

**RP 754—Process Safety Indicators for the Refining and Petrochemical Industries
Questions & Answers**

Note: Information added since Jan. 2011 is highlighted in yellow

Category	Example
<p>General</p>	<p>1. Are events that had the <i>potential</i> to create a Tier 1 or Tier 2 consequence to be counted? Or is it only events that generated the actual consequence to be counted?</p> <p>Only the actual consequence is used to determine Tiering.</p>
	<p>2. Should we anticipate the need for any new or revised placarding or labeling requirements or best practices?</p> <p>RP 754 introduces no new or revised placarding or labeling requirements or best practices.</p>
	<p>3. Was there any consideration that calculating rates based on worked hours may be biased against smaller refineries? Consider a 100 Kbbbl and a 300Kbbbl refinery, both of the same complexity. The smaller refinery has fewer hours worked than the larger refinery, although both may have the same potential frequency for PSEs and will therefore have a higher rate for the same number of incidents.</p> <p>Many considerations were examined before selecting workforce hours for the normalization factor for a PSE rate, including potential biases. Several potential normalization factors were considered, each having different strengths and weaknesses. Although not a perfect normalization factor, workforce hours was selected, in part, due to its availability.</p>
	<p>4. Why are LOPC events outside of the process or storage facility fence line excluded while those hazards are just as serious?</p> <p>Consistent with the CSB recommendation for the development of Process Safety Indicators, RP 754 distinguishes between LOPC events that occur inside the fence line, which are recorded as Process Safety Events, and those that occur outside the fence line, which are indicative of transportation safety performance. Both Process Safety and Transportation Safety are important and both should have performance indicators in place.</p>
	<p>5. What is the basis for the flash points used in API 754? The words “flammable liquid” and “combustible liquid” have very specific meanings in the context of fire prevention and suppression, as defined by the Code of the National Fire Protection Association. The 754 table doesn’t use the term flammable or combustible.</p> <p>The API 754 committee specifically dropped using the terms flammable and combustible liquids because of the confusion associated with those terms having many different definitions depending upon the source. The purpose for that was that the committee hoped the standard would be recognized internationally rather than just where API, OSHA or NFPA definitions are recognized. The break points chosen align with those in the UN Dangerous Goods List / GHS, which have achieved a level of international recognition.</p>
	<p>6. What are the reasons for grouping (a) days away from work; (b) fatality and (c) incident with direct cost over \$25,000 in the same Tier?</p> <p>The consequences and their thresholds were not intended to be compared to one another or to be equated (e.g., a fatality does NOT equal \$25,000 in damages).</p>

Category	Example
	<p>Each of the consequence categories and their thresholds were selected to indicate a more (Tier 1) or less (Tier 2) severe process safety event when focused on that given consequence (e.g., fire, release or injury).</p>
<p>Acids/Bases</p>	<p>7. Can you provide information on where to get a readily available listing of STRONG ACIDS/BASES and/or MODERATE ACIDS/BASES?</p> <p>Most companies use pH as the indicator of "Strong Acid/Base" per the definition given in section 3.1.2 because the strength is closely tied to concentration of the acid/base. As a result, there is no universal source for listing the strong acids / bases. Where pH cannot be readily determined (e.g. solid acids / bases) the GHS determination can be used. Most of those materials have already been examined and have been placed into appropriate Packing Groups and are listed in the sources provided in the 754 standard.</p> <p>8. How do we classify packing group II moderate acids/bases? Are they excluded under Category 6? If so, they are not brought back into Category 7 (strong acids/bases are, but not moderate), yet Category 7 includes all Packing Group III materials</p> <p>Where the hazard of a material is expressed by one of the criteria specifically listed in Tables 1 and 2 (Toxic Inhalation, Flammability and Corrosivity, i.e. acid/base), those criteria take preference over Packing Group placement. Packing groups are used to categorize those materials (pyrophorics, reactives, contact toxins, etc.) whose hazard is not addressed by the listed criteria.</p>
<p>Definition of Process Safety Event (PSE)</p>	<p>9. Clarification re: Example #8 in RP 754 regarding a contaminated scaffold board. If the source of the oil contamination can be traced to a loss of containment, does it qualify as a PSE?</p> <p>The first test is whether or not there was an unplanned or uncontrolled release from a process; therefore, if the oil contamination is traced to a LOPC, then it passes the first test. The next determination is whether or not it resulted in one or more of the consequences. In Example #8, the consequence was fire. If the damage exceeded \$25,000, then it would be a Tier 1 PSE. If the damage exceeded \$2,500, then it would be a Tier 2 PSE. If less than \$2,500, the site may choose to record the event as a Tier 3 "Other LOPC Event."</p> <p>10. Does the PSE determination depend on the rate (i.e., would it only be a PSE if the LOPC was an acute release or would an accumulation over time from a slow weeping leak count as an LOPC?</p> <p>The release amount/release rate is only one of the potential PSE consequences. An event could be a PSE without exceeding the TQ values if it caused one of the other consequences. If the release quantity is the only consequence, then it must have exceeded the Table 1 or Table 2 TQ values in any one-hour period.</p> <p>11. Under Section 5.2 of RP 754, Pressure Relief Discharge, our understanding is that although the discharge results in one or more of the 4 consequences a) liquid carryover, b) discharge to a potentially unsafe location, c) on-site shelter in place, d) public protective measures) BUT the discharge quantity is less than the threshold quantity in Table 1, this is not a Tier 1 Process Safety Event. See related second example in Example No. 31 (RP 754). Please confirm that the interpretation is correct, which means it has to be both: To be a Tier 1 PSE, discharge quantity</p>

Category	Example
	<p>exceeds the TQ in Table 1 AND the discharge results to any of the 4 (a, b, c, or d above) consequences.</p> <p>This interpretation is correct. To be a Tier 1 PSE, discharge quantity exceeds the TQ in Table 1 AND the discharge results in any of the 4 consequences. Note: the TQ is measured at the RV discharge and not as the quantity that escaped the destructive device or was uncombusted in the flare.</p>
	<p>12. A tank was out of service and had been removed from the process. This tank was going to be cleaned by a contractor. The contractor had a cleaning equipment to be used for cleaning the tank that had been removed from the process. The cleaning equipment was connected to the site steam supply. A steam leak occurred in the contractor's cleaning equipment while the equipment was connected to the site steam supply. The contractor was sprayed with the leaking steam resulting in steam burns and lost time injury. Is this a Tier 1 PSE? Does this qualify as one of the exceptions because the steam leak occurred on the cleaning equipment, which is ancillary equipment?</p> <p>This is a personal safety incident and not a PSE. There are situations where materials from distribution systems connected to the process may be used for non-process purposes. These include the use of water for hydroblasting, air for sandblasting, and steam for steam jet cleaning. Where an injury occurs as a result of the use of these materials for non-process purposes, the event should not be classified as Process Safety. Typical examples of non-process events causing injury include: hydroblaster being cut by high pressure water from the hydroblast unit, burns to personnel using steam lances for cleaning purposes, abrasions or particles in the eye from sandblasters where plant air systems are used and impact injuries to persons using pneumatic tools connected to air or (in rare circumstances) nitrogen systems. Care must be used to ensure that the activity is truly a non-process activity.</p>
	<p>13. An operator was purposely draining a material with a boiling point of 270°F and a flash point of about 75°F from a tank car into an oil water collection system as part of a vessel evacuation procedure. Draining of the rail car into the collection system was a planned activity. In the process of draining this rail car, some material overflowed out of the pipe that was connected to the oily water collection system. The material that overflowed was estimated to be about 40 bbls in 1.5 hours and it went onto the ground and onto another collection system. Since this is a planned activity, would it still be considered a Tier 1 PSE?</p> <p>The definition of a PSE is “. . . an unplanned or uncontrolled release . . .” The scenario described above is “uncontrolled since the intent was for all of the material to be drained to the collection system. A material with a flash point of 75°F would be a Tier 1 Category 7 that has a Threshold Quantity of 14 bbls. It is suggested that the 40 bbls be divided by the 1.5 hour duration to arrive at a 27 bbl/hr release rate, which exceeds the TQ for Tier 1 for this material making this a Tier 1 PSE.</p>
	<p>14. A Coker Operator Technician was clearing (using a welding rod to unplug) a bleed valve on a control loop block valve on the Coker Heater when hot water (condensate/steam mix) spewed out onto his right leg causing 2nd and/or 3rd degree burns to his calf resulting in a DAFW case. The Coker Heater was being steamed out at the time of the incident. The unit was down and blocked in at the battery limits. Was this a PSE and if so, what Tier?</p> <p>Sat Gas Unit Operators were in the process of hooking up and connecting hoses to supply make-up firewater into the Sat Gas Deaerator Flash Drum at the level control</p>

Category	Example
	<p>bridle. The block valve on the flash drum was opened before the hoses were completely connected allowing hot water to spray onto one of the operator technicians causing 2nd degree burns on his thighs. As a result, the employee received medical treatment that resulted in a DAFW case. Is this a PSE and if so, what Tier?</p> <p>These are both Tier 1 PSEs due to loss of primary containment that resulted in DAFW injuries. These incidents are similar to Example 5 in RP 754.</p>
	<p>15. A refinery has a hydrocarbon LOPC event which results in offsite odors, impacting the local community and a public high school. Many students and faculty claim they are ill from the odors; several go the local emergency room but there is no evidence that there are any admissions or other medical treatment. The school administration evacuates the school and students/faculty are dismissed for the day. For purposes of this scenario, the estimated quantity of hydrocarbon released does not exceed Tier 1 or 2 threshold quantities.</p> <p>The evacuation of the school was not declared by the police, local emergency responders, local emergency management administration officials, or by refinery emergency management personnel. Would this event be considered a Tier 1 PSE?</p> <p>RP 754 defines “officially declared” as it relates to a community action as “A declaration by a recognized community official (e.g., fire, police, civil defense, emergency management) or delegate (e.g., company official) authorized to order the community action (e.g., shelter-in-place, evacuation).” A school principal would be a recognized community official, but he does not have the <u>authority</u> to order community action. Since none of the other PSE triggers were satisfied (e.g., the hydrocarbon released did not exceed Tier 1 or 2 threshold quantities), this event would not be counted as a PSE.</p>
	<p>16. For several days prior to a particular refinery event, there was another odor not associated with the refinery that permeated the surrounding community, including a public high school. These odors (unrelated to refinery) resulted in a number of students’ complaints of illness, alleged visits to hospital (admittance not confirmed), and the resultant closure of the school by high school administration for two days.</p> <p>On the third day, due to several large rain storms, several refinery process sewer junction boxes leading to the API separator overflowed to the ground and a storm water containment lagoon. Overflow was water and oil. The oil caused a disagreeable odor which traveled offsite. The refinery acknowledged that odors from the process sewer overflow traveled offsite. As a result of these odors (and possible continuation of the previous odor), the high school administration decided to leave the school closed. The refinery is not aware of any alleged illnesses or hospital visits/admissions associated with odors on the third day.</p> <p>The closure (or continued closure) of the school was not declared by the police, local emergency responders, local emergency management administration officials, or by refinery emergency management personnel. Would this event be considered a Tier 1 PSE? Is the overflow of a process sewer with oil and water considered a LOPC for API 754 purposes?</p> <p>If the overflow of the process sewer met the RP 754 threshold criteria for a PSE as a release, it would be classified according to the consequences. Odors are unpleasant, but not process safety events and the principal of the school has the authority to close the school, but he does not have the authority to order any community action. (Note: see question and answer above.)</p>

Category	Example
Fire & Explosion	<p>17. In Example 9 (which talks about internal deflagration in a vessel) of RP 754, what is the definition of a "vessel"? For example, a heater in the process had a fire and explosion which resulted to equipment damage greater than \$25,000 but there is no loss of containment. Is this a PSE?</p> <p>In a heater the primary containment consists of the process tubes in the furnace and the fuel system up to the point of the burner. For a fire / explosion to have occurred primary containment of one or the other of these had to be lost (process from the tubes or fuel from the fuel system without being combusted at the burner). Therefore, since a LOPC occurred and resulted in a fire / explosion causing damage with a direct cost greater than \$25,000 this is a Tier 1 PSE.</p> <p>18. While taking a steam header out of service, steam flow was increased in a parallel header that was not checked or verified to be free of condensate. The resulting condensate water hammer caused a rupture of the parallel steam header, which cause greater than \$25,000 damage. There were three recordable injuries that occurred when the personnel in the area were evacuating. None of the recordable injuries resulted in a lost work day case and none were related to the actual steam release. Is this a Tier 2 incident?</p> <p>The definition of "explosion" in RP 754 was specifically worded such that it would include "mechanical explosion" where the energy from the explosion was carried by a shock wave. The next question is whether the explosion caused the \$25,000 in damages. It appears that the "explosion" damaged the failed piping, but would not include replacement of the remainder of the piping if the failure identified severe corrosion or some other reason to repair the line beyond the point of failure. The greater than \$25,000 repair cost due to the explosion would make the event a Tier 1 PSE. If the damage does not qualify this as a Tier 1 PSE, the injuries while responding to (evacuating) the event would make this a Tier 2 PSE.</p> <p>19. See Example 22 of RP 754 where there is a tube rupture in a fired heater causing a fire (contained in the heater). If you calculate the release quantity based on the hydrocarbon that burned based on an orifice calculation, the equivalent release quantity is greater than the TQ in Table 1. The damage due to the fire is less than \$25,000. Is this a Tier 1 PSE?</p> <p>Where a LOPC of a material results in a fire where the material is completely consumed (as it would be for a tube rupture / leak into a firebox) the damage criteria for fire / explosion is used, not the release quantity.</p> <p>20. Are events caused by motors or switchgear fires considered process safety events even if no loss of primary containment occurred?</p> <p>Because motor and switchgear fires do not begin with loss of containment, they will not be recorded in Tiers 1 or 2. Companies may choose to record motor and switchgear fires that occur in process unit areas as Tier 3 Process Safety Events.</p> <p>21. In the case of a release that results in a fire/explosion, do you calculate the amount of material released AND the fire damage?</p> <p>No—you calculate the damage only from the fire/explosion to determine the Tier of the event and do not try to calculate a release quantity. However, if the fire/explosion results in secondary releases report threshold quantities of released</p>

Category	Example
	<p>chemicals.</p> <p>22. Lightning strikes an open top floating roof tank and ignites the fugitive emissions that always exist at the seal between the floating roof and the tank wall. There is no liquid above the floating roof before the fire and there is no evidence that liquid escapes above the seal before the fire is extinguished. (Pumped some firefighting foam to the foam chambers at the top of the tank.) The fire causes damage to the seal triggering replacement at a cost above \$25 K. How should this be classified?</p> <p>Because there was no evidence that anything burned other than the thin film of liquid that was left on the tank's inner wall when the level of the floating roof was dropping, it appears that no LOPC occurred. There was no liquid release to the top of the floating roof. Assuming that there was no known seal gap issue, that would make this a Tier 3 PSE—Other Process Unit Fire. In situations where there is a pre-existing, known failure of the tank seal that is significant enough to trigger repair or replacement of the seal, it should be assumed that LOPC occurred at the seal to tank wall interface if that is where the fire occurred. Damages caused by the fire would then be a result of this fire and Direct Cost losses (i.e., the repair of the already failed seal) would be used to categorize this PSE.</p>
<p>Loss of Primary Containment (LOPC)</p>	<p>23. If there is an overfill (exceeding the TQ in Table 1) on a vessel but this vessel is connected to another vessel through a pipe or a fixed hose and the overfill is contained (no release to the atmosphere) and there are no consequences (no release to the atmosphere, no injury, no hospital admission, no officially declared evacuation, no fire/explosion), is this LOPC? Is this a PSE?</p> <p>There is no LOPC in this event since the material remained in some type of primary containment (though maybe not the one intended). This may be a Tier 3 PSE as a Safe Operating Limit Exceedance if a Safe Operating Limit had been identified for the level on this vessel.</p> <p>24. According to RP 754, one must have “an unplanned or uncontrolled release that results in an explosion with greater than \$25,000 in direct cost.” In the example of taking the steam header out of service [see Fire & Explosion above], it was the reverse order—an internal explosion that resulted in an uncontrolled release of steam. So, according to the decision tree on p. 37 of RP 754, it would not qualify as a PSE.</p> <p>If the water hammer had not resulted in LOPC, you would not go further, but there was LOPC. Next you evaluate if you had a consequence identified in RP 754; there was a mechanical explosion that resulted in damage greater than \$25,000. If one took the approach that LOPC must always occur first and then the explosion, many historic severe incidents would be eliminated because they started with the formation of a flammable mixture inside the equipment followed by detonation. The damage resulted when the detonation caused failure of the vessel resulting in LOPC, but the detonation occurred before the vessel failed. The Tier 1 definition does not say that the LOPC must occur before the explosion. It will for VCE and others, but not for all. The Tier 1 definition says that a LOPC occurred and one of the consequences occurred, but not that one has to happen before the other, although that will be true for most cases.</p> <p>25. Sat Gas Unit Operators were in the process of hooking up and connecting hoses to supply make-up firewater into the Sat Gas Deaerator Flash Drum at the level control bridle. The block valve on the flash drum was opened before the hoses were completely connected allowing hot water to spray onto one of the operator</p>

Category	Example
	<p>technicians causing 2nd degree burns on his thighs. As a result, the employee received medical treatment by a qualified medical provider and it subsequently resulted in a day-away-from-work case. Is this a PSE and if so, what Tier does it fall under?</p> <p>This is a Tier 1 PSE because there was an unintended/uncontrolled release from primary containment that resulted in a Tier 1 injury. (See example #5 in RP 754.)</p>
	<p>26. A Coker Operator Technician was using a welding rod to unplug a bleed valve on a control loop block valve on the Coker Heater when hot water (condensate/steam mix) spewed out onto his right leg causing 2nd and/or 3rd degree burns to his calf that resulted in a day-away-from-work case. The Coker Heater was being steamed out at the time of the incident and the unit was down and blocked in at the battery limits. Is this a PSE and if so, what Tier does it fall under?</p> <p>This is a Tier 1 PSE because there was an unintended/uncontrolled release from primary containment that resulted in a Tier 1 injury.</p>
	<p>27. If a release of material NOT on the tables has an unintended consequence (injury, release to an unsafe location), is it counted regardless of quantity? If so, how is it done since quantity is the delineation between Tiers 1 and 2?</p> <p>Where a release of material NOT on the tables (i.e. non-toxic and non-flammable) causes a listed consequence (For Tier 1: an employee, contractor or subcontractor "days away from work" injury or fatality, hospital admission or fatality of a third party, officially declared community evacuation or shelter-in-place, or a fire or explosion resulting in greater than or equal to \$25,000 in direct cost), the quantity of material released is not a consideration. Release quantities for materials that are on the tables are used to determine a Tier when none of the listed consequences occur, when the release is through a Pressure Relief Device and causes one of its four listed consequences, or when the release quantity exceeds the threshold for Tier 1, but other consequences were Tier 2 or less.</p>
	<p>28. An area operator identified crude oil on top of the roof of an external floating roof. A pontoon compartment filled with oil due to a leak within the pontoon. The oil was able to migrate through small holes on the upper deck onto the top of the roof causing an internal odor complaint. Approximately 10 bbls of oil were identified on top of the roof.</p> <p>There was a loss of primary containment from under the floating roof. The crude oil is a Tier 2 Threshold Release Category 7 material. The LOPC could qualify as a Tier 2 release if the 10 bbls accumulated on the roof in less than an hour. Assuming the leak was longer than one hour, it would not meet the threshold quantity criteria for either Tier 1 or Tier 2 PSE. The internal odor complaint is not one of the recognized consequences</p>
	<p>29. Is it a correct interpretation to say an LOPC involving a non-toxic and non-flammable material must result in one of the following consequences to be considered Tier 1 or Tier 2: injury consequences, an officially declared community evacuation or community shelter-in-place, or a fire or explosion above the direct cost threshold? The other two consequences would not apply to a non-toxic or non-flammable LOPC because a threshold quantity must be exceeded.</p> <p>Non-toxic and non-flammable materials do not have a threshold quantity; therefore, a LOPC of these materials must result in one of the other actual consequences. A PRD discharge of non-toxic or non-flammable materials is still a LOPC and should</p>

Category	Example
	<p>not be dismissed based upon the PRD threshold quantity provision. If the PRD discharge results in one of the primary consequences, it should be counted as either Tier 1 or Tier 2. The PRD special case exists in recognition that PRDs and downstream destructive devices are intended to render toxic or flammable releases harmless. If that is not the case (i.e., the PRD release results in one of the PRD special case consequences), then it should be counted as Tier 1 or Tier 2.</p> <p>30. A facility has an HF Acid Unit to upgrade gasoline octane. An acid cooler began leaking acid into the cooling water. This was immediately detected by the pH meter at the cooling tower and the suspect cooler's water inlet/outlet was blocked. The engineering department believes that there was very little if any HF vapors that escaped to the atmosphere. The water was neutralized and the pH brought up to spec. No hydrocarbons were released or water to the ground.</p> <p>In this instance, the basis for determining if it was a PSE is the LOPC from the cooler and not the amount of acid that may have escaped to the atmosphere from the cooling water. There was an unplanned release from primary containment—the cooler. The design of the cooler was not intended to release acid into the cooling water. The release quantity from the cooler is compared to the Tier 1 and Tier 2 TQs to determine if this incident was a Tier 1 PSE, Tier 2 PSE, or Tier 3 other LOPC.</p> <p>31. This is an expansion of Example #18 (RP 754) in Loss of Primary Containment: A heat exchanger is taken off-line for cleaning. All of the valves connecting the exchanger to the rest of the process are closed and tagged under the Energy Isolation procedure. A maintenance technician working under a work permit begins opening the exchanger for cleaning. Although the operator who isolated the exchanger and the maintenance technician reviewing the Energy Isolation believed the exchanger to be empty, one kilogram of hot liquid remained in a low point. When the flange at this low point is opened by the maintenance technician, the hot liquid runs onto her arm resulting in a burn that causes a Days Away From Work injury. Is this a PSE since the exchanger had been isolated from the process at the time the hot liquid was released?</p> <p>This is a Tier 1 PSE. Closure of valves and even installation by blinds does not re-categorize equipment such that it is not part of a "process" as defined in 3.1.23. The release was unplanned and uncontrolled, making the event a Loss of Primary Containment that resulted in Tier 1 PSE consequences.</p> <p>32. Are releases of solid materials (e.g., FCCU catalyst, plastic pellets, organic powders, etc.) also included in the scope of API 754 if there is a LOPC?</p> <p>Releases of solid materials are included to the extent that they meet the threshold quantities/ criteria outlined in Table 1 and Table 2 of API 754. Few solids have been assigned packing groups due to their hazardous properties. For example, plastic pellets are not included in the Hazardous Materials Table, but aluminum chloride is a Packing Group II material. Based on Table 1, an LOPC of aluminum chloride more than 2200 lbs. would be a Tier 1 release.</p>
Injury	<p>33. This is an expansion of Example #6 (RP 754) under Injury: A technician is performing work inside a vessel under "inert entry" conditions. A failure of the breathing air system (e.g., stoppage of breathing air flow, rupture of breathing air line, or contamination of breathing air by an inert or toxic material) results in a fatality because the technician cannot egress from the vessel in time or cannot connect to an emergency egress line (EEL). Is this a PSE?</p>

Category	Example
	<p>While this is a tragic event, it did not occur due to an unplanned or uncontrolled release of any material from a process; therefore, it is not a PSE. It would be recorded on the site's injury and illness log.</p> <p>34. An employee was in the process of collecting routine spent acid sample and opened valves in incorrect sequence per the procedure and did not check pressure gauge per procedure. When the employee cracked open quarter turn ball valve, acid was under pressure and flowed quickly from the sample pot, splashing towards the employee. The employee was not wearing full-required PPE (goggles, but no face shield) and was splashed in the face, resulting in a recordable burn.</p> <p>Because this was an uncontrolled release from a process, it is a Tier 2 PSE as long as the burn doesn't escalate to a lost time injury.</p> <p>35. An operator was on a tank deck preparing to blow down transmitter; steam was used to melt ice off transmitter. The operator turned on the steam, but had control of the wrong steam hose. Steam/condensate hit the operator in the lower abdomen and left front thigh causing a recordable burn.</p> <p>This is not a Process Safety Event because the release of steam condensate was not related to a process; however, it would be recorded as a personal injury in the OSHA log.</p>
<p>A Release Within Any One-Hour Period</p>	<p>36. During the filling of a lube oil reservoir, the operator pinned the filling valve and left the area. This negligence allowed approximately 650 gallons of GST32 to overflow the reservoir and end up in the unseg drain. Lube oil is classified as a Tier 2 Threshold Release Category 7 and the reporting threshold volume would be 10 bbl; the release was greater than 10 bbls; the material was released below its flash point; and there were no other consequences reported.</p> <p>This would be a Tier 2 PSE since the spill was greater than 10 bbl in one hour.</p> <p>37. A compressor crew called into the control room informing the Board Operator that the lube oil tank on the compressor deck was overflowing. Personnel went to the compressor deck and immediately blocked in the ball valve, which cut off the lube oil supply to the tank and then blocked in the gate valve, which stopped the tank from overflowing. Lube oil is classified as a Tier 2 Threshold Release Category 7 and the reporting threshold volume would be 10 bbl; the release was greater than 10 bbls; the material was released below its flash point; and there were no other consequences reported.</p> <p>This would be a Tier 2 PSE since the spill was greater than 10 bbl in one hour.</p>
<p>Threshold Release Categories (TQs)</p>	<p>38. A leak in a compressor led to two gas releases—H₂S and natural gas. The quantity of natural gas released exceeded Tier 1 LOC thresholds, but the quantity of H₂S released did not exceed Tier 1 LOC thresholds, but exceeded Tier 2 LOC thresholds. Is this categorized as Tier 1 and Tier 2 PSE or just a Tier 1 PSE?</p> <p>The event should be reported as a single Tier 1 event. In the reporting spreadsheet, only the Tier 1 flammable gas release should be included. (Note: this is separate and distinctly different than reporting for environmental considerations.)</p> <p>39. An alkylation unit uses hydrofluoric acid and the concentration is normally around 90%. What is the Threshold Release Category for this concentration? Anhydrous hydrogen fluoride is Category 3 and hydrofluoric acid above 60% is Category 5.</p>

Category	Example
	<p>The purpose of the multiple classifications of materials is to recognize the different nature and level of hazard that they represent. Aqueous mixtures such as that of HF and water demonstrate one of the difficulties in providing a single list for all nature and concentrations of such materials. Those materials that represent Toxic Inhalation Hazards are placed in the Threshold Release Categories that have the lowest threshold quantities because they have the potential to cause the greatest harm at the greatest distance from the point of release at the lowest concentrations as they disperse in air. The most appropriate way to tier the release of 90% HF in water as listed above is to perform a flash calculation to determine the percentage of HF that will be released into the air given the temperature at which the mixture is released. If the temperature of the HF mixture is relatively constant, it is appropriate to perform the flash calculation once at that temperature and provide the plant site with a set of threshold quantities for that HF mixture rather than to re-run the flash calculation for each release.</p>
	<p>40. During the filling of a lube oil reservoir, the operator pinned the filling valve and left the area. Approximately 650 gallons of lube oil overfilled the reservoir and ended up in the unsegregated drain. Is this a Tier 2 PSE? Lube oil would be classified as a Threshold Release Category 7 for Tier 2 and the reporting threshold volume would be 10 bbl. The release was greater than 10 bbls. Material flash is above 140°F, but released below its flash point. No other consequences reported.</p> <p>A compressor crew called into the control room informing the board operator that the lube oil tank on the compressor deck was overflowing. The plant operator blocked in the ball valve, which cut off the lube oil supply to tank and then blocked in the gate valve, which stopped the tank from overflowing. Lube oil would be classified as a Threshold Release Category 7 for Tier 2 and the reporting threshold volume would be 10 bbl. The release was greater than 10 bbls. Material flash point is above 140°F, but it released below its flash point.</p> <p>In both cases, since the spills were greater than 10 bbl in a one-hour period, they would be Tier 2 events. A material does not have to be specifically listed on the UNDG list to result in a Tier 1 or Tier 2 event. The hazard of these lubricating oils is related to their combustibility and they have been appropriately classified as Category 7 on Table 2.</p>
	<p>41. If there is a release of more than one product in different Threshold Release Categories (e.g., HF acid and propane), each amount being below the individual threshold quantity for Tier 1 and Tier 2 reporting, I have been calculating the percentage of threshold quantity for the combined release, and if it is greater than 100%, I report it under the appropriate tier level. When I report my data, I am asked if I have had a Tier 1 or Tier 2 release under each of the different Threshold Release Categories. Technically, the quantity of each individual product was not reportable by itself, but the combined release caused the PSE to be a Tier 1 or Tier 2. How do I record this data?</p> <p>First, note that Footnote “d” in the tables for Threshold Release Quantities (Tables 1 and 2) highlights that where there are clear and independent toxic and flammable consequences of the mixture (such as the one listed above for HF and propane), the toxic and flammable hazards are calculated separately. No aggregation of the percentages is necessary for those situations. Generally, no calculation of percentages is necessary where the hazard is flammable, although a flash calculation may be appropriate when a release of a mixture of flammable gas is dissolved in a combustible liquid having a high flash pint (e.g., the release of a lubricating oil in contact with propylene refrigerant).</p>

Category	Example
	<p>Calculating of percentages will primarily occur where the hazard is toxic inhalation where the toxicity effects are not believed to be additive. It is appropriate to detail these situations in the comments column of the spreadsheet provided, rather than selection of any one Toxic Release Category.</p> <p>42. For classification of substances in Groups 1-7, API 754 uses flash point and boiling point, as well as packing group definitions. In the case of mogas and diesel, the use of packing group will lead to a different classification as by the use of physical chemical data (flp, bp). What is the background for the mass quantities used in the different classes 1-7? Is the intention to have an equal risk potential toxic-explosion hazard (e.g., release of 10 kg HF in class 3 for T2 vs. 50 kg LPG in class 5 for T2 (explosion) 0?</p> <p>The intent is that where the hazard posed by the material released arises due to its flammability (Hazard Class 2.1 for flammable gases and Hazard Class 3 for flammable liquids), the boiling point and flash point criteria in the Threshold Release Category descriptions supersedes Packing Group. The same concept applies for TIH materials (Class 2.3) and for the strong and moderate acids and bases.</p> <p>In some situations one must use caution when using the UNHGL and DOT Hazardous Materials Sheet because they sometimes list the Packing Group for a generic material. In some cases it is because the generic material contains a "contaminant" that drives to a higher hazard level. If the material released does not have that contaminant, the Threshold Release Category changes. A rule of thumb for some is that the information on the MSDS and/or Certificate of Analysis for the material actually released takes precedence.</p> <p>In response to the second question above, the differences in threshold release quantities are intended to roughly represent the relative risk of a release of those materials.</p>
<p>Mixtures</p>	<p>43. When multiple products are released—one being flammable and one being corrosive, are they reported on the same line of the spreadsheet under one incident, or are they considered to be separate? For example, a sight glass failed in an alkylation unit releasing both propane and hydrofluoric acid. Both products by themselves were below the Tier 1 TQs.</p> <p>Refer to Example 30 in RP 754 for guidance; Hydrofluoric acid is a catalyst in the alkylation reaction and not part of a mixture. The two components of the release (HF and propane) should be judged independently as in Example 30. If either one exceeds the TQ for its classification, then the incident would be recorded at the higher level. In this case both the HF and propane exceeded the Tier 2 TQ and would be recorded as one Tier 2 event with two materials released.</p> <p>44. The bi-media filters at a refinery Dissolved Gas Flotation (DGF) unit (i.e. oily water separator) became plugged resulting in an overflow of the oily water. There were 190 bbls of oily wastewater spilled inside the DGF containment area. Does one calculate the amount of oil in the wastewater or the wastewater as a whole for determining release threshold quantity? (Note: the flash point of the oily material was (less than) 80 F.</p> <p>In most cases, a refinery would be dealing with an oil that had low solubility, so one would look strictly at the quantity of oil contained in the spill. If there was some component that was soluble in the water, such that the mixture became a flammable liquid, then one would use the entire quantity.</p>

Category	Example
<p>Pressure Relief Device</p>	<p>45. Under Section 5.2 of RP 754, it talks about a pressure relief device (PRD) discharge to the atmosphere via a downstream destructive device. If there is control valve discharge (not from a PRD) to the atmosphere via a downstream destructive device, and it exceeded the threshold quantity in Table 1 BUT did not result to either a) liquid carryover, b) discharge to a potentially unsafe location, c) on line shelter in place, d) public protective measures, is this a Tier 1 PSE?</p> <p>The designed action of a control valve would not normally be considered a Loss of Primary Containment since the action was planned for in the design and controlled via valve selection and positioning. In this case, the flow is to a downstream destructive device which is also a form of control. This event does not meet the definition of a Loss of Primary Containment, although it may be a reportable environmental non-compliance. If the flow through the control valve exceeded design parameters or if the downstream destructive device malfunctioned in a way that the release could not be considered planned and controlled, then the event should be examined for potential Tier 1 or 2 consequences, to determine if the event reached the point of being a Tier 1 or 2 PSE. If the control valve is not part of the normal process, but is instead part of a safety response similar to an SIS or PRV, then the criteria for PRD releases should be applied.</p>
	<p>If a release involves a PRD, does it have to be within a one-hour period to be reportable?</p> <p>Releases through Pressure Relief Devices must cause one of the listed consequences (liquid carryover, discharge to a potentially unsafe location, on-site shelter-in-place, or public protective measure) to be reported in Tiers 1 or 2. The PRD release within any one hour period would be used to differentiate between Tiers 1 and 2.</p>
	<p>46. According to Section 5.2 of RP 754 regarding Pressure Relief Device discharges, in order for an event to be a Tier 1 PSE, it has to meet two criteria: the discharge quantity is greater than the TQ in Table 1 and it resulted in any of the four consequences in the definition of a Tier 1 PSE. Is this correct?</p> <p>Yes-- in order for a pressure relief discharge to be a Tier 1 PSE, both criteria must be met: discharge quantity greater than TQ and any of the four consequences listed.</p>
	<p>47. When a PRD relieves to a flare (downstream destructive device) and results in one or more of the listed consequences (e.g., liquid carryover), is the quantity calculated at the PRD discharge or the flare discharge?</p> <p>The quantity is calculated at the PRD discharge.</p>
	<p>48. If you have a situation where PRDs relieve on multiple gasoline tanks because of a failure of a vapor recovery unit, is the release amount for threshold quantity determination the aggregate of all the tanks or is it considered to be evaluated on each tank where a release occurred?</p> <p>The cause of the PRD release is not considered in determining the PSE tiering of the event. PSE tiering is focused at consequences. Since no consequences are listed to have occurred, the PRD releases cannot be Tier 1 or Tier 2. This would be an event with multiple Tier 3 PSEs (one for each tank with a PRD release).</p> <p>There are many causation events (plant-wide power failure, cooling water failure or instrument air failure) that may cause a large number of Tier 3 PSEs, one for each</p>

Category	Example
	<p>PRD that releases, where no Tier 1 or Tier 2 consequences should result from a properly designed and operating pressure relief system.</p> <p>49. A power failure resulted in a PRD activation. The PRD operated as designed and released more than the 500kg of Threshold Release Category 5 (flammable vapor) material within 10 minutes. It did not result in any one of the consequences (liquid carryover, discharge to a potentially unsafe location, an on-site shelter-in-place or a public protective measure). Is this is Tier 1 PSE?</p> <p>Whenever a PRD release fails to cause one of the listed consequences (liquid carryover, discharge to a potentially unsafe location, an on-site shelter-in-place or public protective measure) and also fails to cause harm to people (DAFW or recordable injury to employees, contractors or hospital admission to a third party) or a fire or explosion causing damage greater than \$2,500, the event cannot be either a Tier 1 or Tier 2 PSE.</p>
<p>Downstream Destructive Devices</p>	<p>50. During planned maintenance of the pilot gas system to a flare (pilot gas isolated for the job), the flare flame goes out. In 60 minutes, the Tier 1 threshold quantity of a flammable gas is released to atmosphere uncontrolled. The flammable gas is present from process vents under normal operations. There is no liquid carryover, no discharge to an unsafe location, no on-site shelter-in-place or public protective measures. Has consideration been given to flare systems being defined as both primary and secondary containment? Since no PRD discharge was involved under which the flare would be secondary containment, is the flare system considered primary containment for continuous process vent material? If so, does this make this a Tier 1 PSE under the acute release from LOPC definition?</p> <p>Flare systems are considered to be “downstream destructive devices” having an open end intended for release and normally destruction of the gases at that point. Flare stacks are normally designed to address a number of parameters beyond radiant heating level. One of those is provision for dispersion of flammable and toxic gases in the event of loss of flame. Because there was no indication that this dispersion was not successful (i.e., no indication of a flammable mixture reaching grade or other occupied area), this was not an uncontrolled or unplanned loss of containment and thus, this would not be a Tier 1 or Tier 2 PSE. Businesses may consider this event to be a Tier 3 PSE as a challenge to the safety system. However, if there had been an actual consequence (e.g., liquid carryover, discharge to an unsafe location), then it would qualify as a Tier 1 or Tier 2 PSE since the event was “uncontrolled.”</p> <p>51. Under the definition of secondary containment, would a flare be categorized as such?</p> <p>A flare is a downstream destructive device and therefore different than secondary containment.</p> <p>52. A process unit is shut down by the activation of an interlock resulting from a faulty instrument or exceeding a process limit. The interlock closes a vent line valve to a destruction device (e.g., boiler burner, flare, catalyst reactor) and opens a vent valve directly to atmosphere. Is this considered an LOPC as an unplanned release? Since the atmospheric vent is not designed as a PRD, it is correct that the PRD special case consequences do not apply, and the event may be a Tier 1 or Tier 2 PSE based on the TQ release tables?</p> <p>The deciding factor in whether to consider the event a PRD case or release case falls back to whether or not the atmospheric vent valve was designed for that general scenario (dispersion modeling done, etc. ensuring that the volume would go</p>

Category	Example
	<p>to a safe location).</p> <ul style="list-style-type: none"> • If yes, then the PRD case would apply since the scenario is very similar. Criteria under the PRD case would be evaluated (e.g., liquid carry-over, unsafe location). If the PRD case applied, the vent worked properly and the material was vented to a safe location (meeting all PRD criteria), it would be a Tier 3 Event. • If no, the event should be evaluated as a release since the vent valve routing was not planned and no different than a release from a hole in a line. Thresholds in Tables 1 and 2 would apply to determine whether it was a Tier 1 or Tier 2 event.
<p>Truck & Rail</p>	<p>53. During loading of the railcar with a flammable liquid, there was an overfill (of approximately 2,500 kgs) on the railcar. The overfill quantity went through a fixed pipe or hose that is connected to another railcar that is also lined up to be filled with the same material. There was no release of material to the atmosphere and the flammable liquid is still contained in a similar vessel. Is this LOPC? Is this a PSE?</p> <p>If the overfill line and second rail car is considered secondary containment within the design or designated procedure, the overflow is uncontrolled and unplanned and should be considered a PSE if the criteria are met.</p>
	<p>54. Same as above, but as a consequence of the overfill, about 55 kgs (of the 2500 kgs overfill of the flammable liquid that went to the other railcar) of the material was released to the atmosphere through the vent of the rail car loading vapor recovery system. We assume that the liquid has an initial boiling point of less than or equal to 35 C. Is this Tier 2 PSE since the TQ of 50 kgs is exceeded?</p> <p>If the venting is a normal part of the process then it is planned and controlled and this would not be a PSE. If the venting is not a normal part of the process then the release is not planned and controlled and once again this would be a Tier 2 PSE if the criteria are met. If the 55 kg released from the vent were a liquid, it would presumably reach the ground and therefore be a liquid carryover making this a Tier 2 PSE.</p>
	<p>55. This is an expansion of Example #40 (in RP 754) in Marine Transport and #44 in Truck and Rail: A truck is delivering sulfuric acid when the filter plugs causing the delivery to stop. Changing the filter elements will take a few hours. The truck driver wants to leave the site and return when the filter elements have been changed. He disconnects the delivery hose and is splashed by acid under pressure due to the filter plugging resulting in acid burns that cause a Days Away From Work injury. Is this a PSE since the release occurred as the unloading hose was disconnected at the time of the contact?</p> <p>This is a Tier 1 PSE. The phrase “is connected to the process for the purposes of feedstock or product transfer” should be interpreted to begin as soon as the truck or railcar wheels stop turning at a loading/unloading station and continues until the wheels begin turning again after all loading/unloading lines have been disconnected, the chocks removed and the truck or railcar is moving away from the loading/unloading station. For Marine Transport operations, the phrase should be interpreted as extending from the time the first mooring line is attached at a loading/unloading pier until the time that the last mooring line is released to allow the vessel to get underway.</p>

