CHEMICAL HAZARD ANALYSIS REPORT

WONIK MATERIALS – MANOR, TX

MARCH 31, 2025 (DRAFT)

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REVISION TABLE:

Rev #	Date	Description	Comments
0	03.31.2025	Planning / Zoning Review	Initial Submission for planning and zoning committee use and reference

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EXECUTIVE SUMMARY

ACS Group has prepared this Chemical Hazard Analysis (CHA) Report to describe the hazards associated with various processes and chemical storage, handling and use planned for the Wonik Materials Building (herein referenced as “project”, "Wonik”).

This report is intended to satisfy the requirements of IBC §414.1.3 for a technical opinion identifying the maximum expected quantities of hazardous materials to be stored, used in an open system, and used in a closed system.

Materials that are planned for the facility, such as flammable liquids and combustible liquids, pose physical hazards, whereas toxic and corrosive materials pose health hazards. General requirements for these materials including documentation, material releases, personnel training, ignition source control, separation of incompatible materials, system equipment, and signage are described herein.

A coordinated approach has been developed for the hazardous materials such that they will either be stored and used in quantities below the maximum allowable quantity (MAQ) per control area, or they will be appropriately protected within a Group H, High-Hazard, space. The following spaces will be designed and constructed as Group H-2 space due to the anticipated quantities of materials presenting physical hazards and health hazards:

- Gas Cylinder Storage Room

This report documents required operational controls and built-in features to mitigate the hazards. Applicable prescriptive requirements are detailed for the storage/use of each type of material in both control areas and Group H spaces. This includes requirements for the following systems:

- Fire Protection
- Limit Controls (i.e., temperature, pressure, liquid level)
- Emergency Alarm System
- Ventilation Systems
- Explosion Control
- Electrical Area Classifications
- Spill Control & Secondary Containment
- Secondary or Emergency Power

This report will focus specifically on hazardous materials, Maximum Allowable Quantities (MAQs), control areas, and high-hazard (i.e., Group H) occupancies. General building requirements, general fire protection and life safety features, as well as specific high-piled combustible storage or combustible dust requirements should be addressed in separate reports.

1.0 GENERAL INFORMATION

Per IBC §414.1.3, a report must be submitted to the building official identifying the maximum expected quantities of hazardous materials to be stored, used in a closed system, and used in an open system, and subdivided to separately address hazardous material classification categories based on Tables 307.1(1) and 307.1(2). The methods of protection from such hazards, including but not limited to control areas, fire protection systems and Group H, High-Hazard, occupancies must be detailed.

1.1 Project Description

The proposed Wonik Materials T-Project Phase 1 will involve the site development of a new site to include multiple buildings, a tank farm, and a metal canopy for tank lorry / ISO tube trailer storage. Wonik Materials supplies materials, including hazardous gases, for semiconductor production facilities.

The main building is a single-story, approximately 37,360-sf building and will consist of a gas cylinder storage area, analysis lab area, fire protection and utility area, and office area. It is understood that hazardous materials will only be stored and distributed at this location. While low volume hazardous material usage may occur at a lab-scale in the analysis area, no large-scale hazardous material usage is planned as part of this initial phase.

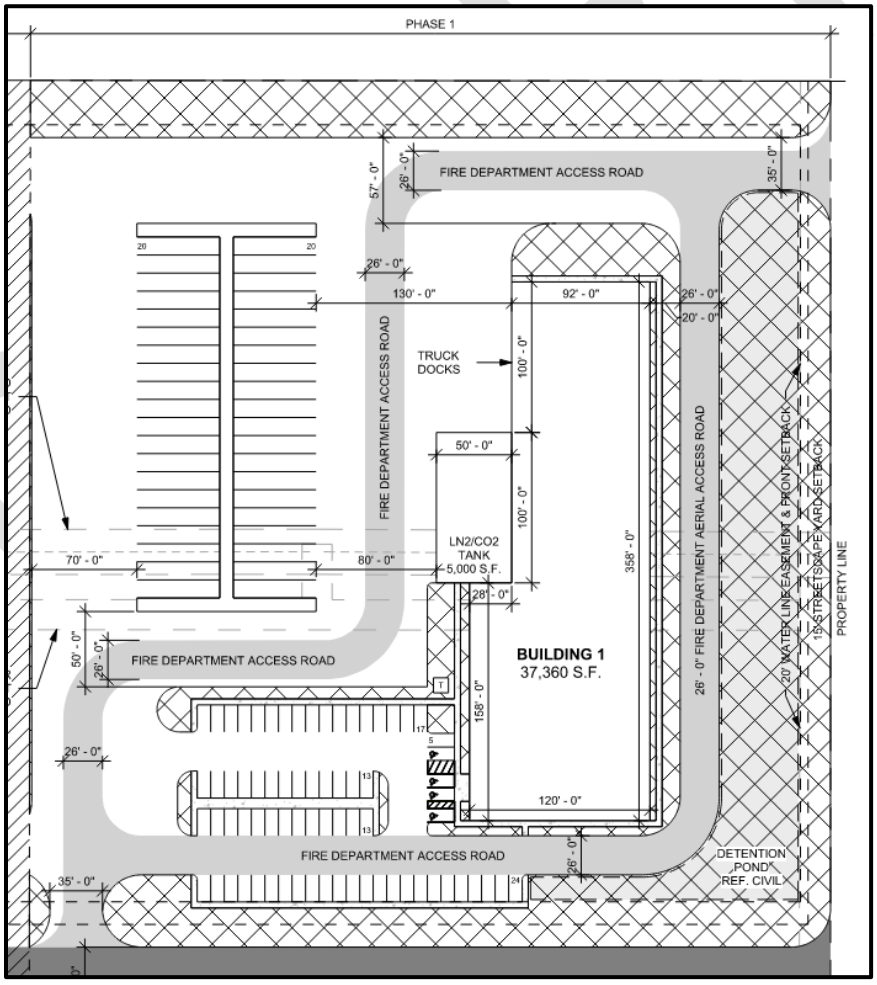

Figure 1: Wonik Materials – Site Plan

1.2 Applicable Codes and Standards

The City of Manor, Texas currently adopts the following codes and standards:

- 2015 International Fire Code (IFC)
- 2015 International Building Code (IBC)
- 2015 International Mechanical Code (IMC)
- 2015 Uniform Plumbing Code
- 2020 NFPA 70, National Electrical Code (NEC)

These model codes reference the following additional codes and standards for hazardous materials provisions and general guidance:

- NFPA 13, *Standard for the Installation of Sprinkler Systems* (2022)
- NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection* (2013)
- NFPA 30, *Flammable and Combustible Liquids Code* (2012)
- NFPA 55, *Compressed Gas and Cryogenic Fluids Code* (2020)
- NFPA 72, *National Fire Alarm and Signaling Code* (2013)
- NFPA 80, *Standard for Fire Doors and Other Opening Protectives* (2013)
- NFPA 110, *Standard for Emergency and Standby Power Systems* (2013)
- NFPA 400, *Hazardous Materials Code* (2020)
- NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response* (2017)

2.0 PROCESS DESCRIPTION

The primary purpose of the Wonik Materials building will be for the storage of production material related to semiconductor manufacturing. The entire building shall be considered a single building for building code application purposes. Manufacturing will not occur in the Wonik Materials building.

The proposed gas cylinder storage room will be the primary location for all production support related chemical storage. The gas cylinder storage room is intended for chemical storage only.

3.0 CHEMICAL CLASSIFICATION

Per IFC §5001.2.2, hazardous materials shall be classified according to their hazard categories specified in the IFC. Mixtures have been classified in accordance with the hazards of the mixture as a whole by an approved, qualified organization, individual, or testing laboratory. This includes waste comprised of or containing hazardous materials. Hazardous materials that have multiple hazards will conform to the code requirements for each applicable hazard category. Applicable hazard classifications for the project are as follows:

3.1 Compressed Gases

Compressed gases are defined as a material, or mixture of materials that is a gas at 68°F or less and has a boiling point of 68°F or less at 14.7 psi of pressure. Liquified gases are compressed gases which, under a charged pressure, is partially liquid at a temperature of 68°F. For gases with no other health- or physical-hazard properties, they are not considered to be compressed until the pressure in the packaging exceeds 41 psi at 68°F.

3.2 Flammable and Combustible Liquids

Flammable liquids are defined as any liquid that has a closed-cup flash point (FP) below 100°F, as determined by the test procedures and apparatus set forth in NFPA 30 §4.4, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi at 100°F, as determined by ASTM D 323. Flammable liquids are subdivided into three classes as follows:

- Class IA: FP below 73°F and boiling point (BP) below 100°F
- Class IB: FP below 73°F and boiling point (BP) above 100°F
- Class IC: FP between 73°F and 100°F

Combustible liquids are defined as any liquid that has a FP at or above 100°F, as determined by the test procedures and apparatus set forth in NFPA 30 §4.4. Combustible liquids are subdivided as follows:

- Class II: FP between 100°F and 140°F
- Class IIIA: FP between 140°F and 200°F
- Class IIIB: FP above 200°F

3.3 Flammable Gas

A material which is a gas at 68°F or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a boiling point of 68°F or less at 14.7 psia] which:

- Is ignitable at 14.7 psia when in a mixture of 13 percent or less by volume with air; or
- Has a flammable range at 14.7 psia with air of not less than 12 percent, regardless of the lower limit.

3.4 Flammable Liquefied Gas

Flammable liquefied gas is defined as a liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of 68°F and which is flammable.

3.5 Oxidizing Gas

A gas that can support and accelerate combustion of other materials more than air does.

3.6 Pyrophoric

A chemical with an autoignition temperature in air, at or below a temperature of 130°F.

3.7 Water Reactive

A material that explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

- Class 3: Materials that react explosively with water without requiring heat or confinement.
- Class 2: Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases, or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.
- Class 1: Materials that react with water with some release of energy, but not violently.

3.8 Corrosives

Corrosives are defined as chemicals that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method in DOTn 49 CFR 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces (i.e., “corrosive to metals”).

3.9 Toxics

Toxic materials are any material that produces a median lethal dose (LD50) or a median lethal concentration (LC50) within any of the following categories:

- LD50 between 50-mg/kg and 500-mg/kg of body weight when administered orally to albino rats weighing between 200-g and 300-g each.
- LD50 between 200 mg/kg and 1000 mg/kg of body weight when administered by continuous contact for 24 hours, or less if death occurs within 24 hours, with the bare skin of albino rabbits weighing between 2 kg and 3 kg each.
- LC50 in air between 200 and 2000-ppm by volume of gas or vapor, or between 2 and 20-mg/L of mist, fume, or dust when administered by continuous inhalation for 1 hour, or less if death occurs within 1 hour, to albino rats weighing between 200 g and 300 g each.

Highly toxic materials are any material that produces a LD50 or LC50 that falls within any of following categories:

- LD50 of 50 mg/kg or less of body weight when administered orally to albino rats weighing between 200 g and 300 g each
- LD50 of 200 mg/kg or less of body weight when administered by continuous contact for 24 hours, or less if death occurs within 24 hours, with the bare skin of albino rabbits weighing between 2 kg and 3 kg each or albino rats weighing 200 g to 300 g each
- LC50 in air of 200-ppm by volume or less of gas or vapor, or 2-mg/L or less of mist, fume, or dust, when administered by continuous inhalation for 1 hour, or less if death occurs within 1 hour, to albino rats weighing between 200 g and 300 g each.

4.0 COMPLIANCE STRATEGY

4.1 Maximum Allowable Quantities (MAQ)

Buildings are permitted to use and store hazardous materials without being classified as a High-hazard, Group H occupancy if the amounts of hazardous materials are less than the MAQs for a single control area. Areas which exceed their respective MAQs must be classified as a Group H occupancy, which includes more robust protection requirements, but less restrictive quantity limitations.

The use of hazardous materials are assessed as either closed systems or open systems. The definition of each type of system is detailed below.

- **Closed System:** uses a solid or liquid hazardous material in a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system; and all uses of compressed gases.
- **Open System:** uses a solid or liquid hazardous material in a closed vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated, or the product is exposed to the atmosphere during normal operations.

As previously noted, all hazardous materials will be in the storage configuration with no open or closed use anticipated.

4.2 Control Areas

Buildings are permitted to use, handle, and store hazardous materials without being classified as a High-hazard, Group H occupancy if the amounts of hazardous materials are less than the MAQs for a single control area. Areas which exceed their respective MAQs must be classified as a Group H occupancy, which includes more robust protection requirements, but less restrictive quantity limitations.

Control areas are defined as spaces where quantities of hazardous materials not exceeding the MAQ per control area are stored, dispensed, used, or handled. Since the building is a single-story building a maximum of four (4) control areas is permitted to be provided on Level 1 (IFC Table 5003.8.3.2).

Control areas are separated from each other utilizing a minimum 1-hr fire-resistance rated fire barrier as required by IFC Table 5003.8.3.2.

The Wonik Materials building will utilize a single control area for the entire building for MAQ compliance. Any Group H areas will be separated from the remainder of the building as required for Group H occupancies and will not be considered control areas.

4.3 Group H, High-Hazard, Occupancies

Any portion of the Wonik Materials building that involve the manufacturing, processing, generation, or storage of hazardous materials in quantities exceeding their respective MAQs must be classified as High-Hazard, Group H, occupancies in accordance with IBC §307.

The following area will be storing pyrophoric gases in quantities exceeding the MAQ thus, it will be classified as a Group H-2 occupancy:

- Gas Cylinder Storage Area

4.4 Overall building

Most of the Wonik Materials building warehousing areas is classified primarily as Groups B, Business, and F-1, Moderate-hazard Industrial, occupancies. The building will utilize the separated mixed-use occupancy approach in accordance with IBC §508.4.

Group H-2 occupancies will be separated from other differing occupancies by 2-hour fire barrier construction. At least 25 percent of the perimeter of the Group H-2 occupancies will be located on an exterior wall as required by IBC §415.6. Group H-2 occupancies are separated from the remainder of the building and from each other via 2-hour fire barriers in accordance with IBC Table 508.4.

The MAQs for the various applicable categories of hazardous materials used and stored in the Wonik Materials Building are provided in IBC Table 307.1(1) and Table 307.1(2), as shown in Table 1 below. The following notes have been provided for further clarity related to MAQ tables provided in this report.

Material	Sub-group	Storage
Combustible Liquids	Class II	240-gal
	Class IIIA	660-gal
Flammable Liquids	Class IA	60-gal
	Class IB & IC	240-gal
Flammable Gases	Liquefied	300-lbs
	Gaseous	2,000-cf
Oxidizing Gases	Liquefied	300-lb
	Gaseous	3,000-cf
Pyrophoric	Gases	50-cf
	Liquids	0.4-gal
Water Reactive	Class 2 Liquid	10-gal
Corrosives	Liquefied	1,620-cf
	Gaseous	300-lb
Toxic	Liquefied	1,620-cf
	Gaseous	300-lb
Highly Toxic	Liquefied	40-cf
	Gaseous	4-lb

Table 1: Wonik Materials - MAQs per Control Area

All materials in the Wonik Building are considered in the storage configuration. The table above includes the 100% increase for certain materials due to the building being fully sprinklered. The storage MAQs may also be increased by an additional 100% when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with the IFC and NFPA 400. Since the building will be fully sprinklered, the quantity of Class IIIB Combustible Liquids and Inert Gases in storage and use will not be limited.

5.0 GENERAL HAZARDOUS MATERIALS REQUIREMENTS

5.1 Documentation

A. Safety data sheets (SDS) will be available on the premises for hazardous materials regulated by NFPA 400. When approved, SDSs are permitted to be retrievable by electronic access.

B. A hazardous material inventory statement (HMIS) has been produced and will be maintained onsite. This will contain the following information:

- Product Name
- Component
- Chemical Abstract Service (CAS) number
- Location where stored or used
- Container Size
- IFC Hazard Classification
- Amount in storage, closed-use, and/or open-use

5.2 Release of Hazardous Materials

A. The Wonik Materials facility is a non-discharge facility. Hazardous materials will not be released into a sewer, storm drain, ditch, drainage canal, lake, river, or tidal waterway; upon the ground, a sidewalk, a street, or a highway; or into the atmosphere, unless such release is permitted by NFPA 400 §6.1.3.1.

B. When an unauthorized release due to primary container failure is discovered, the involved primary container will be repaired or removed from service.

C. Overpack containers will be permitted to be used as a means to provide protection for primary containers to be transported for repair or removal from service.

D. Appropriate spill clean-up kits shall be located in the facility for all types of chemicals in storage and use.

5.3 Piping

A. Piping, tubing, valves, and fittings conveying hazardous materials shall be designed and installed in accordance with ASME B31 or other approved standards and in accordance with IFC Section 5003.2.

5.4 Ignition Source Control

A. Smoking will be prohibited within 25-ft of dispensing or open use areas. Smoking is prohibited throughout the Wonik Materials site.

B. Open flames and high-temperature devices will not be used in a manner that creates a hazardous condition.

5.5 Incompatible Materials

A. Incompatible materials in storage must be separated when the stored materials are in containers having a capacity of more than 5 pounds or 0.5 gallons.

B. Incompatible materials used in open systems must be separated from each other in the secondary containment system.

C. Separation of incompatible materials can be accomplished by any of the following methods:

- Segregating incompatible materials in storage by not less than 20 feet.
- Isolating incompatible materials in storage by a noncombustible partition extending not less than 18 inches above and to the sides of the stored material.
- Storing liquid and solid materials in hazardous material storage cabinets. Incompatible materials will not be stored within the same cabinet.

Incompatible material separation will be achieved via noncombustible partitions above and to the sides of the stored materials.

D. In addition to the requirements above, the indoor storage of pyrophoric materials shall be isolated from incompatible hazardous materials by 1-hour fire barriers unless stored in approved hazardous materials storage cabinets.

5.6 Hazardous Materials Cabinets

A. When storage cabinets are used to increase MAQ per control area, separate incompatible materials, or to otherwise comply with NFPA 400 provisions, such cabinets must comply with NFPA 400 §6.1.18.

B. The cabinets must be constructed of metal with the entire interior treated, coated, or constructed of materials that are nonreactive with the hazardous material stored.

C. Cabinets will be either listed as suitable for the intended storage or constructed in accordance with the following:

- Cabinets will be of steel having a thickness of not less than 0.044 in.
- The cabinet, including the door, will be double-walled with 1⁄2 in. airspace between the walls.
- Joints will be riveted or welded and will be tight-fitting.
- Doors will be well fitted, self-closing, and equipped with a self-latching device.
- The bottoms of cabinets utilized for the storage of liquids will be liquid tight to a minimum height of 2 in.
- For requirements regarding electrical equipment and devices within cabinets used for the storage of hazardous liquids, compressed gases, or cryogenic fluids, see NFPA70.

D. Cabinets will be marked in conspicuous lettering that reads as follows: HAZARDOUS — KEEP FIRE AWAY.

5.7 Exhausted Enclosures

A. Where an exhausted enclosure is used to increase MAQ per control area or for highly toxic and toxic compressed gas storage, such enclosures shall comply with IFC §5003.8.5.1 through §5003.8.5.3.

B. Exhausted enclosures shall be of noncombustible construction.

C. Exhausted enclosures shall be provided with an exhaust ventilation system. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area and shall be installed in accordance with the IMC.

5.8 Gas Cabinet

A. Where a gas cabinet is used to increase MAQ per control area or for highly toxic and toxic compressed gas storage, such enclosures shall comply with IFC §5003.8.6.1 through §5003.8.6.3.

B. Gas cabinets will be constructed in accordance with the following:

- Cabinets will be of steel having a thickness of not less than 0.097 in.
- Self-closing limited access ports or noncombustible windows to give access to equipment controls.
- Doors will be well fitted, self-closing, and equipped with a self-latching device.
- Interiors of treated, coated or constructed of materials that are compatible with the hazardous materials stored. Such treatment, coating or construction shall include the interior of the cabinet.

C. Gas cabinets shall be provided with an exhaust ventilation system. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area and shall be installed in accordance with the IMC.

D. The number of cylinders contained in a single gas cabinet shall not exceed three.

5.9 Gas Rooms

A. Where a gas room is used to increase MAQ per control area or for highly toxic and toxic compressed gas storage, such enclosures shall comply with IFC §5003.8.4.1 through §5003.8.4.2 and IFC §6004.2.2.6.

B. Gas rooms shall be separated from the remainder of the building based on the occupancy group into which it has been classified.

C. The ventilation system for gas rooms shall be designed to operate at a negative pressure in relation to the surrounding areas and shall be installed in accordance with the IMC.

5.10 Signage

A. Visible hazard identification signs in accordance with NFPA 704 will be placed at entrances to locations where hazardous materials are stored, dispensed, used, or handled in quantities requiring a permit, except where the AHJ has received an HMMP and HMIS and has determined that omission of such signs is consistent with safety.

B. Where" no smoking" is not applicable to an entire site or building, signs will be provided in rooms or areas where hazardous materials are stored or dispensed or used in open systems in amounts requiring a permit.

C. Signs will meet the following requirements:

- Be of durable construction
- Be of size, color, and lettering in accordance with nationally recognized standards
- Be in English as the primary language.

D. Signage will be maintained in a legible condition without obscuration. They will not be removed, unless for replacement.

5.11 Compressed Gases

A. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems will comply with NFPA 55.

B. Compressed gas containers, cylinders or tanks that are not designed for refillable use will not be refilled after use of the original contents.

C. Compressed gas containers, cylinders and tanks will be designed, fabricated, tested, marked with the specifications of manufacture and maintained in accordance with the regulations of DOTn 49 CFR Parts 100—185 or the ASME Boiler and Pressure Vessel Code, Section VIII.

D. Pressure relief devices will be provided for the cylinders.

E. Piping systems (if provided) will be marked in accordance with ASME A13.1. Markings used for piping systems will consist of the content's name and include a direction-of-flow arrow. Markings will be provided at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at not less than every 20-ft or fraction thereof throughout the piping run.

F. Compressed gas containers, cylinders, tanks and systems will be secured against accidental dislodgement and against access by unauthorized personnel.

G. The handling of compressed gas containers, cylinders and tanks shall comply with IFC §5305.10.1 and §5305.10.2.

H. Any gas storage rooms containing asphyxiant or irritant gases will be provided with ventilation, an oxygen depletion alarm, or a gas detection system.

5.12 Emergency Wash Systems

A. Any room wherein corrosives or flammable liquids are handled or where open flame devices are used, will be equipped with one or more emergency showers and eyewash stations installed in accordance with ISEA Z358.1. and ASSE 1071 (IPC §411).

B. Waste connections shall not be required for emergency showers and eyewash stations.

C. Where hot and cold water is supplied to an emergency shower or eyewash station, the temperature of the water supply shall be only be controlled by a temperature actuated mixing valve in accordance with ASSE 1071 (IPC §411.3).

5.13 Outdoor Storage Areas

The outdoor storage, dispensing, and storage of hazardous materials will be in accordance with the IFC. Where weather protection is provided for sheltering outdoor hazardous material storage or use areas, such areas shall be considered outdoor storage or use when the weather protection structure complies with IBC §414.6, as follows:

- Walls shall not obstruct more than one side of the structure or do not obstruct more than 25% of the perimeter where walls are provided on multiple sides of the structure.
- The distance from the structure to buildings, lot lines, public ways or means of egress to a public way shall be not less than the distance required for an outside hazardous material storage or use area without weather protection.
- The overhead structure shall be of approved noncombustible construction with a maximum area of 1,500-sf, unless permitted by IBC §506. IBC §506 will permit Type IIB construction for a roof canopy up to 14,000-sf in area.

The storage or staging of compressed oxidizing gases in ISO Tubes within the parking area will be in accordance with NFPA 55 Table 7.7.2. This requires the following minimum distances to buildings not associated with the distribution of oxidizing gases, a public way, or a property line, as well as the minimum distance between storage areas:

- 0-50,000-ft^3: 5-ft
- 50,001-100,000-ft^3: 10-ft
- ≥100,000-ft^3: 15-ft

The outdoor stationary large insulated liquid carbon dioxide system in the tank farm will be located in accordance with NFPA 55 Table 13.5.1 as follows:

- Buildings: 2-ft
- Wall Openings: 2-ft
- Air Intakes: 10-ft
- Property Lines: 5-ft
- Combustible Materials: 15-ft
- Incompatible Hazardous Materials: 20-ft
- Building Exits: 10-ft

The liquified nitrogen tank located in the exterior utility yard will be considered a cryogenic fluid and will be stored in accordance with NFPA 55 Chapter 8. Guard posts or other means will be provided to protect the tank from vehicular or other damage. The outdoor tank area will be provided with a means to prevent accidental discharge of fluids from endangering personnel, containers, equipment, and adjacent structures and from entering enclosed spaces. The following separation distances will be provided between the tank and exposure hazards in accordance with NFPA 55 Table 8.6.2.

- Buildings: 1-ft
- Wall Openings: 1-ft
- Air Intakes: 10-ft
- Property Lines: 5-ft
- Combustible Materials: 15-ft
- Incompatible Hazardous Materials: 20-ft
- Building Exits: 10-ft

6.0 HIGH-HAZARD (GROUP H) REQUIREMENTS

6.1 Wonik Materials - Group H Areas

A. The following areas are classified as a Group H-2 occupancy:

- Gas Cylinder Storage Room

6.2 Fire Protection & Detection

A. Group H occupancies must be equipped throughout with an automatic sprinkler system. An automatic sprinkler system installed in accordance with NFPA 13 has been provided throughout the entire Wonik Materials facility.

B. Areas in which compressed gases or cryogenic fluids are stored or used shall be protected with a sprinkler system designed for not less than Ordinary Hazard Group 2 with a design density of 0.20-gpm/sf over 1,500-sf.

C. Areas in which the flammable or pyrophoric compressed gases or cryogenic fluids are stored or used shall be protected with a sprinkler system designed for not less than Extra Hazard Group 1 with a design density of 0.30-gpm/sf over 2,500-sf.

D. Group H occupancies must be equipped with automatic fire detection systems (NFPA 72) and emergency alarms for the detection and notification of an emergency condition.

6.3 Explosion Control

A. Since the quantity of pyrophoric and flammable gases is exceeded in the gas cylinder storage area, IFC Table 911.1, requires the spaces to be equipped with deflagration venting in accordance with NFPA 68 or an explosion prevention system in accordance with NFPA 69.

B. The details of the explosion control system will be determined as the project progresses.

6.4 Floor Requirements

A. Floors in Group H storage areas containing corrosive liquids and highly toxic or toxic materials must be of liquid-tight, non-combustible construction (IBC §415.10.3).

6.5 Limit Controls

A. Limit controls will be provided in accordance with IFC §5004.8, as outlined below.

B. Materials that must be kept at temperatures other than normal ambient temperatures to prevent a hazardous reaction will be provided with an approved means to maintain the temperature within a safe range.

C. Redundant temperature control equipment that will operate on failure of the primary temperature control system will be provided. The use of alternative means that prevent a hazardous reaction will be permitted subject to the approval of the AHJ.

D. Stationary tanks and equipment containing hazardous material liquids that can generate pressures exceeding design limits due to exposure fires or internal reaction will have some form of construction or other approved means that will relieve excessive internal pressure. The termination point for a piped vent systems used for pressure relief will be located to:

- Prevent impingement exposure on the system served and to minimize the effects of high-temperature thermal radiation.
- Prevent the effects of contact with the material being vented from the escaping plume on the supply system, personnel, adjacent structures, and ignition sources.

6.6 Emergency Alarms

A. Emergency alarm-initiating devices will be installed outside of each exit or exit access door of storage rooms. The activation of this device must sound a local alarm, 15 dBA above the ambient sound level, to alert occupants of an emergency involving hazardous materials.

B. Where hazardous materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 are transported through corridors, an emergency telephone system, local manual alarm station or an approved alarm-initiating device will be provided at not more than 150-ft intervals and at each exit and exit access doorway throughout the transport route.

C. Emergency alarm systems will be supervised by the fire alarm system to provide a supervisory signal to an approved central, proprietary, or remote station service.

D. Emergency alarm systems will be provided with emergency power.

6.7 Ventilation Systems

A. The gas cylinder storage area shall be provided with mechanical exhaust ventilation in accordance with the IMC as follows (IMC §502.8):

- Mechanical ventilation will be provided at a rate of not less than 1-cfm per square-foot of floor area over the storage area.
- The systems will operate continuously unless alternate designs are approved.
- A manual shutoff control will be provided outside of the room in a position adjacent to the access door to the room or in another approved location. The switch will be a break-glass or other approved type and will be labeled “VENTILATION SYSTEM EMERGENCY SHUTOFF.”

- The exhaust ventilation will be designed to consider the density of the potential fumes or vapors released. For fumes or vapors that are heavier than air, exhaust will be taken from a point within 12 inches of the floor.
- The location of both the exhaust and inlet air openings will be designed to provide air movement across all portions of the floor or room to prevent the accumulation of vapors.
- Exhaust air capable of emitting hazardous vapors and contaminants such as explosive or flammable vapors, fumes or dusts; flammable, highly toxic or toxic gases; or radioactive materials will not be recirculated to occupied areas.

B. Where gases, liquids or solids in amounts exceeding the MAQ per control area and having a hazard ranking of 3 or 4 in accordance with NFPA 704 are dispensed or used, mechanical exhaust ventilation will be provided to capture gases, fumes, mists or vapors at the point of generation.

C. Electrical equipment and appliances used in operations that generate explosive or flammable vapors, fumes or dusts will be interlocked with the ventilation system so that the equipment and appliances cannot be operated unless the ventilation fans are in operation.

D. Motors for fans used to convey flammable vapors or dusts will be located outside the duct or be protected with approved shields and dustproofing.

E. Parts of fans in contact with explosive or flammable vapors, fumes or dusts will be of nonferrous or non-sparking materials, or their casing will be lined or constructed of such material.

F. Where the size and hardness of materials passing through a fan are capable of producing a spark, both the fan and the casing will be of non-sparking materials.

G. Where fans are required to be spark resistant, their bearings will not be within the airstream, and all parts of the fan will be grounded.

H. Equipment and appliances used to exhaust explosive or flammable vapors, fumes or dusts will bear an identification plate stating the ventilation rate for which the system was designed.

I. Fans located in systems conveying corrosives will be of materials that are resistant to the corrosive or will be coated with corrosion-resistant materials.

6.8 Electrical Classification

A. Electrical utilization equipment and wiring must not constitute a source of ignition for any ignitable vapor that might be present under normal operation or because of a spill.

B. As defined by 500.5(B)(1) of NFPA 70, a Class I, Division 1 (CID1) location will be any location where one of the following conditions exists:

- An ignitable concentration of flammable gas or vapor can exist under normal operating conditions.
- An ignitable concentration of flammable gas or vapor can exist frequently because of repair or maintenance operations or because of leakage.

- Breakdown or faulty operation of equipment or processes might release an ignitable concentration of flammable gas or vapor and might also cause simultaneous failure of electrical equipment in such a way as to directly cause the electrical equipment to become a source of ignition.

C. As defined in 500.5(B)(2) of NFPA 70, a Class I, Division 2 (CID2) location will be any location where one of the following conditions exists:

- A flammable gas or a Class I liquid [FP < 37.8°C (100°F)] is handled, processed, or used, but any flammable gas, vapor, or liquid is confined within a closed container or a closed system from which it can escape only in the case of an accidental rupture or breakdown of the container or system or in case of abnormal operation of the equipment.
- An ignitable concentration of flammable gas or vapor is normally prevented by positive mechanical ventilation but might exist because of failure or abnormal operation of the ventilating equipment.
- An ignitable concentration of flammable gas or vapor might occasionally be transmitted from an adjacent Class I, Division 1 location, unless such transmission is prevented by positive pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided.

D. The Gas Cylinder Storage Room shall be classified, at minimum, as **CID2** due to the bulk storage of compressed flammable gas.

E. Electrical equipment in classified areas will be protected by one or more of the techniques in NFPA 70 500.7. The equipment will be listed or labeled for the explosive, combustible, or ignitable properties of the volatile flammable solvents and will be marked to show the environment for which it has been evaluated. This includes the following:

- Class and Division
- Material Classification Group
- Equipment Temperature
- Ambient Temperature Range

6.9 Spill Control & Secondary Containment Requirements

A. Group H rooms used for storage of hazardous materials liquids in individual containers having a capacity of more than 55-gal, or in which the aggregate capacity of multiple vessels exceeds 1,000 gallons, must be provided with spill control to prevent the flow of liquids to adjoining areas.

B. Spill control must be designed to contain a spill from the largest single vessel.

C. Group H rooms used for the storage of liquids or solids where the capacity of an individual vessel exceeds 55 gal (or 550-lb for solids) or the aggregate capacity of multiple vessels exceeds 1,000 gal (or 10,000-lb for solids) must be provided with secondary containment.

D. Secondary containment must be designed to contain a spill from the largest vessel plus the design flow volume of fire protection water calculated to discharge from the fire-extinguishing

system over the minimum required system design area, or area of the room, whichever is smaller, for a period of 20 minutes.

E. Where spill control or secondary containment is required, floors inside the room must be constructed using one of the following methods to meet the performance criteria outlined above:

- Liquid tight sloped or recessed floors
- Liquid tight floors with liquid tight raised or recessed sills/dikes
- Sumps and collection systems

F. Except for surfacing, the floors, sills, dikes, sumps, and collection systems will be constructed of noncombustible material, and the liquid tight seal will be compatible with the material stored.

G. Where liquid tight sills or dikes are provided, they will not be required at perimeter openings that are provided with an open-grate trench across the opening that connects to an approved collection system.

H. A monitoring method will be provided to detect hazardous materials in the secondary containment system.

- Monitoring method is permitted to be visual inspection of the primary or secondary containment or other approved means.
- Where monitoring devices are provided, they will be connected to distinct visual or audible alarms.

I. In addition to the methods above, secondary containment can utilize drainage systems leading to an approved location.

- The slope of floors in indoor locations to drains or similar areas in outdoor locations will be not less than 1 percent.
- Drains from indoor storage areas will be sized to carry the volume of the fire protection water, as determined by the design density discharged from the automatic fire-extinguishing system over the minimum required system design area, or area of the room or area in which the storage is located, whichever is smaller.
- Materials of construction for drainage systems will be compatible with the materials stored.
- Separate drainage systems will be provided to avoid mixing incompatible materials where such materials are present in an open-use condition.
- Drains will terminate in an approved location away from buildings, valves, means of egress, fire access roadways, adjoining property, and storm drains.

6.10 Highly Toxic and Toxic Compressed Gas Requirements

A. The indoor storage and use of highly toxic and toxic compressed gases shall be in accordance with IFC §6004.2.1 through §6004.2.2.10.3, as outlined for applicability below.

B. All highly toxic and toxic cylinders shall be located within gas cabinets, exhausted enclosures or gas rooms. Portable and stationary tanks shall be located within gas rooms or exhausted enclosures.

C. The room or area in which gas cabinets or exhausted enclosures are located shall be provided with exhaust ventilation. Gas cabinets or exhausted enclosures shall not be used as the sole means of exhaust for any room or area.

D. One or more gas cabinets or exhausted enclosures shall be provided to handle leaking cylinders, containers or tanks.

E. The exhaust ventilation from gas cabinets, exhausted enclosures, and gas rooms shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The system shall be designed in accordance with IFC §6004.2.2.7.1 through §6004.2.2.7.5 and Section 510 of the IMC, as outlined below.

F. Treatment systems shall be capable of diluting, absorbing, containing, neutralizing, burning or otherwise processing the contents of the largest single vessel of compressed gas. Where a total containment system is used, the system shall be designed to handle the maximum anticipated pressure of release to the system when it reaches equilibrium.

G. Treatment systems shall be designed to reduce the maximum allowable discharge concentrations of the gas to one-half immediate by dangerous to life and health (IDLH) at the point of discharge to the atmosphere. Where more than one gas is emitted to the treatment system, the treatment system shall be designed to handle the worst-case release based on the release rate, the quantity and the IDLH for all compressed gases stored or used.

H. Treatment systems shall be sized to process the maximum worst-case release of gas based on the maximum flow rate of release from the largest vessel utilized. The entire contents of the largest compressed gas vessel shall be considered.

I. The maximum flow rate of release for cylinders shall be calculated based on the total release from the cylinder or tank within 5 minutes for nonliquefied gases or 30 minutes for liquefied gases. Where cylinders are equipped with approved excess flow or reduced flow valves, the worst-case release shall be determined by the maximum achievable flow from the valve as determined by the valve manufacturer or compressed gas supplier. Reduced flow and excess flow valves shall be permanently marked by the valve manufacturer to indicate the maximum design flow rate. Such markings shall indicate the flow rate for air under normal temperature and pressure.

J. A gas detection system complying with IFC §916 shall be provided to detect the presence of gas at or below the PEL or ceiling limit of the gas for which detection is provided. The system shall be capable of monitoring the discharge from the treatment system at or below one-half the IDLH limit and shall initiate an alarm.

K. The gas detection system shall initiate a local alarm and transmit a signal to a constantly attended control station when a short-term hazard condition is detected. The alarm shall be both audible and visible and shall provide warning both inside and outside the area where gas is detected. The audible alarm shall be distinct from all other alarms.

6.11 Hazardous Exhaust

A. Hazardous exhaust systems are systems designed to capture and control hazardous emissions generated from product handling or processes and convey those emissions to the outdoors. Hazardous emissions include flammable vapors, gases, fumes, mists or dusts, and volatile or

airborne materials posing a health hazard, such as toxic or corrosive materials. For the purposes of this section, the health-hazard rating of materials will be as specified in NFPA 704.

B. A hazardous exhaust system will be provided wherever operations involving the handling or processing of hazardous materials, in the absence of such exhaust systems and under normal operating conditions, have the potential to create one of the following conditions:

- A flammable vapor, gas, fume, mist or dust is present in concentrations exceeding 25 percent of the lower flammability limit of the substance for the expected room temperature.
- A vapor, gas, fume, mist or dust with a health-hazard rating of 4 is present in any concentration.
- A vapor, gas, fume, mist or dust with a health-hazard rating of 1, 2 or 3 is present in concentrations exceeding 1 percent of the median lethal concentration of the substance for acute inhalation toxicity.

C. The design and operation of a hazardous exhaust system will be such that:

- The emissions are confined to the area in which they are generated by air currents, hoods or enclosures and will be exhausted by a duct system to a safe location or treated by removing contaminants.
- Flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit.
- Contaminants are captured by an airstream at the area where the emissions are generated and conveyed into a product-conveying duct system such that contaminated air is removed from the work area.
- Hoods or enclosures will be used where contaminants originate in a limited area of a space. The design of the hood or enclosure will be such that:
- Air currents created by the exhaust systems will capture the contaminants and transport them directly to the exhaust duct.
- Areas are diluted below the thresholds specified in §510.2 with air that does not contain other hazardous contaminants.
- Makeup air intakes will be provided at a rate approximately equal to the rate that air is exhausted by the hazardous exhaust system.

D. Hazardous exhaust systems will be independent of other types of exhaust systems.

- Incompatible materials will not be exhausted through the same hazardous exhaust system.
- Hazardous exhaust systems will not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

E. The minimum clearance between hoods and combustible construction will be the clearance required by the duct system.

F. Hazardous exhaust duct systems will extend directly to the exterior of the building and will not extend into or through ducts and plenums. Where direct connection to the exterior is not feasible, the following measures will be taken and the hazardous exhaust duct penetrates a fire-resistant rated will, the following protection will be provided.

- Fire and smoke dampers will not be provided at the point of penetration
- Ducts will be enclosed in FRR construction from the point of penetration to the outlet.
- In lieu of FRR duct enclosures, the interior of the duct may be equipped with an approved automatic fire suppression system.

G. Ducts conveying flammable and combustible fumes, mists and vapors will require an approved automatic fire suppression system where the largest cross-sectional diameter of the duct is less than 10-in. Exhaust ducts conveying only health hazard fumes, mists, and vapors are not required to be provided with a suppression system.

A hazardous exhaust system will be required for the treatment system serving the highly toxic and toxic compressed gas cylinder storage cabinets, exhausted enclosures or room.

6.12 Emergency & Standby Power

A. Emergency power shall be provided for occupancies with silane gas as required in accordance with IFC §2702.2.13. This would apply to the gas cylinder storage area.

B. Emergency or standby power must be provided in accordance with IBC §2702 for the following systems, where required as hazardous material safeguards:

- Mechanical Ventilation
- Treatment Systems
- Temperature Control
- Fire Alarm & Emergency Alarm Systems
- Gas & Smoke Detection Systems
- Exit Signage

C. Standby power for mechanical ventilation, treatment systems and temperature control systems will not be required where an approved fail-safe engineered system is installed.

7.0 CONCLUSION

The information provided above outlines the applicable hazardous materials requirements determined in accordance with the applicable codes and standards. The results of this analysis demonstrate that all hazardous materials are either below the maximum allowable quantity per control area, or appropriately stored in High-Hazard Group H rooms, and that each High-Hazard Group H room is provided with spill control and secondary containment.

Additional provisions may be required if changes or alterations are made in the facility regarding the chemical inventory, quantities, or way in which chemicals are handled, used, or stored. If the hazardous material quantities are modified, this analysis shall also be modified to reflect those changes.

Prepared by:

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Hazardous Material Inventory Statement (HMIS) - WONIK MATERIALS											STORAGE			CLOSED USE			OPEN USE	
CAS #	UN NO.	Chemical Name	Component(s)	Hazard Category	State (S, L, G)	Purity	Container Size	Quantity	Storage/Use	Location	Group H Classification	Gallons	Lbs	Cubic Ft	Gallons	Lbs	Cubic Ft	Gallons	Lbs
O2 : 7782-44-7 He : 7440-59-7	1956	0.5%O2/He	Oxygen - 0.5% Helium - 99.5%	Compressed Gas	Compressed Gas	Mixture	47L - 110 kg/cm^2	20	Storage	Gas Cylinder Storage	None	0	0	33.21	0	0	0	0	0
F2 : 7782-41-4 Kr : 7439-90-9 Ne : 7440-01-9	1956	0.95%F2/1.25%Kr/Ne	Fluorine - 0.95% Krypton - 1.25% Neon - 97.8%	Compressed Gas	Compressed Gas	Mixture	47L - 6,000 L	50	Storage	Gas Cylinder Storage	None	0	0	10594	0	0	0	0	0
F2 : 7782-41-4 Ar : 7440-37-1 Ne : 7440-01-9	1956	0.95%F2/3.5%Ar/Ne	Fluorine - 0.95% Argon - 3.5% Neon - 95.55%	Compressed Gas	Compressed Gas	Mixture	47L - 6,000 L	50	Storage	Gas Cylinder Storage	None	0	0	10594	0	0	0	0	0
PH3 : 7803-51-2 He : 7440-59-7	1955	1%PH3/He	Phosphine - 1% Helium - 99%	Highly Toxic	Compressed Gas	Mixture	47L - 110 kg/cm^2	5	Storage	Gas Cylinder Storage	Group H-4	0	0	8.3	0	0	0	0	0
151625-26-2	2924	1,2-Bis(diisopropylamino)disilane	BDIPADS - 100%	Flammable Liquid IB Water Reactive 2 Corrosive	Liquid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	186	0	0	0	0	0	0	0
He : 7440-59-7 Ne : 7727-37-9	1956	1.2%He/N2	Helium - 1.2% Nitrogen - 98.8%	Compressed Gas	Compressed Gas	Mixture	47L - 110 kg/cm^2	50	Storage	Gas Cylinder Storage	None	0	0	82.25	0	0	0	0	0
Kr : 7439-90-9 Ne : 7440-01-9	1956	1.25%Kr/Ne	Krypton - 1.25% Neon - 98.75%	Compressed Gas	Compressed Gas	Mixture	47L - 6,000 L	50	Storage	Gas Cylinder Storage	None	0	0	10594	0	0	0	0	0
Ge2H6 : 13818-89-8 H2 : 1333-74-0	1954	10% Ge2H6/H2	Digermane - 10% Hydrogen - 90%	Flammable Gas	Compressed Gas	Mixture	49L	10	Storage	Gas Cylinder Storage	Group H-2	0	0	17.31	0	0	0	0	0
1333-74-0 7782-65-2	1953	10% GeH4/H2	H2 - 90% GeH4 - 10%	Flammable Gas Toxic	Compressed Gas	Mixture	47L - 2 kg	20	Storage	Gas Cylinder Storage	Group H-2 Group H-4	0	0	32.9	0	0	0	0	0
He : 7440-59-7 N2 : 7727-37-9	1956	10% He/90% N2	Nitrogen - 90% Helium - 10%	Compressed Gas	Compressed Gas	Mixture	47L	30	Storage	Gas Cylinder Storage	None	0	0	49.79	0	0	0	0	0
Xe: 7440-63-3 Ar: 7440-37-1 Ne: 7440-01-9	1956	10ppmXe/3.5%Ar/Ne	Xenon - 10 ppm Argon - 3.5% Neon - 96.5%	Compressed Gas	Compressed Gas	Mixture	47L - 6,000 L	50	Storage	Gas Cylinder Storage	None	0	0	10594	0	0	0	0	0
F2 : 7782-41-4 N2 : 7727-37-9	3306	20%F2/N2	Fluorine - 20% Nitrogen - 80%	Oxidizing Gas Highly Toxic Corrosive	Compressed Gas	Mixture	47L - 1,150 psi	150	Storage	Gas Cylinder Storage	Group H-3 Group H-4	0	0	246.75	0	0	0	0	0
O2 : 7782-44-7 He : 7440-59-7	3156	30%O2/He	Oxygen - 30% Helium - 70%	Oxidizing Gas	Compressed Gas	Mixture	47L - 110 kg/cm^2	5	Storage	Gas Cylinder Storage	Group H-3	0	0	8.3	0	0	0	0	0
H2 : 1333-74-0 N2 : 7727-37-9	1956	4%H2/N2	Hydrogen - 4% Nitrogen - 96%	Compressed Gas	Compressed Gas	Mixture	Iso Tube - 18,000 L	3	Storage	Tank Lorry Storage	None	0	0	1890	0	0	0	0	0
1MS : 992-94-9 Ar : 7440-37-1	1954	5% 1MS/Ar	Methylsilane - 5% Argon - 95%	Flammable Gas	Compressed Gas	Mixture	47L - 1,800 psi	10	Storage	Gas Cylinder Storage	Group H-2	0	0	16.45	0	0	0	0	0
H2 : 1333-74-0 He : 7440-59-7	1954	5%H2/He	Hydrogen - 5% Helium - 95%	Flammable Gas	Compressed Gas	Mixture	47L - 110 kg/cm^2	10	Storage	Gas Cylinder Storage	Group H-2	0	0	16.45	0	0	0	0	0
7664-41-7	1005	Ammonia	NH3 - 100%	Flammable Gas Corrosive	Liquified Gas	100%	47L - 22.7 kg / 20 kg	20	Storage	Gas Cylinder Storage	Group H-2 Group H-4	248.32	0	248.32	0	0	0	0	0
27804-64-4	3399	Bis(diethylamino)silane	BDEAS - 100%	Flammable Liquid IC Water Reactive 2 Toxic	Liquid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	186	0	0	0	0	0	0	0
10294-34-5	1741	Boron Trichloride	BCl3 - 100%	Toxic Corrosive	Liquefied Gas	100%	47L - 50 kg	10	Storage	Gas Cylinder Storage	Group H-4	0	0	124.12	0	0	0	0	0
7637-07-2	1008	Boron Trifluoride	BF3 - 100%	Highly Toxic Corrosive	Compressed Gas	100%	47L - 800 psi	10	Storage	Gas Cylinder Storage	Group H-4	0	0	16.6	0	0	0	0	0
124-38-9	1013	Carbon Dioxide	CO2 - 100%	Compressed Gas	Liquefied Gas	100%	Tank Lorry - 17,272 kg	4	Storage	Tank Lorry Storage	None	0	152308.6	0	0	0	0	0	0
630-08-0	1016	Carbon Monoxide	CO - 100%	Flammable Gas Toxic	Compressed Gas	100%	47.5L - 6,200 L	10	Storage	Gas Cylinder Storage	Group H-2 Group H-4	0	0	16.625	0	0	0	0	0
463-58-1	2204	Carbonyl Sulfide	COS - 100%	Flammable Gas Highly Toxic	Liquified Gas	100%	47L - 40 kg	50	Storage	Gas Cylinder Storage	Group H-2 Group H-4	621.2	0	621.2	0	0	0	0	0
7782-50-5	1017	Chlorine	Cl2 - 100%	Oxidizing Gas Highly Toxic Corrosive	Liquefied Gas	100%	47L - 50 kg	20	Storage	Gas Cylinder Storage	Group H-3 Group H-4	248.28	0	248.28	0	0	0	0	0
7790-91-2	1749	Chlorine Trifluoride	ClF3 - 100%	Oxidizing Gas - Liquefied Highly Toxic Corrosive	Liquefied Gas	100%	47L	10	Storage	Gas Cylinder Storage	Group H-3 Group H-4	124.1	0	0	0	0	0	0	0
7782-39-0	1957	Deuterium	D2 - 100%	Flammable Gas	Compressed Gas	100%	47L	20	Storage	Gas Cylinder Storage	Group H-2	0	0	33.2	0	0	0	0	0
12078-25-0	1992	Dicarbonylcyclopentadienylcobalt	CpCoCO - 100%	Flammable Liquid IC Toxic	Liquid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	186	0	0	0	0	0	0	0
4109-96-0	2189	Dichlorosilane	DCS - 100%	Flammable Gas Highly Toxic Corrosive	Compressed Gas	100%	47L	10	Storage	Gas Cylinder Storage	Group H-2 Group H-4	0	0	16.6	0	0	0	0	0
56792-69-9	1993	Dicobalt Hexacarbonyl Tert-butylacetylene	CCTBA - 100%	Combustible Liquid IIIA	Liquid	100%	47L	30	Storage	Gas Cylinder Storage	Group H-3	186	0	0	0	0	0	0	0
75-10-5	3252	Difluoromethane	CH2F2 - 100%	Flammable Gas	Liquefied Gas	100%	47L - 10 kg	72	Storage	Gas Cylinder Storage	Group H-2	894	0	0	0	0	0	0	0
13760-02-6	3129	Diiodosilane	DIS - 100%	Combustible Liquid II Water Reactive 2 Toxic Corrosive	Liquid	100%	19L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	75.29	0	0	0	0	0	0	0
908831-34-5		Di-iso-propylaminosilane	DIPAS	Flammable Liquid IB Water Reactive 3 Corrosive	Liquid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	186	0	0	0	0	0	0	0

Hazardous Material Inventory Statement (HMIS) - WONIK MATERIALS											STORAGE			CLOSED USE			OPEN USE	
CAS #	UN NO.	Chemical Name	Component(s)	Hazard Category	State (S, L, G)	Purity	Container Size	Quantity	Storage/Use	Location	Group H Classification	Gallons	Lbs	Cubic Ft	Gallons	Lbs	Cubic Ft	Gallons	Lbs
1590-87-0	3161	Disilane	Si2H6 - 100%	Flammable Gas Pyrophoric	Compressed Gas	100%	47L - 10 kg	82	Storage	Gas Cylinder Storage	Group H-2	0	0	100.78	0	0	0	0	0
74-85-1	1962	Ethylene	C2H4 - 100%	Flammable Gas	Liquified Gas	100%	47L - 10.25 kg	10	Storage	Gas Cylinder Storage	Group H-2	0	0	16.45	0	0	0	0	0
75-46-7	1984	Fluoroform	CHF3 - 100%	Compressed Gas	Liquefied Gas	100%	47L - 35 kg	30	Storage	Gas Cylinder Storage	None	0	0	49.35	0	0	0	0	0
75-73-0	1982	Halocarbon R-14 (Tetrafluoromethane)	CF4 - 100%	Compressed Gas	Compressed Gas	100%	47L - 32 kg	30	Storage	Gas Cylinder Storage	None	0	0	49.35	0	0	0	0	0
7440-59-7	1046	Helium	He - 100%	Compressed Gas Inert Gas	Compressed Gas	100%	Iso Tube	4	Storage	Tank Lorry Storage	None	0	0	1128664.5	0	0	0	0	0
13465-77-5	2987	Hexachlorodisiliane	HCDS - 100%	Combustible Liquid IIIA Corrosive	Liquid	100%	19L - 26.5 kg	30	Storage	Gas Cylinder Storage	Group H-3 Group H-4	150.55	0	0	0	0	0	0	0
685-63-2	3160	Hexafluoro-1, 3-Butadiene	C4F6 - 100%	Toxic	Liquefied Gas	100%	47L	10	Storage	Gas Cylinder Storage	Group H-4	0	0	124.13	0	0	0	0	0
7647-01-0	1050	Hydrogenchloride	HCl - 100%	Toxic Corrosive	Liquefied Gas	100%	440L - 250 kg	10	Storage	Gas Cylinder Storage	Group H-4	0	0	1162.36	0	0	0	0	0
7647-01-0	1050	Hydrogenchloride	HCl - 100%	Toxic Corrosive	Liquefied Gas	100%	Iso Tube	4	Storage	Tank Lorry Storage	Group H-4	0	0	679156	0	0	0	0	0
16921-96-3	3307	Iodine Heptafluoride	IF7 - 100%	Oxidizing Gas Highly Toxic Corrosive	Liquefied Gas	100%	47L	10	Storage	Gas Cylinder Storage	Group H-3 Group H-4	0	0	16.45	0	0	0	0	0
74-82-8	1971	Methane	CH4 - 100%	Flammable Gas	Compressed Gas	100%	47L - 120 kg/cm^2	10	Storage	Gas Cylinder Storage	Group H-2	0	0	16.45	0	0	0	0	0
10241-05-1	2508	Molybdenum(V) Chloride	MoCl5 - 100%	Corrosive	Solid	100%	47L	5	Storage	Gas Cylinder Storage	Group H-4	0	1410	0	0	0	0	0	0
13637-68-8	3260	Molybdenum(VI) Dichloride Dioxide	MoO2Cl2 - 100%	Corrosive	Solid	100%	47L	30	Storage	Gas Cylinder Storage	Group H-4	0	1410	0	0	0	0	0	0
10102-43-9	1660	Nitric Oxide	NO - 100%	Oxidizing Gas Toxic	Compressed Gas	100%	47L - 20 bar	30	Storage	Gas Cylinder Storage	Group H-3 Group H-4	0	0	49.35	0	0	0	0	0
7783-54-2	2451	Nitrogen Trifuoride	NF3 - 100%	Oxidizing Gas	Compressed Gas	100%	440L	10	Storage	Gas Cylinder Storage	Group H-3	0	0	4400	0	0	0	0	0
7783-54-2	2451	Nitrogen Trifuoride	NF3 - 100%	Oxidizing Gas	Compressed Gas	100%	Iso Tube - 8,000 kg	12	Storage	Tank Lorry Storage	Group H-3	0	0	1128664.5	0	0	0	0	0
10024-97-2	1070	Nitrous Oxide	N2O - 100%	Oxidizing Gas	Liquefied Gas	100%	ISO Tube - 9,000 kg	11	Storage	Tank Lorry Storage	Group H-3	21322	1410	0	0	0	0	0	0
10024-97-2	1070	Nitrous Oxide	N2O - 100%	Oxidizing Gas	Liquified Gas	100%	47L - 27 kg / 10 kg	200	Storage	Gas Cylinder Storage	Group H-3	2482.22	0	0	0	0	0	0	0
115-25-3	1077	Octafluorocyclobutane	C4F8 - 100%	Compressed Gas	Liquefied Gas	100%	47L - 40 kg	92	Storage	Gas Cylinder Storage	None	1142	0	0	0	0	0	0	0
556-67-2	1993	Octamethylcyclotetrasiloxane	OMCTS - 100%	Combustible Liquid IIIA	Liquid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3	186	0	0	0	0	0	0	0
19824-59-0	3132	Pentakis (Dimethylamino) Tantalum(V)	PDMATa - 100%	Flammable Solid Water Reactive 2 Corrosive	Solid	100%	47L	15	Storage	Gas Cylinder Storage	Group H-3 Group H-4	0	1410	0	0	0	0	0	0
1333-74-0 7803-51-2	3305	Phosphine (15%) and Hydrogen (85%)	H2 - 85% PH3 - 15%	Flammable Gas Highly Toxic	Compressed Gas	Mixture	47L - 1.4 kg	308	Storage	Gas Cylinder Storage	Group H-2	0	0	511.06	0	0	0	0	0
7783-55-3	3304	Phosphorus(III) Fluoride	PF3 - 100%	Highly Toxic Corrosive	Liquefied Gas	100%	47L - 10 kg / 5 kg	50	Storage	Gas Cylinder Storage	Group H-4	0	0	621.2	0	0	0	0	0
7647-19-0	2198	Phosphorus(V) Fluoride	PF5 - 100%	Highly Toxic Corrosive	Compressed Gas	100%	47L	10	Storage	Gas Cylinder Storage	Group H-4	0	0	16.45	0	0	0	0	0
115-07-1	1077	Propylene	C3H6 - 100%	Flammable Gas	Compressed Gas	100%	47L - 18 kg	120	Storage	Gas Cylinder Storage	Group H-2	0	0	197.4	0	0	0	0	0

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Houston, Texas, 77002

September 13, 2024

Memorandum

This memorandum aims to develop a permitting strategy for the new Wonik Materials Manor, Texas, Site (the "Facility") in Travis County, Manor, Texas. eSPARC utilized and reviewed technical data provided by Build Block, Inc. ("Buildblock") to create this memorandum. The following sections are environmental permits that may apply and need to be obtained by the Facility to maintain compliance with environmental regulatory requirements in the State of Texas. Other environmental programs may be necessary but do not necessarily involve permits. These requirements are also outlined in the memorandum below.

Executive Summary

The scope of work for this task involves a comprehensive Critical Issues Analysis ("CIA") and permitting assessment to ensure regulatory compliance and address potential environmental impacts. The CIA aims to identify key environmental and regulatory concerns, necessary permits, associated costs, and timelines for approval. This analysis is the starting point to evaluate potential issues and requirements essential for project development, construction, and operation.

The assessment process includes several key tasks: an initial Environmental Site Screening to review preliminary project details; a Critical Issues Assessment to examine zoning, noise, ecological, and cultural resource impacts; and the preparation of a Critical Issues Analysis Report. This report summarizes findings, presents a preliminary Permitting Plan with a permit matrix, and outlines required steps, timeframes, and costs for securing necessary approvals. This structured approach ensures that all critical factors are considered and addressed to facilitate smooth project development.

Process Description

Wonik Materials is planning to establish a set of industrial facilities in Manor, Texas, dedicated to the manufacturing, transporting, and storing of semiconductor gases. The project involves constructing advanced gas manufacturing lines, innovative cleanroom environments, analysis facilities, and essential infrastructure upgrades to boost production capacity. The primary aim of the facility is to support large-scale semiconductor chip manufacturing operations in Austin and Taylor, Texas.

The project will be executed in three phases:

- Phase 1 will focus on setting up the manufacturing lines for advanced semiconductor gas production. It includes investments in specialized equipment, the creation of classroom facilities, and the installation of a sophisticated gas purification system.
- Phases 2 & 3: These phases will expand production capacity and scale up operations to meet increasing market demand.

Air Permitting

Air Permit-by-Rule (PBR)

Travis County is currently in attainment with all National Ambient Air Quality Standards ("NAAQS") pollutants.[1] This means the county's air quality meets or exceeds the federal standards for key pollutants, including ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. Continuous monitoring and regulatory measures ensure these pollutants remain within safe limits, contributing to a healthier environment and national air quality standards compliance.

The Texas Air PBR program allows authorizations for activities that produce more than the de minimis level of emissions but less than other New Source Review ("NSR") options. The major processes during semiconductor gas manufacturing will release emissions and may require specific PBRs for these processes.

Description	Potential Emissions	Applicable PBR
Modifications, additions, or relocations of equipment (excluding add-on controls) used for semiconductor manufacturing operations that result in the addition, increase, or substitution of an air contaminant are permitted by rule provided the following conditions of this section are satisfied.	• PM – 5 tpy • VOCs – 15 tpy • Non-VOCs – 5tpy • Acids/bases – 10 tpy • Any other – 5tpy • Total – 25 tpy	§106.225: Semiconductor Manufacturing
Any air separation or other industrial gas production, storage, or packaging facility is permitted by law. For purposes of this section, industrial gases include only oxygen, nitrogen, helium, neon, argon, krypton, and xenon.	• VOCs • Non-VOCs	§106.372: Industrial Gases
Fugitive Emissions	• VOCs • Non-VOCs	§106.261: Facilities (Emission Limitations)
Fugitive Emissions	• VOCs • Non-VOCs	§106.262: Facilities (Emission and Distance Limitations)

PBR Qualifications

- To qualify for a permit by rule, the following general requirements must be met[2]:
  (1) Total actual emissions authorized under permit by rule from the facility shall not exceed the following limits, as applicable:
    (A) 250 tons per year (tpy) of carbon monoxide (CO) or nitrogen oxides (NO_X);
    (B) 25 tpy of volatile organic compounds (VOC), sulfur dioxide (SO_2), or inhalable particulate matter (PM);
    (C) 15 tpy of particulate matter with diameters of 10 microns or less (PM_{10});
    (D) 10 tpy of particulate matter with diameters of 2.5 microns or less ($PM_{2.5}$); or

[1] https://www3.epa.gov/airquality/greenbook/anayo_tx.html

(E) 25 tpy of any other air contaminant except:

(i) water, nitrogen, ethane, hydrogen, and oxygen; and

(ii) (ii) notwithstanding any provision in any specific permit by rule to the contrary, greenhouse gases as defined in §101.1 of this title (relating to Definitions).

PBR Fees & Timeline:

Permit	Timeline
§106.225: Semiconductor Manufacturing	Approximately 60 days from Authorization
§106.372: Industrial Gases	Approximately 60 days from Authorization
§106.261: Facilities (Emission Limitations)	Approximately 60 days from Authorization
§106.262: Facilities (Emission and Distance Limitations)	Approximately 60 days from Authorization
- PBR Registration Fee	N/A
Project Management General	N/A
Subtotal →	

Air Permitting Target Time Frames

Project Type	Issuance (Days)
Permits By Rule	45
Standard Permits (w/o public notice), Changes to Qualified Facilities (SB1126) and relocations	45
Standard Permits (with public notice)	150
Standard Permits for Concrete Batch Plants (with public notice)	195
New Source Review (NSR) New Permits	285
New Source Review Alterations and other changes	120
New Source Review Amendments	315
New Source Review Renewals	270
Federal New Source Review (Prevention of Significant Deterioration, Nonattainment,112g, PAL) New and Major Modifications	365
Title V Federal Operating Permits - New Site Operating Permit (SOP)	365
Title V Federal Operating Permits - Site Operating Permit Revision	365
Title V Federal Operating Permits - Site Operating Permit Renewal	365
Title V Federal Operating Permits - New General Operating Permit (GOP)	120
Title V Federal Operating Permits - General Operating Permit Revision	330
Title V Federal Operating Permits - General Operating Permit Renewal	210

Note: All the listed issuance time frames are target goals.

Water Use, Water Connection, and Stormwater Permitting

Permits related to municipal water use and connections and the management of stormwater discharges fall under the Facility's responsibility. It is assumed that the Facility plans to conduct all operational activities indoors, where exposure to stormwater is not a factor, and a stormwater permit will not be necessary for their operations. **As a result, a stormwater permit will not be necessary.**

Wastewater Permitting

The project documentation is insufficient to determine if wastewater permitting is required. We will review the information to identify any necessary state and local permits. As our July 23 email noted, the budget includes developing a Texas Pollution Discharge Elimination System ("TPDES") Permit but excludes drafting and laboratory analysis costs. A TPDES permit can take 1 to 2 years, so timely assessment is crucial. If a TPDES permit is unnecessary, we will assist with the appropriate authorization for wastewater discharge or on-site septic systems. Based on the condition that the Facility will not discharge any wastewater, **an industrial wastewater permit is not required.**

Waste – Waste Management Program for Used Oil, Industrial, Universal, & Hazardous Wastes – Texas Operations

The Facility is unlikely to generate more than 1,000 kilograms of hazardous waste in any given month to be considered a Small Quantity Generator. Instead, it would be considered a Very Small Quantity Generator ("VSQG") and exempt from any written permitting or planning requirements. To comply with state and federal regulations, the Facility must identify all generated waste (not exceeding 1,000 kilograms of storage at any time) and deliver or have the waste transported and disposed of off-site by a licensed waste handler. There is no time limit associated with waste generation. The Facility must document that the waste is handled consistently with Universal Waste regulations and that recycling materials do not constitute waste under the Resource Conservation and Recovery Act ("RCRA"). Costs breakdown for a Waste Management Program for Used Oil, Industrial, Universal, & Hazardous Wastes – Texas Operations are presented below.

Waste Management Program for Used Oil, Industrial, Universal, & Hazardous Wastes – Texas Operations & Timeline:

Permit	Timeline
Waste Management Program for Used Oil, Industrial, Universal, & Hazardous Wastes – Texas Operations	Approximately 90 days post-startup
Project Management General	N/A
Subtotal →	

Oil Storage – Spill Prevention, Control and Countermeasure ("SPCC") SPCC

If the Facility intends to store oil in aboveground storage tanks ("ASTs") at the Facility, it may trigger an oil plan to be created. Oil and water mixture containers with a maximum storage capacity of over 1,320 gallons are subject to the Spill Prevention Control and Countermeasure ("SPCC") rule. A mixture of wastewater and oil is "oil" under the statutory and regulatory definition of the term (33 U.S.C. 1321(a)(1) and 40 CFR 110.2 and 112.2). Discharging wastewater containing oil to navigable waters or adjoining shorelines in a "harmful quantity" (40 CFR part 110) is prohibited. As a result, an SPCC Plan will need to be developed for the facility. The purpose of an SPCC Plan is to help facilities prevent a discharge of oil into navigable waters or adjoining shorelines. SPCC plans help facilities prevent oil spills and control a spill should one occur.

There are two thresholds for developing an SPCC Plan. The cost of both options is presented in the Table below. At this time, we anticipate that Option 1 SPCC Plan will be required.

1. Greater than 1,320 gallons but less than 10,000 gallons, is a non-certified SPCC Plan and is a smaller report.
2. Greater than 10,000 gallons requires a professional engineer certification and is a larger report.

Option 1 SPCC Plan & Timeline:

Permit	Timeline
SPCC Plan for less than 10,000 Gallons	Approximately 90 days post-startup
Project Management General	N/A
Subtotal →	

Option 2 SPCC Plan & Timeline:

Permit	Timeline
SPCC Plan for greater than 10,000 Gallons	Approximately 180 days post-startup
Project Management General	N/A
Subtotal →	

Phase I Environmental Site Assessment

eSPARC can provide a Phase I Environmental Site Assessment ("ESA") of the Facility. The Phase I ESA aims to identify *Recognized Environmental Conditions* ("RECs"), as defined by the ASTM E 1527-21 standard, at the site.

The following activities will be conducted as part of the site visit:

- A thorough site inspection, including all accessible building interiors and exterior property and grounds. This site inspection includes a visual inspection to identify the presence of hazardous substances, petroleum products, chemical storage tanks, stained soils, and industrial activities.
- Interviews with persons knowledgeable of the property history.
- An evaluation of risks of neighboring properties upon the subject property.

The following documents will be reviewed as part of the desktop review:

- Historical Aerial Photographs.
- Historical City Directories.
- Historical Fire Insurance Maps.
- Historical Topographical Maps.
- Federal, State, Local, and Tribal Records.
- Chain-of-title for Environmental Liens and/or Activity and Land Use Limitations.
- Available government environmental records of the property may contain information related to spills, environmental releases, fuel tank registrations, hazardous material manifests, and water quality and soil contamination issues.

All findings, recommendations, conclusions, supportive documentation, diagrams, and photographs will be included in a site-specific Phase I ESA report.

Phase I & Timeline:

Permit	Timeline
Texas Facility Phase I (includes document review, onsite Facility review, and report deliverable)	Approximately 60 days from Authorization
Project Management General	N/A
Subtotal →	

This document is the Environmental Questionnaire required by **[Blank]**. The purpose of this **questionnaire is to help determine the appropriate level of environmental review** required under the National Environmental Policy Act (NEPA) and related laws.
The main sections are as follows:

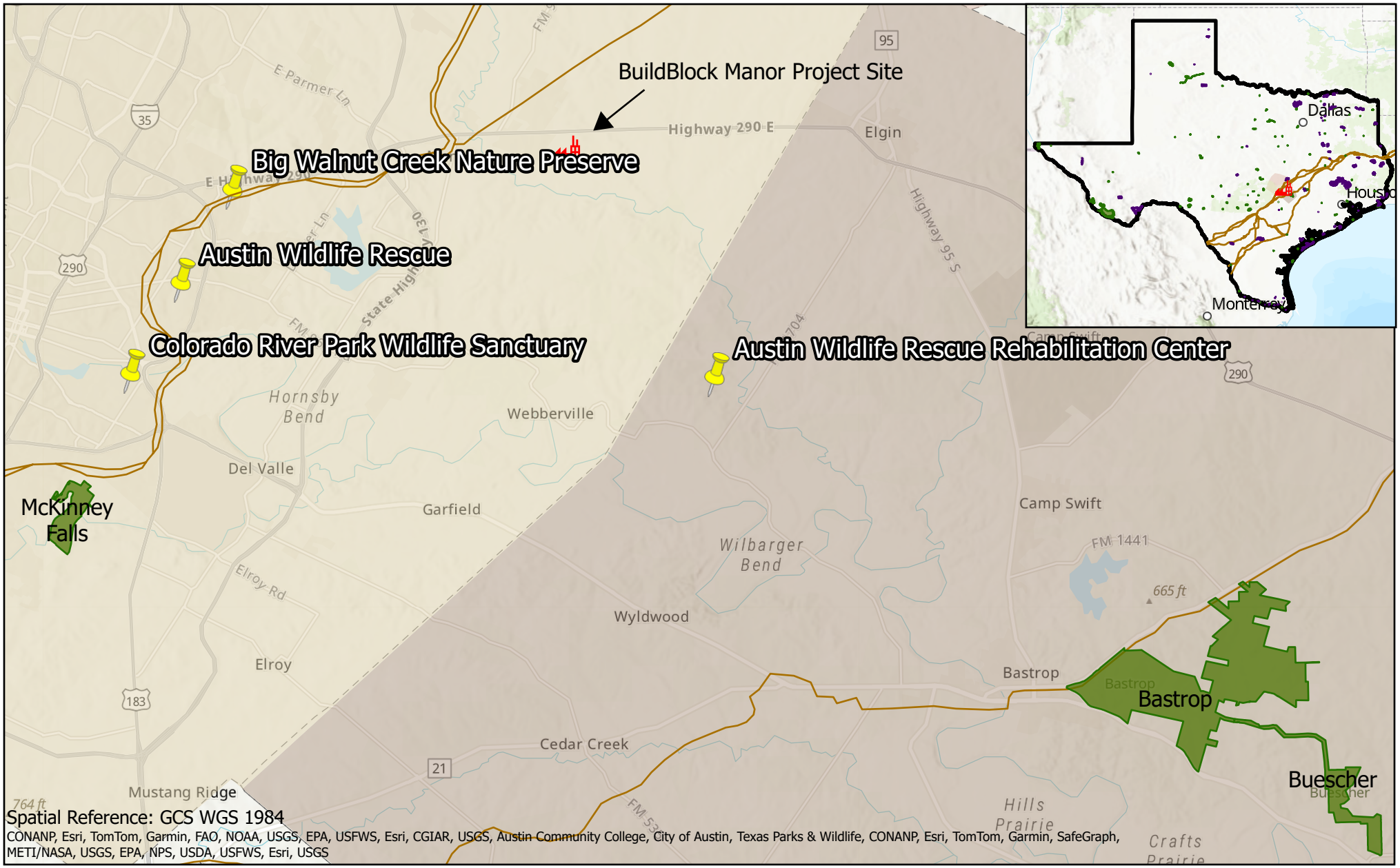
Questionnaire	Answers
1. Project Description: Summary of proposed project and activities.	Wonik Materials plans to establish industrial facilities in Manor, Texas, for the manufacturing, transporting, and storing of semiconductor gases. This construction encompasses the creation of advanced gas manufacturing lines, innovative cleanroom environments, analysis facilities, and essential infrastructure upgrades to enhance production capacity. The production facility prioritizes supply to a large-scale semiconductor chip manufacturing facility in Austin and Taylor, Texas. The project will be structured in 3 phases. - Phase 1: The initial phase focuses on setting up manufacturing lines for advanced semiconductor gas production, including investment in specialized equipment, classroom facilities, and the setup of a highly sophisticated gas purification system - Phases 2&3: The following phases focus on expanding production capacaity and scaling up operations to meet growing market demand.
2. Project Site/Affected Environment: Location, site characteristics, ownership.	The Project Site is located at 12522 & 12542 Old Kimbro Rd, Manor, TX 78653. The Site is a 23.8AC lot (combined) that is owned by Wonik Materials North America LLC, the owner of the project. The Site is currently plated (Lots 4 and 5, Kimbro Road Estates) according to the plat recorded in Volume 79, Page 12, Plat Records of Travis County, Texas. The Site is identified in Travis Central Appraisal District records with Property IDs 236879 and 236885.
3. Resource Consumption and Emissions Stream and Impact: Material inputs and emissions, resource consumption, energy use.	The Wonik Materials Manor project will be built in phases with careful attention to how materials will be handled in all aspects of the project. This will include an analysis of planned operations to ensure that emissions and energy use are minimized and resources conserved. Specific details will be provided once the design is finalized.
4. Tribal, Historical, and Cultural Resources: Presence of tribal lands, historical/cultural resources.	No documented cultural resources are located within or immediately adjacent to the boundaries of the Property, and the Site does not have any historic buildings nor is the Site located within the Historic District as defined by the City of Manor's Code of Ordinances. Based on the absence of historic-age structures within the Property boundaries on historical aerial photographs and topographic maps, there exists a low potential for historic-age architectural and/or archeological resources within the boundaries of the Property.
5. Project Setting: General description of the project area.	The Site is currently zoned as Manor-ETJ, so it will need to be annexed and rezoned to IN-1 zoning or IN-2 Zoning for the development of the facility. Current land use on the Site consists of rangeland for cattle grazing with a single family residence located on the eastern portion of the Site.
6. Vegetation and Wildlife Resources: Vegetation and wildlife in or near the project area.	The Site is situated within the Blackland Prairie ecological area of Texas (Gould, 1975) and the Crops vegetational area of Texas (McMahan et al., 1984). Plant communities observed on the subject Site wre consistent with rangeland. Vegetation observed on the site includes the following: - Sugarberry (Celtis laevigata) - Honey mesquite (Prosopis glandulosa) - Bermudagrass (Cynodon dactylon) - Texas prickly pear (Opuntia engelmannii) - Common ragweed (Ambrosia artemisiifolia) - Common broomweed (Amphiachyris dracunculoides) - Tall goldenrod (Solidago altissima) - Texas croton (Croton texensis) - Black willow (Salix nigra) - Broadleaf cattail (Typha latifolia)
7. Conservation Areas: Designated conservation areas near the project site.	There are no known conservation areas within the Project Site. Nearby conservation areas include the Colorado River Park Wildlife Sanctuary (approximately 17 miles away), Austin Wildlife Rescue (4 miles away), Austin Wildlife Rescue and Rehabilitation Center (about 21 miles away), and the Big Walnut Creek Nature Preserve (around 9 miles away). Additionally, the El Camino Real de los Tejas National Historic Trail passes through Manor, Texas. The site is also located about 16 miles from McKinney Falls State Park and 23 miles from Bastrop State Park. Refer to **Attachment 1.**
8. Coastal Areas and Navigable Waters: Coastal management zone, beaches, shorelines.	The Project Site is outside the Coastal Management Zone and does not include any shorelines, dunes, or estuaries. Additionally, the site has no confirmed wetland features or navigable waters. Refer to **Attachment 2.**
9. Wetlands: Wetlands on or near the project site.	No wetlands have been identified within the Project Site. However, online wetland databases show that neighboring properties have freshwater ponds located approximately 40 feet from the north property boundary and about 1,450 feet from the southwest property boundary. The water body on the Project Site is unclassified. To confirm the presence or absence of wetlands, further investigation through wetland delineations and stream assessments is recommended. Refer to **Attachment 3.**
10. Floodplains: Location within floodplains.	The site is located within Zone 'X', areas determined to be outside the 0.2% annual chance floodplain, as shown on F.I.R.M. Panel No. 48453C0485J, Travis County, Texas dated August 18, 2014. A Floodplain Map has been included as **Attachment 4.**

11. Endangered Species: Endangered species and habitats in the project area.	The team did not observe potentially suitable habitat on the subject site or within a 500-foot radius of the subject site for any of the federally or state-listed Threatened/Endangered Species of Travis County.
12. Land Use and Zoning: Current land use and zoning.	The proposed development will be required to meet City of Manor Zoning regulations for building height, building setbacks, impervious cover limits, signage, landscaping, and parking. The site is located within an area designated by the City of Manor as industrial. A Zoning Map is included as **Attachment 5**. Once the site is annexed, it will be re-zoned either (IN-1) Light Industrial (IN-2) Heavy Industrial to accommodate the proposed development.
13. Solid Waste Management: Types and amounts of solid waste generated by the project facilities.	Only minimal solid wastes are expected to be generated during the operational phase of this project. A full waste review will be conducted as the project design is finalized. The Wonik facility will develop and utilize a Waste Management Plan to track the handling, storage, characterization, and disposal of all wastes in accordance with applicable regulations.
14. Hazardous or Toxic Substances: Hazardous/toxic substances used or generated by the project facilities.	The following hazardous substances will be stored, yet not used in the facility. - Propylene: 205 Cubic Ft - Silicon Tetrachloride: 56,610 Lbs - Disilane: 4,350 Lbs, 58.1 Cubic Ft - Nitric Oxide: 46.5 Cubic Ft - Difluoromethane: 9,560 Lbs - Octafluorocyclobutane: 9,560 Lbs - 10% GeH4/H2: 88 Cubic Ft - 15% PH3/H2: 964 Cubic Ft - Nitrogen Trifluoride: TBD - Nitrous Oxide: TBD - Carbon Dioxide: TBD - Nitrogen: TBD
15. Water Quality/Water Resources Impact: Water resources at the project site and impacts.	The Project Site is served by the Manville Water Supply Corporation, Number TX2270033, Zone 8. According to the TWDB. the two nearest state wells are 5844302 at about 2,100 ft away and 5844303 approximately 5,500 ft away from the property. Refer to **Attachment 6.**
16. Water Supply and Distribution Systems: Anticipated water usage by the project facilities.	Water usage amounts will be determined as the engineering design of the project is finalized. Wonik plans to implement water-efficient fixtures such as a rainwater harvesting system and greywater recycling where appropriate.
17. Wastewater Collection and Treatment Facilities: Wastewater treatment facilities for additional discharges.	There currently are no wastewater lines near the site. According the City of Manor's Public Works Department, they are planning on extending a 12-inch wastewater line along the west side of the site but the construction of the wastewater main will not be completed until December 2024/January 2025. **Attachment 7** shows the approximate location of the wastewater lines that will be built by the City of Manor Public Works Department. An alternate option to provide wastewater service to the site is to introduce an on-site septic system that will require a minimum 1-acre lot and approval from Travis County due to the City of Manor and Travis County having a interlocal agreement regarding on-site septic systems.
18. Environmental Justice and Socioeconomic Impact: Impact on disadvantaged communities.	Within a 5-mile radius of the Project Site, the area ranks in the 81st percentile nationwide for people of color, the 74th percentile for individuals with less than a high school education, and the 40th percentile for low-income population. The breakdown of race includes 54% Hispanic, 23% White, and 20% Black. The 5-mile area surrounding the location does not include American Indian Reservation Land or a "Justice40(CEJST)" disadvantaged community. However, the area appears to contain an EPA IRA disadvantaged community and therefore the project may potentially benefit a disadvantaged community. The area ranks in the 85th percentile nationwide for annual average PM2.5 levels, the 71st percentile for average maximum daily ozone concentrations, and the 85th percentile for RSEI modeled toxic concentrations at stream segments adjusted for distance.
19. Transportation (Roads, Traffic, and Parking): Road systems connecting to the project site.	Per the City of Manor's Thoroughfare Plan, a proposed Major Arterial will be introduced 2,000 feet east of Kimbro Road. <u>Access</u> Existing driveways will need to be relocated to comply with current driveway spacing as well as throat length per the City of Austin's Transportation Criteria Manual. The initial requirement from the City of Manor is to align the proposed driveway on Kimbro Road with the opposing driveway serving a commercial use. <u>Parking</u> Parking requirements are a function of use. Per the City of Manor's Code of Ordinances (Article 15.02.004a) the following parking will be required for the proposed industrial use: One space for each 700 square feet indoor GFA One space for each 1,000 square feet outdoor facility GFA One space for each 2,500 square feet GFA indoor storage area Off-street loading spaces will be required in accordance with the City of Manor's Code of Ordinances Article 15.02, Section 15.02.006. Bicycle parking will need to be provided. A bike rack is required for each development/building providing storage capacity for a minimum of four bicycles. For sites with multiple buildings a bicycle rack is required to be provided at each building. For commercial sites with buildings exceeding 50,000 square feet a bicycle rack(s) with the capacity to provide a minimum of eight bicycle spaces is required.
20. Air Quality: Air emissions from the project facilities.	A detailed assessment of air emissions will be developed during the air permitting strategy phase of the project development. Wonik Materials is committed to meeting all local, state, and federal air quality emissions standards and will minimize air emission impacts wherever possible.

21. Greenhouse Gas and Climate Impact: Greenhouse gas emissions impact.	Greenhouse Gas emissions impacts will be assessed during the air permitting strategy phase of the project development. Wonik Materials will quantify and track emissions, establish climate related goals, and will monitor progress utilizing Key Performance Indicator intensity factors related environmental impacts such as water usage, energy consumption, waste generation, and emissions which will be tied to applicable reference data point such as building square footage and materials produced. Wonik Materials is committed to an ESG management strategy that encompasses all stakeholders, including customers, shareholders, communities, partners, and employees.
22. Noise: Potential noise increase from project facility operations.	Negligible increases in noise levels are anticipated as a result of the Wonik Materials Project. The manufacturing plant and associated process areas will all be indoors. There will be some vehicle traffic, but this is not anticipated to be at levels that will cause elevated noise levels.
23. Health and Safety: Health and safety risks to the public or project workers.	Materials that are planned for the facility such as flammable, oxidizing, and pyrophoric compressed and liquified compressed gases pose physical hazards, and toxic and corrosive compressed gases might pose health hazards. However, Wonik Materials has prepared a Chemical Hazard Analysis Reports in order to satisfy the requirements of IBC. A coordinated approach will be developed for the hazardous materials such athat they will either be stored and used in quantities below the maximum allowable quantity (MAQ) per control area, or they will be appropriately protected within a High-Hazard, Group H space or stored outdoors with respect to sepration distance and release requirements.
24. Permits and Other Governmental Involvement: Permits and governmental involvement related to the project.	Potential environmental permits required may include a New Source Review (NSR) Permit, and Title V Operating Permit. Additionally, a Stormwater Construction Permit and Stormwater Management Plans, a National Pollutant Discharge Elimination System (NPDES) Permit, and an Industrial Wastewater Discharge Permit (if discharging wastewater into publicly owned treatment works or water body) may be necessary. Additional effort is recommended (e.g., environmental field study) to assess authorities having jurisdiction and project permitting requirements.
25. Public Notification/Controversy: Community awareness and controversy regarding the project.	No public controversy is anticipated related to this project. Wonik Materials and Build Block have held multiple meetings with the City of Manor. Both parties are committed to the successful development of this project which will bring employment and economic growth to the City of Manor. As the project progresses, Wonik and Build Block plan to host informational meetings for interested community members who want to learn more about the project.
26. Environmental Experience and Approach: Experience in addressing environmental issues in similar past projects.	Build Block and Wonik Materials will engage CAMS eSPARC, an environmental consulting firm, to assist with the environmental review of the project. eSPARC has an experienced staff that has supported environmental development and operations for large scale power generation and industrial facilities located across the United States.

ATTACHMENT 1

REVIEW OF DESIGNATED CONSERVATION AREAS



Attachment 1: Review of Designated Conservation Areas

- Wonik Materials Project Site
- Texas State Boundary Wildlife Management Areas State
- Parks - Texas
- El Camino Real de los Tejas

County Boundaries
- Bastrop
- Travis
- Williamson

N

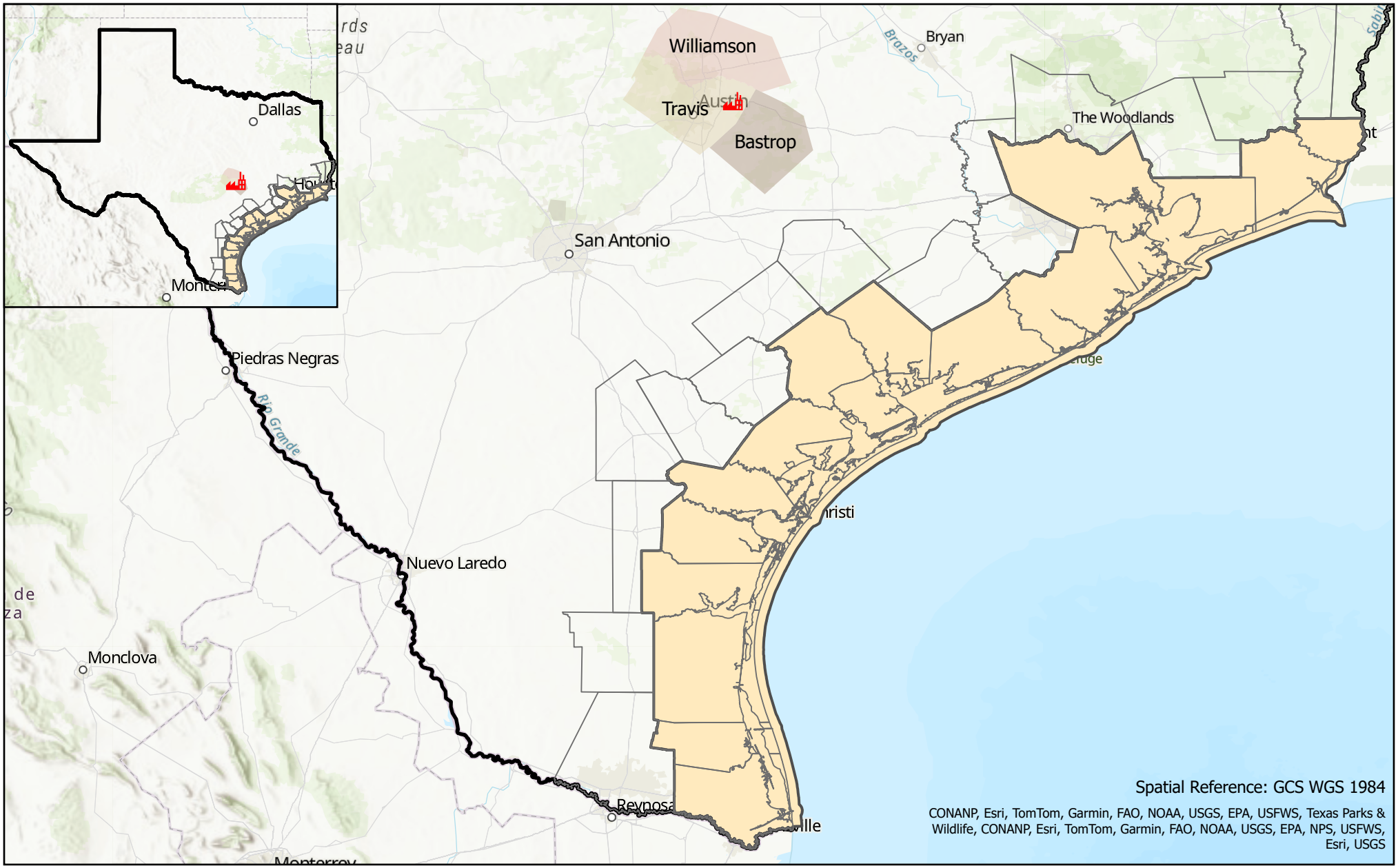
0 2.5 5 mi

eSPARC

Date: 6/21/2024
Prepared by: Sara Rojas

ATTACHMENT 2

REVIEW OF COASTAL AREAS & NAVIGABLE WATERS



Attachment 2: Review of Coastal Areas & Navigable Waters

- Wonik Materials Manor Project Site
- Texas State Boundary
- Texas Counties In or Near Coastal Management Zone
- Texas Coastal Management Zone

County Boundaries

- Bastrop
- Travis
- Williamson

N

0 50 100 mi

eSPARC

Date: 6/21/2024
Prepared by: Sara Rojas

ATTACHMENT 3

REVIEW OF WETLANDS

Attachment 3: Review of Wetlands

Wetlands Type

- Freshwater Emergent Wetland
- Freshwater Pond
- Riverine
- Wonik Materials Manor Project Site

N

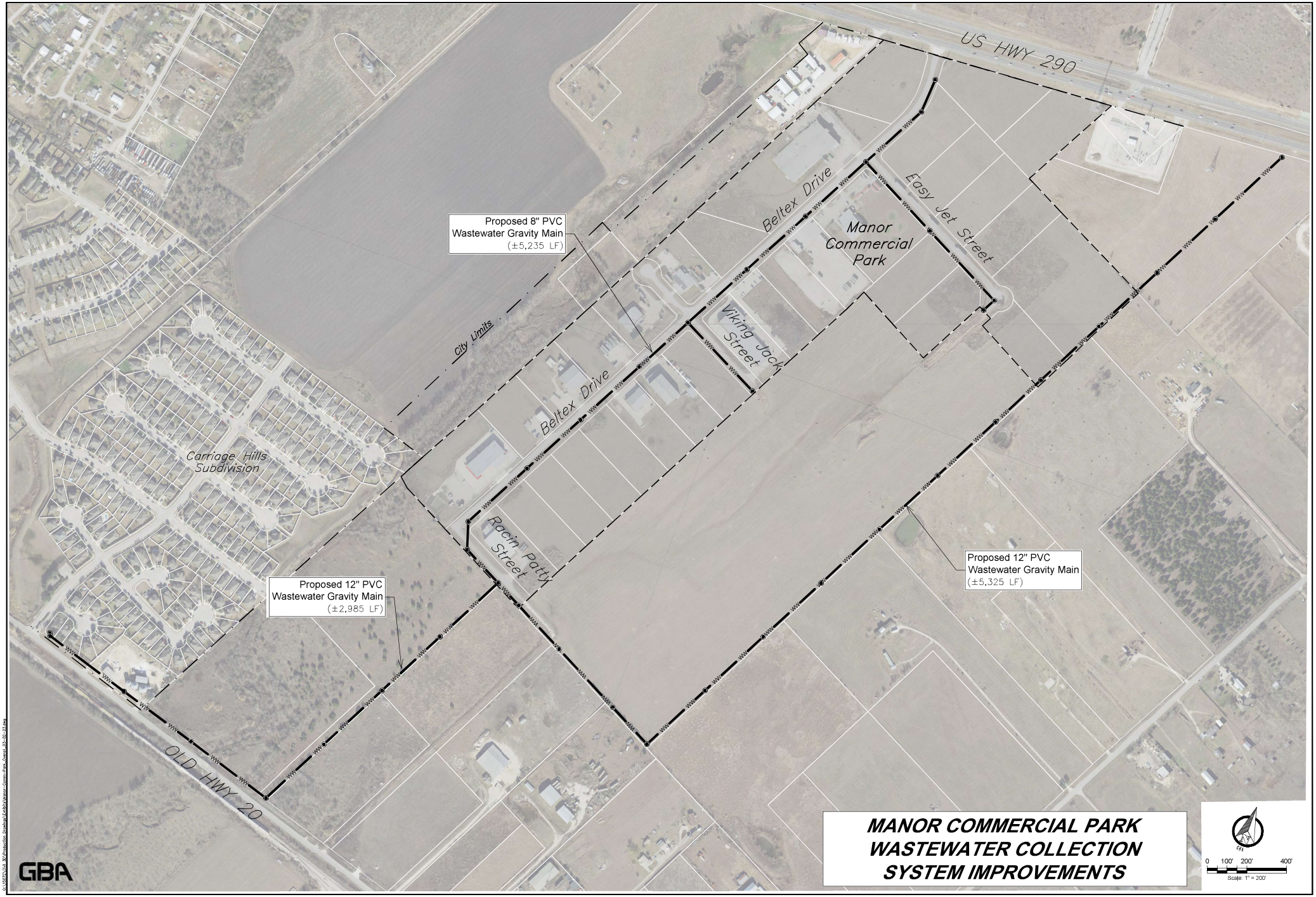
0 333 667 1000 ft

eSPARC

Date: 6/21/2024
Prepared by: Sara Rojas

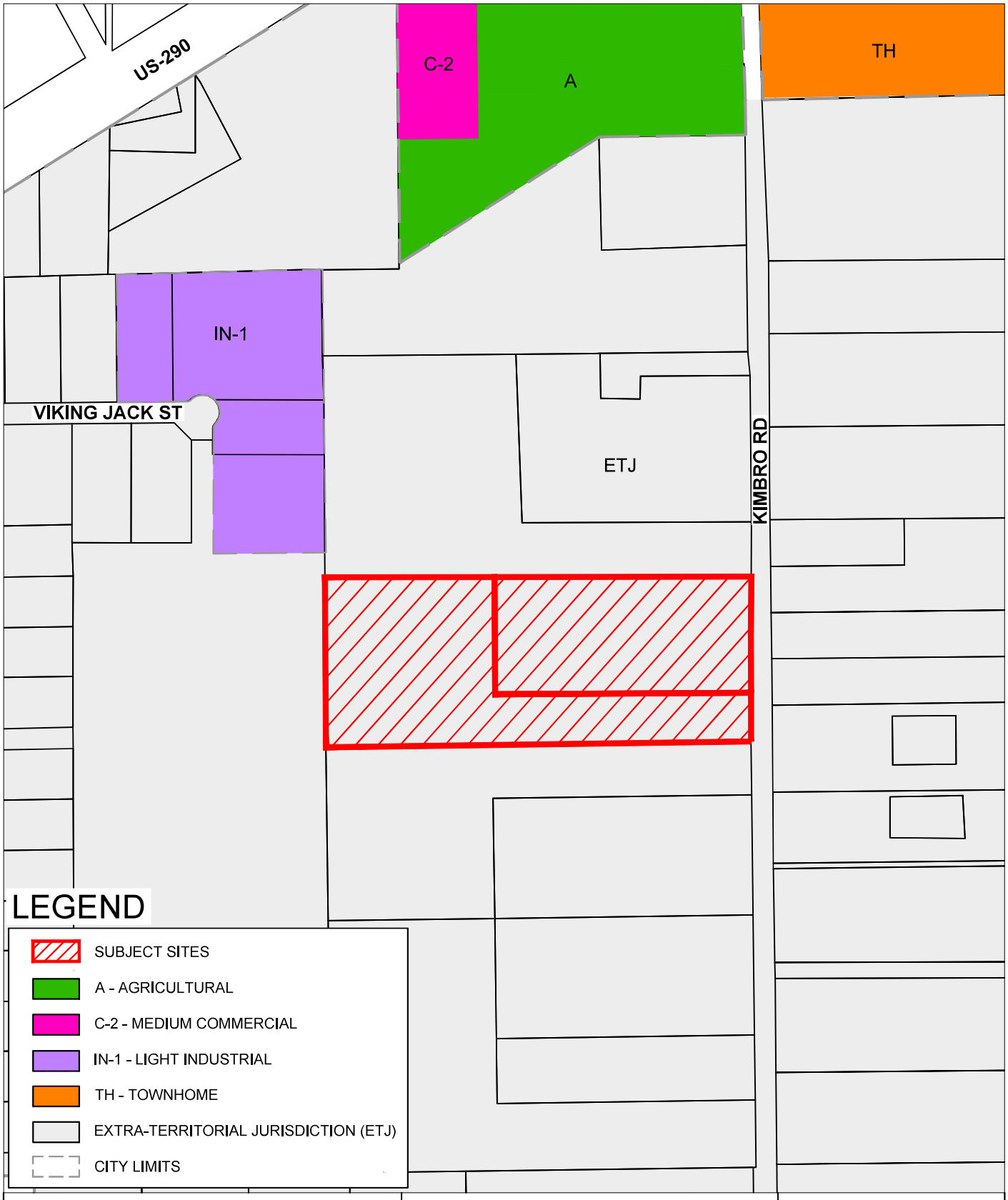
ATTACHMENT 4

FLOODPLAIN MAP


US HWY 290
Beltex Drive
Easy Jet Street
Manor Commercial Park
Viking Jack Street
Beltex Drive
City Limits
Carriage Hills Subdivision
Racin Patty Street
OLD HWY 20
Proposed 8" PVC Wastewater Gravity Main (±5,235 LF)
Proposed 12" PVC Wastewater Gravity Main (±2,985 LF)
Proposed 12" PVC Wastewater Gravity Main (±5,325 LF)
MANOR COMMERCIAL PARK WASTEWATER COLLECTION SYSTEM IMPROVEMENTS
GBA
0 100' 200' 400'
Scale: 1" = 200'

ATTACHMENT 5

ZONING MAP



LEGEND

- SUBJECT SITES
- A - AGRICULTURAL
- C-2 - MEDIUM COMMERCIAL
- IN-1 - LIGHT INDUSTRIAL
- TH - TOWNHOME
- EXTRA-TERRITORIAL JURISDICTION (ETJ)
- CITY LIMITS

Zoning Map

12542 and 12522 Kimbro Rd

Manor, Texas
October 2023

0 500' 1000'
GRAPHIC SCALE 500'

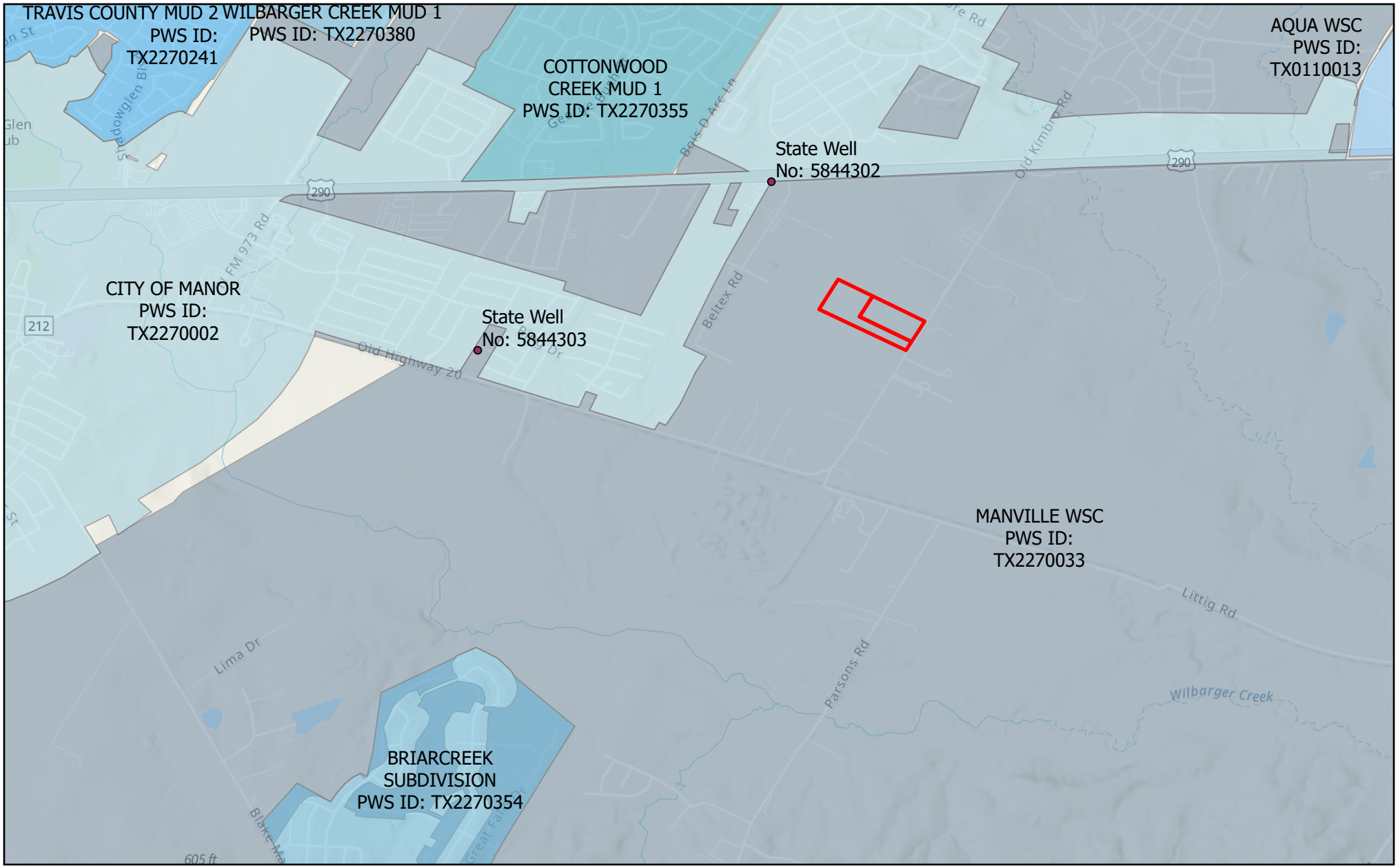
N E S W

Kimley»Horn
10814 Jollyville Road
Campus IV, Suite 200
Austin, TX 78759
512-418-1771
State of Texas Registration No. F-928

PLOTTED BY: MONEGRO, MELISSA 10/9/2023 5:01 PM
DWG NAME: \\KIMLEY-HORN.COM\TX_AUS\AUS_CIVIL\069422701--MONIK MATERIALS\CAD\EXHIBITS\PLANSHEETS\EXHIBIT C -- ZONING MAP.DWG
LAST SAVED: 8/30/2023 2:50 PM

ATTACHMENT 6

WATER QUALITY & WATER RESOURCE MAP



Public Water Service Areas
- AQUA WSC
- BRIARCREEK SUBDIVISION
- CITY OF MANOR
- COTTONWOOD CREEK MUD 1
- MANVILLE WSC
- TRAVIS COUNTY MUD 2
- WILBARGER CREEK MUD 1

- Wonik Materials Manor Project Site
- TWDB Well Locations

N

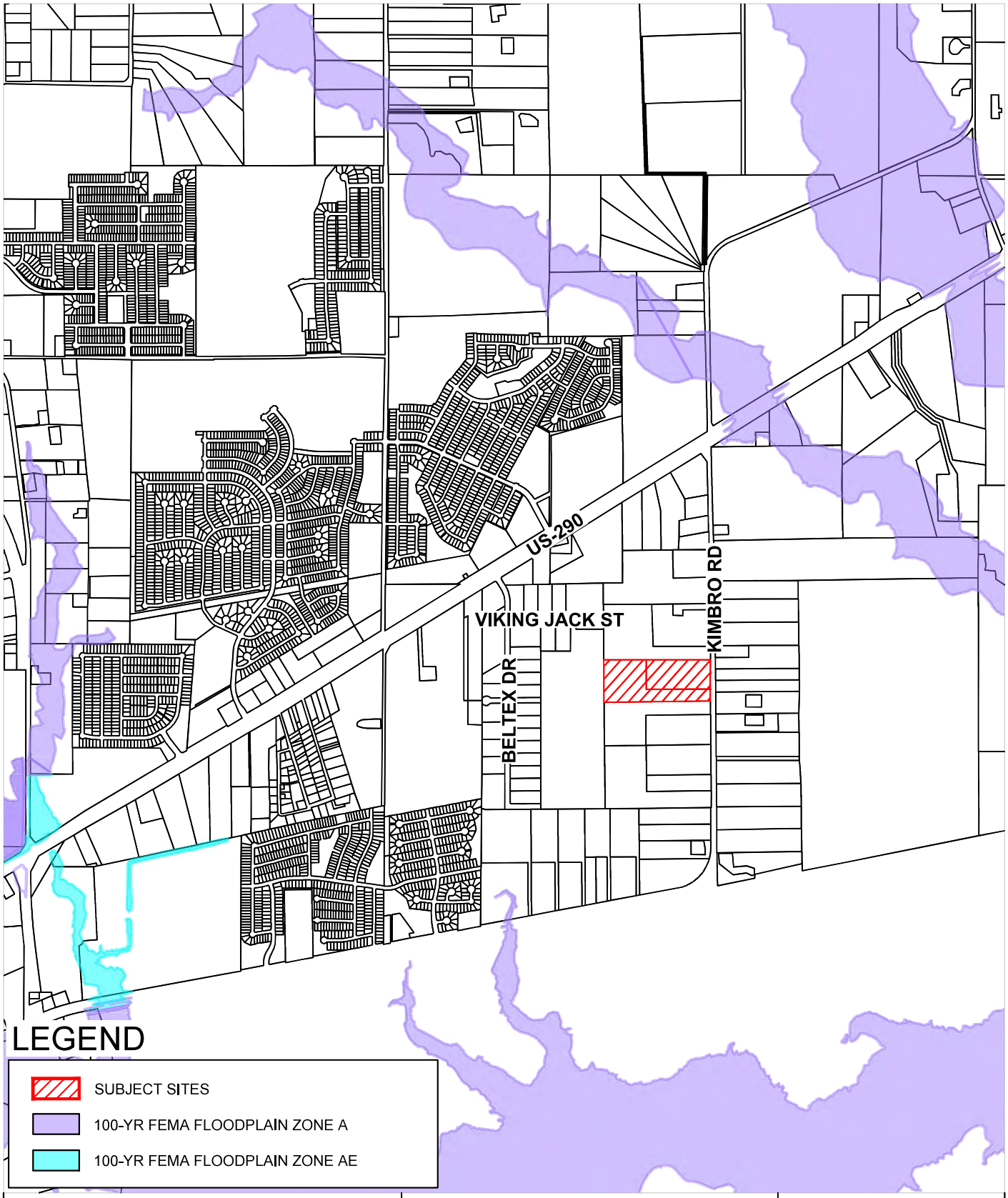
0 0.3 0.6 mi

eSPARC

Date: 6/21/2024
Prepared by: Sara Rojas

ATTACHMENT 7

WASTEWATER LINE MAP



LEGEND

- SUBJECT SITES
- 100-YR FEMA FLOODPLAIN ZONE A
- 100-YR FEMA FLOODPLAIN ZONE AE

Floodplain Map

12542 and 12522 Kimbro Rd

Manor, Texas
October 2023

0 2000' 4000'
GRAPHIC SCALE 2000'

N E S W

Kimley»Horn
10814 Jollyville Road
Campus IV, Suite 200
Austin, TX 78759
512-418-1771
State of Texas Registration No. F-928

NOTE: THIS PLAN IS CONCEPTUAL IN NATURE AND HAS BEEN PRODUCED WITHOUT THE BENEFIT OF A SURVEY, TOPOGRAPHY, UTILITIES, CONTACT WITH THE CITY, ETC.

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SAFETY DATA SHEET

Nitrogen Trifluoride

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Nitrogen Trifluoride

Chemical name : nitrogen trifluoride

Other means of identification : Nitrogen fluoride; Trifluorammonia; Trifluoramine; NITROGEN FLUORIDE (NF3); Perfluoroammonia; Trifluoroammonia; Trifluoroamine; Nitrogen fluoride (NF3) [D]; nitrogene trifluoride

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : Nitrogen fluoride; Trifluorammonia; Trifluoramine; NITROGEN FLUORIDE (NF3); Perfluoroammonia; Trifluoroammonia; Trifluoroamine; Nitrogen fluoride (NF3) [D]; nitrogene trifluoride

SDS # : 001079

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : OXIDIZING GASES - Category 1
GASES UNDER PRESSURE - Compressed gas
ACUTE TOXICITY (inhalation) - Category 4
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
Harmful if inhaled.
May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

Prevention : Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves, valves and fittings free from oil and grease. Use only outdoors or in a well-ventilated area. Do not breathe gas.

Response : Get medical attention if you feel unwell. In case of fire: Stop leak if safe to do so. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell.

Section 2. Hazards identification

Storage : Protect from sunlight. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : nitrogen trifluoride

Other means of identification : Nitrogen fluoride; Trifluorammonia; Trifluoramine; NITROGEN FLUORIDE (NF3); Perfluoroammonia; Trifluoroammonia; Trifluoroamine; Nitrogen fluoride (NF3) [D]; nitrogene trifluoride

Product code : 001079

CAS number/other identifiers

CAS number : 7783-54-2

Ingredient name	%	CAS number
Nitrogen trifluoride	100	7783-54-2

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention following exposure or if feeling unwell. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Harmful if inhaled.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 4. First aid measures

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Oxidizing material. This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
nitrogen oxides
halogenated compounds

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Keep away from clothing, incompatible materials and combustible materials. Do not breathe gas. Keep reduction valves free from grease and oil.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Separate from reducing agents and combustible materials. Store away from grease and oil. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Nitrogen trifluoride	**ACGIH TLV (United States, 3/2017).** STEL: 29 mg/m³ 15 minutes. TWA: 10 ppm 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 29 mg/m³ 10 hours. TWA: 10 ppm 10 hours. **OSHA PEL (United States, 6/2016).** TWA: 29 mg/m³ 8 hours. TWA: 10 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 29 mg/m³ 8 hours. TWA: 10 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Section 8. Exposure controls/personal protection

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Compressed gas.]

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -208.5°C (-343.3°F)

Boiling point : -129°C (-200.2°F)

Critical temperature : -39.2°C (-38.6°F)

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 657.2 (psia)

Vapor density : 2.46 (air=1)

Specific Volume (ft^3/lb) : 5.4466

Gas Density (lb/ft^3) : 0.1836

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : Not available.

Section 9. Physical and chemical properties

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Molecular weight : 71 g/mole

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
contact with combustible materials
Reactions may include the following:
risk of causing fire

Conditions to avoid : No specific data.

Incompatible materials : Highly reactive or incompatible with the following materials:
combustible materials
reducing materials
grease
oil

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Nitrogen trifluoride	LC50 Inhalation Gas. LC50 Inhalation Gas.	Mouse Rat	2000 ppm 6700 ppm	4 hours 1 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Section 11. Toxicological information

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Nitrogen trifluoride	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Harmful if inhaled.

Skin contact : Contact with rapidly expanding gas may cause burns or frostbite.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Inhalation (gases)	3350.000 ppmV/4h

Section 11. Toxicological information

Other information : IDLH : 1000 ppm

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN2451	UN2451	UN2451	UN2451	UN2451
UN proper shipping name	NITROGEN TRIFLUORIDE	NITROGEN TRIFLUORIDE, COMPRESSED	NITROGEN TRIFLUORIDE	NITROGEN TRIFLUORIDE	NITROGEN TRIFLUORIDE
Transport hazard class(es)	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

Section 14. Transport information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: 75 kg. Cargo aircraft: 150 kg.

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.23-2.25 (Class 5).
Explosive Limit and Limited Quantity Index 0
ERAP Index 25
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index 75
Special provisions 38

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 75 kg. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Section 15. Regulatory information

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

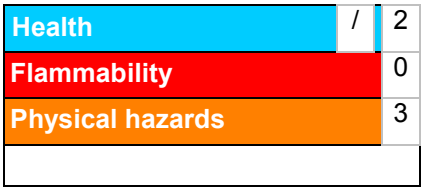
Not listed.

Inventory list

Australia	:	Not determined.
Canada	:	This material is listed or exempted.
China	:	This material is listed or exempted.
Europe	:	This material is listed or exempted.
Japan	:	**Japan inventory (ENCS)**: Not determined. **Japan inventory (ISHL)**: This material is listed or exempted.
Malaysia	:	Not determined.
New Zealand	:	Not determined.
Philippines	:	This material is listed or exempted.
Republic of Korea	:	This material is listed or exempted.
Taiwan	:	This material is listed or exempted.
Thailand	:	Not determined.
Turkey	:	Not determined.
United States	:	This material is listed or exempted.
Viet Nam	:	Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

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National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Section 16. Other information

Procedure used to derive the classification

Classification	Justification
OXIDIZING GASES - Category 1	Expert judgment
GASES UNDER PRESSURE - Compressed gas	According to package
ACUTE TOXICITY (inhalation) - Category 4	Expert judgment
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Expert judgment

History

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Date of previous issue : No previous validation

Version : 1

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.