

## CAPABILITIES SUMMARY

**Safety Management Services, Inc.** (SMS) is nationally-recognized for providing a variety of risk management services to a wide range of commercial clients and government agencies. SMS is a specialized team of highly qualified engineers and scientists who have experience applying risk management protocol to ensure safe processing and handling of energetic materials and hazardous chemicals.

*The mission of Safety Management Services, Inc. is to safeguard people, processes, and the environment. Our mission is accomplished by assisting our clients in maintaining the safety of their operations through the systematic identification of safety-related deficiencies, and the development and implementation of solutions based on sound principles.*

Years of experience serving GOCO, GOGO, and LAP facilities; propellants, explosives, pyrotechnics (PEP), and aerospace industries; the chemical processing industry; the oil production and refining industries; the environmental industry; and others, enables SMS to offer a unique perspective in evaluating and communicating risk. SMS is successful in assisting clients with the implementation of risk management systems, which enhance the culture required for safe operations.

The following provides a brief overview of the SMS capabilities:

**Regulatory Compliance:** SMS personnel understand the appropriate interpretation and application of DoD, DOT, OSHA, and EPA regulations. Specifically we have experience applying the principles outlined in the following regulations:

- Mil Std 882C (Systems Safety Program Requirements)
- DOD 6055.9 (Ammo & Explosive Safety)
- DOD 4145.25 (Contractor Safety Manual)
- NAVSEA OP5 (Ammo & Explosive Safety)
- AFM 91-201 (Explosive Safety)
- EWR 127-1 ( Eastern & Western Range)
- AFOSHA
- AR 385-64 (Explosive Safety Program)
- DA Pamphlet 385-64 (Explosive Safety Std.)
- OSHA 29 CFR 1910.119 (Process Safety Management)
- EPA 40 CFR Part 68 (Risk Management Programs)

These regulations address the elements of a proper risk management system. Our approach to implementing risk management is a direct reflection of the intent and philosophy of these regulations.

**DOT Classification of Explosives:** SMS is authorized by the U.S. Department of Transportation (DOT) to examine and test explosives and assign a recommended shipping description, division, and compatibility group. Authorization by the DOT required a thorough disclosure of our energetic material expertise, regulatory requirements interpretation/application experience, and testing protocol. We provide this service to a wide range of clients in the explosives industry.

**Risk Management:** Our approach to risk management emphasizes: 1) minimizing personnel exposure, 2) minimizing quantities of hazardous materials, 3) “safety by design,” 4) accurate procedures and standards, and 5) rigorous personnel training. Proper risk management focuses not only on normal operations/conditions but also abnormal operations/conditions, equipment design, human factors, standard operating and contingency procedures, maintenance operations, and facility design and siting.

The SMS approach to risk management focuses resources on addressing critical credible failure scenarios. This is accomplished by prioritizing operations/equipment based on perceived risk and material type and quantity, identifying and ranking potential hazards using qualitative methodologies (e.g., JSA, HAZOP, FMEA, etc.), and then using quantitative methodologies (e.g., probability risk assessment, Fault Tree, event probabilities, probit analysis, etc.) to evaluate the critical scenarios.

SMS has unique capabilities and experience comparing in-process energies to the energetic material response to the stimuli. We have developed effective methods for measuring, calculating, and/or modeling the normal and potential abnormal in-process energies. Our methodology allows us to compare this information with the energetic material response data, which is also in engineering units.

SMS performs consequence analysis on incident scenarios to determine the potential effects of thermal flux, fragments, and overpressure on personnel, equipment, and facilities. Understanding the nature of potential failure scenarios, in-process energies, material response, and consequences, allows SMS personnel to make recommendations for process/equipment design, system operating parameters, and facility design and siting. SMS takes considerable pride in assisting our clients in identifying risk-minimizing solutions that are based on sound engineering principles and are cost effective.

**Material Characterization Testing:** SMS testing capabilities include laboratory, bench-scale, sub-scale, and full-scale testing. This includes over 50 standard tests, which are used to characterize materials under conditions that simulate actual process conditions. These standard tests include material sensitivity testing (e.g., impact, friction, ESD, electrical properties, chemical compatibility, etc.), DOT and DoD testing, and TNT equivalency testing. Our testing capabilities also include custom testing tailored specifically to the client's requirements. Bench-scale and full-scale testing can be performed to better understand key operating parameters of processes and systems.

SMS personnel are intimately familiar with test methodologies, equipment, data acquisition, and data evaluation. Our understanding of energetic and hazardous materials along with our testing expertise allows us to assist clients with determining what tests are appropriate, development of custom tests, interpretation of test results, and application of test results to the specific process or system.

**Facility Design & Siting:** SMS personnel understand civilian and military explosives manufacturing and storage regulations and their application. SMS uses industry and government accepted methodologies (e.g. DoD, BATF, Uniform Building Code [UBC], etc.) for the evaluation of siting and orientation of facilities to minimize the potential hazards from reactive chemicals and explosives for a given facility. The objective of a siting evaluation is to protect personnel and facilities from explosive or other highly reactive operations through proper facility design or separation. The rationale is to minimize the personnel exposure and/or facility damage that could be caused by a worst case scenario involving hazardous material releases, fires, or explosions. SMS has the capability to model such events and evaluate the credible consequences of fires, fireballs, BLEVEs, deflagrations, and detonations. We also provide recommendations based on the results from explosion modeling and vapor/plume dispersion modeling.

**Mechanical Integrity:** A mechanical integrity program ensures that the integrity of critical equipment is maintained over the life of a facility. This is accomplished by identifying the critical equipment, specifying the type and frequency of inspection and testing (I&T), establishing accurate I&T procedures, evaluating I&T results, calculating the remaining useful life, and taking the proper actions to ensure the equipment's integrity does not degrade with time. SMS has considerable experience developing and implementing all aspects of a mechanical integrity program.

**Ergonomic Analysis:** Ergonomic analyses allow for the identification, prioritization, and mitigation of ergonomic hazards in the workplace. SMS has developed and applied systematic ergonomic analysis methodology to a variety of operations. This methodology facilitates clear identification and communication of ergonomic issues. SMS provides practical solutions to ergonomic hazards encountered in a myriad of working conditions where cumulative trauma disorders (CTDs), repetitive strain injuries (RSIs), acute soft tissue injuries, or other ergonomic concerns are present. SMS personnel are experienced in workplace design, manual material handling, human factors, office ergonomics, and developing corporate ergonomic programs.

**Industrial Hygiene:** Industrial hygiene augments SMS risk management capabilities. These capabilities include air contaminant and physical agents monitoring and control, facility safety and health inspections, employee training, and health and safety programs development. These activities are done under the direction of a Certified Industrial Hygienist.

**Training:** SMS provides personnel training on various risk management topics. These topics include "Selecting the Appropriate Hazards Analysis Methodology", "Conducting a Risk Management System Audit", "PHA Training for Team Leaders", "Conducting a Proper Incident Investigation", and other topics related to our area of expertise. Courses are tailored to meet the specific needs of the client and its employees.

## HERITAGE

Safety Management Services, Inc. (SMS) has a heritage that is based on over 35 years of experience applying risk management disciplines to the safe manufacturing, storage, and transportation of energetic and hazardous materials. This experience encompasses the same philosophy and approach to risk management embraced by OHSH, EPA, and the US Department of Defense. SMS personnel have years of experience in serving the propellant, explosives, and pyrotechnics (PEP) industry; the chemical processing industry; the oil, gas, and refining industries; and the environmental support industry.

SMS heritage began in the Hazards Analysis Groups at Hercules Aerospace. These groups were established in the late 1960's to evaluate the hazards with PEP and specialty chemical operations/processes. The methodologies and approaches to analyzing process hazards and material characterization testing evolved with the development of automated operations and complex control systems.

In 1992 SMS personnel became part of a Hercules Aerospace subsidiary, Global Environmental Solutions (GES). Providing commercial and governmental risk management support was a primary business objective of GES. Additionally SMS personnel were responsible for evaluating and minimizing the risks associated with state-of-the-art demilitarization operations and environmental cleanup of sites contaminated with energetic materials.

Alliant Techsystems (ATK) purchased Hercules Aerospace and GES in 1995. The charter of SMS personnel was expanded to include risk assessment support of ATK domestic operations and international demilitarization operations.

Safety Management Services, Inc. was founded in April 1998, as an employee owned company. This transition occurred under favorable circumstances with ATK. ATK continues to be a client of SMS and is under contract to provide laboratory and test sites for SMS to conduct characterization and classification testing of energetic materials.

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