

APPENDIX G

**Guidance from USEPA Region X
For ASPPs from Industrial Users**

APPENDIX 3

Detailed Information to be Considered in Development of IU ASPPs:

- Identification of Potential Spill and Slug Discharge Sites and Pathways
- Existing and Proposed Spill Prevention Equipment
- Spill Prevention Procedures
- Existing and Proposed Spill Response Procedures
- Follow Up Reporting and Documentation Procedures

Identification of Potential Spill and Slug Discharge Sites & Pathways

The industrial facility should include in its ASPP plan a description of all potential spill sites at the facility. As many such sites may exist within an industrial facility, it is recommended that the sites be broken down into the following three categories:

- Vicinity of chemical storage, transfer, or transport areas and equipment
- Vicinity of chemical processing equipment
- Vicinity of pumps, valves, and other fluid flow equipment

Chemical storage areas consist of tanks, drums, bags or other containers in which are stored either the raw materials or the products of the industrial process. The industry should provide in its ASPP plan an inventory of the chemicals stored in these containers, as well as provide information on the location and storage capacities for each of these chemicals throughout the plant. Specifically, the ASPP plan should indicate the following:

- Whether above-ground storage and process tanks are open-topped or closed
- Whether below-ground tanks are cathodically protected
- The period of storage for all drummed and bagged chemicals
- Whether storage or process units, as well as valves and pumps, are currently showing signs of wear (e.g., rusty drums, torn bags, leaky valves, etc.)
- An industrial facility diagram indication a process flow schematic, all points, and the probable direction of flow of spilled material
- The location of secondary containment for storage, transfer, and transport areas.

The industrial facility should describe the condition of the containers and transfer equipment and make an independent assessment of the spill potential and possible effects at each industry.

The industrial facility should also describe in its ASPP plan all chemical processing equipment and the chemical contents of this equipment. Chemical processing equipment includes, but is not limited to, the following:

- Chemical reaction vessels
- Plating / pickling baths
- Distillation vessels
- Extraction equipment / separators
- Condensers
- Evaporators
- Scrubbers

In particular, the industrial facility should indicate what materials are pumped in and out of each piece of process equipment, as well as what catalysts and / or other material may be permanently stored in these vessels. The industrial facility should also indicate whether chemical processing is performed on a continuous, batch, or intermittent basis. The facility should describe in general terms its manufacturing process and potential that exists for its process to result in accidental spills or slug discharges of high-strength wastes. This should include identification of the locations of major pumps and valves, as well as other potential process line “weak spots”, such as major piping connections, rotometers, manometers, sight tubes, etc.

Existing and Proposed Spill Prevention Equipment

This section of the ASPP should describe all existing spill prevention equipment that the industry has in place or plans to obtain for implementation of the ASPP; whether the equipment already exists or needs to be purchased should be indicated in the listing.

Equipment required to control a spill, falls into two categories; equipment to prevent spills and equipment to contain spills. The industry ASPP plan should describe current and proposed inventories of both equipment types. Equipment to prevent spills consists of appropriately selected chemical storage and process equipment, as well as built-in safeguards to prevent chemicals from being spilled. Spill containment equipment consists of apparatus available to keep a spill from spreading as well as equipment to remove the spill. Typical equipment of both types are listed below.

Equipment to Prevent Spills

Chemical Storage and Process Tanks

- Pumping equipment (compatible material)
- Shell and bottom construction (compatible material)
- Underground seepage protection
- Cathodic protection of underground tanks
- Liquid level sensing devices
- Overflow, temperature, pressure alarms
- Heating coils
- Collision protection
- Support construction
- Secondary containment
- Divisionary structures in quench tanks

Drums

- Drum construction
- Storage areas
- Secondary containment
- Divisionary structures
- Collision protection
- Drum handling equipment
- Drip pans

Pipes, Valves, Fitting, Pumps, Electrical and Mechanical Equipment

- Seals
- Valve stem packing
- Gaskets
- Cathodic protection
- Vehicular traffic warning signs

Loading Stations

- Fill safeguards
- Curbs and drains
- Warning signs / improper disconnect protection
- Secondary containment

Equipment to Contain Spills

Booms, barriers, sweeps, and fenders
Surface collecting agents
Absorbent materials
Skimmers
Oil / water separators
Sumps
Sewer plugs

The ASPP plan should discuss the industrial facility's status in regard to the following spill prevention equipment requirements:

- All chemical storage vessels, as well as all process vessels and fitting (pumps, valves, piping) must be constructed of material compatible with the chemical passing through them. In particular, tanks and drums used to store corrosive chemicals should be constructed of stainless steel or of a corrosion resistant plastic. Any pumps or valves used to process these chemicals must possess corrosion-resistant seals and packing. Similarly, pumps or valves through which organic chemicals pass must contain seals and packings which are dissolution-resistant. The industry should indicate in its ASPP equipment inventory, where applicable, that appropriate materials of construction have been used, and are compatible with the chemicals being processed.
- Foundations and supports of large storage tanks, process vessels, and piping must also meet compatibility and integrity requirements. All above ground vessels should be protected from vehicular damage through the use of truck guards. Underground vessels and pipes should be well marked and weight limits placed on roadways that may cross these underground vessels. All underground vessels should be cathodically protected to prevent damage due to corrosion. Underground piping should be double-walled at vehicle crossings.
- Open storage and process tanks should be equipped with liquid level control devices, and, where necessary, grounding apparatus. In addition, overflow alarms should be installed to warn personnel of tank overfilling events. Similarly, temperature and pressure alarms should be installed on closed chemical processing equipment, to alert industry personnel to runaway reactions or other factors resulting in excessive temperatures and pressures. Such extreme conditions can otherwise result in the automatic opening of relief valves, with the subsequently spilling of the process vessel's contents.
- Proper drum handling equipment should be made readily available. The practice of scooping drums with forks of a fork-truck must be eliminated. Pallets should be used to aid handling and inspection. Oil dispensing racks should be provided with drip pans.
- Loading / unloading pump station controls must be secured in a manner to prevent the pumps from being turned on by unauthorized personnel. Warning signs of physical obstructions such as crossing gates should be used to prevent trucks from driving away while the loading hose is connected.
- All contact and non-contact cooling water cross connections should be eliminated. All unnecessary floor drains should be plugged.

- Many facilities face the potential of spills into plant storm water or sewer systems. Automatic storm water and/or sewer sampling systems can be utilized to monitor for spills. These sampling systems can be tied into automatic shutoff devices that will prohibit discharge from a plant effluent system.

Once spill potential reduction measures have been addressed, secondary containment systems should be considered. A manufacturing facility which has the potential for a spill or slug discharges should provide secondary containment systems, wherever possible, that will control the spread of a spill of toxic wastes or slug discharges of high-strength wastes at or near a potential spill source (e.g., storage tanks, processing equipment and piping). Secondary containment systems which fail to function under rainstorm conditions are considered to be inadequate. There exist several forms of secondary containment systems:

- Diking is the most effective form of secondary containment for bulk chemical storage. Dikes can be constructed from concrete, cinder blocks, or earth. Bulk storage tanks and/or drum storage should be surrounded with an impervious dike that will hydrostatically contain 110% of the capacity of the largest tank plus water from a maximum 24 hour / 10 year rainfall event, whichever is greater. Drainage of accumulated rainwater from a diked area should be accomplished with a manually operated pump or siphon system. Flapper valves must not be utilized. Design of the dike should account for the containment of a spraying leak from the side of the tank. Where this design is not feasible, bafflers could be installed at the top of the dike that would deflect potential leaks and cause them to drop within the containment area.
- Diversion of flow of potentially spilled material away from its naturally expected path can also be an effective means of secondary containment. Diversionary structures consist of curbs, sumps, and/or gutters which divert spilled material down gradient to a collection tank. These structures should be used in areas where diking is impractical or unsafe. For example, chemicals which emit noxious fumes might be diverted to a closed tank in the event of a spill, rather than left in an open dike area. Diversionary structures can include quench tanks, which serve to simultaneously collect and treat chemicals. Many industrial facilities possess process quench tanks to control runaway chemical reactions.
- A quick drainage system is frequently employed in small volume storage and loading areas. It consists of an impervious curbed or below gradient pad that slopes into a drain that is connected to an impervious slump. Spilled volumes of oil are collected in the impervious sump and then removed and appropriately treated, discharged, or disposed.

Finally, collection and recycling or disposal of spilled materials or high-strength wastes is an important step in a spill response and may require a great deal of time and manpower. Equipment required for the cleanup spill varies and depends upon the nature of the material spilled, volume spilled, location of spill, and ultimate destination of spilled materials. Equipment and materials that should be made readily available for clean up spills include booms, surface or collecting agents, absorbent materials, skimmers and oil/water separators and/or other equipment that may be necessary depending upon the types of the spills that may be anticipated from the analyses described above.

Equally important as the selection and installation of spill prevention and containment equipment is the implementation of spill prevention procedures by industry employees. Such procedures consist of inspection and maintenance practices, many of which should be already implemented by industrial facilities as process control and product conservation measures. A list of spill prevention procedures are presented below:

Tanks

- Filling – overfilling practices
- Sampling
- Cleaning
- Integrity testing
- Inspections

Drums

- Transfer of chemicals practices
- Inspection of storage areas

Pipes, Valves, Fitting, Pumps, Electrical and Mechanical Equipment

- Maintenance
- Inspections

Chemical Disposal Practices

Security

- Fence
- Locked gates during off hours
- Lock closing tank outlets
- Post warning signs

Prior to filling a tank, industry personnel shall inquire as to the tank's previous contents, to ensure that incompatible liquids and/or vapors will not be mixed as a result. In any event, temperature pressure and/or flow meters should be constantly monitored throughout the filling process. Whenever tanks are being filled, personnel should be monitoring fluid level within the tank to ensure that tanks are not overfilled. Tanks should be periodically sampled to ensure that chemical transformations have not occurred. Tanks should be inspected for signs of wear and deterioration on a periodic basis.

Drum handling procedures should be established, aimed at preventing spillage of drum contents during fluid transfer operations. All drums and drum storage areas should be periodically inspected for signs of drum wear and/or leakage.

Pipes, valves, pumps, and other mechanical equipment and fitting should be periodically inspected for leakage. A routing maintenance program should be established for this equipment; all additions or alterations to the system should be addressed in the ASPP.

A spill should not be the result of employee ignorance or negligence. This can be critical in the disposal of chemicals. Signs should be posted to indicate the proper way to transfer chemicals,

and dispose of wastes. In particular, signs indicating that wastes not be discharged to a drain are very useful to prevent an absent-minded spill or slug discharge. Sealing all unnecessary floor drains will also minimize this problem.

The industrial facility should exercise security measures to ensure that spills do not result from vandalism or other intrusion. The industrial facility's grounds, especially storage tank areas, should be fenced, and the fences should always be locked at night. All outdoor valves should similarly be locked shut at night.

Most of these procedures are simple common-sense procedures. The industrial facility should detail in its ASPP plan its status in regard to the above requirements. In addition, the industrial facility should include in its ASPP plan a description of all spill response training programs required of its employees. Personnel should be periodically trained in the following areas:

- Operation and maintenance practices specifically designed to prevent and control spills and slug discharges.
- Applicable pollution control laws
- Current plant policies regarding spill prevention and slug discharges
- Plant spill and slug discharge response procedures (actions to be taken, names and phone numbers of POTW and fire department personnel to be contacted)

In general, the potential for spills and slug discharges will need to be evaluated and engineering changes may need to be made. These changes will need to focus on the reduction of spill potential and minimization of the damages if a spill does occur, particularly, if it reached the POTW collection system.

Existing and Proposed Spill Response Procedures

Despite the implementation of spill preventive measures, a spill may still occur. To mitigate the damage resulting from a spill, the industrial facility should detail in its ASPP plan its existing spill response program and any currently proposed modifications to it. Spill response techniques required will vary greatly, depending on the nature, amount, and/or location of the material spilled. However, all spill response activities can be grouped into the following categories:

- Safety measures
- Acquisition of assistance / notification
- Spill containment / diversion / isolation

The above described activities must be carried out by industry spill response personnel, and carried out in the order shown. If adequate spill prevention and control measures have been taken, emergency spill control may not be necessary; therefore, although spill control is of great importance, safety and notification can be addressed first.

Safety Measures

The safety of industry personnel, and the community, is of paramount importance at the time of any chemical spill. The threat of a spill to human health depends upon the nature, quantity, and location of the material spilled. Under OSHA requirements, many industrial and commercial facilities are already well versed on safety considerations in the work place. Although every spill or slug discharge is unique, and no substitute exists for sound, professional onsite assessments, certain general safety considerations can be delineated:

- Personnel should be evacuated from areas where flammable, explosive, reactive, or noxious/fuming chemicals have been spilled in large quantities. (e.g., in unventable areas)
- All heated or flame-producing apparatus in the vicinity of a spill of flammable material should be immediately shutdown and/or cooled. Exposed steam lines within such an area should be valves off. Obviously, personnel should be prevented from creating any flame or spark within such an area.
- Incompatible materials stored within the vicinity of a spill must be moved. Bagged bases, such as bicarbonate or lime, must be moved from the scene of an acid spill. With proper supervision and certain precautions, these can be used to neutralize spilled acids. Reductant chemicals should similarly be moved from the scene of an oxidant spill. (Such measures should be taken only when the safety of industry personnel performing the tasks is assured).
- Breathing apparatus should be immediately provided to all personnel in the vicinity of a spill of noxious/fuming chemicals. Frequently, such chemicals are also corrosive oxidants; consequently oxidation-resistant clothing will also be essential.
- Spill response personnel should carefully weigh each spill response action in terms of safety; sometimes incorrect response activities do much more harm than good. For example, fans may not be a good choice of equipment for ventilating noxious fumes; if the fumes are flammable or explosive, the fan's electrical motor could spark a fire or explosion. Caution must be watchword.

Acquisition of Assistance

Immediately upon insuring the safety of industry personnel on site, through evacuation and/or other precautions, the industry spill response coordinator should contact the POTW and fire department (it may be also required that the industry contact the county, state and federal agency responsible for emergency response). These local agencies can provide assistance in spill response and onsite cleanup coordination. In the case of fire and/or explosion, the fire department should provide the expertise in remedial actions. It is important to not that this call is also a safety measure. A quick assessment of the severity of the spill will dictate the need to call the POTW or the fire department before official notification of other concerned agencies. It is best, and recommended to develop an understanding with these agencies in advance through a written response plan.

The industry should obtain the names and phone numbers of appropriate spill response personnel within both local agencies. These names and phone numbers should be distributed and

conspicuously posted throughout the plant. As discussed under notification procedures, the POTW should be providing the notification procedures to the industry.

Spill Containment/Diversion/Isolation

The highest priority in immediate spill response activities, next to safety, is spill isolation. Clearly, the first spill response step should be to stop the flow of material being spilled, if possible. This activity consists of shutting valves and/or stopping pumps from further feeding chemicals to the vessel generating the spill. Generally, the size of a spill can be limited to a single tank volume or less if prompt action is taken in this regard.

Containment diversion activities depend upon the nature of the material spilled. If appropriate safeguards, such as dikes and other secondary containment vessels have been installed, industrial response requirements at the site of a spill may be minimal. If the spilled material does not pose an immediate safety hazard (e.g., flammable, explosive, reactive, noxious) and spill containment equipment such as booms, barriers, sweeps, adsorbents, etc., are available, the industry personnel should commence the cleanup activities with this equipment.

Follow-Up Reporting and Documentation Procedures

The industrial facility should also describe in its ASPP plan its follow-up reporting and documentation procedures after a chemical spill or slug discharge. Two major questions must be addressed in such documentation:

- What caused the incident and/or how can it be avoided in the future?
- How effective were response and cleanup activities and how can response procedures be improved as a result?

The industrial facility should conduct an internal investigation to ascertain what sequence of events led to the incident. Two factors contribute to the occurrence of most events:

- Improper process evaluations
- Insufficient inspection and maintenance programs

A myriad of human errors in process operations can result in chemical spills and slug discharges; accidental overfilling of open tanks, failure to control reactor conditions and flow rates, inadvertent locking shut of high pressure lines during process operation, hosing down material into floor drains, etc. Logically, the industry investigator should begin by questioning the individuals responsible for operating the equipment from which the spill or slug originated. The investigator should base his determination of the cause of the incident upon the evidence provided by the process equipment, the explanations of the plant personnel, and his own professional judgment. In interpreting the information provided him by plant operators, the investigator should bear in mind that spills can be caused by instrumentation error / malfunction as well as operator neglect.

Poorly maintained process and storage equipment frequently results in spills and slug discharges. The investigator should note in his report all details concerning the condition of the equipment from which the chemical spilled. In particular, the investigator should note the following:

- Tanks-conditions of welded seams
- Drums-depth of rust, deterioration
- Pumps & valves-condition of seals, packing
- Spill preventive equipment-availability, appropriateness, condition

The industrial facility should also report on the adequacy of its response procedures. In particular, the investigator's reports should address the following questions:

- Was the safety of industry personnel and the surrounding community insured throughout the incident?
- Were personnel working close to the incident provided adequate access to breathing apparatus, protective clothing, etc.?
- Was the spill confined quickly?
- Was fire extinguishing equipment adequate and readily available when needed?
- Did secondary containment structures remain intact throughout the spill response? Were these structures of adequate volume to confine the spill or slug discharge?
- Were appropriate POTW and fire department officials immediately notified of the incident?

Upon completion of the described investigation, improved operational, inspection, maintenance, and/or spill response procedures should become evident to the industry investigator. He should detail these recommendations in his report. The investigation report should then be made available to the POTW, fire department, and insurance firms if applicable, to assist these agencies in their own investigations.