

# Safety and the dangerous goods professional

The handling and storage of hazardous materials involves risk, so it is well-regulated to ensure safety and minimize environmental hazards. Transportation of hazardous materials and dangerous goods increases that risk, and potentially exposes more people and larger geographic areas. Hence, the need for safe handling practices is even more critical during transportation procedures. Professional certification of dangerous goods professionals is one method to help ensure the secure and proper handling and management of hazardous materials; enhance regulatory compliance, safety, and overall credibility of operations; and provide recognition to individuals who meet its rigorous requirements. The certification program needs to be valid, credible, relevant, fair, and ethical.

## **WORLDWIDE DANGEROUS GOODS TRANSPORT**

The international transport of dangerous goods involves a myriad of regulations which vary from country to country, change with the mode of transport involved and type of materials being moved. The international, regional or modal differences in regulatory requirements introduce impediments and challenges for companies. Confusion in the transport system and associated delays expose transport personnel and the general public to greater risk through increased handling and time that the dangerous goods are in the transportation system. In addition, it increases the regulatory and economic burden on the regulated industry with no associated benefit.

To promote safety, facilitate trade, and improve the efficiency of hazardous materials transport, the United Nations (UN) Model Regulations on the Transport of Dangerous Goods provides a basis for regulations for all modes of transport, harmonized across international borders. The UN Model Regulations were first published in 1957 to establish minimum requirements for the transport of hazardous materials by all modes. Since then, they have gained global acceptance as the basis for the legally binding dangerous goods transport regulations on the international, regional, and domestic levels.

As an example, international transportation by vessel or by air is governed by the requirements of the International Maritime Dangerous Goods Code (IMDG) or the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO TI). Both of these are based on the requirements in the UN Model Regulations. Regional regulations such as the European Agreements Concerning the International Carriage of Dangerous Goods by Rail (RID) and by Road (ADR) are also based on the Model Regulations. Additionally, domestic regulations such as the Hazardous Materials Regulations (HMR) in the United States are based on the Model Regulations.

The UN Model Regulations enhance safety, improve enforcement capability, ease training requirements, and enhance global trade and economic development. Safety is enhanced primarily because harmonized requirements simplify the complexity of the regulations, simplify training efforts, and decrease the likelihood of non-compliance. The Model Regulations provide economic benefits by eliminating the costs of complying with a multitude of differing national, regional, and modal regulations. They also facilitate compatibility between modal requirements so that a consignment may be transported by more than one mode without intermediate reclassification, marking, labeling, or repackaging. Of course, this system isn't perfect. For example, transportation to or through countries that don't adopt the biannual amendments entails challenges, as well as greater opportunities for delayed and frustrated shipments. However, the UN Model Regulations represent a best effort to harmonize and streamline the regulations for enhanced safety. Establishing harmonized or compatible transport provisions enhances public safety, strengthens environmental protection, and supports US manufacturing and transport industries.

## **INTRODUCTION TO CREDENTIALS**

The continuous evolution of these international regulations introduces significant challenges for keeping people up to date and informed. Professionals working in the field are faced daily with new technologies, new regulatory requirements, and uncertain economic times where "doing more with less" is the norm. Under these circumstances, maintaining a high threshold of safety in managing, shipping, and transporting hazardous materials and dangerous goods can be a challenge. Finding qualified experienced professionals in the field can also be difficult. Just as the UN Model Regulations help streamline compliance, internationally recognized credentialing of hazardous goods professionals improves safety and provides confidence that the professional knows and can implement the regulations.

The Institute of Hazardous Materials Management (IHMM) offers accredited credentials to verify competencies and best practices of hazardous materials and dangerous goods professionals, providing a benchmark for industry and ensuring that minimum levels of safety are maintained or exceeded.

IHMM currently offers three accreditations:

- \* Certified Dangerous Goods Professional (CDGP): the standard of proficiency for those dealing with the safe and secure international transportation of dangerous goods.

- \* Certified Hazardous Materials Manager (CHMM): the standard of proficiency for those who manage or advise others on hazardous materials or situations including such items.

- \* Certified Hazardous Materials Practitioner (CHMP): the standard of proficiency for front-line hazardous materials workers.

All three credential programs meet the requirements of ANSI/ISO/IEC 17024, International Standard for Personnel Certification Programs. The Council of Engineering and Scientific Specialty Boards (CESB) also accredit CHMM and CHMP.

## **VERIFYING THE LEGITIMACY OF THE CREDENTIAL**

Before developing a credential, it is important that the infrastructure to manage, coordinate, and deliver a credential program be considered. These resources include dedicated staff to manage: the Subject Matter Expert (SME) committee(s), document policy and procedures, expert consultants on test development and analysis, the test delivery company, tracking certificants, and the policies and procedures for recertification to keep the pool of professionals current. Dedicated staff working for an independent organization helps ensure that the credential, its competency requirements and measures are independent, fair, and equitable.

Development of credentials starts with a dedicated group of Subject Matter Experts (SMEs) who volunteer their time and efforts to develop the necessary competency measures. The SMEs first decide which standard to follow for the certifying body, as well as for development and maintenance of a certification. There are three standards promulgated in the United States: 1) American National Standards Institute, ANSI/ISO/IEC 17024, Conformity assessment--General requirements for bodies operating certification of persons, 2) Council of Engineering and Scientific Specialty Boards, Accreditation Guidelines for Engineering and Related Specialty Certification Programs, and 3) The National Commission for Certifying Agencies, ICE 1100 2010(E)--Standard for Assessment-Based Certificate Programs.

The IHMM credentials use ANSI 17024 as their basis. The ANSI 17024 requirements were designed to produce credentials that are valid, credible, relevant, fair, and ethical. The sidebar included in this article provides a detailed outline of the criteria that IHMM and other ANSI 17024 credential organizations must meet in order for the credential to be ANSI 17024 accredited.

## **CREDENTIAL MANAGEMENT**

The credential itself is based on an outline developed by the SMEs in answer to the question: "What would a minimally competent professional know about the processes and procedures of the profession?" This question drives the credential development process.

An analysis of areas of knowledge, duties, and tasks are conducted using a Job Task Analysis (JTA). The JTA is a process for analyzing the tasks performed by individuals in an occupation, as well as the knowledge, skills, and abilities required to perform those tasks. The JTA is used to identify the core knowledge areas, critical work functions, and/or skills that are common across a representative sampling of current practitioners or job incumbent workers.

Results from the JTA establish the blueprint that reflects the skills, knowledge, and abilities required for competent job performance. The JTA process uses subject matter experts to: 1) accurately describe and define their jobs, 2) describe the tasks that workers perform, 3) describe the means used to perform those tasks, and 4) describe tasks that demand certain knowledge, skills, tools, and worker behaviors.

For the JTA, the SMEs collect quantitative data by surveying the profession on the importance, criticality, and frequency of knowledge, duties, and tasks. For example, respondents are asked if a duty is: not critical, slightly critical, moderately critical, or very critical. One recent JTA conducted by IHMM to develop a dangerous goods professional credential surveyed over 20 knowledge, duty, and task areas to estimate how much time is spent on each. This quantitative information allows the SMEs to apportion the knowledge, task and duty areas for a competent credentialed professional. For example, the JTA for the Certified Dangerous Goods Professional (CDGP) provides the following percentages over particular knowledge areas:

- \* National and International Regulatory Standards--13 percent
- \* Inter-relationships Between the Regulatory Standards--9 percent
- \* Management of Transportation--27 percent
- \* Handling of Cargo--10 percent
- \* Management of Documentation--18 percent
- \* Emergency Management--14 percent
- \* Security--9 percent

The JTA and the subsequent blueprint provide the basis for the SMEs to start developing, publishing, and delivering the competency examination. The exam questions are based on the credential blueprint. Consequently, SMEs are now asked to develop, review, revise, and document questions that test potential certificants on each area of the blueprint.

The blueprint percentages are used to define the number of exam questions in each knowledge area. For example, based on the blueprint percentages above, a 100-question CDGP exam would have approximately 13 questions related to National and International Regulatory Standards, an area that covers the UN Model Regulation, the International Civil Aviation Organization's Technical Instructions, and the International Maritime Organization's Dangerous Goods Code.

Experts on exam development typically guide a group of SMEs in developing questions and proper question writing techniques. For a 100-question examination, about 300 questions are typically developed. After the question database is developed, the exam is beta- or field-tested, a passing score analysis is performed, and exam questions are chosen. Over the life of the examination, usually five years, yearly cut score and question analyses are also performed.

After five years, a new JTA is conducted to determine if professionals see any changes in the blueprint. This ensures that the credential reflects the current practice of the profession. Any changes to the blueprint would reinitiate the process described above.

During the survey of professionals on knowledge areas, duties, and tasks, survey respondents are asked a series of demographic questions to ensure the body of respondents includes a representative cross-section of the industry and to evaluate the validity of survey responses. Questions usually include: location of current practice, employment status, job title, years of experience in the field of hazardous materials management or dangerous goods transport, area(s) of work as related to hazardous materials management and dangerous goods transport, work sector, and if any other credentials/certifications are held. Selected demographic data from two JTAs that IHMM conducted for the CDGP are shown in Figures 1 and 2.

## **CONCLUSION**

The handling and management of hazardous materials and the transport of dangerous goods are governed by regulations published by the US Environmental Protection Agency, US DOT, Committees and modal Administrators of the United Nations, as well as a network of state, national, and international organizations. To ensure public safety, professionals need the competency to use, interpret, and implement the regulations. Properly developed and maintained professional credentials validate that these professionals have the knowledge to properly handle, transport, and store hazardous materials, and to perform the required functions of the profession.

## **REFERENCES**

- \* International Maritime Organization's Dangerous Goods Code (IMDG Code).
- \* International Civil Aviation Organization's Technical Instructions (ICAO TI).
- \* UN Recommendations on the Transport of Dangerous Goods--Model Regulation.
- \* ANSI/ISO/IEC 17024, Conformity assessment --General requirements for bodies operating certification of persons, American National Standards Institute, Washington, DC, 2002.
- \* Accreditation Guidelines for Engineering and Related Specialty Certification Programs, Council of Engineering and Scientific Specialty Boards, Annapolis, MD, 2010.
- \* ICE 1100 2010(E)--Standard for Assessment-Based Certificate Programs, The National Commission for Certifying Agencies, Washington, DC, 2005.

### **ANSI 17024 Criteria**

ANSI 17024 requires that the credential organization maintain an active committee consisting of subject matter experts whose responsibility is to develop and maintain valid, legally defensible, and credible certification exams in accordance with the latest ANSI-approved policies and procedures. These policies and procedures are required to be based upon professionally recognized psychometric principles and on

the standards of the accreditation body(ies). ANSI performs yearly audits on committee activities to verify that the credential organization is following its policies and procedures.

ANSI 17024 requires that the certification body remain independent from exam training and from aiding others in the preparation of such services to ensure that confidentiality and impartiality of the examination and other procedures are not compromised. In effect, this ensures that credentialed professionals are all treated fairly in demonstrating competency and that any credential award is fair and based on objective criteria.

ANSI 17024 requires that the certification body maintain a publicly-available management system. The management system is usually documented in an organization's Management Systems Manual (MSM) and is available for public download. IHMM's MSM has information on credential eligibility, examination, record keeping, security, and proper usage requirements. The MSM also documents the pass/fail criteria for a competency exam.

ANSI 17024 requires that the certification body maintain a proactive process to monitor the credentialed professional's compliance with a Code of Ethics (COE). Signatory to the COE is required for a credential award and the certificant is bound by the COE for the duration of the credential award. IHMM demands the highest moral integrity from those responsible for handling hazardous materials and transporting dangerous goods. The COE requires all IHMM certificants to perform within the requirements of the law and in the interest of environmental protection and public safety.

Furthermore, IHMM certificants are bound by the COE to report any observed potential COE violations within the profession and duly report them to IHMM. Potential violation reporting procedures meet ANSI requirements and provide the profession a means to voluntarily improve best practice. Once reported, all reports are investigated by a Professional Standards Committee with procedures found in the MSM using the principal of judgment by one's peers.

ANSI 17024 requires that the certification body define recertification requirements to ensure that the certificant continues to comply with current certification requirements. This usually means maintaining employment in the profession and being active in professional development activities. Certificants must meet a certain threshold of employment and professional development activities to maintain the credential.

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