INTERNATIONAL COUNCIL OF CHEMICAL ASSOCIATIONS

Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

GUIDANCE FOR REPORTING ON THE ICCA GLOBALLY HARMONIZED PROCESS SAFETY METRIC

June 2016

The Responsible Care® Leadership Group

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June 15, 2016

Background

The Responsible Care® initiative began in 1985 as the chemical industry's commitment to continuous performance improvements. Process Safety has been a pillar of Responsible Care since its inception, and while many regional approaches to tracking and reporting process safety performance have developed over the 30 years of Responsible Care implementation, no globally harmonized system had been put into place. In 2012, in the wake of several high profile process safety events, the International Council of Chemical Associations (ICCA) Board of Directors directed the Responsible Care Leadership Group (RCLG) to develop a recommendation for globally harmonized process safety performance reporting by no later than 2015.

Throughout 2013 and 2014, a Taskforce comprised of multinational companies and RCLG associations, chaired by Dr. Peter Schmelzer, Head of Health, Safety and Environmental Protection, Bayer HealthCare AG, worked to develop a globally harmonized ICCA approach to process safety performance reporting. A list of Taskforce members can be found in Appendix C. During the same timeframe, the American Petroleum Institute (API) also initiated a process to update its Recommended Practice 754 (RP-754) – Leading and Lagging Process Safety Metric Standard. RP-754 is broadly used in the refining and petrochemical sector and in the Americas region to track process safety performance. To optimize global adoption of a unified standard, the RCLG Taskforce strived to achieve full harmonization of its recommendation with the revised API RP 754 metric, expected to be finalized in the first quarter, 2016.

Executive Summary

After more than 2 years of discussion, research, debate and feasibility assessment, the Process Safety Harmonization Taskforce recommends that ICCA adopt a process safety event rate metric. The adoption of this metric would require each RCLG association to collect the number of process safety events experienced by their members on an annual basis, as well as total number of worker hours (employees and contractors) experienced by their members each year. The process safety event rate is the ratio of events to hours. The Taskforce also recommends that reporting of these data points to the RCLG be phased in over the next 3 years, allowing regions with the desire and ability to report immediately to do so, while also allowing additional time to companies and organizations that are developing the ability to track these data for the first time.

The criteria that determine whether a process-related event qualifies as a process safety event are based on a loss of primary containment of a chemical or a release of energy triggering thresholds any one of four impact areas: 1) safety/human health consequences; 2) direct cost due to damage from incident; 3) community impact; and 4) chemical release quantity (see the flow chart showing reporting triggers). These four impact areas in the recommended ICCA process safety event definition are identical to the impact areas in the RP-754 Tier II incident standard. The thresholds for reporting are also identical in all areas with the exception of the chemical release quantity thresholds. To address this difference, the ICCA process safety event definition will allow companies the use of either the GHS-based reporting thresholds developed by ICCA for the chemical release criteria, or the UN Dangerous Goods (UNDG)-based reporting thresholds used in the RP-754 standard for Tier II incidents. The Taskforce believes that the two systems, though different, are comparably robust in the universe of chemicals covered and the severity of incidents captured by reporting. While there will be relatively little difference in the numbers of events captured and reported using the two different threshold approaches, there may be

differences that would be most clearly seen at the company level based on raw material and product use; hence the Taskforce cautions companies not to compare their results with companies that use a different chemical release threshold approach. Regardless, under the RCLG proposal, companies can choose the chemical release thresholds by which they report in to their national and regional associations. If associations are interested in translating results based on one reporting approach to another, the RCLG will provide a translation table. However, given the complexity of this exercise and the need to access raw incident data, the Taskforce does not believe that this adds value and recommends against it.

The Taskforce believes that this proposal for process safety event reporting will enable broad-based global reporting of process safety performance across the chemical and petrochemical industries. It will provide a roadmap for regions, associations and companies that are currently not tracking process safety performance to recognize the benefits that tracking and reporting will bring. For regions, associations and companies that are already experienced in gathering process safety data, this recommendation allows for broader global alignment and focus on continuous improvement in process safety performance. The systems that are built to improve process safety performance are informed by robust process safety event data, and this is the major objective of this initiative.

Data to be reported by RCLG Associations to RCLG

On an annual basis, RCLG Associations will be asked to report two data points into ICCA using the RCLG KPI Reporting Website on the schedule provided below.

1. Total Member Company Worker Hours for Association (employee and contractor)
2. Total Number of Process Safety Events

ICCA will use the above two data points to report process safety performance in the form of Process Safety Event Rate (PSER), normalized per 100 employees where an employee works 2,000 hours a year.

(Total Events / Total Hours) x 200,000 = PSER

Recommended Reporting Schedule

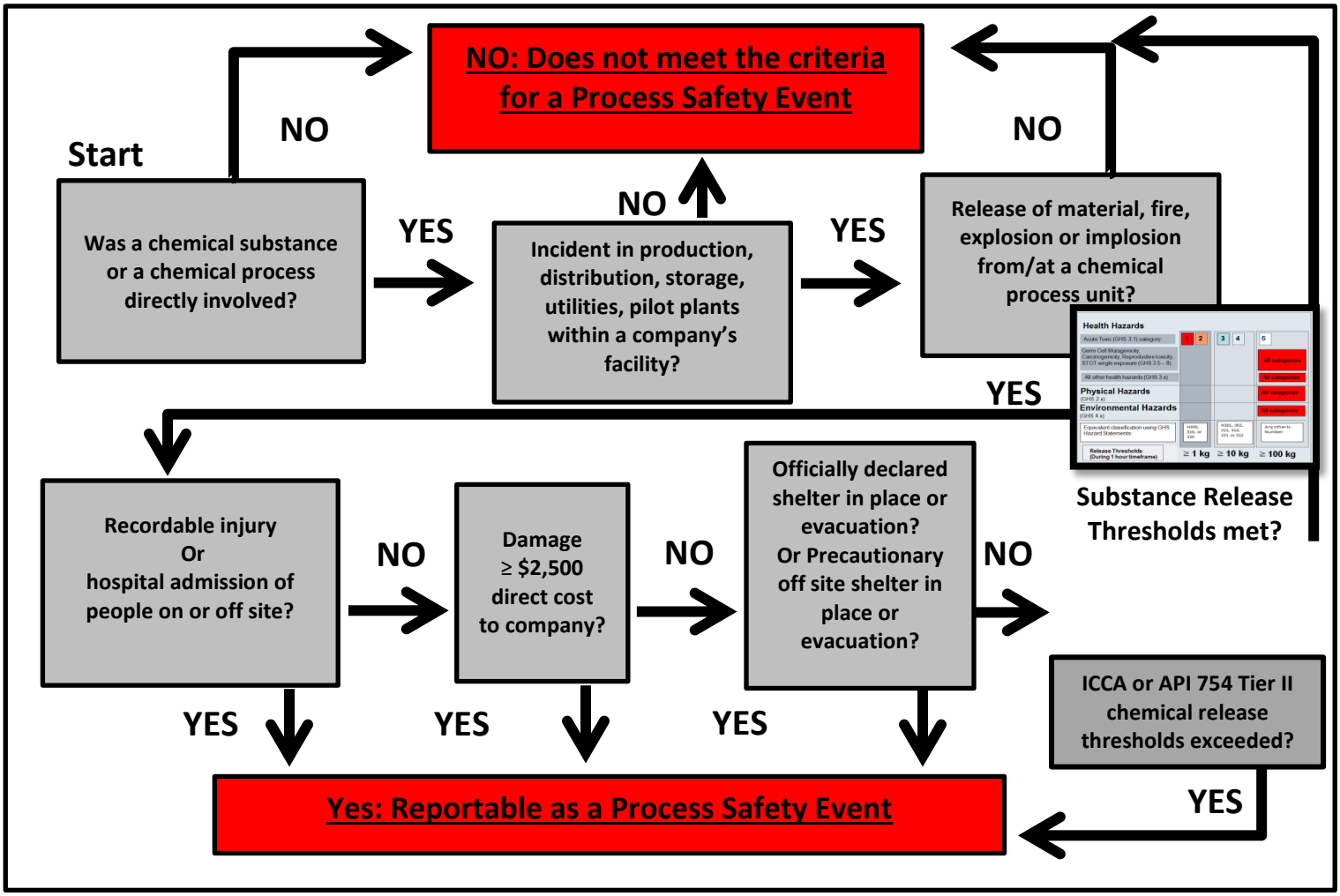
The Taskforce recommends a phased-in approach for reporting process safety event rate. Such a schedule will allow more experienced companies and associations to report in the next several years, while allowing other companies and associations to begin reporting by 2019. RCLG Associations would be asked to report the two process safety event rate data points annually to the ICCA through the RCLG KPI metrics reporting system: http://kpi.responsiblecare.eu If you do not know your association's username and password, please contact the RCLG.

The proposed schedule for process safety event rate reporting by RCLG associations is as follows:

April 2015	RCLG considers Taskforce proposal
June 2015	ICCA Board of Directors considers RCLG final recommendation
July 2015	RCLG releases the first detailed reporting guidance document for associations and member companies
Feb, 2016 RCLG Reporting	RCLG initiates process safety reporting pilot program through association volunteers with an updated enhanced guidance document; RCLG rolls out final guidance document in June, 2016
2017	RCLG Associations begin collecting data from its membership
2018-2019 RCLG Reporting	**Optional** process safety data reporting by RCLG Associations
2020 Reporting	RCLG includes process safety as a **mandatory** metric in the KPI reporting program

See Appendix D – Detailed Schedule of Events

Overview of ICCA Process Safety Event Criteria as a Flow Chart



Key Criteria for Reporting Process Safety Events to RCLG

Total Worker Hours

RCLG Associations should report the total number of employee hours worked for each member company in their association **and** the total number of contractor hours worked for each member company as a **combined, single number**. For the purposes of this guidance document, each association should refer to their local and regional definitions for employee and contractor. The goal for reporting total hours is to include **all individuals** who are involved with chemical manufacturing, except where those individuals are tasked with major construction projects such as large scale investments with specific, one-time project organizations created for design, engineering, and construction of new or significant expansion to existing process facilities. When reporting total worker hours, companies should report the same hours used for reporting **personnel hours**. This way, companies can have the same data set for occupational and process safety. Personnel hours should include those hours from **all** chemical manufacturing operations, not just from facilities where a process safety incident occurred.

Process Safety Event

For the purposes of this ICCA Reporting, a process safety event has occurred when:

- **A.** A chemical substance or a chemical process is directly involved; **AND**
- **B.** The incident occurred in production, distribution, storage, utility, pilot plant within the site boundaries of company's facility; **AND**
- **C.** There was a release of material or energy (e.g. fire, explosion, implosion) from a process unit; **AND**
- **D.** One or more of the following **Reporting Thresholds** have been met:
    1. **Safety / Injury**
        - Injury resulting in a Recordable, Lost Time Accident or Fatality; or Hospital admission of anyone on or off site; **OR**
    2. **Direct Damage Cost**
        - A fire, explosion or clean up necessary to avoid/remediate environmental damage resulting in a direct cost equal to or greater than US$2,500; **OR**
    3. **Shelter in Place / Evacuation**
        - An officially declared shelter in place (on or off site); **OR**
        - An officially declared evacuation (on or off site); **OR**
        - A precautionary off site shelter in place or evacuation **OR**
    4. **Threshold Release**
        - The material released meets one of the GHS thresholds in **Table 1**. (measured in amount released during **one hour**)

As an alternative, companies can choose to use the release thresholds contained in the API RP-754 standard – **Table 2**. Note – Individuals who would like to view the API RP-754 Standard may purchase and download that standard at - http://www.api.org/oil-and-natural-gas/health-and-safety/process-safety/process-safety-standards

Detailed Guidelines on Identifying a Process Safety Event

A. Chemical Involvement

When a chemical substance or chemical process is directly involved

A chemical or chemical process must have been directly involved in the event or incident. For this purpose, the term "process" is used broadly to include the equipment and technology needed for petrochemical production, including reactors, tanks, piping, boilers, cooling towers, refrigeration systems, etc. An incident with no direct chemical or process involvement, e.g., an office building fire, even if the office building is on a plant site, is not reportable.

B. Location

The incident occurred in production, distribution, storage, utility, pilot plant within the site boundaries of company's facility

The incident occurs in production, distribution, storage (including active storage areas such as warehouses – see FAQ section), utilities or pilot plants of a facility reporting metrics under these definitions. This includes tank farms, ancillary support areas (e.g., boiler houses and waste water treatment plants) and distribution piping under control of the site. All reportable incidents occurring at a location will be reported by the company that is responsible for operating that location. This applies to incidents that may occur in contractor work areas as well as other incidents. At tolling operations and multi-party sites, the company that operates the unit where the incident initiated should record the incident and count it in their reporting.

C. Release of Material

There was a release of material or energy (e.g. fire, explosion, implosion) from a process unit

Release of Material – an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g. steam, hot water, nitrogen, compressed CO2 or compressed air), from a process that results in consequences that exceed one or more of the 4 Reporting Thresholds listed in this document.

A release to a flare or scrubber is still considered to be within the primary containment as long as the mitigation system (e.g. scrubber, flare) is operated under normal conditions without any release above the thresholds defined for normal operation. A release to a secondary containment (e.g. waste water treatment or dike) will qualify as a process safety event because the substance is leaving the primary process system.

D. Thresholds

One or more of the following Reporting Thresholds must be met for reportable process safety events.

1. Safety / Injury
Injury resulting in a Recordable, Lost Time Accident or Fatality; or Hospital admission of anyone on or off site;

Recordable injuries are work-related injuries that results in any of the following: death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of consciousness, or a significant injury diagnosed by a physician or other licensed health professional.

Lost time injuries and fatalities that occur as a result of process-related loss of primary containment, fire, or explosion are those that fit into one of the following categories:

- Employee (Lost time and/or Fatality)
- Contractor and Subcontractor (Lost time and/or Fatality)
- Third Party (Injury/illness resulting in Hospital Admission or Fatality)

Hospital Admission – formal acceptance by a hospital or other inpatient health care facility of a patient who is to be provided with room, board, and medical service in an area of the hospital or facility where patients generally reside at least overnight. Treatment in the hospital emergency room or an overnight stay in the emergency room would not by itself qualify as a "hospital admission."

Examples of injury or fatality cases that would be reportable include a burn injury resulting from steam released during cleaning; a physical injury from a cap blown off by pressure during a pressure test; or a chemical burn from a spill while taking a sample. Examples of injuries or fatality cases that would not be reportable include a fall from an elevated work station while performing maintenance; a burn from a fire in a laboratory or office building; or injuries from an excavation cave-in. None of these cases are directly due to the release of energy or material from the process.

2. Direct Damage Cost
A fire, explosion or clean up necessary to avoid/remediate environmental damage resulting in a direct cost equal to or greater than US$2,500

Costs to be considered for this threshold should be those costs directly attributed to the fire and/or explosion, such as the replacement value of equipment lost, structures lost, cost of repairs, environmental cleanup (on and off site), emergency response and/or fines. Direct cost <u>does not include</u> indirect costs, such as business opportunity losses, loss of profits due to equipment

outages, cost of obtaining or operating temporary facilities or cost of obtaining replacement products to meet customer demand (product losses).

3. Shelter in Place / Evacuation

An officially declared shelter in place or evacuation either on or off site OR a precautionary shelter in place or evacuation off site

For the purposes of this reporting, an officially declared shelter in place or evacuation, on or off site, OR a precautionary shelter in place or evacuation is declared off site would trigger this threshold

Officially Declared – 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).

Precautionary Declaration - A precautionary public response is a measure taken from an abundance of caution and issued by a recognized community official or delegate whom has reasonably determined that such an evacuation or shelter in place was necessary to protect the public health and safety.

Shelter in Place – is the use of a structure and its indoor atmosphere to temporarily separate individuals from a hazardous outdoor atmosphere

Evacuation – the act or process of removing persons from a place for reasons of safety or protection

4. Threshold Release

*An **acute release** that exceeds one of the GHS thresholds in **Table 1** or in the API 754 standard for Tier II process safety release thresholds in **Table 2** (measured in amount released during **one hour**)*

As mentioned in the Executive Summary, the ICCA process safety event definition allows use of either GHS-based reporting thresholds developed by ICCA for the chemical release criteria, or the UN Dangerous Goods (UNDG)-based reporting thresholds used in the RP-754 standard for Tier II incidents. The GHS thresholds are listed in **Table 1.** It is intended for companies to decide which table to use and to allow companies the option to use one system globally.

Acute Release – A release of flammable, combustible, or toxic chemicals from the primary containment (i.e., vessel or pipe) greater than the chemical release threshold quantities is described for GHS Classification **Table 1** and in the API 754 standard for Tier II process safety release thresholds in **Table 2.**

Pressure Relief Device: Acute Releases, defined above, **include** releases to a properly designed and operating pressure relief device if a quantity is released greater than or equal to the threshold quantities in **Table 1** OR in the API 754 standard for Tier II process safety release thresholds **Table 2**, that results in one or more of the following four consequences:

1. Rainout;
2. Discharge to a potentially unsafe location;
3. An on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation;
4. Public protective measures (e.g., road closure) including precautionary public protective measures.

Releases to a properly designed and operating pressure relief device (see page 17) **do not** have to be reported if they do not meet one of the four criteria above.

Individuals who would like to view the API RP-754 Standard may download that standard at - **http://www.api.org/environment-health-and-safety/process-safety/process-safety-standards/standard-rp-754.**

1 Hour Rule

For the purpose of the reporting under this metric, release thresholds are established for materials over a one-hour time frame. If the release amount of a material reaches or exceeds the reporting threshold in a 1-hour time period or less, it is reportable. Typically, acute releases occur in 1-hour or less. If the duration of the release cannot be determined, the duration should be assumed to be 1 hour.

Primary Containment – A tank, vessel, pipe, rail car or equipment intended to serve as the primary container or used for the transfer of the material. Primary containers may be designed with secondary containment systems to contain and control the release. Secondary containment systems include, but are not limited to, tank dikes, curbing around process equipment, drainage collection systems into segregated oily drain systems, the outer wall of double walled tanks, etc.

Severity Table Severity weighting can provide additional useful information about process safety events that may help drive performance improvement**. Appendix A** is the RCLG methodology for calculating a severity weight for process safety events. Using **Appendix A**, a severity weight for each process safety event may be calculated by summing the points associated with each consequence category. **The ICCA strongly encourages the use of a severity weighting system as the use of such a system increases the ability to communicate performance and is an easier way for our stakeholders to understand process safety events. Also, the severity weight will not be comparable among other process safety metric reporting formats.**

Table 1 – GHS Classification Table

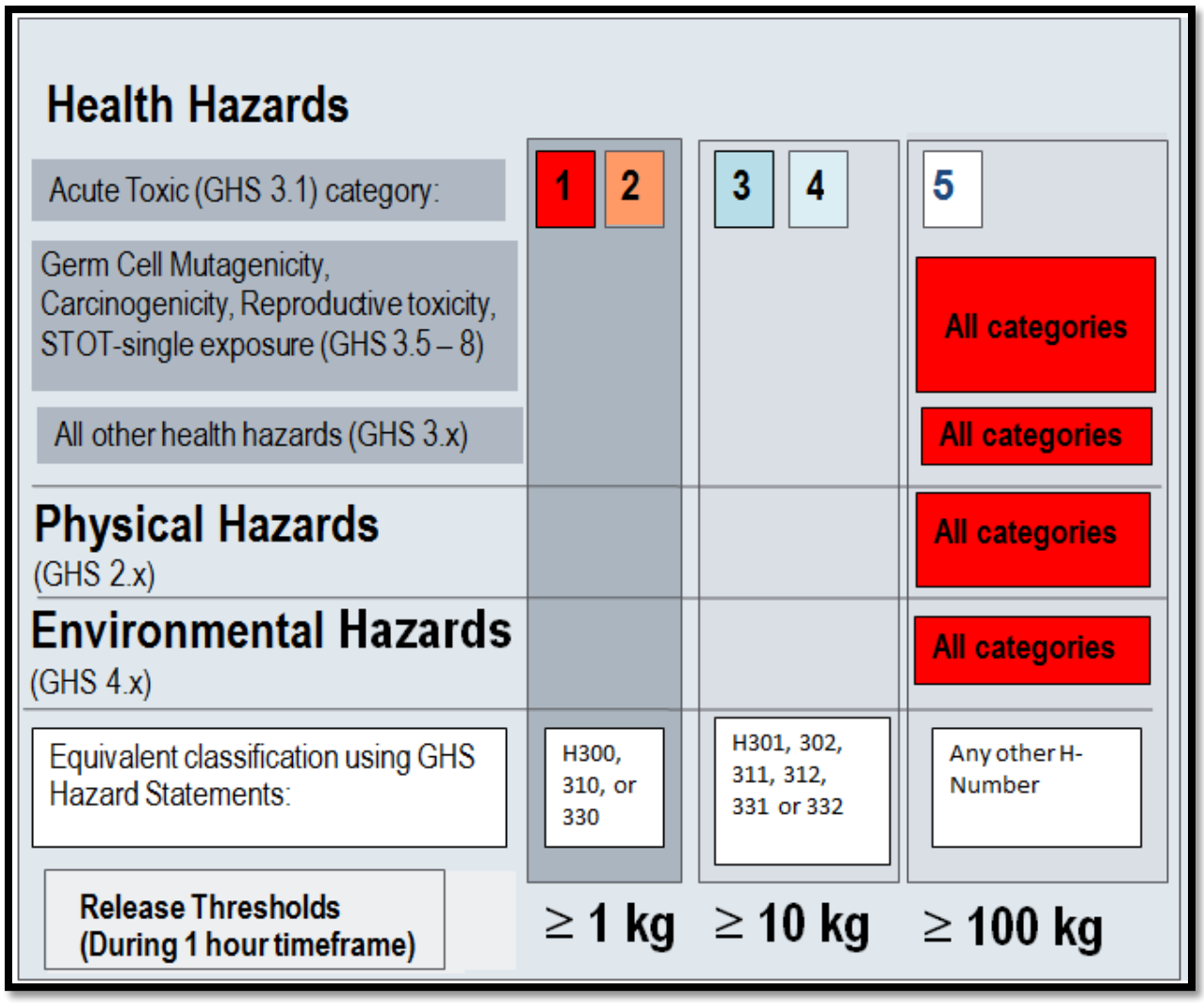


Table 2 – API RP 754 Tier II Classification Table

Threshold Release Category	Material Hazard Classification [a,c,d,e,f]	Threshold Quantity (outdoor release)	Threshold Quantity (indoor[b] release)
T2-1	TIH Zone A Materials	≥ 0.5 kg (1.1 lb)	≥ 0.25 kg (0.55 lb)
T2-2	TIH Zone B Materials	≥ 2.5 kg (5.5 lb)	≥ 1.25 kg (2.75 lb)
T2-3	TIH Zone C Materials	≥ 10 kg (22 lb)	≥ 5 kg (11 lb)
T2-4	TIH Zone D Materials	≥ 20 kg (44 lb)	≥ 10 kg (22 lb)
T2-5	Flammable Gases **OR** Liquids with Normal Boiling Point ≤ 35 °C (95 °F) and Flash Point < 23 °C (73 °F) **OR** Other Packing Group I Materials (excluding acids/bases)	≥ 50 kg (110 lb)	≥ 25 kg (55 lb)
T2-6	Liquids with Normal Boiling Point > 35 °C (95 °F) and Flash Point < 23 °C (73°F) **OR** Other Packing Group II Materials (excluding acids/bases)	≥ 100 kg (220 lb) or ≥ 0.7 bbl	≥ 50 kg (110 lb) or ≥ 0.35 bbl
T2-7	Liquids with Flash Point ≥ 23 °C (73 °F) and ≤ 60 °C (140 °F) **OR** Liquids with Flash Point > 60 °C (140 °F) released at a temperature at or above Flash Point **OR** strong acids/bases (see definition Refer to draft RP 754 document) **OR** UNDG Class 2, Division 2.2 (non-flammable, non-toxic gases) excluding air **OR** Other Packing Group III Materials	≥ 200 kg (440 lb) or ≥ 1.4 bbl	≥ 100 kg (220 lb) or ≥ 0.7 bbl
T2-8	Liquids with Flash Point > 60 °C (140 °F) and ≤ 93 °C (200 °F) released at a temperature below Flash Point **OR** Moderate acids/bases	≥ 1000 kg (2200 lb) or ≥ 7 bbl	≥ 500 kg (1100 lb) or ≥ 3.5 bbl

It is recognized that threshold quantities given in kg and lb or in lb and bbl are not exactly equivalent. Companies should select one of the pair and use it consistently for all recordkeeping activities.

In determining the Threshold Release Category for a material, one should first use the toxic (TIH Zone) or flammability (Flash Point and Boiling Point) or corrosiveness (Strong Acid or Base vs. Moderate Acid or Base) characteristics. Only when the hazard of the material is not expressed by those simple characteristics (e.g., reacts violently with water) is the UNDGL Packing Group used.

a Many materials exhibit more than one hazard. Correct placement in Hazard Zone or Packing Group shall follow the rules of DOT 49 CFR 173.2a [14] or UN Recommendations on the Transportation of Dangerous Goods, Section 2 [12]. See Annex F.

b A structure composed of four complete (floor to ceiling) walls, floor and roof.

c For solutions not listed on the UNDG, the anhydrous component shall determine the TIH zone or Packing Group classification. The threshold quantity of the solution shall be back calculated based on the threshold quantity of the dry component weight.

d For mixtures where the UNDG classification is unknown, the fraction of threshold quantity release for each component may be calculated. If the sum of the fractions is equal to or greater than 100 %, the mixture exceeds the threshold quantity. Where there are clear and independent toxic and flammable consequences associated with the mixture, the toxic and flammable hazards are calculated independently. See Annex E, PSE Examples & Questions 49 - 53.

- A LOPC of Liquids with Flash Point > 60 °C (140 °F) and ≤ 93 °C (200 °F) released at a temperature below Flash Point cannot be Tier 1 PSE based upon quantity released no matter the volume.
- A LOPC of a moderate acid/base cannot be Tier 1 PSE based upon quantity released no matter the volume.

Appendix A – Severity Table: Using A Severity Weighting System is Encouraged for All Associations

	Event Incident Categories				
Severity Level	**Safety/Human Health**	**Direct Cost from Fire or Explosion**	**Material Release Within 1-Hr Period**	**Community Impact**	**Environmental Impact [off-site]**
Level 4 **1 point**	• Injury requiring treatment beyond first aid to an employee, contractor, or subcontractor. (Meets local regulations)	• Resulting in Direct Damage Cost of **$2.5 K ≤ up to $25 K**	• Release volume between **1x ≤ TQ < 40x**	• Officially declared shelter-in-place or officially declared evacuation (on or off site) • Precautionary off site shelter in place or evacuation **≤ 3 hours**	• Acute Environmental Remediation Cost **$2.5 K ≤ up to $25 K**
Level 3 **3 points**	• Days Away From Work injury to an employee, contractor, or subcontractor, or • Injury requiring treatment beyond first aid to a third party (Meets local regulations)	• Resulting in Direct Damage Cost of **$25 K ≤ up to $250 K**	• Release volume between **40x ≤ TQ < 160x**	• Officially declared shelter-in-place or officially declared evacuation (on or off site) • Precautionary off site shelter in place or evacuation **3 hours ≥ up to 12 hours**	• Acute Environmental Remediation Cost **$25 K ≤ up to $250 K**
Level 2 **9 points**	• A fatality of an employee, contractor, or subcontractor, or • A hospital admission of a third party (Meets local regulations)	• Resulting in Direct Damage Cost of **$250 K ≤ up to $25 MM**	• Release volume between **160x ≤ TQ < 640x**	• Officially declared shelter-in-place or officially declared evacuation (on or off site) • Precautionary off site shelter in place or evacuation **12 hours ≥ up to 24 hours**	• Acute Environmental Remediation Cost **$250 K ≤ up to $25 MM**
Level 1 **27 points**	• Multiple fatalities of employees, contractors, or subcontractors, or • multiple hospital admission of third parties, or • A fatality of a third party (Meets local regulations)	• Resulting in Direct Damage Costs of **≥ $25 MM**	• Release volume **≥ 640x TQ**	• Officially declared shelter-in-place or officially declared evacuation (on or off site) • Precautionary off site shelter in place or evacuation **≥ 24 hours**	• Acute Environmental Remediation Cost **≥ $25 MM**

(K = 1,000 MM = 1,000,000) (For Environmental Impact, companies and associations should agree on input criteria where definitions aren't readily available)

Severity Table (Appendix A) Details

Appendix A above is designed to be used with the GHS Classification System **ONLY** (Table 1). If your company is using the API RP 754 Tier II Process Safety Metric Threshold Table, Table 2 in this document, please use the API RP 754 Process Safety Severity Table. It is important to state that the severity table in the API RP 754 Standard is for Tier 1 incidents only. **Comparing the relative severity of events using different tables will not be statistically valid.**

Acute Environmental Cost - Cost of short-term cleanup and material disposal, associated with a PSE with off-site environmental impact.

Rate Adjusted Metrics

Utilizing the severity table described above, there are a variety of rate-based metrics which can be generated. These include:

Process Safety Total Incident Rate (PSTIR): $\frac{\text{Total event incidents x 200,000}}{\text{Total Worker Hours}}$

Process Safety Event Severity Rate (PSESR) (i.e., severity-weighted Process Safety incident rate formula):

$$\textbf{PSESR} = \frac{\text{Total severity score for all events x 200,000}}{\text{Total Worker Hours}}$$

In determining this rate, 1 point is assigned for each Level 4 incident attribute, 3 points for each Level 3 attribute, 9 points for each Level 2 attribute, and 27 points for each Level 1 attribute. Theoretically, a process safety event could be assigned a minimum of 1 point (i.e., the incident meets the attributes of a Level 4 incident in only one category) or a maximum of 135 points (i.e., the incident meets the attributes of a Level 1 incident in each of the five categories.)

PS Level "X*" incident rate: $\frac{\text{Total Severity Level "X*" PS incident x 200,000}}{\text{Total employee, contractor \& subcontractor work hours}}$

Where X* can be the total count of Severity Level 4, 3, 2, or 1 incidents. The severity level of an incident is the maximum severity rating of the five consequence categories.

Normalization – In some associations and member companies, process safety events are normalized on a 'per 100' employee basis given that one worker averages 2,000 per year. So, to normalize on a 'per 100' employee basis, events are multiplied by 200,000 worker hours. In other associations and member companies, events are normalized on a 'per 500' employee basis and events are multiplied by 1,000,000 worker hours. Associations and members should discuss this option and come to a conclusion together. The above formulas are set at a 'per 100' employee rate.

(K = 1,000 MM = 1,000,000) (For Environmental Impact, companies and associations should agree on input criteria where definitions aren't readily available)

Appendix B – Frequently Asked Questions

Applicability

It is recommended that companies record and report Process Safety Events occurring at Company-owned or operated facilities, except as noted below:

1. PSEs that originated off Company property
2. Marine transport vessel incidents, except when the vessel is connected to the facility for the purposes of crude or product transfer
3. Truck and/or rail incidents, except when the truck or rail car is connected to the facility for the purposes of crude or product transfer
4. Routine emissions that are allowable under permit or regulation
5. Underground contamination that had no process safety consequences. Note: The exclusion does not apply if the release resulted in an aboveground reportable PSE, such as release of toxic vapors or pooling of flammable liquids
6. Office building incidents (e.g., office heating equipment explosions, fires, spills, releases, personnel injury or illness, etc.)
7. Personnel safety "slip/trip/fall" incidents that are not directly associated with evacuating from, or responding to a loss of containment incident
8. Loss of Primary Containment (LOPC) incidents from ancillary equipment not connected to the process (e.g., small sample containers)
9. Planned and controlled drainage of material to collection or drain system designed for such service (Note: Exclusion does not apply to an unintended and uncontrolled release of material from primary containment that flows to a collection or drain system)
10. Mechanical work being conducted outside of process units or in maintenance shops

Interpretations and Examples – Based on GHS Table 1

The following interpretations and examples have been prepared to help clarify areas of potential uncertainty in the evaluation of reportable Process Safety Incidents (PSE).

COMPANY PREMISES

1. A third-party truck loading a flammable product on Company Premises, experiences a leak and subsequent fire and property loss damages of $7,000 (direct costs). Although the truck is "Operated-by-Others", it is connected to the process. The incident would be a reportable PSE if property losses in direct costs were equal to or greater than $2,500 or some other PSE threshold was met or exceeded (e.g., a fatality).

2. Similar example as #1. The truck loaded with flammable product overturns on route out of the plant, resulting in a fire and loss of the truck. This would not be reported as a PSE since the truck is no longer connected to the plant.

LOSS OF CONTAINMENT

3. A faulty tank gauge results in the overfilling of a product tank containing “flammable liquids”. Approximately 700 kg of liquid overflows into the tank's diked area. This incident is a reportable PSE since it is an "acute" spill greater than 100 kgs, regardless of secondary containment.

4. A maintenance contractor opens a process valve and gets sprayed with sulfuric acid resulting in a severe burn and lost time injury. This would be a reportable PSE. It is an unintended event involving a material and a loss of containment. For fatalities and days away from work injuries and illnesses, there is no release threshold amount.

5. An operator opens a quality control sample point to collect a routine sample of product and receives a bad hand laceration requiring stitches due to a broken glass bottle and misses the next day of work. This is not a reportable PSE because it is not related to a loss of containment.

ACUTE RELEASES

6. While troubleshooting a higher-than-expected natural gas flow rate, operating personnel find a safety valve on the natural gas line that did not reset properly and was relieving to the atmospheric vent stack through a knock-out drum. Upon further investigation, it is determined that a total of 100,000 kg of natural gas was relieved at a steady rate over a 6 month period. This is not a reportable PSE as the release rate (~10 kg per hour) is not “acute”, (i.e. does not exceed the 100 kg TQ for flammable vapors per 1 hour time period).

FLARES & EMISSION CONTROL DEVICES (e.g., scrubbers)

7. If a chemical is routed to a flare or emission control device (e.g., scrubber), it would not be classified as a PSE as long as that flare or control device operates as designed.

8. If a scrubber is overwhelmed by a flowrate greater than the design of the scrubber system and discharges a chemical in excess of the reporting threshold, it would be reported as a PSE as noted in this document.

   As a note, an upset emission from a permitted or regulated source – **including pressure relief devices** - of a quantity greater than or equal to the threshold quantities in Table 1 or 2 in any one-hour period, that results in one or more of the following four consequences:
   - rainout;
   - discharge to a potentially unsafe location;
   - an on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation;
   - public protective measures (e.g., road closure) including precautionary public protective measures;

   Should be reported as a PSE.

SAFETY RELIEF DEVICE / SYSTEM

9. There is a unit upset and the relief valve opens to an atmospheric vent which has been designed, resulting in a gas release to the atmosphere with no adverse consequences. This would not be a reportable PSE since vapors and gases released to atmosphere from safety valves, high-pressure rupture disks, and similar safety devices that are properly designed for that event per API Standard 521 or equivalent are excluded, as long as the release did not result in (1) a liquid carryover that created a reportable PSE related to the liquid (e.g., lost time incident, fatality, a fire or explosion that caused $2,500 or more of direct cost, liquid release or toxic aerosol release at or above threshold amounts, etc.), or (2) activation of a shelter-in-place response on or off-site, or (3) public protective measures be taken.

10. There is a unit upset and the relief valve fails to open, resulting in overpressure of the equipment and an "acute" release of flammable gas from a leaking flange. The amount released is above the 100 kg (within 1 hour) threshold. This is a reportable PSE. Releases from flanges are not excluded from PSE reporting.

DAYS AWAY FROM WORK INCIDENTS

11. An operator is walking, then slips and falls to the floor and suffers a lost time injury. The slip/fall is due to weather conditions, "chronic" oily floors and slippery shoes. This is not a reportable PSE. Personnel safety "slip/trip/fall" incidents that are not directly associated with evacuating from or responding to a loss of containment incident are specifically excluded from PSE reporting.

12. Same as above, except that the operator slipped and fell while responding to a small flammable liquid spill (e.g., less than 10 kg in 1 hour). This would be PSE reportable since the operator was responding to a loss of containment incident. A PSE is reportable if the loss of primary containment occurs on Company Premises and results in a lost time incident or fatality. For fatalities and lost time incidents, there is no release threshold amount.

13. Same as above, except that the operator slipped and fell several hours after the incident had concluded. This would not be PSE reportable. The terms "evacuating from" and "responding to" in the reporting exclusion mean that the loss of containment and associated emergency response activities are on-going. Slips/trip/falls after the event have concluded (such as "after-the-fact" clean-up and remediation) are excluded from PSE reporting.

14. A scaffold builder suffers a lost time injury after falling from a scaffold ladder while evacuating from a loss of containment incident on nearby equipment. This is a reportable PSE.

15. An operator walks past an improperly designed steam trap. The steam trap releases and the operator's ankle is burned by the steam, resulting in a lost time injury. This is a reportable PSE because even though the loss of containment was steam (vs. hydrocarbon or chemical), the physical state of the material was such that it caused a lost time injury.

16. An enclosure has been intentionally purged with nitrogen. A contractor bypasses safety controls, enters the enclosure and dies. This is a reportable fatality, but not a reportable PSE since there was no unplanned or uncontrolled loss of primary containment.

17. Same as above, except that nitrogen inadvertently leaked into the enclosure. This would be a reportable PSE (and fatality) since there was a fatality associated with an unplanned loss of primary containment.

18. An operator responding to an H2S alarm collapses and is injured. If the alarm was triggered by an actual unplanned or uncontrolled H2S LOPC, the event would be a reportable PSE. If the alarm was a false alarm, the event would not be a reportable PSE because there was no actual release.

PIPELINES

19. A pipeline leaks and releases 2000 lbs (900 kgs) of flammable vapor above ground within 1 hour. However, the release occurred in a remote location within the site. The release is PSE reportable, since "remoteness" is not a consideration.

FIRES or ENERGY RELEASES NOT ASSOCIATED WITH CHEMICAL RELEASE

As a general rule, a fire or energy release is reported as a PSE only if caused by chemical release or results in a chemical release in excess of the reporting quantities. Examples include:

20. An electrical fire impacts the operation of the process resulting in the release of 400 kg of toluene. This event would be reported as a PSE since the chemical release exceeds the 100 kg reporting threshold for toluene.

21. An electrical fire, loss of electricity, or any other loss of utility occurs which may cause a plant shutdown and possibly incidental equipment damage greater than $2,500 (e.g., damage to reactors or equipment due to inadequate shutdown) but does not create a chemical release greater than the threshold quantity, or cause a fatality or serious injury. This event would not be reported as a PSE since the equipment damage was not caused by a chemical process fire/explosion and there was not a chemical release greater than the threshold quantity.

MARINE TRANSPORT VESSELS

22. A company operated Marine Transport Vessel has an onboard "acute" spill of combustible material greater than 100 kg. The event is not PSE reportable since Marine Transport Vessel incidents are specifically excluded, except when the vessel is connected to the refinery, petrochemical, or chemical manufacturing facility for the purposes of crude or product transfer.

23. A third-party barge is being pushed by a tug and hits the company dock. A barge compartment is breached and releases 1,000 kg of diesel to the water. The event is not a reportable PSE since the marine vessel was not berthed at the dock and actively involved in crude or product transfer operations.

TRUCK AND RAIL

24. A company railcar derails and spills more than 1,000 kg of gasoline while in transit. The incident is not PSE reportable since rail incidents off company property are specifically excluded.

25. A third-party truck/trailer overturns while in the Company Premises, resulting in an "acute" spill of gasoline greater than 1,000 kg. The incident is not PSE reportable if the truck is no longer connected to the loading/unloading facilities. However, it is recommended that companies also have transportation incident metrics, which would capture this event.

26. A contract truck hauler is unloading caustic and the hose separates and generates an airborne aerosol and/or liquid caustic spill of 2500 kg. The event is a reportable PSE since the caustic TQ of 100 kg was exceeded and the truck was still connected to the loading/unloading facility immediately prior to the incident.

OFFICE BUILDING

27. There is a boiler fire at the Main Office complex, and direct cost damages totaled $75,000. The incident is not PSE reportable since Office Building incidents are specifically ***excluded***.

MAN-MACHINE INTERFACE INCIDENTS

28. An operations technician is injured while working around the finishing equipment in a polymers plant. The injury is caused by the mechanical, man-machine interface with the equipment. This would not be a reportable Process Safety Event because there was no loss of containment of hazardous material.

MIXTURES

29. If a mixture by itself has a GHS classification you use that classification to determine the threshold. If the mixture itself does not have a GHS-classification, we go back to the individual components of the mixture and based on kg released per threshold group calculate a 'weighted' contribution to the thresholds. **Example:** a release of 100 kg of a mixture in a one hour period that consists of 0.5 kg of a substance classified as acute toxic H300, 4.5 kg of substance classified with H301 and 40 kg of a substance with another H-number and the remaining 55 kg of water with no GHS classification would be calculated as 0.5/1 + 4.5/10 + 40/100 = 0.5 + 0.45 + 0.4 = 1.35 is exceeding 1 and would be counted as a reportable process safety incident even though none of the individual hazardous components exceeded the threshold for the individual substance.

DIRECT DAMAGE COSTS

30. Direct damage costs considered for this threshold should be those costs directly attributed to the fire and/or explosion, such as the replacement value of equipment lost, structures lost, cost of repairs, environmental cleanup, emergency response and/or fines. Direct cost **does not include** indirect costs, such as business opportunity losses, loss of profits due to equipment outages, cost of obtaining or operating temporary facilities or cost of obtaining replacement products to meet customer demand **(product losses).**

31. As an example, a leak of flammable gas occurred in a vent line connected to a gas treatment system. At the same time, a failure in the process allowed air to enter in the same vent line. An explosion occurred and the over pressure damaged the vent line and associated upstream equipment including a seal pot. Nobody was hurt. The cost for repair was about $12,000. This is a PSE considering the cost to repair the equipment due to the explosion and fire.

32. As an example, after a PSE event, a company releases 50 kg of a very special, GHS Category 5 product which causes $2,000 of damage to equipment. The product released was a very special blend of materials and the company incurs over $50,000 in materials associated with the product loss. This event is not reportable as PSE since the reportable threshold for GHS Category 5 releases is 100 kgs and product losses do not count as Direct Damage Costs.

NATURAL DISASTERS

33. Natural disasters can present substantial risks to chemical process operations and damage to plant equipment which may result in a loss of containment of hazardous substances. Where the potential for one or more types of natural disasters is deemed relevant to plant operations, process safety and operational systems shall address the applicable risk in terms of hazards and consequence analysis, plant design, operating procedures for loss of utilities and process shutdown, and emergency planning and response.

    Types of natural disasters includes hurricanes and typhoons (including associated storm surge), floods, tornadoes, earthquakes, derechos (straight line wind storms), wildfires, volcanic eruptions, tsunamis, and avalanches.

    If your facility experiences a natural disaster that triggers one or more of the thresholds, it should be reported as a process safety event.

PRECAUTIONARY PUBLIC RESPONSE

34. A precautionary public response is a measure taken from an abundance of caution. **For example**, a company may require all workers to shelter-in-place in response to an LOPC independent of or prior to any assessment (e.g., wind direction, distance from the LOPC, etc.) of the potential hazard to those workers. **For example**, a recognized community official (e.g., fire, police, civil defense, emergency management) may order a community shelter-in-place, evacuation, or public protective measure (e.g., road closure) in the absence of information from a company experiencing a process safety event, or 'just in case' the wind direction changes, or due to the sensitive nature of the potentially affected population (e.g., school children, the elderly).

ACTIVE WAREHOUSE

35. An active warehouse is an on-site warehouse that stores raw materials, intermediates, or finished products used or produced by a process. From a process perspective, an active warehouse is equivalent to a bulk storage tank. Rather than being stored in a single large container, the raw materials, intermediates, or finished products are stored in smaller containers (e.g., totes, barrels, pails, etc.).

Appendix C – List of RCLG Taskforce Members

Name	Affiliation
Peter Schmelzer	Bayer, CEFIC - Chairman
Americo Diniz Carvalho Neto	Braskem
Bradford Johnson	American Chemistry Council
David Cummings	DuPont
Debra Phillips	American Chemistry Council
Hans Schwarz	BASF
Kathryn Walton	Plastics and Chemicals Industries Association
Kazuyuki Akita	Japan Chemical Industry Association
Kelly Keim	ExxonMobil Chemical Company, API Representative
Kenan Stevick	Dow
Kiyokazu Murata	Japan Chemical Industry Association
Larry Bowler	SABIC
Lorna Young	Chemistry Industry Association of Canada
Louisa Nara	Center for Chemical Process Safety
Luiz Shizuo Harayashiki	Associação Brasileira da Indústria Química
Masatoshi Kumamoto	Japan Chemical Industry Association
Milton Lacerda	Petrobras
Phil Scott	Chemical Industries Association
Piet Knijff	DSM, European Process Safety Centre
Scott Donaldson and Eamon Chandler	Shell
Scott Wallace	Olin Corporation
Shakeel Kadri	Air Products and Chemicals, Inc.

Appendix D – Detailed Schedule of Events

2016	2017	2018	2019	2020
Feb - April *RCLG PS Pilot Program* May – Adjustments/clarification to guidance document **June** Report outcomes of pilot program to RCLG and ICCA Board **July - December** • RCLG associations consider guidance and develop reporting methodology for their memberships • RCLG associations can request ICCA capacity building funds for PS reporting workshops for members, if needed	**Jan - Dec** RCLG Association membership begin collecting PS data from their members **Jan – Dec** Associations hold workshops on Process Safety and performance reporting, utilizing RCLG funds and experts if needed	**Jan – Feb** Reporting of process safety incidents to RCLG begins for associations with data (2017 data) **April** RCLG reviews outcomes, challenges and raw data from the first reporting cycle (internally) **June** RCLG share draft data with ICCA Board **July - December** Update and adjust guidance as necessary – Version 1 Associations hold workshops on Process Safety and performance reporting, utilizing RCLG funds and experts if needed	**Jan – Feb** Reporting of process safety incidents to RCLG begins for associations with data (2018 data) **April** RCLG reviews outcomes, challenges and raw data from the second reporting cycle (internally) **June** RCLG share draft data with ICCA Board **July - December** Update and adjust guidance as necessary Associations hold workshops on Process Safety and performance reporting, utilizing RCLG funds and experts if needed	**Jan – Feb** Reporting of process safety incidents to RCLG begins for **all associations** Process Safety incident reporting becomes part of the recommend base set of RCLG KPI metrics (2019 data) **April** RCLG reviews outcomes, challenges and raw data from the second reporting cycle (internally, consider external reporting) **June** RCLG share draft data with ICCA Board

Appendix E – Optional Excel Reporting Form

When member companies begin tracking process safety events, a single form should be utilized for all member companies to make data analysis easier and to allow all members to work from the same tracking sheet. The RCLG has developed an optional tracking sheet that members and associations can start with when developing their own tracking sheet.

DOWNLOAD TRACKING SHEET HERE:

ICCA Process Safety
Event Tracking Sheet

This document consists of a contact page, the survey itself, and a ‘do not edit’ page where the drop down menu answers are stored.