Guidance for Analysis Required by
COMAR 26.27.01 Hazardous Material Security

1.0 Prioritization of security threats, vulnerabilities, and consequences

1.1 Exclusions

1.1.1 Facilities in Baltimore City

1.1.2 Facilities subject to any comprehensive federal site security program, including all Department of Defense facilities.

1.2 General

This document identifies the minimum standards necessary to assess and reduce the risks arising from security threats. Its purposes are to reduce the likelihood of adverse effects on employees, the public, and the environment and help companies avoid losses and liability that would negatively impact the State's economy

1.2.1 The following vulnerability assessments and security plan development and implementation codes provide acceptable analyses under this guidance:

1.2.1.1 Site Security Guidelines for the U.S. Chemical Industry, American Chemistry Council, Chlorine Institute, Inc., and the Synthetic Organic Chemical Manufacturers Association (October 2001);

1.2.1.2 Chlorine Packaging and Sodium Hypochlorite Plant Security Vulnerability Assessment Methodology for chlorine packaging and sodium hypochlorite manufacturing plants in conjunction with, as applicable, American Chemistry Council/Chlorine Institute's Transportation of Poison-by-Inhalation Materials by Rail Security Plan Implementation Guidance.

1.1.3 The Department may periodically review and approve additional voluntary industry standards, as appropriate.

1.1.4 The guidance in 1.2 is applicable to those industries for which 1.1.1 is not applicable.

1.2 Security threats

Security threats may be external or internal and may cause impacts from damage or destruction to material confinement, processes, or structures. Maryland recommends that security threats be reduced through a structured risk assessment process that evaluates the potential hazards from multiple sources.

1.2.1 Vulnerabilities arise from potential hazards from materials stored or produced on site due to the:
1.2.1.1 Nature of the substance;
1.2.1.2 Amount stored;
1.2.1.3 Extent of physical security; and
1.2.1.4 Extent of processes and/or controls on access, responsibility, and inventory maintenance.

1.2.2 Consequences of release or dispersal of the substances may be evaluated
1.2.2.1 On- and off-site;
1.2.2.2 With respect to the magnitude of harm that can be done, e.g., ranging from skin irritation to mortality;
1.2.2.3 With respect to the number of people potentially at risk;
1.2.2.4 The types of facilities that could be impacted, e.g., schools, hospitals; and
1.2.2.5 Duration of impacts.

1.2.3 Special circumstances
1.2.3.1 Limited access for responders (e.g., narrow roads, inadequate staging areas).
1.2.3.2 Limited water for fire fighting.
1.2.3.3 Limited road capacity for evacuation
1.2.3.4 The presence of persons requiring special medical evacuation.
1.2.3.5 Special natural resource considerations such as sensitive habitat or rare, threatened or endangered species.

2.0 Periodic analysis

2.1 Minimum frequency to review and revise analysis of threats, vulnerabilities and consequences is once every five years.

2.2 If there have been significant changes in chemical inventory, processes, or physical plant that could significantly impact the security measures that should be undertaken, the analysis should be reviewed and revised within one year of the completion of those changes.

3.0 Risk Assessment/Vulnerability Analysis

3.1 Chemical risk assessment prioritization (see example in Appendix A)

3.1.1 List substance and Chemical Abstract Society (CAS) number

3.1.2 Calculate the National Fire Protection Association (NFPA) Sum. The NFPA sum is the **sum of the NFPA 704 Hazard Identification Ratings (the "fire diamond")** for each substance stored, dispensed, used, or handled in excess of the threshold defined in 40 C.F.R. 68.130, and is calculated by adding all three

numeric factors (Health, Flammability, and Instability) of the hazard ratings from the Material Safety Data Sheet (MSDS).

3.1.3 Prioritize risk by considering the characteristics of the substance (e.g., solid, gas, or liquid); the volume stored, dispensed, used or handled, and the containment of the storage, dispensing, use or handling area; estimate **dispersal potential weight** according to the following categories for a likely scenario:

3.1.3.1 Very Low (Weight = 1): Will likely be contained within a section of the facility.

3.1.3.2 Low (Weight = 2): Will likely be contained on-site.

3.1.3.3 Moderate (Weight = 3): May disperse off-site but would not impact residences or sensitive facilities such as schools or hospitals.

3.1.3.4 High (Weight = 4): Would likely impact residences or sensitive facilities.

3.1.4 Calculate the **chemical risk factor** by multiplying the **NFPA Sum** by the **dispersal potential weight**.

3.2 Physical factors risk assessment

3.2.1 Overall facility access control

3.2.1.1 If the facility is secured by a wall, fence, or gate that provides a significant obstacle to a vehicle (Weight = 0.9). To a person (Weight = 1).

3.2.1.2 If the perimeter is not fenced or walled, but road entry is controlled by a guard (Weight = 1.5)

3.2.1.3 If entry is controlled by card access (Weight = 2).

3.2.1.4 If facility is monitored by CCTV (Weight=0.9).

3.2.2 Access to hazardous materials. If entry to the area where the hazardous materials are used, stored, dispensed or handled

3.2.2.1 Is controlled by a locked door with limited key or card access (Weight = 1)

3.2.2.2 Is controlled by an unlocked door with signage noting limited access (Weight = 2)

3.2.2.3 Is uncontrolled (Weight = 3).

3.2.3 Structural integrity of storage areas

3.2.3.1 Would unauthorized access to the hazardous materials require

3.2.3.1.1 Major physical force for entry, e.g., secured bunker (Weight = 1).

3.2.3.1.2 Moderate force for entry, e.g., steel door in steel frame with high quality lock (Weight = 2).

3.2.3.1.3 Minor force for entry, e.g., lock cutters could readily gain entry (Weight = 3).

3.2.4 Multiply the three physical factors together to calculate **physical vulnerability factor**.

3.3 Risk prioritization

3.3.1 Multiply the **chemical risk factor** by the **physical vulnerability** factor to calculate the **combined risk factor**.

3.3.2 Rank each chemical according to the risk factor.

3.3.3 The combined risk factor, chemical risk factor, physical vulnerability and all supporting analysis and discussion are confidential and may be disclosed only in accordance with COMAR 26.27.01.04.

3.4 Analysis of Intermittent Security Risks/Gap Analysis

3.4.1 Additional analysis of other potential, intermittent security risks shall be undertaken.

3.4.2 The analysis required under COMAR 26.27.01.03 shall consider specific intermittent risks separately and explicitly, such as unloading a hazardous material, process change, introduction of new personnel, etc.

3.5 Prioritization Rank

3.5.1 Facilities shall create a list in which combined risk factor values for each chemical on site are placed in numeric descending order. This list will become the prioritization ranking for the facility.

3.5.2 Intermittent risks are not to be included as part of the prioritization ranking process but considered separately as noted in 3.4.

4.0 Implementation of security measures commensurate with risk

4.1 Prioritization of mitigation should be based on the prioritization rank. In particular, combined risk factors greater than 100 or prioritization ranks 1-3 should be fast-tracked for mitigation.

4.2 Review each of the factors involved in prioritizing the risks starting with the factors for the substance ranked highest.

4.3 Begin mitigation by reducing the risk prioritization factors wherever possible.

4.4 Mitigation of intermittent risk shall be undertaken, commensurate with that risk.

4.5 Utilization of inherently safer materials and/or processes and opportunities for risk prevention, reduction and mitigation should be considered.

5.0 Security management programs and procedures.

5.1 Written and electronic versions required by COMAR 26.27.01.08 shall be maintained describing policies, actions, standard operating procedures, emergency procedures, training and guidance as they relates to chemical

hazard security. This documentation will be available immediately during emergencies, and may be reviewed and/or audited on 24-hour notice by the Department of the Environment or the Department of State Police.

5.2 All aspects of general site security, hazardous material security, inventory control, and training shall be documented.

5.3 All security procedures to prevent risks from unauthorized handling of hazardous materials and improper access to handling of hoses, tubes, couplings, joints, valves and other potential points of release shall be documented.

5.4 Security procedures to mitigate intermittent risks shall be documented separately, if applicable.

5.5 Each facility shall address in its mitigation plan how the measures undertaken can prevent or reduce the likelihood of reasonably feasible scenarios that would cause more than minor injury (i.e. treatment and release) to residents or occupants of sensitive facilities given typical conditions of occupancy and weather.

5.6 As part of the mitigation plan, each facility shall document the measures undertaken to prevent or reduce the on-site risk to employees and visitors.

6.0 Security training, drills and guidance to enhance awareness and capability

6.1 Employees

6.1.1 Annual Training – Model on Coast Guard Maritime Transportation Security Act (MTSA) rules or DOT HM-232 rules

6.1.2 Drills -- Model on Coast Guard MTSA rules
One drill shall be conducted prior to the five-year revision of the risk analysis.

6.1.3 Each facility shall maintain standard operating procedures for all activities related to security.

6.2 Contractor guidance. Each facility shall advise on-site contractors or those who deliver any materials to the site as to proper access control, security procedures, parking, and sign-in procedures.

6.3 Service providers' guidance. Each facility shall advise service providers that come on-site as to proper access control, security procedures, parking, and sign-in procedures.

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7.0 Communications, dialog and exchange of information

7.1 Employees
In addition to training opportunities, at each facility, managers shall provide opportunities for employees to make suggestions for improvements in hazardous material security.

7.2 Communities

Each facility shall designate a person to handle questions and inquiries from the public. Any questions or inquiries which appear suspicious should be forwarded to the appropriate authorities.

7.3 Government agencies and officials
Environment Article §§7-701 – 7-709 Annotated Code of Maryland provide adequate access to facilities for personnel from the Department of the Environment or Department of State Police.

8.0 Internal audits

8.1 Audits

8.1.1 Each facility shall conduct an annual audit of compliance with the facility's security plans and procedures.

8.1.2 The internal audit shall assess relevant security programs and processes, and provide schedules for the implementation of corrective measures.

8.1.3 If corrective measures are required, a list of those measures with the schedule shall be submitted to the Department.

8.2 Implementation of corrective measures shall begin (e.g., feasibility, design) no more than one year after identification of needs. Depending on the cost and complexity, completion may exceed one additional year.

9.0 Third party verification

9.1 Potential security threats, vulnerabilities, consequences
A third party shall verify that the physical security measures identified under the periodic analysis of potential threats, vulnerabilities and consequences have been implemented.

9.2 Conflict of interest
There shall be no direct or indirect familial relationship between the third party verifiers and the facility owners or operators, other than the third party verification or related security, hazard mitigation or similar issues except as may be fully disclosed in the facility's certification to the Department. The existence of any contractual, corporate or financial relationship between the third party verifiers and the facility owners or operators, other than for purposes of performing services related to site security, shall be documented in the certification.

9.3 Credentials
Written documentation of the qualifications of the third party, demonstrating the appropriate skills and experience to adequately complete the verification shall be submitted to the Department of the Environment.

9.4 Certification

Written certification that the verification was completed by the third party shall be submitted to the Department.

Appendix A: Example

Two-acre site, surrounded by chain link fence with two exits, one controlled by card access and one with a guardhouse. All employees must show ID and all guests must sign in and be accompanied by an employee. Three hazardous substances are on-site above the threshold levels; each is stored in separate facilities. Access to the separate enclosures for the anhydrous ammonia and chlorine is controlled by only a chain link fence with a padlock. The sulfur dioxide is within a gas-tight cinderblock chemical storage locker with a steel door and doorframe and heavy-duty padlock. Although the amount of sulfur dioxide stored is over the threshold, generally much smaller amounts are removed from the storage locker at a time. There are residences immediately across the street.

Table 1: Chemical hazard ranking

Chemical	CAS	NFPA Sum	Dispersal Potential	Chemical Risk Factor
Anhydrous ammonia	7664-41-7	4	4	16
Chlorine	7782-50-5	4	4	16
Sulfur dioxide	7446-09-5	3	2	6

NFPA Sum = sum of four numbers in NFPA fire diamond which can be found on the MSDS (§.3.1.2)
Dispersal Potential = Estimate of the potential for spread of the substance. Any accepted method may be documented and used to estimate (§3.1.3).
Chemical Risk Factor = NFPA Sum x Dispersal factor (§3.1.4).

Table 2: Physical factors assessment.

Chemical	Facility Access Control	Access to Hazardous Materials	Structural Integrity of Storage Areas	Physical Vulnerability
Anhydrous ammonia	1	1	3	3
Chlorine	1	1	3	3
Sulfur dioxide	1	1	2	2

Facility Access Control = Weighting factor controlling access to site (§3.2.1).
Access to Hazardous Materials = Weighting factor controlling access to hazardous materials (§3.2.2).
Structural Integrity of Storage Areas = Weighting factor for controlled access to storage facility (§3.2.3).
Physical Vulnerability = Facility Access Control x Access to Hazardous Materials x Structural Integrity of Storage Areas (§3.2.4)

Table 3: Risk Prioritization

Chemical	Chemical Risk Product	Physical Vulnerability	Combined Risk Factor	Prioritization Rank
Anhydrous ammonia	16	3	48	1
Chlorine	16	3	48	1
Sulfur dioxide	6	2	12	2

Chemical Risk Product: From Table 1.
Physical Vulnerability: From Table 2.
Combined Risk Factor = Chemical Risk Product x Physical Vulnerability.
Prioritization Rank = Rank order by Risk Product