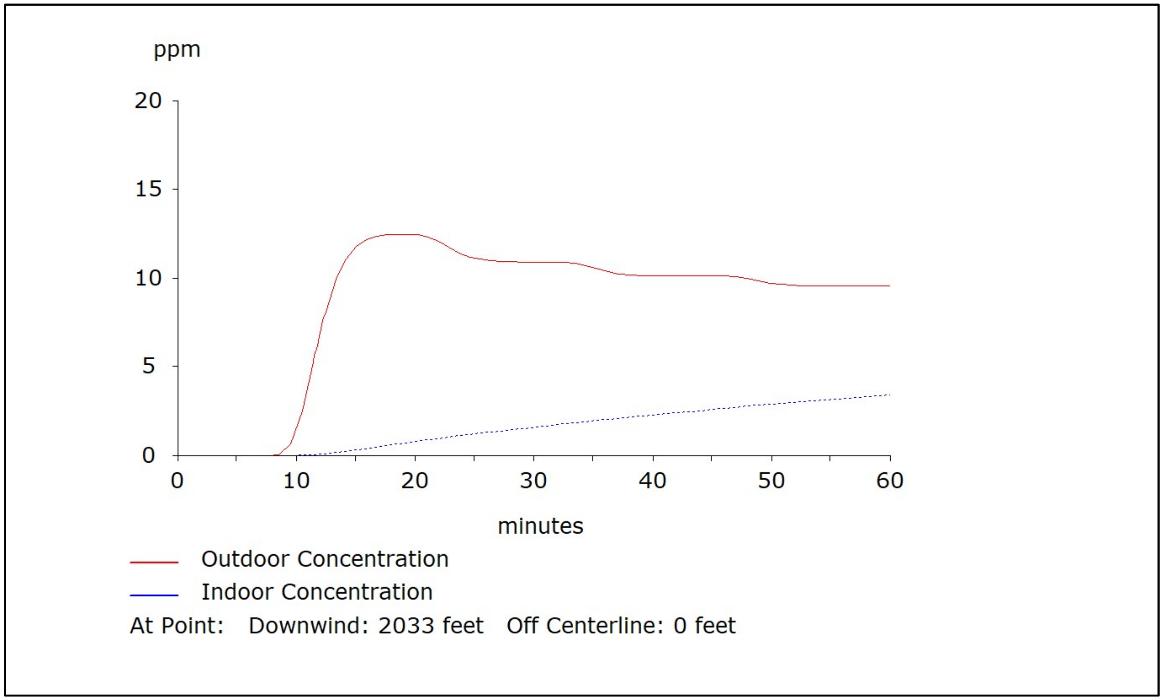


Figure 12: Model estimates for Tetrahydrofuran for punctured drum at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

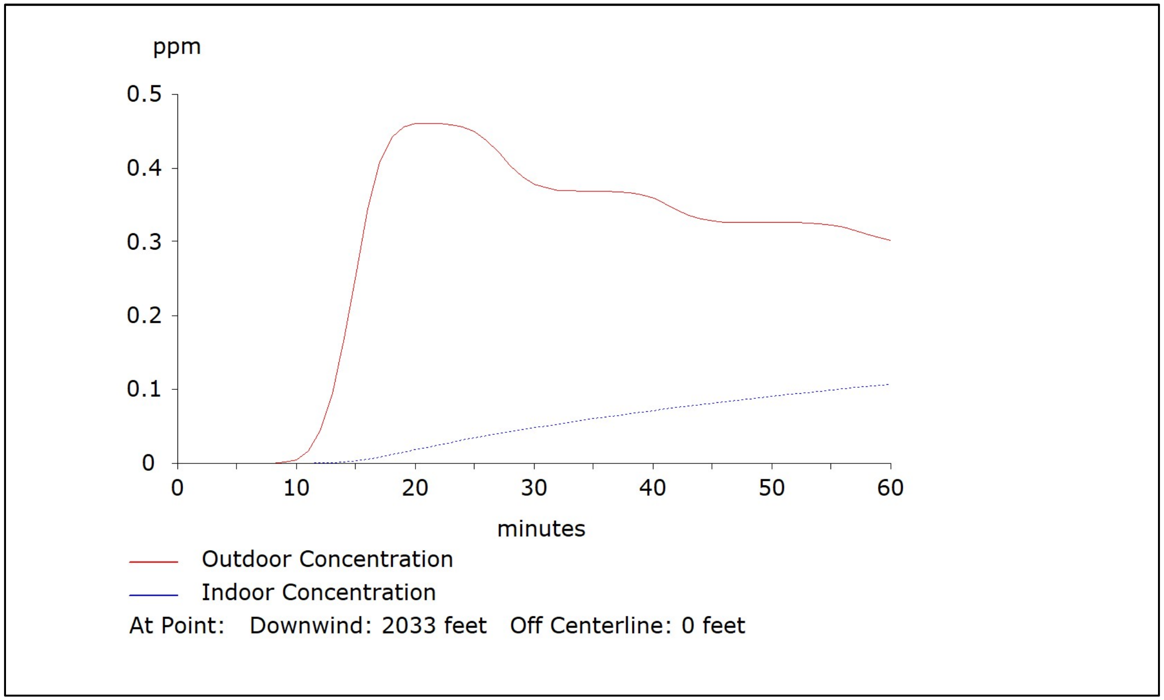


Figure 13: Model estimates for Methanol for 2-gallon forklift punctured drum modeled as an instantaneous puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

Under the forklift puncture release scenario, ambient air concentrations for all modeled chemicals did not exceed the 60-minute PAC at any of the five receptor locations, see Table 4. Only one chemical, acetonitrile (Figures 6 through 8), had a modeled ambient concentration above the AEGL-1 maximum concentration of 13ppm for any length of time; that concentration level, however, was not maintained long enough (greater than 60 minutes) to exceed the PAC guideline. At receptor R1 (The Carson City Corporate Yard), acetonitrile concentrations only rose above 13ppm for 43 minutes. At R2 and R3, the length of time above 13 ppm was 31- and 8-minutes, respectively. At R4—2518 feet away—acetonitrile did not reach the PAC threshold concentration level for any length of time, see Figure 9.

**Table 4: Summary of modeled forklift release scenario Protective Action Criteria (PAC) for forklift drum puncture scenario against 60-minute PAC guidelines.**

| | 60-min PAC Levels (ppm) | | | Maximum Concentration (ppm)/ Time in Excess (min) | | | | | Exceedance of PAC?/ Which Location(s)? |
|---|---|---|---|---|---|---|---|---|---|
| **Chemical** | **-1** | **-2** | **-3** | **R1** | **R2** | **R3** | **R4** | **R5** | |
| N,N-Dimethylaniline | 10 | 330 | 2000 | 0.763/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Dichloromethane | 200 | 560 | 6900 | 20.3/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Perchloroethylene | 35 | 230 | 1200 | 1.91/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Methyl Amyl Ketone | 150 | 670 | 4000 | 0.392/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Acetonitrile | 13 | 50 | 150 | 17/ 43 | 16.4/ 31 | 13.4/ 8 | 12.4/ 0 | -- | **NO/NONE** |
| Methyl Acetate | 280 | 1000 | 1700 | 15.1/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Tetrahydrofuran | 250 | 1700 | 10000 | 12.5/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Trans-1,2-Dichloroethylene | 100 | 500 | 5000 | 17.4/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Methanol | 530 | 2100 | 7200 | 0.461/ 0 | -- | -- | -- | -- | **NO/NONE** |

## Modeling Scenario: Containers Falling from Forklift

The City requested an evaluation of a scenario involving a release due to multiple drums falling from a forklift at the loading dock and spilling outside the building. All substances received and stored by Inland Star arrive and remain in DOT-approved containers, which are required to undergo testing to ensure that a fall from a distance typical of loading dock conditions would not leak.[4] As such, a fall off of a forklift would not typically be expected to result in a release from the container. In addition, even if a container were damaged and product released, the DOT

[4] Inland Star's loading dock is approximately 3.9 feet from the ground.

packaging would still be protective, release would be gradual and would be mitigated by Inland Star's standard operating procedures. Inland Star took these factors into account when proposing the forklift puncture evaluated above as the worst-case release scenario.

For the reasons just presented, the likelihood of a chemical release following multiple DOT-approved containers falling from a forklift at the loading dock is remote. Were a release to occur, however, the amount of material released would not be expected to exceed the amount of material released following the forklift puncture evaluated above or the amount of material assumed to be released in the roof-failure scenario evaluated below. As discussed above and below, neither of those scenarios resulted in exposures to the sensitive receptors above the Protective Action Criteria. Accordingly, the scenario in which multiple containers fall off a forklift in the loading dock area also is not expected to cause exposures above the Protective Action Criteria.

**Modeling Scenario: Earthquake and Roof Collapse**

The City also asked Inland Star to evaluate an accidental release in the event of collapse of the building's wooden roof due to a major seismic event, such as a magnitude 7 earthquake.

The building design, seismic upgrades, and other improvements (e.g., reinforced storage shelving structures) offer substantial protection against damage in the event of an earthquake. The wooden roof is the preferred roof type because it is a lighter weight material that moves with the building in the event of seismic activity. It is thus unlikely that the roof or other structural elements of the building would collapse in the event of an earthquake. The DOT-approved packaging of individual containers would further mitigate the likelihood or size of any release.

Although the likelihood of a roof collapse due to an earthquake and a subsequent chemical release is very low, concentrations of chemicals at the receptor locations were modeled using a set of conservative assumptions for such a release based on CalARP worst-case scenario parameters. More specifically, the modeled concentrations were based on the assumption of near-instantaneous release of the largest container of each of the chemicals evaluated, which created an evaporating pool of 1cm depth. In addition, no attenuation of downwind concentrations due to partial containment or attenuation of air flow by a damaged roof and building was assumed. In combination with the inherently conservative nature of the ALOHA model and the other modeling assumptions described above, the modeling approach taken provides a conservative evaluation of the release scenario recommended by the City.

The figures below present the results of modeling an instantaneous full container release of each of the nine identified chemicals using the CalARP guidance for worst-case scenario. As this scenario creates a constant source through an evaporating puddle, the same 60-minute PAC criteria used to evaluate potential risk in the forklift scenario are used here, see Table 3. This scenario also creates very similar release conditions as those used for the forklift scenario, namely an evaporating puddle with a depth of 1 cm. Ultimately, both the forklift scenario and the instantaneously released drum result in a puddle source with a depth of 1cm and a maximum area defined by the full volume of the container (see Table 1). As would be expected, and as is reported below, the time-series concentration estimates for both scenarios are very similar.

Figures 14 through 24 report time dependent concentrations curves for receptor locations located directly downwind of an instantaneous release of a full chemical container using conservative

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assumptions defined under CalARP. For a given chemical, results are reported for receptor distances until a modeled result indicates that ambient concentrations do not exceed the PAC guidelines' threshold level. In the case of Dichloromethane, the temperature of the chemical was reduced to 100 degrees F, as 105 degrees F is above its boiling point and the ALOHA model was unable to model the release as a leak into a puddle. Had GSI allowed the temperature of Dichloromethane to remain at 105F, the release would have been interpreted by ALOHA as a mist pool; this would have produced lower modeled concentration estimates than a standard puddle. By doing this, GSI introduced additional conservative assumptions into the model estimates.

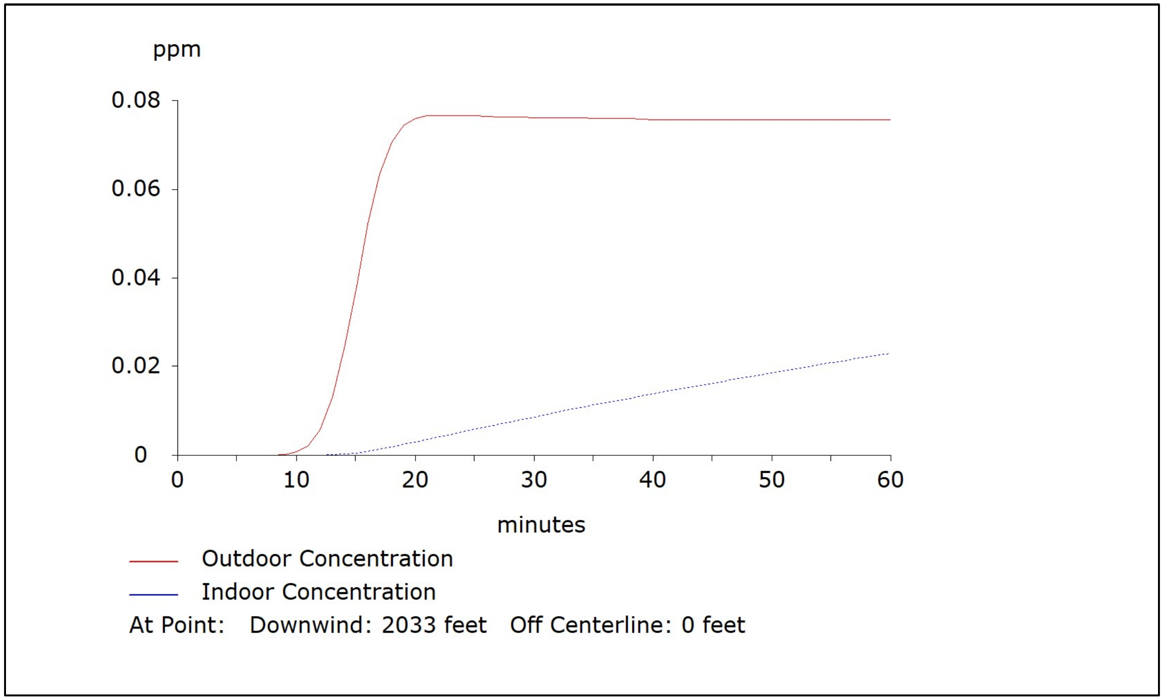


Figure 14: Model estimates for N,N-Dimethylaniline for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

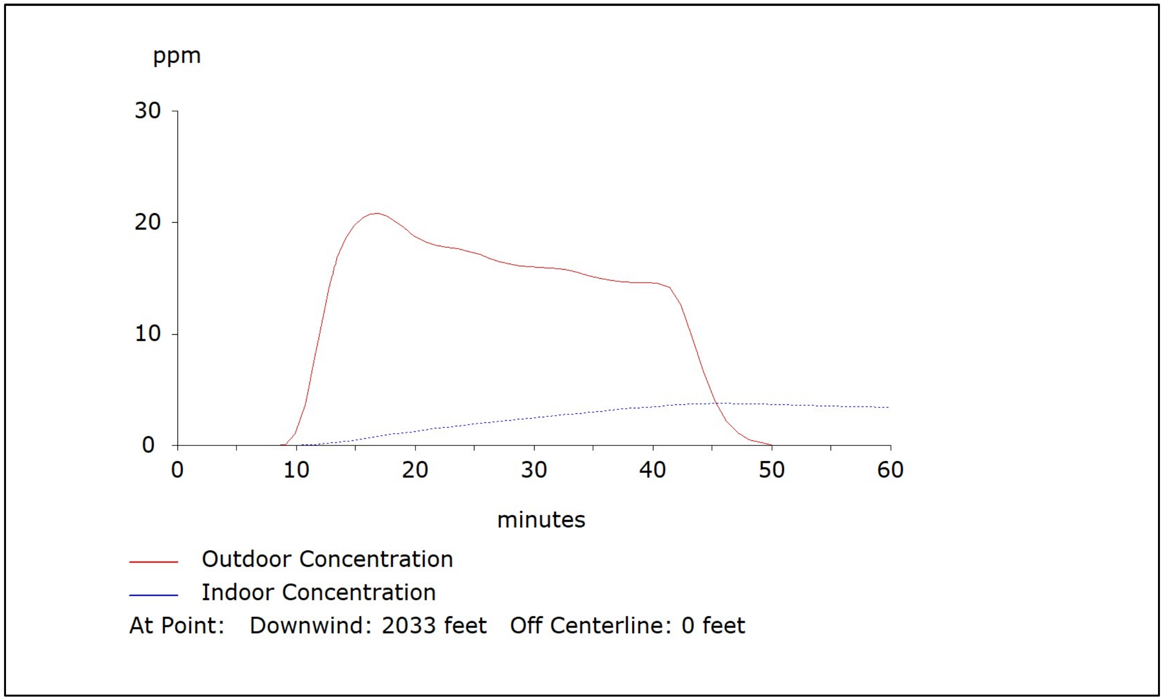


Figure 15: Model estimates for Dichloromethane for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

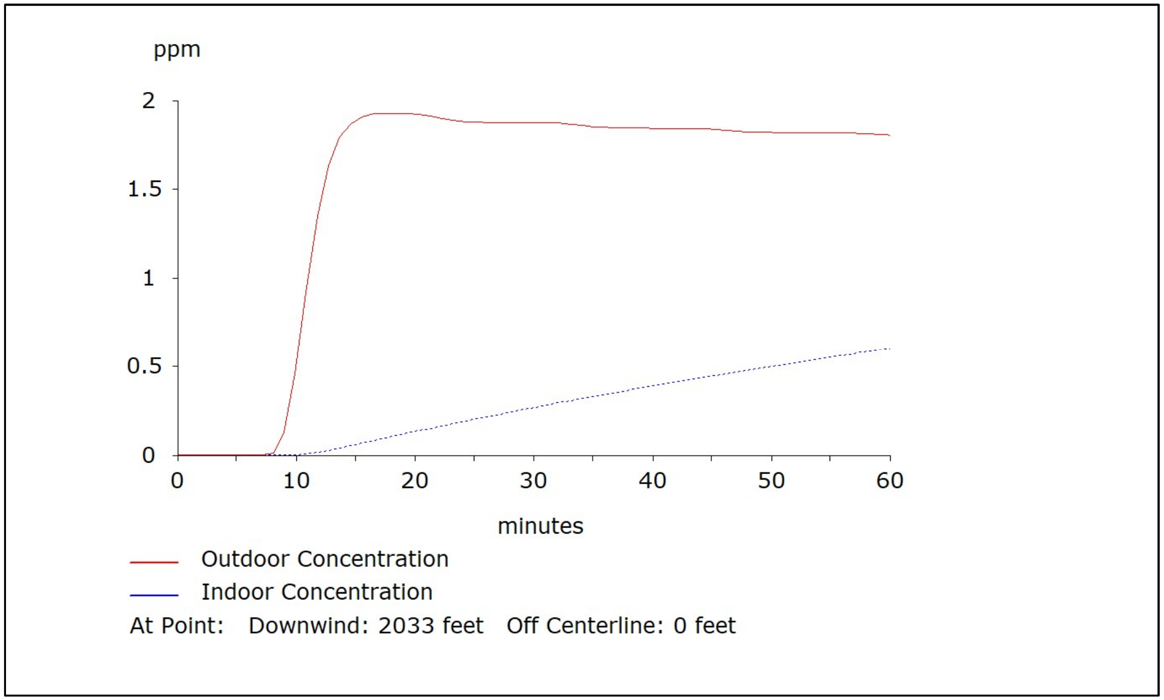


Figure 16: Model estimates for Perchloroethylene for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

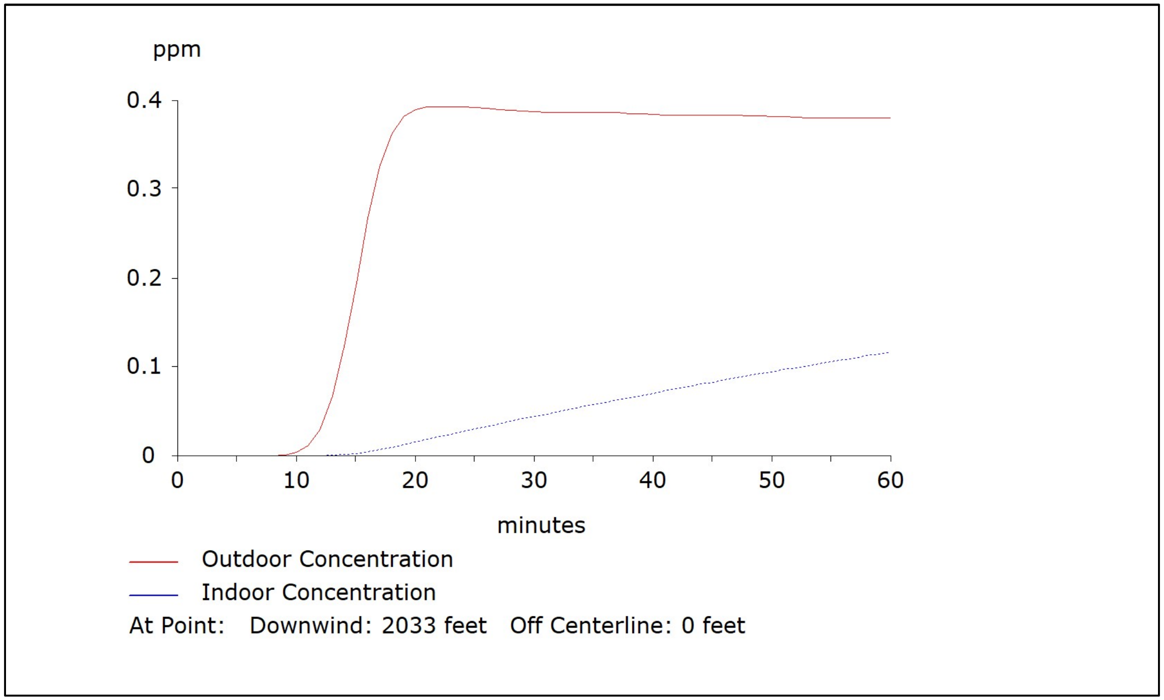


Figure 17: Model estimates for Methyl Amyl Ketone for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

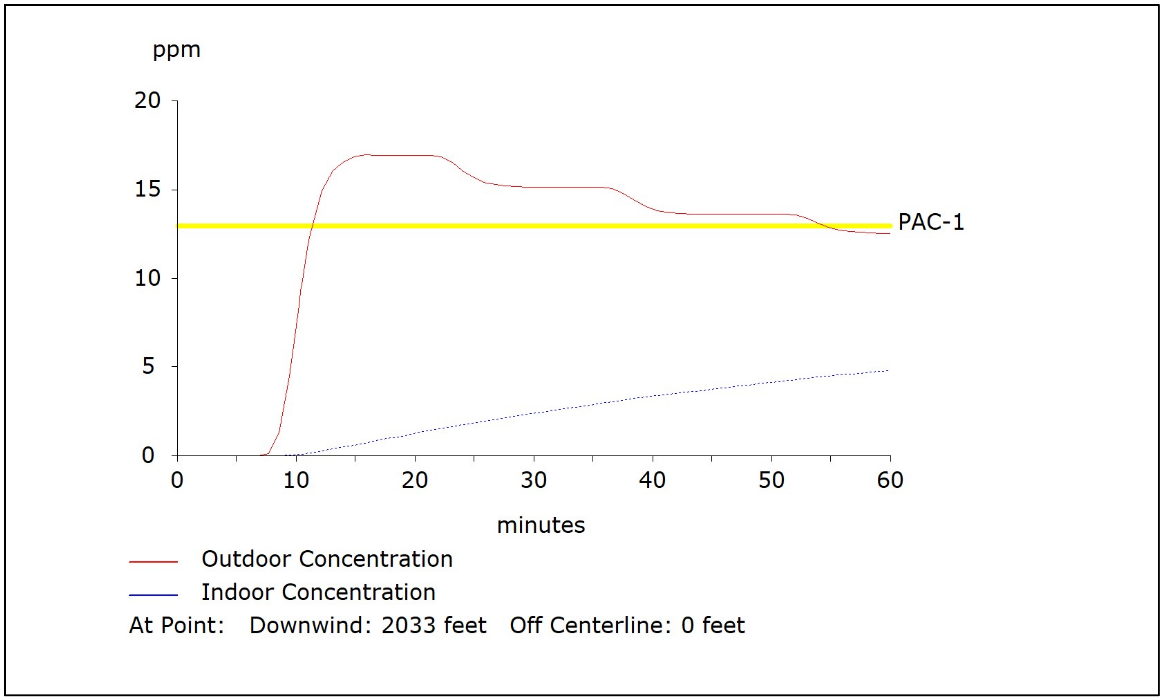


Figure 18: Model estimates for Acetonitrile for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

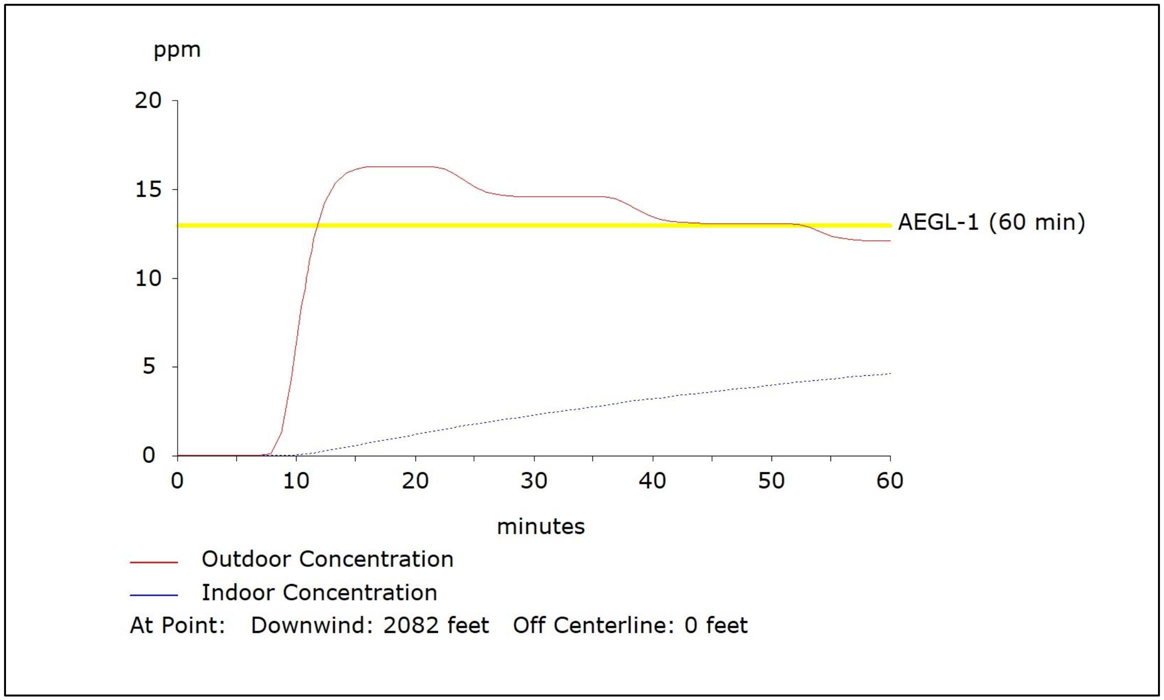


Figure 19: Model estimates for Acetonitrile for an instantaneous complete container puddle release at distance of 2082 feet from the source, equivalent to the distance between the Inland Star loading dock and the houses West of Wilmington Avenue (R2)

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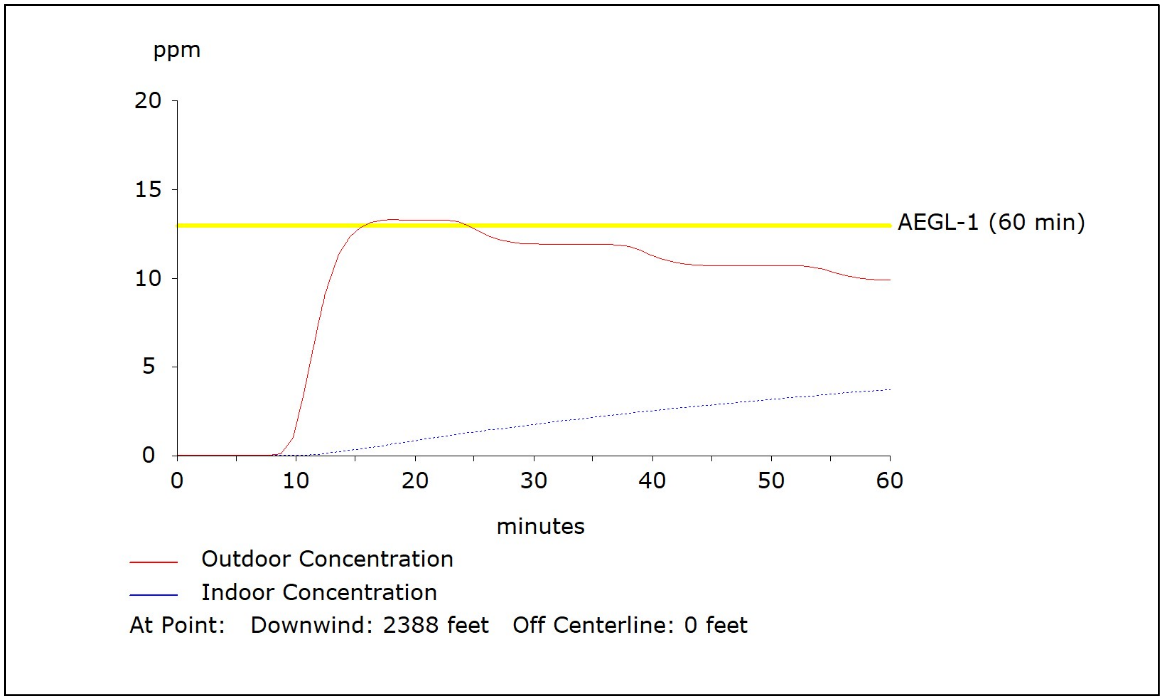


Figure 20: Model estimates for Acetonitrile for an instantaneous complete container puddle release at distance of 2388 feet from the source, equivalent to the distance between the Inland Star loading dock and Del Amo Elementary School (R3)

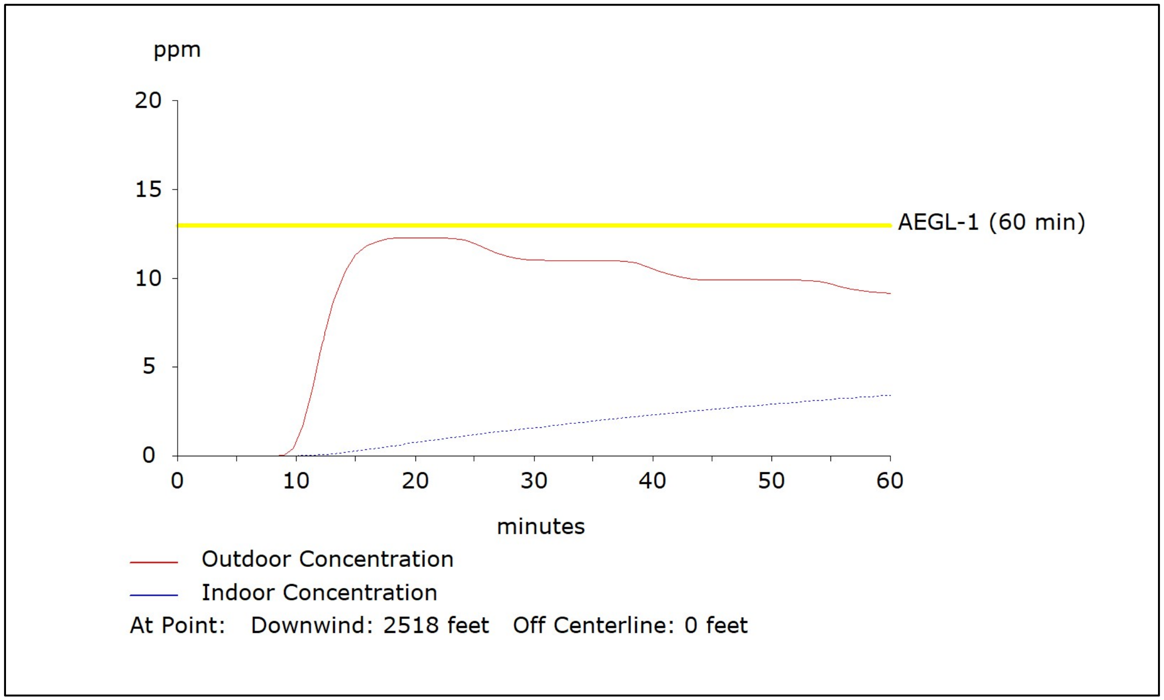


Figure 21: Model estimates for Acetonitrile for an instantaneous complete container puddle release at distance of 2518 feet from the source, equivalent to the distance between the Inland Star loading dock and the House East of Alameda Street (R4)

GSI ENVIRONMENTAL

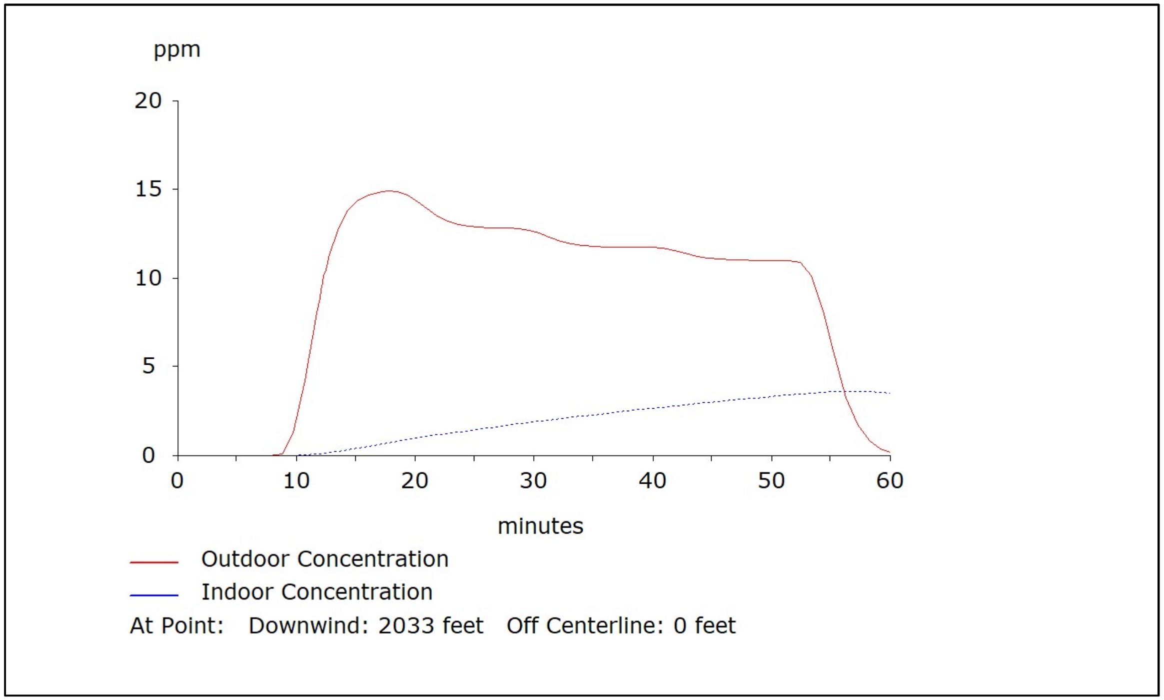


Figure 22: Model estimates for Methyl Acetate for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

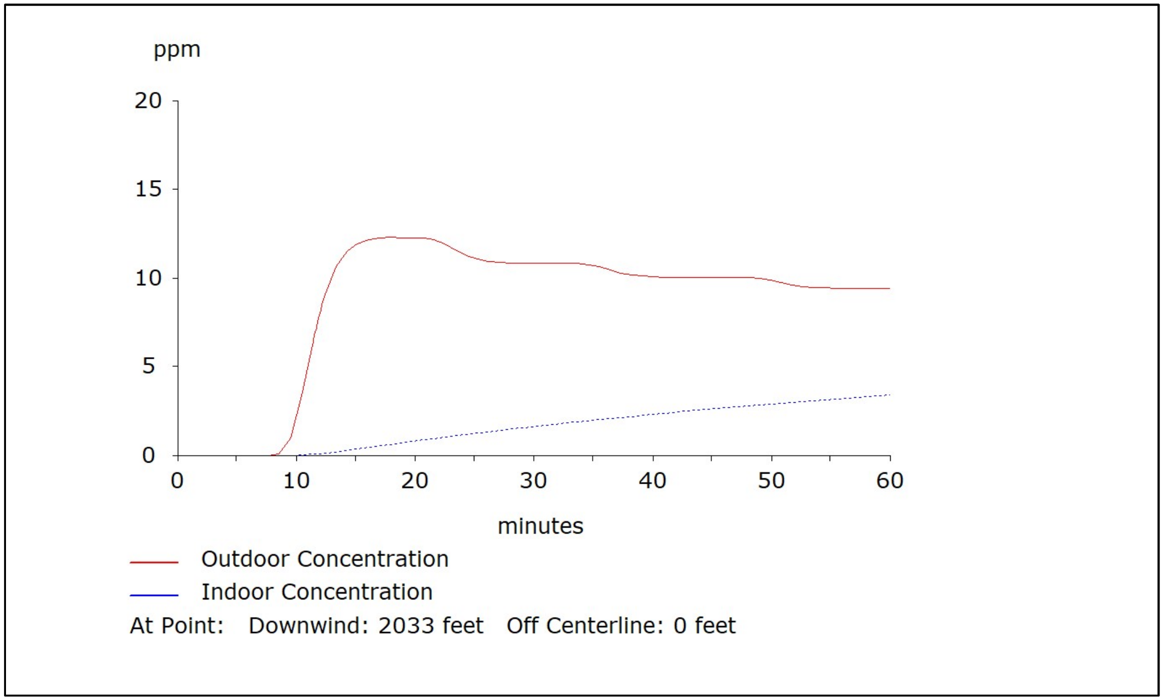


Figure 23: Model estimates for Tetrahydrofuran for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

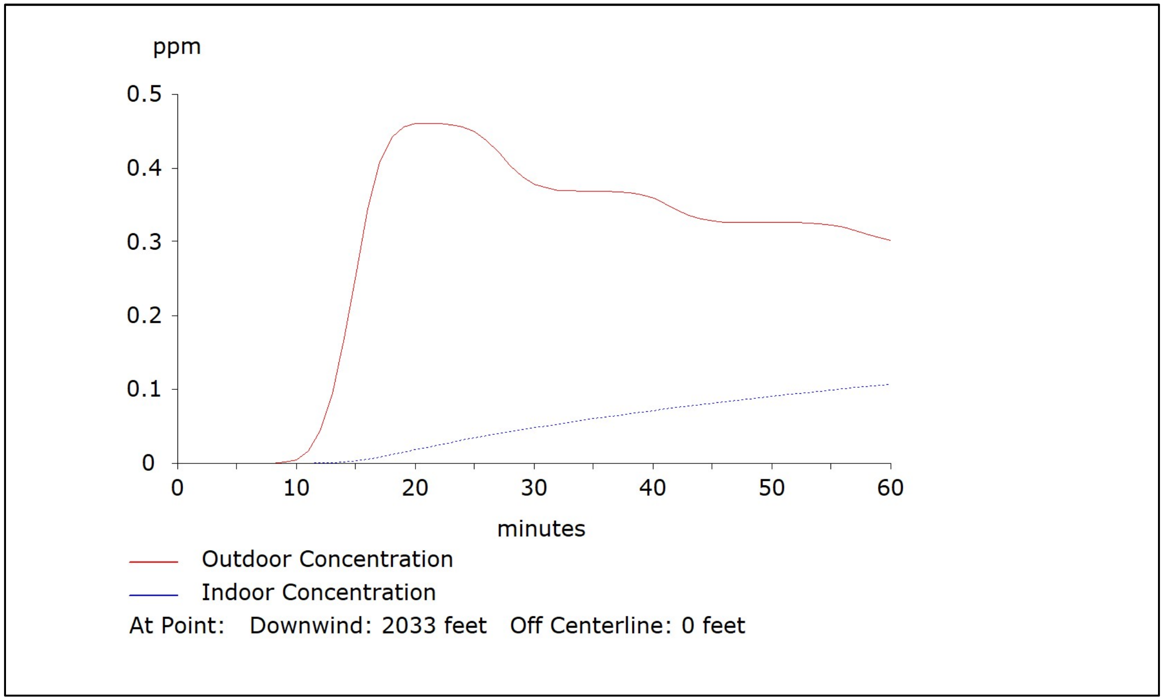


Figure 24: Model estimates for Methanol for an instantaneous complete container puddle release at distance of 2033 feet from the source, equivalent to the distance between the Inland Star loading dock and the Carson City Corporate Yard (R1)

Under the instantaneous full container release scenario, ambient air concentrations for all modeled chemicals did not exceed the 60-minute PAC at any of the five receptor locations, see Table 5. Only one chemical, acetonitrile (Figures 18 through 20), had a modeled ambient concentration above the AEGL-1 maximum concentration of 13 ppm for any length of time; that concentration level, however, was not maintained long enough (greater than 60 minutes) to exceed the PAC guideline. At receptor R1 (The Carson City Corporate Yard), acetonitrile concentrations only rose above 13ppm for 43 minutes. At R2 and R3, the length of time above 13 ppm was 31- and 8-minutes, respectively. At R4—2518 feet away—acetronitrile did not reach the PAC threshold concentration level for any length of time, see Figure 21.

**Table 5: Summary of modeled full container release scenario Protective Action Criteria (PAC) for forklift drum puncture scenario against 60-minute PAC guidelines.**

| | 60-min PAC Levels (ppm) | | | Maximum Concentration (ppm)/ Time in Excess (min) | | | | | Exceedance of PAC?/ Which Location(s)? |
|---|---|---|---|---|---|---|---|---|---|
| **Chemical** | **-1** | **-2** | **-3** | **R1** | **R2** | **R3** | **R4** | **R5** | |
| N,N-Dimethylaniline | 10 | 330 | 2000 | 0.764/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Dichloromethane | 200 | 560 | 6900 | 20.5/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Perchloroethylene | 35 | 230 | 1200 | 1.92/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Methyl Amyl Ketone | 150 | 670 | 4000 | 0.393/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Acetonitrile | 13 | 50 | 150 | 16.7/ 43 | 16.1/ 31 | 13.2/ 8 | 12.2/ 0 | -- | **NO/NONE** |
| Methyl Acetate | 280 | 1000 | 1700 | 14.8/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Tetrahydrofuran | 250 | 1700 | 10000 | 12.3/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Trans-1,2-Dichloroethylene | 100 | 500 | 5000 | 17.2/ 0 | -- | -- | -- | -- | **NO/NONE** |
| Methanol | 530 | 2100 | 7200 | 0.461/ 0 | -- | -- | -- | -- | **NO/NONE** |

## CONCLUSIONS

GSI has evaluated health risks associated with the release of chemicals from the Inland Star facility under three scenarios: forklift puncture, container falling off a forklift, and earthquake/roof collapse. None of the nine modeled chemicals exceeded the 60-minute PAC at any of the graded severity levels (-1, -2, and -3), at any of the five receptor locations. For all but one chemical, modeled ambient concentrations did not even reach the PAC threshold concentration for any period of time. For one chemical, acetonitrile, modeled ambient concentrations rose above the PAC concentration threshold at three receptors, but did not maintain this concentration for longer than 60 minutes, and thus did not exceed the PAC. From the results of this modeling, it is not expected that releases under the scenarios presented above would cause an increased risk to health. This conclusion is reinforced by the fact that models were developed with conservative assumptions representing a “worst-case” scenario.

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