

COATINGS INSPECTOR SAFETY

9

Introduction

Module 9 presents a range of safety-related information for the coatings inspector. It covers general safety and health exposures and controls involved in coatings inspection including falls, respiratory hazards, visual impairment and noise, toxic metal exposures, chemical exposures and confined space hazards.

Completion of Module 9 on Inspector Safety will enable the coatings inspector to:

1. List potential safety hazards associated with coatings inspection
2. Describe the common personal protective equipment used by a coatings inspector

Additional information on inspector safety and general safety on painting projects can be found in SSPC Publication 03-14 (The Inspection of Coatings and Linings) and in SSPC Painting Manual Volume 1 (Good Painting Practice), Chapter 26.0 - Safety and Health in the Protective Coatings Industry as well as SSPC Guide 17 “Guide to Developing a Corporate Safety Program for Industrial Painting and Coating Contractors.”

There are organizations outside of SSPC: The Society for Protective Coatings that can provide worker safety information Domestically,

OSHA provides awareness on occupational safety and health. When working outside the United States, you can get worker awareness information from document 18001 by OHSAS.

General Safety Responsibilities of the Coatings Inspector

Coatings inspectors are frequently classified as “workers” and held by law to be responsible, as far as is reasonable, for their own safety. To protect themselves and to help assure safe working conditions, all inspectors should:

- Participate in construction safety training.
- Become informed about relevant safety and health issues, and remain current by reading industry publications and journals.
- Obtain copies of safety-related documents referenced by specifications.
- Discuss safety issues/concerns at the pre-job conference or at site meetings whenever possible and whenever safety problems arise. Inspectors should make efforts to clarify their role and the safety-related duties expected of them before beginning to work at any location.
- Become familiar with the location of medical facilities, telephones, hazard warning systems, escape practices, etc., and obtain any site-specific safety training that is required.
- Recognize the hazards they are exposed to, be conservative and avoid unnecessary risks.

Inspectors can take these steps to protect themselves, but what responsibility do they carry to protect the other workers around them and the general public? The answer is that the inspector and all other workers share in some level of responsibility for their collective safety and the safety of the public. They should recognize the need to be aware of safety hazards, and take reasonable care to reduce risks wherever possible. Everyone at the jobsite should keep a look-out for unsafe acts or operations and report them to their respective supervisors or to the engineer in charge of the project. Inspectors should obtain specific guidance on their role relative to safety issues from their employer and/or counsel. Inspectors that observe an imminent hazard likely to cause death or serious injury to

another worker should take immediate action to prevent the accident. Otherwise, unless observation of safety hazards is explicitly within the inspector's scope of services (and the inspector is qualified to perform the task), inspectors should not routinely address matters involving the safety and health of workers employed by others or the public. If the inspector recognizes a hazard that might result in serious injury, it should be brought to the attention of the project supervisor for resolution and documented in the daily log on a one-time basis. Beyond this, inspectors should obtain specific guidance on their role relative to safety issues from their employer and/or counsel.

Inspector Medical Surveillance

An inspector may become exposed to hazardous materials during the course of inspection activities. Pre- and post-project medical surveillance (e.g., blood or urine testing, chest x-rays, etc.) can assess the level of selected toxic materials the body has absorbed during the project (if any).

Besides medical surveillance for hazardous materials, fitness for duty and drug/alcohol testing may be required. Some companies require inspectors to pass regular fitness tests, proving their ability to see (visual acuity), hear, maintain balance, climb stairs and ladders, and wear respiratory protection. Most companies now have written drug policies and may require inspectors to be tested for alcohol and other substances regularly.

Safety Monitoring

Coatings inspectors are often employed on construction sites where safety is left under the control of the (Painting) Contractor and/or the General Contractor (GC). However, in permanent facilities such as refineries, chemical plants steel fabrication shops or a marine terminal, there may be a safety officer or safety department responsible for supplying additional information, support and guidance to workers about the hazards of the facility's operations (i.e., the hazards created by ongoing facility operations as opposed to the hazards of the construction work). Facility safety officers may also be responsible

for monitoring the safety of construction work for recognized hazards and/or to ensure that all workers comply with facility's safety rules. Unless covered by the Contractor's or Facility's safety program, the inspector will need to independently monitor the construction site to identify hazards and ensure adequate controls are in place to minimize any risk of personal exposure. This may include coordination with utilities or other agencies.

Risks

The coatings inspector can face general risks, personal risks and legal risks. None of these risks can be eliminated entirely. The inspector's main responsibility is to know what the risks are, and to take reasonable steps to avoid or to minimize them. In any case, a better understanding of the risks allows them to be controlled or eliminated.

General Risks

General risks not only affect the inspector, but other workers and perhaps the general public. General risks include risks like explosion, particularly from flammable solvents in enclosed space, because of the potential to impact anyone on or near the job site. Other general risks include:

- A hazardous atmosphere, through release of solvents or toxic dust to the environment.
- A dangerous scaffold structure that could collapse, leading to injury to persons working on the structure as well as those passing by.
- Inadequate hazard warnings around exclusion zones (i.e., areas restricted to properly trained and protected workers).

Personal Risks

Personal risks are particular to the individual. The inspector may face the same personal risks as a worker, including:

- Entering a hazardous environment, such as an inadequately ventilated enclosed space
- Falling from a height
- Breathing toxic materials, such as dusts or solvent vapors

Personal risks may at times become compounded. For example, breathing solvent vapors can cause disorientation, leading to another problem such as falling, or they may have a slow and cumulative effect, leading to long term illness. In any event, personal risks, such as falling objects, inadequate access, or insecure staging are always a factor, and inspectors should never work where they feel unsafe. If there are any doubts as to the safety of the work environment, the only safe action is to avoid the area until the doubt is eliminated, by whatever means necessary. Usually this involves notifying the Contractor responsible for control of the work area and requesting that the hazards of concern be eliminated or controlled.

Legal Risks

Legal risks can be classified as secondary risks, arising from failure or neglect on the part of an individual or company to provide services the standard of care customary for the industry. The importance of legal risks has to be emphasized, since the increasing tendency is for litigation to arise from any incident which could conceivably have been avoided. Everyone, even the inspector at the jobsite, is vulnerable to legal action in the event of an incident. Although this is not the prime justification for working safely, it can be a significant factor in the work environment.

Types of Hazards

Coatings inspectors are exposed to the same hazards as painters, although the magnitude or duration of exposure may be less. In addition, the coatings inspector often works in or near inherently hazardous operations, such as oil and gas production or storage, fuel storage facilities, sewage treatment plants, and enclosed spaces such as tanks or pipelines. On-the-job hazards for coatings inspectors may be classified as:

Hazardous Materials

- Cleaning solvents
- Abrasives and dusts
- Toxic metals
- Coating components

- Thinners
- Chemical strippers
- Acidic and caustic solutions
- Asbestos (e.g., lagging on utility lines)
- Other hazardous materials

Hazardous Environments

- Heights
- Confined spaces
- Electrical hazards
- Energized equipment
- Fire and explosion hazards
- Heat/steam
- Working over water
- Other hazardous environments

Hazardous Activities

- Solvent cleaning
- Abrasive blast cleaning
- High and ultra high-pressure water jetting
- Power tool cleaning
- Airless spraying
- Other site-specific hazardous activities

Hazardous Materials

The World Health Organization (WHO) and United Nations (UN) maintain registers of hazardous chemicals. The effect of hazardous materials on an inspector's health depends the level, duration and route of exposure. For example, the body reacts differently to inhalation and ingestion (direct entry into the body) of dusts and vapors than it does to skin contact. The amount of material entering the body and the timeframe over which the exposure occurs also influences the effect on the body. An individual's reaction to various exposures cannot be accurately predicted. The effect of hazardous materials on an individual inspector's health also depends on the individual's tolerance level. When exposure exceeds the tolerance level, adverse health consequences can occur.

Safety Data Sheets (SDSs)

Safety data sheets (SDSs) provide safety-related information for materials and their ingredients. SDSs must accompany products wherever they are stored or used. In addition, when coating materials are transported by road or rail, in whatever quantity, detailed labeling is required on each individual container and the shipping container, providing data that can be used in any emergency situation such as a spill.

The SDS informs workers about the health hazards of a material's components and provides safeguards for handling (e.g., personal protective equipment required) and proper actions in the event of an emergency. The revised Hazard Communication Standard requires the following 16-section chronological format:

Section 1: Identification

Section 2: Hazards Information

Section 3: Composition/Information on Ingredients

Section 4: First-Aid Measures

Section 5: Fire-Fighting Measures

Section 6: Accidental Release Measures

Section 7: Handling and Storage

Section 8: Exposure Controls/Personal Protection

Section 9: Physical and Chemical Properties

Section 10: Stability and Reactivity

Section 11: Toxicological Information

Section 12: Ecological Information

Section 13: Disposal Considerations

Section 14: Transport Information

Section 15: Regulatory Information

Section 16: Other Information, Including Date of Preparation or Last Revision

A sample SDS from the OSHA web site is appended to this Module.

Organic Solvents

Most solvents are toxic to some degree, depending upon the magnitude and duration of exposure and may burn when exposed to an ignition source. Solvents may enter or affect the body in three ways. The most frequent way solvents affect the body is by skin contact. When a solvent is allowed to contact the skin, even for a short period of time, it will start to damage the skin by stripping its natural oils, causing dermatitis (reddening and swelling of the skin). Depending upon the solvent, it may trigger a response from the immune system (e.g., not unlike poison ivy) or pass through the skin and be transported by the blood to damage other areas of the body. A second route of entry of solvents into the body is by breathing, or inhalation. Once solvents are inhaled, the vapors can pass from the lungs directly to the blood. The solvent may irritate the respiratory tract and/or cause adverse health effects to other body systems such as the central nervous system. The third route of entry of solvents into the body is by ingestion. Ingestion of solvents occurs when eating, drinking or consuming tobacco products with contaminated hands or clothing, and may affect the gastrointestinal tract as well as other body organs.

Inspectors can refer to SSPC TU 8 “The Use of Isocyanate-Containing Paints as Industrial Maintenance Coatings” for more information on hazards associated with isocyanate-containing paints and SSPC TU 6 “Chemical Stripping of Organic Coatings from Steel Surfaces” for more information on chemical stripping.

Coating Components

Coatings are made from chemical formulations of solid powdered materials (pigments and fillers) dispersed in a film-forming liquid vehicle (resin and solvents). Information on toxicity and/or other hazards is found on Material Safety Data Sheets (MSDSs) and product data sheets provided by the coating manufacturer. Organic solvents were discussed earlier in this module.

Pigments and Binders

Most heavy metals are potentially hazardous. This has had an immediate impact on some of the ingredients used by coating formulators, particularly corrosion inhibitive pigments such as lead

and zinc chromate. Other pigments used in coatings may be classified as suspected toxins, carcinogens and/or environmental pollutants. Even zinc, a mineral that is needed by the human body to maintain good health can be toxic in high doses.

The binders used in some coatings are potentially hazardous. For example, polyurethane coatings are formed by reactions involving highly reactive isocyanate compounds that are strong irritants and sensitizers (i.e., cause allergic reactions of the skin and/or respiratory system). Typical effects include skin reactions, eyes watering, respiratory difficulties and possibly other long term effects. Great care must be taken to select the proper respiratory protection when applying coatings containing isocyanates. Manufacturers specify the type of personal protective equipment on their MSDS.

Other Hazardous Materials Encountered by Inspectors

Acids/Caustics

In certain industries, e.g., pulp and paper mills, food and beverage processing plants, and water and wastewater treatment plants, the inspector may become exposed to strong acids and/or caustics used to prepare concrete/steel surfaces for coating. Both acids and caustics will cause eye damage and burn skin upon contact. Appropriate personal protective equipment (PPE) including respiratory protection, gloves, eye protection and skin protection should be used whenever working with or near acids or caustics. The PPE required can be determined by consulting the product MSDS.

Dusts

Airborne dust is generated during surface preparation activities and during blow down of surfaces prior to coating. Blast cleaning abrasives are generally chosen in part for their surface preparation performance characteristics. However, recent studies have demonstrated that certain generic types of abrasives can contain toxic materials that are released as the particles become fractured upon impact. It is generally accepted that the smallest particle size that is visible to the unaided eye is 50 μm . Respirable dust is 10 μm and smaller. As a result, an

inspector may be inhaling harmful dust particles without awareness, since the dust that can make it into the deep regions of the lungs (i.e., respirable) is too small to see. Breathing too much of any fine dust, (independent of its inherent toxicity) can irritate the linings of the throat and lungs, leading in extreme cases to irreversible long-term effects. Other chronic lung diseases are also possible. For instance, use of silica sand as a blast cleaning abrasive is prohibited in many parts of the world due to the potential of silicosis, a deadly lung disease. Respirators equipped with High Efficiency Particulate Air (HEPA) filtration cartridges must be fitted properly and worn to help avoid dust inhalation.

Toxic Metals



Hand Wash Station

Many aged coatings contain lead, chromium and other toxic metals. These metals pose no hazard to humans while they are part of an intact coating system, but become hazardous when they are “disturbed” during maintenance painting activities, including surface preparation operations. Once these metals become fractured and the dust becomes airborne, they pose an inhalation hazard. Once in the body, the toxic metals can affect the lungs, blood forming system, and/or nervous system damage among other problems. The metals can also enter the body through ingestion if the inspector does not wear gloves, or does not wash their hands and face before eating, drinking or using tobacco products. Basic personal hygiene, respiratory protection and protective clothing can prevent the hazards associated with these metals from affecting the health of the inspector.

Hazardous Environments

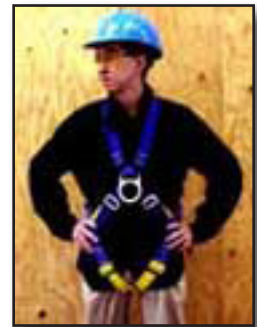
Working at Heights

Falls on construction sites continue to be a leading cause of fatalities and injuries every year. Inspectors should therefore understand and use of personal fall protection systems whenever exposed to unprotected fall hazards. Fall protection can be provided with guardrails, safety nets, personal fall arrest systems, positioning devices and/or warning

line systems. Where work platforms with guardrails are not feasible, personal fall arrest systems must be used.

A personal fall arrest system frequently consists of a lifeline connected to secure anchorage points, and a harness worn by the worker connected to the lifeline by a shock absorbing lanyard using specially designed clamping devices. The most appropriate harnesses are fastened across the chest and shoulders and around the legs, and attach to a lanyard in the upper part of the back.

Safety harnesses should be checked at regular intervals to ensure that they are not chafed, cut, or worn. When in use, they should be protected from chafing or exposure to harmful materials, such as solvents, and always kept clear of any obstructions so that they may operate properly in the event of a fall. A harness must be connected to a properly designed support system (e.g., lifeline), rather than to the access structure itself (e.g., scaffolding).



If there are any doubts as to the safety of the access arrangements, the only safe action is to avoid access until the doubt is eliminated, by whatever means necessary. A difficult situation may arise when an inspector has to use staging that painters are using, which the inspector considers to be unsafe. The safe option is to establish the adequacy of the fall protection controls before using any doubtful access structure. It is better to risk some delay of the work than to risk a fall.

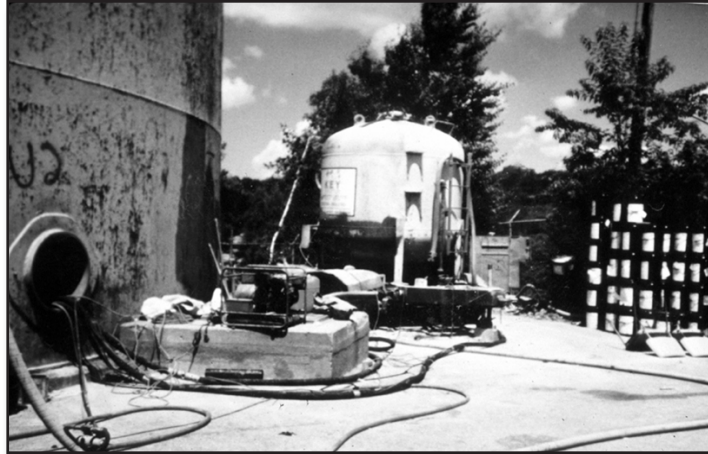
Confined Spaces

A coatings inspector may be required to work in confined spaces such as storage tanks. A confined space is defined as a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work,
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits), and
- Is not designed for continuous occupancy

Hazardous conditions a coatings inspector may encounter when working in confined spaces include:

- Flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL), where the LEL is defined as the lowest concentration of the vapor in air that might explode if a source of ignition were present,
- Airborne combustible dust at a concentration that meets or exceeds its LEL,
- Atmospheric oxygen concentrations below 19.5% or above 23.5%,
- Atmospheric concentrations of substances in excess of the permissible exposure limits (PEL), where PEL is a legally enforceable airborne concentration to which workers may be exposed which may be based upon an 8 hour time weighted average exposure, a 15 minute short-term exposure limit, and/or an instantaneous maximum ceiling limit, dependant upon the chemical,
- Mechanical or electrical hazards from equipment connected to or inside of the confined space (e.g., blades inside a large mixing tank).



Confined spaces can be classified as non-permit or permit required. Permit-required confined spaces are those that:

- Contain or have the potential to contain a hazardous atmosphere,
- Contain a material that has the potential to engulf an entrant,
- Has an internal configuration such that an entrant could be trapped or asphyxiated, or
- Contains any other recognized serious safety or health hazard.

Prior to entering a confined space, the inspector should verify that it has been tested and cleared for entry, and that proper personal protective equipment is employed, including in some cases supplied-air respirators. Detailed confined space entry training is always required before entering any confined space.

Electrical Shock

In facilities such as electrical generating stations and on ordinary construction sites, the inspector may be exposed to the risk of electrical shock. In such cases, appropriate lockout/tagout procedures must be observed. Lockout involves blocking the flow of energy from the power source to the equipment with a padlock or chain, or by removing a component such as a fuse or circuit breaker. Items typically locked out include electrical connections, steam lines, valves, and moving parts such as agitators, gears and pistons, high-voltage motors, breaker cabinets, transformers, overhead cranes, transmission structures, etc. Tags are placed on each locking device to identify the party(s) locking out the power source. Some electrical hazards cannot be easily locked or tagged. Energized third rails on a train or subway line and overhead electrical transmission wires may be encountered near the work area. In such instances, the inspector must take particular caution to avoid contact with live electrical loads while accessing a structure or the work area. High-voltage holiday detectors may pose an additional hazard to inspectors, particularly if they are working at a height when any surprise may cause a fall to occur.

Other Hazardous Environments

Some of the other hazardous environments that the coatings inspector may encounter are:

- Slippery or obstructed walkways (causing falls)
- Excessive heat (causing heat stress/exhaustion) or cold (causing hypothermia)
- Inadequate lighting (causing trips and falls)*
- Noise (causing long term hearing loss)
- Vehicular (struck-by hazard)
- Drowning (when working near water)
- Animal borne risks (e.g., insect or snake bites, bird droppings, etc.)

* Refer to SSPC Guide 12 “Guide for Illumination of Industrial Painting Projects” for further information on lighting.

Hazardous Activities

At times, the inspector may work in the vicinity of hazardous activities. For example:

- Abrasive blast cleaning is a dangerous operation. The high-pressure compressed air through the system and the air-propelled abrasive from the nozzle can cause serious injury. Abrasive blast cleaning presents additional hazards when nuisance dusts and/or toxic dusts (from toxic coatings and/or the abrasive) are released into the atmosphere. Loud noise from blast nozzles and compressors may also impede communication and cause hearing loss over time.



- High- and ultra-high pressure water jetting may use pressures as high as 345 MPa (50,000 psi) and water volumes as low as 8 to 56 liters (2 to 15 gallons) per minute. Since high-pressure water can cut through concrete or even steel, the hazard to inspectors in the vicinity of the work cannot be over-stressed.
- Airless spray uses high pressure (e.g., 3000-6000 psi or higher) to atomize a coating. Placing hands or fingers in front of the spray tip can cut the skin and inject paint beneath the skin and into the blood stream. An inspector should never be near an applicator during airless spray application unless the applicator is notified in advance of his presence. Similarly, it is also a hazard to check spray guns and tips while the system is under pressure.

Personal Protective Equipment

Personal protection is a must for safety. The coatings inspector should wear suitable safety equipment and clothing. Generally, the inspector is exposed to a lower level of hazards than workers, since the inspector is seldom in the work area continuously. Nevertheless, the hazards are similar, and a wise inspector adopts at least the same level of personal protection as necessary for the other workers.

Material safety data sheets (MSDSs) are the primary means for determining the type and level of personal protective equipment required. The MSDS should always be consulted when chemical products are used. The MSDS will list the component ingredients of the product, and will also indicate the personal protective equipment recommended to safely work with or around the product.

Respiratory Protection



Half-face Respirator

It is likely that inspectors will be required to wear some type of respiratory protection during the inspection of surface preparation and coating operations, particularly when the contractor is removing paint containing toxic metals (e.g., lead) or applying coatings containing toxic materials. While a containment on a structure protects the environment, high concentrations of solvent vapors, organic vapors or toxic metal dusts can occur inside the contained area, even when the ventilation system is operational. An inspector should not enter a containment that is not properly ventilated. Even when respiratory protection is worn, the ventilation system should be allowed to clear the area for several minutes before an inspector enters to perform an inspection in order to reduce the airborne concentration of contaminants to within the protection factor of the respirator.

In general there are two basic types of respirators. Air purifying respirators remove particulates from the air in the breathing zone by filtering it prior to inhalation. Supplied air respirators supply breathing air from outside the work environment. The proper respirator must be selected based upon the hazards of the specific chemicals involved, the likely level of exposure and other factors.



Powered Air Purifying Respirator (PAPR)

In a hazardous environment, particularly in an enclosed space such as a tank or vessel, respiratory protection is required in the form of air-purifying (filtering face masks) or air-supplied respirators. Inspectors wearing tight-fitting face pieces must not have any facial hair that interferes with the face-to-mask seal. Fit testing is necessary for all tight-fitting respirators and must be repeated at least annually to ensure that the face mask fits. Training on respirator use must also occur at least annually.

If air purifying respirators are used, a cartridge change schedule must in place to ensure that the cartridges are changed before they become saturated, resulting in the atmospheric contaminants passing through the filter to the inspector. Air-supplied respirators should be fed with fresh air, preferably from a remote area, upwind of the job site, so that there is no possibility of the site contaminants (solvents, diesel fumes, etc.) entering the inlet. In addition, air lines should pass through charcoal filters to clean any contaminants that may be incorporated in the air supply, and the supply should be monitored for carbon monoxide.

Sight Protection

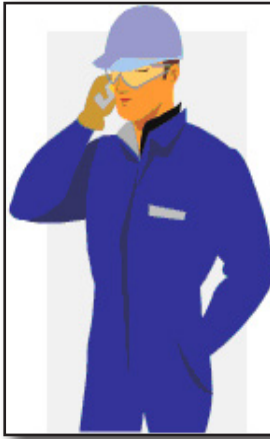


Wrap-around or goggle safety glasses should be worn whenever there is a risk of eye injury. Separate side protection pieces can be used by those who normally wear prescription safety eyeglasses.

Hearing Protection

Protective equipment against noise exposure may take the form of muffs, ear plugs, and canal caps. Inspectors will typically wear ear plugs for hearing conservation.





Protective Clothing and Equipment

Inspectors should be protected from hazards with appropriate protective clothing. This may include a long-sleeve coverall, gloves, work boots and a hard hat. Other safety devices include life vests when working over water and traffic vests when working on bridge and highway structures where a vehicular hazard is present, or steel toed shoes when crushing hazards exist (e.g., in a fabrication shop).

Potential Hazards Regarding Inspection Equipment

Any electrically operated inspection equipment used in hazardous environments (i.e., greater than 10% of the Lower Explosive Limit) must be “intrinsically safe.” Most battery-operated inspection equipment is not, and should not be used in a hazardous environment without an appropriate permit. This rule applies to all equipment with batteries and a switch, including flashlights, cameras and cellular telephones, holiday detectors, electronic psychrometers and surface temperature thermometers, electronic surface profile gages, electronic dry film thickness gages, destructive dry film thickness gages, etc.

Summary

Coatings inspectors are frequently classified as “workers” and held by law to be responsible, as far as is reasonable, for their own safety. Everyone at the jobsite should keep a look-out for unsafe acts or operations. An inspector who is aware of a serious safety violation but fails to report it to the effected workers’ supervisor may put themselves at risk of legal action if an accident occurs. The coatings inspector can face general risks, personal risks, and legal risks. The inspector is responsible to know what the risks are, and to take reasonable steps to avoid them.

The coatings inspector can encounter hazardous materials, hazardous environments and hazardous activities on a project. Hazardous materials include cleaning solvents, abrasives and dusts, toxic metals, coating components, thinners, chemical strippers and acidic and caustic solutions. Hazardous environments include heights, confined spaces, electrical, fire and explosion hazards, slippery or obstructed walkways, excessive heat, inadequate lighting, noise, vehicles and moving heavy parts on cranes, etc. Hazardous activities include solvent cleaning, abrasive blast cleaning, high pressure water jetting, power tool cleaning and airless spraying.

Safety Data Sheets (SDS) are the primary document that describes the hazards associated with the chemicals used on a project and the personal protective equipment required to safely handle the product.

While the inspector receives a shorter duration of exposure to hazards than workers, the hazards themselves are similar and coatings inspector should wear similar, suitable safety equipment and clothing. Personal protective equipment for an inspector typically includes a hard hat and safety glasses, ear plugs in a noisy environment, respiratory protection, a fall harness and shock absorbing lanyard (if working from heights), work boots and long sleeved coveralls.

Most battery-operated inspection equipment is not “intrinsically safe” and should not be used in a hazardous environment (greater than 10% of the LEL) without the appropriate permit.

Chemical Stuff
(GHS MSDS Example)

GHS SAFETY DATA SHEET

1. Identification

Product Name: Chemical Stuff
Synonyms: Methyltoxy Solution
CAS Number: 000-00-0
Product Use: Organic Synthesis
Manufacturer/Supplier: My Company
Address: My Street, Mytown, TX 00000

General Information: 713-000-0000
Transportation Emergency Number: CHEMTREC: 800-424-9300

2. Hazards Identification

GHS Classification:

Health	Environmental	Physical
Acute Toxicity - Category 2 (inhalation), Category 3 (oral/dermal) Eye Corrosion - Category 1 Skin Corrosion - Category 1 Skin Sensitization - Category 1 Mutagenicity - Category 2 Carcinogenicity - Category 1B Reproductive/Developmental - Category 2 Target Organ Toxicity (Repeated) - Category 2	Aquatic Toxicity - Acute 2	Flammable Liquid - Category 2

GHS Label:

Symbols: flame, skull and crossbones, corrosion, health hazard	
Hazard Statements DANGER! Highly Flammable Liquid and Vapor. Fatal if inhaled. Causes severe skin burns and eye damage. May cause allergic skin reaction. Toxic if swallowed and in contact with skin May cause cancer. Suspected of damaging the unborn child. Suspected of causing genetic defects. May cause damage to cardiovascular, respiratory, nervous, and gastrointestinal systems and liver and blood through prolonged or repeated exposure. Toxic to aquatic life.	Precautionary Statements Do not eat, drink or use tobacco when using this product. Do not breathe mist/vapors. Keep container tightly closed. Keep away from heat/sparks/open flame. - No smoking. Wear respiratory protection, protective gloves and eye/face protection. Use only in a well-ventilated area. Take precautionary measures against static discharge. Use only non-sparking tools. Store container tightly closed in cool/well-ventilated place. Wash thoroughly after handling.

3. Composition / Information on Ingredients

Component	CAS Number	Weight %
Methyltoxy	000-00-0	80

(See Section 8 for Exposure Limits)

4. First Aid Measures

Eye: Eye irritation. Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get immediate medical attention.

Skin: Itching or burning of the skin. Immediately flush the skin with plenty of water while removing contaminated clothing and shoes. Get immediate medical attention. Wash contaminated clothing before reuse.

Inhalation: Nasal irritation, headache, dizziness, nausea, vomiting, heart palpitations, breathing difficulty, cyanosis, tremors, weakness, red flushing of face, irritability. Remove exposed person from source of exposure to fresh air. If not breathing, clear airway and start cardiopulmonary resuscitation (CPR). Avoid mouth-to-mouth resuscitation.

Ingestion: Get immediate medical attention. Do not induce vomiting unless directed by medical personnel.

5. Fire Fighting Measures

Suitable Extinguishing Media: Use dry chemical, foam, or carbon dioxide to extinguish fire. Water may be ineffective but should be used to cool fire-exposed containers, structures and to protect personnel. Use water to dilute spills and to flush them away from sources of ignition.

Fire Fighting Procedures: Do not flush down sewers or other drainage systems. Exposed firefighters must wear NIOSH-approved positive pressure self-contained breathing apparatus with full-face mask and full protective clothing.

Unusual Fire and Explosion Hazards: Dangerous when exposed to heat or flame. Will form flammable or explosive mixtures with air at room temperature. Vapor or gas may spread to distant ignition sources and flash back. Vapors or gas may accumulate in low areas. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Vapors may concentrate in confined areas. Liquid will float and may reignite on the surface of water.

Combustion Products: Irritating or toxic substances may be emitted upon thermal decomposition. Thermal decomposition products may include oxides of carbon and nitrogen.

6: Accidental Release Measures

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. (Also see Section 8).

Vapor protective clothing should be worn for spills and leaks. Shut off ignition sources; no flares, smoking or flames in hazard area. Small spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large spills: Dike far ahead of liquid spill for later disposal.

Do not flush to sewer or waterways. Prevent release to the environment if possible. Refer to Section 15 for spill/release reporting information.

7. Handling and Storage

Handling

Do not get in eyes, on skin or on clothing. Do not breathe vapors or mists. Keep container closed. Use only with adequate ventilation. Use good personal hygiene practices. Wash hands before eating, drinking, smoking. Remove contaminated clothing and clean before re-use. Destroy contaminated belts and shoes and other items that cannot be decontaminated.

Keep away from heat and flame. Keep operating temperatures below ignition temperatures at all times. Use non-sparking tools.

Storage

Store in tightly closed containers in cool, dry, well-ventilated area away from heat, sources of ignition and incompatibles. Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion. Store at ambient or lower temperature. Store out of direct sunlight. Keep containers tightly closed and upright when not in use. Protect against physical damage.

Empty containers may contain toxic, flammable and explosive residue or vapors. Do not cut, grind, drill, or weld on or near containers unless precautions are taken against these hazards.

8. Exposure Controls / Personal Protection

Exposure Limits

Component, Methyltoxy - TWA: 3 ppm (skin) - STEL: C 15 ppm (15 min.)

Engineering Controls: Local exhaust ventilation may be necessary to control air contaminants to their exposure limits. The use of local ventilation is recommended to control emissions near the source. Provide mechanical ventilation for confined spaces. Use explosion-proof ventilation equipment.

Personal Protective Equipment (PPE)

Eye Protection: Wear chemical safety goggles and face shield. Have eye-wash stations available where eye contact can occur.

Skin Protection: Avoid skin contact. Wear gloves impervious to conditions of use. Additional protection may be necessary to prevent skin contact including use of apron, face shield, boots or full body protection. A safety shower should be located in the work area. Recommended protective materials include: Butyl rubber and for limited contact Teflon.

Respiratory Protection: If exposure limits are exceeded, NIOSH approved respiratory protection should be worn. A NIOSH approved respirator for organic vapors is generally acceptable for concentrations up to 10 times the PEL. For higher concentrations, unknown concentrations and for oxygen deficient atmospheres, use a NIOSH approved air-supplied respirator. Engineering controls are the preferred means for controlling chemical exposures. Respiratory protection may be needed for non-routine or emergency situations. Respiratory protection must be provided in accordance with OSHA 29 CFR 1910.134.

9. Physical and Chemical Properties

Flashpoint: 2°C (35°F)

Autoignition Temperature: 480°C (896°F)

Boiling Point: 77°C (170.6°F) @ 760 mm Hg

Melting Point: -82°C

Vapor Pressure: 100.0 mm Hg @ 23°C

Vapor Density(Air=1): 1.7; air = 1

% Solubility in Water: 10 @ 20°C

Pour Point: NA

Molecular Formula: Mixture

Odor/Appearance: Clear, colorless liquid with mild, pungent odor.

Lower Flammability Limit: >3.00%

Upper Flammability Limit: <15.00%

Specific Gravity: 0.82g/ml @ 20°C

% Volatile: 100

Evaporation Rate (Water=1): 5(Butyl Acetate =1)

Viscosity: 0.3 cP @ 25°C

Octanol/Water Partition Coefficient: log K_{ow} : 0.5

pH: 7, 8% aqueous solution

Molecular Weight: Mixture

10. Stability and Reactivity

Stability/Incompatibility: Incompatible with ammonia, amines, bromine, strong bases and strong acids.

Hazardous Reactions/Decomposition Products: Thermal decomposition products may include oxides of carbon and nitrogen.

11. Toxicological Information

Signs and Symptoms of Overexposure: Eye and nasal irritation, headache, dizziness, nausea, vomiting, heart palpitations, difficulty breathing, cyanosis, tremors, weakness, itching or burning of the skin.

Acute Effects:

Eye Contact: may cause severe conjunctival irritation and corneal damage.

Skin Contact: may cause reddening, blistering or burns with permanent damage. Harmful if absorbed through the skin. May cause allergic skin reaction.

Inhalation: may cause severe irritation with possible lung damage (pulmonary edema).

Ingestion: may cause severe gastrointestinal burns.

Target Organ Effects: May cause gastrointestinal (oral), respiratory tract, nervous system and blood effects based on experimental animal data. May cause cardiovascular system and liver effects.

Chronic Effects: based on experimental animal data, may cause changes to genetic material; adverse effects on the developing fetus or on reproduction at doses that were toxic to the mother. Methyltoxy is classified by IARC as group 2B and by NTP as reasonably anticipated to be a human carcinogen. OSHA regulates Methyltoxy as a potential carcinogen.

Medical Conditions Aggravated by Exposure: preexisting diseases of the respiratory tract, nervous system, cardiovascular system, liver or gastrointestinal tract.

Acute Toxicity Values

Oral LD₅₀ (Rat) = 100 mg/kg

Dermal LD₅₀ (Rabbit) = 225-300 mg/kg

Inhalation LC₅₀ (Rat) = 200 ppm/4 hr., 1100 ppm vapor/1 hr

12. Ecological Information

LC₅₀ (Fathead Minnows) = 9 mg/L/96 hr.

EC₅₀ (Daphnia) = 8.6 mg/L/48 hr.

Bioaccumulation is not expected to be significant. This product is readily biodegradable.

13. Disposal Considerations

As sold, this product, when discarded or disposed of, is a hazardous waste according to Federal regulations (40 CFR 261). It is listed as Hazardous Waste Number Z000, listed due to its toxicity. The transportation, storage, treatment and disposal of this waste material must be conducted in compliance with 40 CFR 262, 263, 264, 268 and 270. Disposal can occur only in properly permitted facilities. Refer to state and local requirements for any additional requirements, as these may be different from Federal laws and regulations. Chemical additions, processing or otherwise altering this material may make waste management information presented in the MSDS incomplete, inaccurate or otherwise inappropriate.

14. Transport Information

U.S. Department of Transportation (DOT)

Proper Shipping Name: Methyltoxy

Hazard Class: 3, 6.1

UN/NA Number: UN0000

Packing Group: PG 2

Labels Required: Flammable Liquid and Toxic

International Maritime Organization (IMDG)

Proper Shipping Name: Methyltoxy

Hazard Class: 3 Subsidiary 6.1

UN/NA Number: UN0000

Packing Group: PG 2

Labels Required: Flammable Liquid and Toxic

15. Regulatory Information

U.S. Federal Regulations

Comprehensive Environmental Response and Liability Act of 1980 (CERCLA):

The reportable quantity (RQ) for this material is 1000 pounds. If appropriate, immediately report to the National Response Center (800/424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies.

Toxic Substances Control Act (TSCA): All components of this product are included on the TSCA inventory.

Clean Water Act (CWA): Methyltoxy is a hazardous substance under the Clean Water Act. Consult Federal, State and local regulations for specific requirements.

Clean Air Act (CAA): Methyltoxy is a hazardous substance under the Clean Air Act. Consult Federal, State and local regulations for specific requirements.

Superfund Amendments and Reauthorization Act (SARA) Title III Information:

SARA Section 311/312 (40 CFR 370) Hazard Categories:

Immediate Hazard: X

Delayed Hazard: X

Fire Hazard: X

Pressure Hazard:

Reactivity Hazard:

This product contains the following toxic chemical(s) subject to reporting requirements of SARA Section

313 (40 CFR 372)

Component	CAS Number	Maximum %
Methyltoxy	000-00-0	80

State Regulations

California: This product contains the following chemical(s) known to the State of California to cause cancer, birth defects or reproductive harm:

Component	CAS Number	Maximum %
Methyltoxy	000-00-0	80

International Regulations

Canadian Environmental Protection Act: All of the components of this product are included on the Canadian Domestic Substances list (DSL).

Canadian Workplace Hazardous Materials Information System (WHMIS):

Class B-2 Flammable Liquid

Class D-1-B Toxic

Class D-2-A Carcinogen

Class D-2-B Chronic Toxin

Class E Corrosive

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

European Inventory of Existing Chemicals (EINECS): All of the components of this product are included on EINECS.

EU Classification: F Highly Flammable; T Toxic; N Dangerous to the Environment

EU Risk (R) and Safety (S) Phrases:

R11: Highly flammable.

R23/24/25: Toxic by inhalation, in contact with skin and if swallowed.

R37/38: Irritating to respiratory system and skin.

R41: Risk of serious damage to eyes.

R43: May cause sensitization by skin contact.

R45: May cause cancer.

R51/53: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

S53: Avoid exposure - obtain special instructions before use.

S16: Keep away from sources of ignition - No Smoking.

S45: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S9: Keep container in a well-ventilated place.

S36/37: Wear suitable protective clothing and gloves.

S57: Use appropriate container to avoid environmental contamination.

16. Other Information

National Fire Protection Association (NFPA) Ratings: This information is intended solely for the use of individuals trained in the NFPA system.

Health: 3

Flammability: 3

Reactivity: 0

Revision Indicator: New MSDS

Disclaimer: The information contained herein is accurate to the best of our knowledge. My Company makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances.

	Module Nine
	Coatings Inspector Safety

	Module Nine Learning Outcomes
	■ Comprehension of Module Nine will enable the participant to: ➢ List potential safety hazards associated with coatings inspection ➢ Describe the common personal protective equipment used by a coatings inspector

	Safety References
	■ SSPC Guide 17 ■ OSHA (US worker safety) ■ OHSAS 18001 (International worker safety) 

	General Safety Responsibilities
	■ Participate in construction safety training ■ Become informed/remain current about relevant safety and health issues ■ Obtain copies of safety-related documents ■ Discuss safety issues at the pre-job conference or at site meetings ■ Make efforts to clarify inspector position and safety-related duties; obtain site-specific training ■ Become familiar with the location of medical facilities, telephones, hazard warning systems, escape practices, etc. ■ Be conservative and avoid unnecessary risks

	Inspector Responsibility for Safety
	■ Inspectors share in safety of others ■ Everyone on site should watch for safety violations and report them ■ Obtain specific guidance on safety role ■ Take immediate action if safety violation can cause death/serious injury ■ Report to project supervisor & document

	Inspector Responsibility for Safety (con't.)
	■ Obtain guidance on role regarding safety from employer/counsel prior to project start-up ■ Should not routinely address safety & health issues unless: ➢ Part of scope of services ➢ Qualified

Pre-project Inspector Safety “Inventory”

- Is required safety training current
- Is lead training required/current
- Availability of site decontamination facilities
- Specific PPE
- Fall protection equipment and compatibility with site conditions
- Is confined space training required/current
- Hand wipes, eye wash, first aid kit, bags for contaminated clothing

Inspector Medical Surveillance

- Pre- and post-project medical surveillance to assess net affect of jobsite hazards
 - Blood, urine, chest x-ray, etc.
- Fitness for duty
- Drug/alcohol screening/testing

Safety Monitoring

- Construction sites
 - Safety monitoring/control is the responsibility of controlling contractor
 - May require coordination with utilities/other agencies
- Permanent facilities
 - Safety department/safety officer
 - Often provide safety training/written rules regarding safety policies

Safety Risks

- General Risks (affect inspectors, workers, public)
 - Hazardous environment (explosion, solvent release, dust/toxic metals)
 - Improper erection of access structure (collapsing scaffolding)
 - Lack of hazard warnings and/or barriers

Safety Risks (con' t.)

- Personal Risks (affect individual inspectors, workers)
 - Entering a hazardous environment
 - Falling
 - Breathing toxic materials (solvent vapors, dusts, etc.)

Safety Risks (con' t.)

- Legal Risks
 - Failure or neglect from individual who should know the rules
 - Can result in litigation when an accident occurs (and could have been avoided)
 - Everyone at the jobsite is vulnerable to legal action

Types of Hazards

- Inspectors subjected to same hazards as painting contractor (lesser duration)
- Inspectors work in same “inherently dangerous” environments
 - Refineries, sewage treatment, tanks, etc.

Types of Hazards

- Hazardous Materials
 - Cleaning solvents
 - Abrasives and dusts
 - Toxic metals
 - Coating components
 - Thinners
 - Chemical strippers
 - Acidic and caustic solutions
 - Asbestos (lagging on utility lines)
 - Others

Types of Hazards

- Hazardous Environments
 - Heights
 - Confined spaces
 - Electrical
 - Energized equipment
 - Fire and explosion
 - Heat/steam
 - Working over water
 - Others

Types of Hazards

- Hazardous Activities
 - Solvent cleaning
 - Abrasive blast cleaning
 - High & ultra-high pressure water jetting
 - Power tool cleaning
 - Airless paint spraying
 - Other site-specific hazards

Hazardous Materials

- WHO and UN maintain registers
- Effect of hazard on inspector based on:
 - Level of exposure
 - Duration of exposure
 - Route of exposure (e.g., inhalation vs. skin exposure)
 - Tolerance level

Hazard Communication

- Container labeling
- Safety Data Sheet (SDS)
 - Formerly MSDS; revised according to Hazard Communication Standard
 - Must accompany shipment
 - Inform workers of health hazards
 - Provides safeguards for handling (PPE)

Content of SDS: 16 Section Format

- Section 1: Identification
- Section 2: Hazards Identification
- Section 3: Composition/Information on Ingredients
- Section 4: First-Aid Measures
- Section 5: Fire-Fighting Measures

Content of SDS (con't.)

- Section 6: Accidental Release Measures
- Section 7: Handling and Storage
- Section 8: Exposure Controls/Personal Protection
- Section 9: Physical and Chemical Properties
- Section 10: Stability and Reactivity
- Section 11: Toxicological Information

Content of SDS (con't.)

- Section 12: Ecological Information
- Section 13: Disposal Considerations
- Section 14: Transport Information
- Section 15: Regulatory Information
- Section 16: Other Information, Including Date of Preparation or Last Revision

Organic Solvents

- Toxic to humans
- Burn when ignited
- Respirators equipped with organic vapor cartridges



Organic Solvents

- Toxicity based on exposure magnitude and duration
- Routes of entry:
 - Skin contact
 - Inhalation
 - Ingestion
- Health effects:
 - Dermatitis
 - Respiratory tract irritation
 - Organ damage
 - Central nervous system damage
 - Gastrointestinal tract damage
- SSPC TU 8 & TU 6 describe hazards for isocyanates & chemical strippers



Coating Components

- Pigments
 - Most heavy metals are toxic
 - Some metals are carcinogenic
 - Even zinc can be toxic in high doses
- Binders (resins)
 - e.g., isocyanate in polyurethane coatings
 - Skin and respiratory tract irritants
 - Wear proper PPE (based on MSDS)

Other Hazardous Materials Encountered by Inspectors

- **Acids/Caustics**
 - Cause eye damage and skin burns
 - PPE includes:
 - Respiratory protection
 - Gloves
 - Eye protection
 - Skin protection
 - Reference MSDS

Other Hazardous Materials Encountered by Inspectors

- **Dusts**
 - Surface preparation and blow down
 - Abrasives can contain toxic materials
 - Respirable dust is 10 µm and smaller
- **Health effects**
 - Lung & throat irritation
 - Chronic lung disease (e.g., silicosis)
- **Respiratory protection**
 - HEPA filtration cartridges

Other Hazardous Materials Encountered by Inspectors

- **Toxic Metals**
 - Aged coatings contain lead, chromium, etc.
 - Become airborne once fractured
 - Routes of Entry
 - Inhalation
 - Ingestion
 - Prevention
 - Basic hygiene
 - PPE
 - Respiratory protection (HEPA)
 - Protective clothing



Portable hand wash station

Hazardous Environments

- **Working at Heights**
 - Falls leading cause of fatalities/injuries
 - Fall protection includes:
 - Guardrails
 - Safety nets
 - Personal fall arrest systems
 - Positioning devices
 - Warning line systems

Working at Heights

- **Personal fall arrest system**
 - Lifeline connected to anchorage points
 - Harness
 - Shock absorbing lanyard connected to independent lifeline
 - Check regularly for wear, cuts, etc.
 - Protect from solvents
- **Never access a structure on unsafe equipment**



Confined Spaces

- **Inspector may need to access tanks and other confined spaces**
- **Confined space is defined as:**
 - Large enough to enter & perform work
 - Limited means of ingress and egress
 - Not designed for continuous occupancy

Confined Spaces

- Hazardous conditions:
 - Flammable gas, vapor, mist
 - Airborne combustible dusts
 - Oxygen depleted (<19.5%)
 - Oxygen enriched (>23.5%)
 - Atmospheric substances in excess of PEL
 - Mechanical/electrical



Confined Space Entry for the Coatings Inspector

- Verify space has been tested and cleared for safe entry
- Employ proper PPE (may include supplied air respirator)
- Participate in confined space entry training

Electrical Shock

- Risk in power generating stations and construction sites
 - Observe lockout/tagout procedures
- Risk of contacting live electrical transmission wires or energized third rails during access to structure
 - Contacting Miss Utility
- Risk of shock from high voltage holiday detector (may cause fall)

Other Hazardous Environments

- Slippery/obstructed walkways (falls)
- Excessive heat (heat stress/exhaustion)
- Excessive cold (hypothermia)
- Inadequate lighting (trips/falls)
- Noise (long term hearing loss)
- Vehicular (struck-by hazard)
- Drowning (working near water)
- Animal borne (insect/snake bites, bird debris)

Hazardous Activities

- Abrasive blast cleaning
 - High pressure air propelling abrasive
 - Nuisance dusts/toxic dusts
 - Noise
- Inspectors should not be in the immediate area during abrasive blast cleaning



Hazardous Activities

- High & ultra-high pressure water jetting
 - Potential for laceration or dismemberment from water lance
- Inspectors should not be in the immediate area during water jetting operations



Hazardous Activities

- Airless spray
 - Paint injection
 - Skin laceration
 - Paint enters blood stream
- Inspectors should not be in the immediate area during airless spray application



Personal Protective Equipment (PPE)

- A “must” for a safe coatings inspector
- Hazards similar to workers (lower level)
- MSDS indicate PPE for chemical exposures
- Inspector PPE includes:
 - Respiratory protection
 - Fall protection (if working at heights)
 - Sight protection
 - Hearing protection
 - Protective clothing and gloves
 - Life vests (if working over water)
 - Type 1, 2, 3 safety vests (if struck-by hazard exists)
 - Steel toed shoes (if crushing hazard exists)

Respiratory Protection

- Protection from:
 - Toxic metals
 - Dusts
 - Solvent vapors
 - Organic vapors
- Air purifying
- Supplied air
- Selection based on hazards and concentrations
 - See MSDS



Respiratory Protection

- Respiratory protection required in enclosed (confined) spaces
- No facial hair that interferes with seal of tight-fitting respirators
- Respirator use requires medical clearance, fit testing, fit checks and annual training
- Change-out schedule ensures cartridges are not being used after saturation

Respiratory Protection

- Air supplied respirators must be fed with clean fresh air
- Breathing air:
 - Filtered
 - Monitored for CO



Sight Protection

- Wrap-around goggles
- Safety glass with side shields
- Side shield attachments for prescription eyewear



Hearing Protection

- Ear muffs/plugs often required to preserve hearing



Protective Clothing/Equipment

- Long-sleeve coveralls
- Gloves
- Work boots
- Hard hat
- Other
 - Life vests
 - Traffic vests
 - Steel toed shoes



Potential Hazards Regarding Inspection Equipment

- Inspection instruments must be "intrinsically safe" in hazardous environments
- Most are not
- Any instrument that uses batteries and has a switch creates a "spark" when energized
- Camera
- Flashlight
- Holiday detectors
- Electronic:
 - Psychrometers
 - Surface temperature gages
 - Surface profile gages
 - Coating thickness gages
- Others
 - Cellular telephones

Summary

- Coatings inspectors are responsible for their own safety
- Coatings inspectors can face general, personal and legal risks from working unsafely
- Project hazards are generated by materials, environments and activities

Summary (con' t.)

- SDSs are primary document used to communicate chemical hazards and PPE
- Coatings inspectors should wear suitable PPE and clothing
- Many inspection instruments are not intrinsically safe

Disclaimer

- Module 9 provided non-comprehensive inspector safety "awareness" training
- Participation in separate safety training and site-specific training often required
- Inspector may be required to show "proof of training"