

Industry Standard - Petroleum Refining

PREAMBLE

- This technical standard is an industry standard as defined in section 1 of O. Reg. 419/05.
- With respect to facilities, this industry standard applies to every facility that is part of a class identified by NAICS code: 324110 (Petroleum Refining) and 324190 (Other Petroleum and Coal Product Manufacturing).
- With respect to contaminants, this industry standard applies to contaminants listed in Appendix 6-A.
- Each source of contaminant associated with NAICS codes 324110 and 324190 that discharges a contaminant mentioned in the above bullet has been considered in development of this industry standard. As such, a person that meets the criteria set out in subsection 42 (1) or subsection 44 (1) of O. Reg. 419/05 is, in general, exempt from Part II of the Regulation in respect of the facility and contaminant(s) for which it is registered. In other words, there is no need to model, in a facility's Emission Summary and Dispersion Modelling report, discharges of a registered contaminant from any source of contaminant associated with NAICS codes 324110 and 324190. (For more information, please see the Introduction to the Technical Standards Publication.)
- In accordance with subsection 38 (3) of O. Reg. 419/05, compliance with this industry standard, in accordance with subsection 42 (5) or subsection 44 (3), may reduce the regulatory burden applicable to facilities in this class.
- This standard contains requirements that relate to sources of contaminant associated with the following:
 - storage vessels
 - equipment leaks
 - sewage treatment operations
 - truck and railcar product loading racks and marine vessel loading berths
- For this industry standard, with respect to benzene the publication of this industry standard indicates that the following criteria of paragraph 3 of subsection 38 (1) of O. Reg. 419/05 are met:
 - (a) with respect to at least two facilities located in Ontario to which this standard applies, it is not economically feasible to comply with section 20 of O. Reg. 419/05,
 - (b) compliance, in accordance with subsection 42 (5) of O. Reg. 419/05, with this standard,
 - (i) is technically and economically feasible with respect to at least one facility located in Ontario to which this industry standard applies, and
 - (ii) will permit efforts that would otherwise be made to comply with section 19 or 20 of O. Reg. 419/05 to be put to better use to protect the natural environment, having regard to clause (a), and
 - (iii) including this industry standard in the "Technical Standards to Manage Air Pollution" is more efficient than having the Director consider separate requests under section 32 of O. Reg. 419/05 to set site-specific standards for the contaminant that would otherwise apply to facilities in the class.

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PART I – GENERAL

Definitions

1. (1) For the purposes of this industry standard for petroleum refining facilities,

“Act” means the *Environmental Protection Act*;

“air pollution control device” means a device that removes contaminants from a gaseous stream and includes a carbon adsorber, a thermal oxidizer, a flare, a condenser, an absorber and an incinerator;

“API separator” means a device that separates oil and suspended solids from the industrial sewage of oil refineries, petrochemical plants, chemical plants, natural gas processing plants and other industrial sources. The name is derived from the fact that such separators are designed according to specifications published by the American Petroleum Institute (API);

“benzene-containing product” means a substance produced by a petroleum refining facility that contains two per cent or more benzene by weight, and includes gasoline;

- “carbon adsorber” means an air pollution control device which uses a bed of activated carbon to adsorb contaminants including VOCs;
- “cargo tank” means a container, including all associated pipes and fittings, that is designed to contain liquid product and is constructed to be part of a transportation system, including a truck, railcar or marine vessel;
- “CAS No.” has the same meaning as in subsection 1 (1) of O. Reg. 419/05;
- “catalytic oxidizer” means a technology that passes a gas over a support material coated with a catalyst that promotes oxidation of organic material in the gas;
- “closed system” means a system of piping, ductwork and connections that conveys a gas or vapour from a point of generation to another location without discharging the gas or vapour into the air.
- “connector” means a flanged, screwed or other joined fitting used to connect two pipes or a pipe and a piece of process equipment;
- “deck cover” means a device that stops contaminants from being discharged to the air from an opening on a floating roof deck;
- “deck fitting” means a piece of equipment that is inserted through an opening in a floating roof deck and includes, a sample port, a vacuum breaker, a deck leg, an access hatch, a deck drain, an access ladder well, a fixed-roof support column, and an unslotted or slotted guidepole;
- “drain” means a work that collects and transmits sewage to a sewer line;
- “existing storage vessel” means a storage vessel that,
- (a) was installed at a petroleum refining facility before January 1, 2018, and
 - (b) has not undergone a major modification after January 1, 2018.
- “external floating roof” means a floating roof located in a storage vessel without a fixed roof;
- “flare” means a combustion device that uses an uncontrolled volume of air to burn gases. A flare includes the foundation, flare tip, structural support, burner, igniter, flare controls, air injection or steam injection systems, flame arrestors and the flare gas header system; ;
- “fixed leak detection system” means a permanently located system of sensors that are electrically linked to an analyzer and an electronic data acquisition system. For example, a fixed leak detection system may be located near a component, sample the air at regular time intervals and analyze and record the concentration of VOCs discharged to the air from the leaking component;
- “gasoline” means a petroleum distillate or petroleum distillate and alcohol blend having a Reid vapour pressure of 40 kilopascals or greater which may be used as a fuel for an internal combustion engine;
- “inaccessible component” means a component that is located,
- (a) at least two metres above a permanently available support surface; or
 - (b) in such a manner that the component is made inaccessible by a protective cover or insulation.
- “internal floating roof” means a floating roof located in a storage vessel with a fixed roof;
- “internal vapour valve” means a valve that is inside a cargo tank and is used to control the discharge of VOCs from the cargo tank to the air;
- “loading berth” means the loading arms, pumps, meters, shutoff valves, relief valves and other piping and valves used to load product into a marine vessel cargo tank;
- “loading rack” means the loading arms, pumps, meters, shutoff valves, relief valves and other piping and valves used to load product into a truck or railcar cargo tank;
- “low emission valve” means, a valve that minimizes the discharge of contaminants from the valve to the natural environment;
- “low emission valve packing” means, a material that minimizes the discharge of contaminants from the valve to the natural environment;
- “liquid-mounted rim seal” means a rim seal that is foam-filled or liquid-filled and is designed to be in contact with the stored liquid;
- “maintenance access point” means an access point to a sewer line, sometimes referred to as a person-hole, junction box, maintenance hole, manhole, or grate;

“major modification” means a modification to a piece of equipment, the capital cost of which is at least 50 per cent of the capital cost of replacing the equipment with a piece of equipment of the same size;

“mechanical shoe rim seal” means a rim seal consisting of,

- (a) a band of metal or other suitable material as the sliding contact with the wall of the storage vessel and which extends into the stored liquid, and
- (b) a fabric seal to close the annular space between the band and the floating roof deck;

“Minister” means the Minister of the Environment and Climate Change or such other member of the Executive Council as may be assigned the administration of this Act under the *Executive Council Act*;

“Ministry” means the ministry of the Minister;

“open-ended valve” means a valve, except a pressure relief valve, having one side of the valve seal in contact with process fluid and one side open to the air, either directly or through open piping;

“OGI instrument” means an instrument that makes emissions visible that may otherwise be invisible to the naked eye through the use of optical gas imaging;

“primary rim seal” means,

- (a) a rim seal on a floating roof that has only one rim seal, or
- (b) the lower rim seal on a floating roof that has two rim seals;

“petroleum refining facility” means a facility engaged in producing gasoline, kerosene, distillate fuel oils, residual oils, lubricants, asphalt (bitumen) or other products through distillation of petroleum or through redistillation, cracking or reforming of unfinished petroleum derivatives;

“portable gas detector” means a handheld instrument that, when passed over a leaking component, measures the concentration of the gas leaking from the component;

“registered contaminant” means a contaminant that is discharged into the air from a facility if a person is registered in respect of this industry standard, the facility and the contaminant;

“registered person” means a person that is registered on the Ministry’s Technical Standards Registry – Air Pollution in respect of this industry standard, a petroleum refining facility and one or more contaminants listed in Appendix 6-A;

“residence time” means the average amount of time that a gas spends in a furnace and is calculated by dividing the volume of the furnace by the volumetric flow rate of the gas through the furnace;

“rim seal” means a device attached to the rim of a floating roof deck that spans the annular space between the deck and the wall of the storage vessel;

“secondary rim seal” means the upper rim seal on a floating roof that has two rim seals;

“sewer line” means a work used to collect and transmit industrial sewage to a sewage treatment system and includes a lateral, trunk line, a branch line, a ditch and a channel;

“thermal oxidizer” means a device in which a combustible waste gas passes over or around a burner flame into a chamber where oxidation of the waste gas is completed;

“unsafe component” means a component that, if assessed for leaks, is likely to,

- (a) expose personnel performing the assessment to imminent hazard from temperature, pressure or explosive process conditions; or
- (b) lead to other dangerous circumstances as defined by the *Occupational Health and Safety Act*;

“vapour-mounted seal” means a rim seal that is designed to not be in contact with the stored liquid and includes foam-filled seals and flexible wiper seals;

“volatile organic compound” (“VOC”) means an organic compound the composition of which makes it possible for the compound to evaporate under normal atmospheric conditions of temperature and pressure.

(2) For the purpose of this industry standard, a component is in benzene service if the component may contain or come in contact with a liquid or gas that contains at least 2.0 per cent benzene by weight.

(3) In this industry standard, a reference to a heating value described in kilojoules per standard cubic metre is a reference to a heating value in kilojoules per cubic metre at a temperature of 20°C and a pressure of 101.3 kilopascals.

(4) If this industry standard requires the use of a portable gas detector, the instrument shall meet the requirements set out in subsection 2 (1) of Appendix 6-D and shall be used in a manner set out in section 3 of Appendix 6-D.

(5) If this industry standard requires the use of an OGI instrument, the instrument shall meet the requirements set out in section 1 of Appendix 6-E and shall be used in a manner set out in section 2 of Appendix 6-E.

(6) If this industry standard requires the use of a fixed leak detection system, the system shall meet the requirements set out in section 1 of Appendix 6-F.

(7) In this industry standard, a reference to the Director means,

- (a) the Director appointed under section 5 of the Act in respect of the section of this industry standard in which the reference appears;
- (b) if no Director described in clause (a) has been appointed in respect of section 42 of this industry standard, any Director appointed under section 5 of the Act in respect of paragraph 2 of subsection 11 (1) of O. Reg. 419/05; or
- (c) if no Director described in clause (a) has been appointed in respect of a provision other than a provision mentioned in clause (b), any Director appointed under section 5 of the Act in respect of section 27.1 or paragraph 3 of subsection 11 (1) of O. Reg. 419/05.

Application

2. (1) This industry standard applies, in accordance with subsections (2) and (3), to a person who is registered on the Ministry’s Technical Standards Registry – Air Pollution in respect of,

- (a) this industry standard;
- (b) a petroleum refining facility; and
- (c) one or more of the contaminants listed in Appendix 6-A.

(2) If the person mentioned in subsection (1) is registered with respect to a facility set out in Column 1 of Table 6-2 and one or more of the contaminants listed in an Appendix set out in Column 2 of Table 6-2, the sections set out opposite the Appendix in Column 3 of Table 6-2 apply in respect of the person.

(3) A person mentioned in subsection (1) is required to comply with the sections of this industry standard that apply to the person in accordance with subsection (2) on or before the date the person registers on the Ministry’s Technical Standards Registry – Air Pollution unless a different date is specified in this industry standard.

TABLE 6-2: APPLICATION

Item	Column 1 Facility Type	Column 2 Appendix	Column 3 Applicable Sections
1.	Petroleum refining facility	Appendix 6-A: All Contaminants	1, 2, 41 to 48, 53 to 56
2.	Petroleum refining facility	Appendix 6-B: Benzene	3 to 40, 49 to 52
3.	Petroleum refining facility	Appendix 6-C: Benzo(a)pyrene	--

PART II – PERFMORMANCE

Closed systems

3. (1) Where this industry standard requires a registered contaminant to be conveyed in a manner set out in this section, the registered contaminant shall be conveyed in a closed system to,

- 1. a flare that meets the requirements set out in section 4,
- 2. an air pollution control device that is not a flare that meets the requirements set out in section 5, or
- 3. a process that operates at all times when the registered contaminant is being discharged to it and uses the contaminant in a manner that,
 - i. fully recovers the contaminant,
 - ii. fully incorporates the contaminant into a product to be sold or transferred,
 - iii. fully converts the contaminant into a contaminant that is not a registered contaminant, or

iv. is similar to the manner in which another substance is used in the process.

(2) If the thing from which the gas or vapour is being conveyed in the closed system required by subsection (1) has a vent, the vent shall be closed.

Flare

4. (1) Subject to subsection (2), on and after January 1, 2018, a flare mentioned in paragraph 1 of subsection 3 (1), shall meet the following criteria:

1. The flare must have a flame present at all times.
2. The flare tip velocity must meet one of the following criteria:
 - i. The flare tip velocity shall be less than 18.3 metres per second; or
 - ii. The base 10 logarithm of the flare tip velocity in metres per second shall be less than the value calculated by the following formula:

$$[(NHV_{vg} \times 0.02684 + 1212)/850] - 0.5160$$

where,

NHV_{vg} = the flare vent net heating value in kilojoules per standard cubic metre calculated in accordance with section 42.

3. The flare combustion zone net heating value shall be no less than 10,000 kilojoules per standard cubic metre.
4. If the flare is equipped with air assist, the flare net heating value dilution parameter shall be no less than 250 kilojoules per square metre.

(2) If the date is before January 1, 2023, paragraphs 2, 3 and 4 do not apply to a flare.

Air pollution control devices

5. (1) An air pollution control device mentioned in paragraph 2 of subsection 3 (1), shall meet at least one of the following criteria:

1. The air pollution control device shall reduce the discharge of benzene to the air by at least 95 per cent on a mass basis.
2. The air pollution control device shall not discharge VOCs to the air in a concentration of greater than 20 ppm by volume on a dry basis, corrected to 3 per cent oxygen.
3. Subject to subsection (3), if the air pollution control device is a thermal oxidizer, the gas in the thermal oxidizer shall be maintained at a temperature of at least 760°C for a residence time of at least 0.75 seconds.
4. Subject to subsection (3), if the air pollution control device is a catalytic oxidizer, the gas in the catalytic oxidizer shall be maintained at a temperature of at least 400°C for a residence time of at least 0.2 seconds.

(2) If an air pollution control device that is subject to this section is a carbon adsorber, no person shall discharge or cause or permit the discharge of VOCs to the air when the carbon is being regenerated.

(3) Paragraphs 3 and 4 of subsection (1) do not apply during a period when the air pollution control device is being repaired or maintained, if the total number of hours during which the air pollution control device is repaired or maintained in the preceding one-year period does not exceed 240 hours.

(4) The registered person shall ensure that each time an air pollution control device that uses a thermal process is repaired or maintained, the following information is recorded:

1. The date of the repair or maintenance.
2. The duration of the repair or maintenance.
3. A description of the repair.
4. The person who completed the repair.
5. An indication if the process of which the air pollution control device is part, is operating during the repair or maintenance.

(5) When calculating the number of hours for the purpose of subsection (3), the time when an air pollution control device is being repaired or maintained does not need to be included in the total number of hours if the process of which the air pollution control device is part is not operating during the repair or maintenance.

Requirement to detect leaks

6. A registered person shall ensure that each component leak survey performed under section 31 detects all leaks from every component that is part of the component leak survey.

Technology requirements – open-ended valves, surge control vessels and bottom receivers

7. (1) A registered person shall ensure that,

- (a) each open-ended valve at the petroleum refining facility is equipped with a cap, blind flange, plug, or a second valve that seals the open end; and
- (b) all VOCs from each surge control vessel and bottoms receiver at the petroleum refining facility are conveyed in a manner set out in section 3.

(2) A registered person shall ensure that the path of VOCs from each surge control vessel and bottoms receiver at a petroleum refining facility is depicted on a process flow diagram.

(3) In this section,

“bottoms receiver” means a tank that collects distillation bottoms;

“distillation bottoms” is the portion of crude oil raw material that is discharged from the bottom of the distillation column;

“distillation column” is a column that heats and separates crude oil raw material into components with differing boiling points; and

“surge control vessel” means a vessel that is used to manage flow rates in a process.

Floating roof - requirement to float

8. (1) On and after January 1, 2018, for each storage vessel at a petroleum refining facility that meets the criteria set out in subsection 11 (2) and that has a floating roof, the registered person shall ensure that, if the storage vessel is storing liquid, the floating roof floats on the surface of the liquid stored in the storage vessel.

(2) No later than five days after notification is required to be given under subsection 9 (1) in respect of a floating roof failing to float on the surface of liquid stored in the storage vessel, the registered person shall ensure,

- (a) the storage vessel is filled so that the roof floats on the surface of the liquid stored in the storage vessel as required by subsection (1);
- (b) the storage vessel is emptied of liquid; or
- (c) the concentration of benzene in the liquid stored in the storage vessel is less than two per cent.

(3) The registered person shall ensure that a record of the following information is made with respect to each contravention of subsection (1):

- 1. The identification number of the storage vessel.
- 2. The date and time that the floating roof was identified as not floating.
- 3. The date and time that an action required by subsection (2) was taken.

Notification – performance requirements

9. (1) The registered person shall ensure that, as soon as practicable, a provincial officer is notified in writing of any contravention of sections 3, 6, 7 or 8.

(2) No later than 30 days after notification is required to be given under subsection (1), the registered person shall ensure that the following information is submitted, in writing, to a provincial officer:

- 1. The date and time of the contravention.
- 2. The details of the contravention, including any measured or calculated values relating to an exceedence of a limit.
- 3. An explanation of suspected cause of the contravention, including the suspected cause of each exceedence of a limit, if any.
- 4. A description of any steps taken, or that will be taken, to prevent, minimize or reduce the risk of future contraventions.

PART III – STORAGE VESSELS

Storage vessel record

10. (1) A registered person shall ensure that the following information is recorded for each storage vessel at the petroleum refining facility:

1. The identification number of the storage vessel.
2. The design capacity, in cubic metres, of the storage vessel.
3. The absolute internal pressure, in kilopascals, at which the storage vessel is designed to operate.
4. A description of the liquid contained in the storage vessel, including the nominal percent by weight benzene in the liquid during the previous 12 month period.
5. The date on which the storage vessel was last emptied.
6. The date on which the storage vessel underwent maintenance activities or repairs, and a description of any repairs completed on the storage vessel.
7. The date on which the storage vessel is next anticipated to be emptied and the location that the emptied contents will be stored.
8. The type of roof on the storage vessel.
9. An indication of whether the requirements set out in section 11 apply to the storage vessel.
10. If discharges from the storage tank are conveyed in a manner set out in section 3, a description of how and to where the discharges are conveyed.

(2) No later than five days after a change is made at the petroleum refining facility that would affect the information in the record required by subsection (1), the record shall be updated to reflect the change.

Storage vessels - application

11. (1) Subject to subsection (5), on and after January 1, 2018, a registered person shall ensure that each storage vessel at the facility that meets the criteria set out in subsection (2) meets at least one of the following criteria:

1. Subject to subsection (3), the storage vessel shall be equipped with an internal floating roof that meets the requirements set out in sections 12 and 14.
2. Subject to subsection (4), the storage vessel shall be equipped with an external floating roof that meets the requirements set out in sections 13 and 14.
3. Benzene which would otherwise be discharged from the storage vessel to the air shall be conveyed in a manner set out in section 3.

(2) A storage vessel meets the criteria mentioned in subsection (1) if the storage vessel,

- (a) has a design capacity of greater than 75 cubic metres;
- (b) in the previous 12 month period, stored liquid which had an average benzene concentration of at least 2.0 per cent by weight; and
- (c) is designed to operate at an absolute internal pressure of less than 205 kilopascals.

(3) The requirements set out in sections 12 and 14 do not apply to an existing storage vessel equipped with an internal floating roof.

(4) The requirements set out in sections 13 and 14 do not apply to an existing storage vessel equipped with an external floating roof unless,

- (a) the date is on or after January 1, 2020 and the vessel stores liquid which has an annual average benzene concentration of more than 50 per cent by weight;
- (b) the date is on or after January 1, 2025 and the vessel stores liquid which has an annual average benzene concentration of more than 4 per cent by weight; or
- (c) the date is on or after January 1, 2029.

(5) Subsection (1) does not apply to an existing storage vessel equipped with a fixed roof unless,

- (a) the date is on or after January 1, 2020 and the vessel stores liquid which has an annual average benzene concentration of more than 50 per cent by weight;
- (b) the date is on or after January 1, 2025 and the vessel stores liquid which has an annual average benzene concentration of more than 4 per cent by weight; or

- (c) the date is on or after January 1, 2029.

Internal floating roof – rim seal requirements

- 12.** An internal floating roof shall have,
- (a) a liquid-mounted rim seal;
 - (b) a mechanical shoe rim seal; or
 - (c) a vapour-mounted rim seal and a secondary rim seal.

External floating roof – rim seal requirements

- 13.** (1) An external floating roof shall have,
- (a) a liquid-mounted rim seal and secondary rim seal; or
 - (b) a mechanical shoe rim seal and a secondary rim seal.
- (2) The mechanical shoe rim seal referred to in clause (1) (b) shall meet the following criteria:
- 1. The top of the mechanical shoe rim seal shall be a minimum of 61 centimetres above the surface of the liquid stored in the storage vessel.
 - 2. The band of material of the mechanical shoe rim seal that is in sliding contact with the storage vessel shall extend into the liquid stored in the storage vessel.

Floating roof deck fittings

- 14.** (1) The lower edge of each deck fitting shall be below the surface of the liquid stored in the storage vessel unless the deck fitting is an automatic bleeder vent, vacuum breaker vent or rim space vent.
- (2) Each automatic bleeder vent, vacuum breaker vent and rim space vent shall be equipped with,
- (i) a lid with a gasket,
 - (ii) a pallet with a gasket, or
 - (iii) a flapper with a gasket.
- (3) The space between the floating roof deck and each fixed roof support column shall be filled by a flexible fabric sleeve seal or covered by a deck cover.
- (4) Each sample well and deck drain shall be covered by a slit fabric seal that covers at least 90 per cent of the sample well or deck drain.
- (5) The space between the floating roof deck and each guidepole shall be,
- (a) filled by a pole wiper or a pole sleeve; or
 - (b) covered by a deck cover.
- (6) Each slotted guidepole shall have a gasketed pole float.
- (7) Each unslotted guidepole shall have a gasketed cap on the top of the guidepole.
- (8) A space between the floating roof deck and a deck fitting that is not mentioned in subsections (2) to (7) shall be covered by a gasketed deck cover.
- (9) A deck cover that covers an access hatch or gauge float well shall be bolted or fastened when closed.

Deck covers – requirement to be closed

- 15.** (1) Subject to subsection (2), the registered person shall ensure that each deck cover required by section 14 is closed when the storage vessel contains liquid.
- (2) Subsection (1) does not apply if the deck cover is required to be open to,
- (a) gauge the liquid level in the storage vessel; or
 - (b) take a sample of the liquid in the storage vessel.
- (3) Subject to subsection (4), the registered person shall ensure that each lid, pallet and flapper mentioned in subsection 14 (2) is closed when the storage vessel contains liquid.
- (4) Subsection (3) does not apply if the lid, pallet or flapper is required to be open to relieve excess pressure or vacuum in the storage vessel.

(5) The pressure above or below which is to be considered excess for the purpose of subsection (4) shall be based on the recommendation of a professional.

(6) The source of the professional recommendation mentioned in subsection (5) shall be one of the following documents:

1. An operating and maintenance manual provided by a manufacturer of storage vessels.
2. Written instructions provided by a supplier of storage vessels.
3. A letter from a manufacturer mentioned in paragraph 1 or supplier mentioned in paragraph 2, setting out the recommendation.
4. A letter from a professional engineer setting out the recommendation, the rationale for the recommendation and a description of the relevant experience with respect to the recommendation being made. The engineer must have relevant experience with respect to pressure or vacuum in storage vessels.

Floating roof - visual inspection

16. (1) On and after January 1, 2018, a registered person shall ensure that each storage vessel at a petroleum refining facility that meets the criteria set out in in subsection 11 (2) and that has a floating roof is visually inspected in accordance with this section to determine if any of the defects set out in subsection (6) are present.

(2) The inspection required by subsection (1) shall include an inspection of each floating roof deck, each deck fitting and each rim seal.

(3) Each time a storage vessel described in subsection (1) is empty, the inspection required by subsection (1) shall be performed from the top of the floating roof prior to filling the storage vessel.

(4) If during a 12-month period, a storage vessel described in subsection (1) that has an external floating roof has not been empty, the inspection described in subsection (1) shall be performed from the top of the floating roof no later than 30 days after the end of the 12-month period.

(5) If during a 12-month period, a storage vessel described in subsection (1) that has an internal floating roof has not been empty, the inspection described in subsection (1) shall be performed, no later than 30 days after the end of the 12-month period, by observing the floating roof deck, each deck fitting and each rim seal through an opening in the fixed roof to determine if any of the defects set out in paragraph 1 to 4 of subsection (6) are present.

(6) The defects mentioned in subsection (1) include the following:

1. Liquid on the floating roof of the storage vessel.
2. A hole or tear in the rim seal of the storage vessel.
3. A detachment of any part of the rim seal from either of two surfaces from which the rim seal is intended to minimize air emissions that is,
 - i. greater than 30 centimetres in length, and
 - ii. visible from a distance of 3 metres or more.
4. The roof is not floating on the surface of the liquid as required by subsection 8 (1);
5. An opening for a fixed roof support column is not equipped with a fabric sleeve or deck cover.
6. A sample well is not equipped with a slit fabric seal.
7. A guidepole does not have a pole wiper or pole sleeve.
8. The lower edge of a deck fitting, other than an automatic bleeder vent, vacuum breaker vent or rim space vent, is not below the surface of the liquid.
9. The top of a mechanical shoe rim seal is less than 61 centimetres above the surface of the liquid stored in the storage vessel.

(7) The registered person shall ensure that the following information is recorded for each visual inspection required by subsection (1):

1. The date of the visual inspection.
2. The position title of the person who assigned a person to perform the inspection.
3. A summary of any defects observed during the inspection.
4. A description of any repairs made with respect to a defect observed during the inspection, including the date that the repair was made.

Storage vessels - OGI inspection

17. (1) On and after January 1, 2018, subject to subsection (2), a registered person shall ensure that each storage vessel that meets the criteria set out in subsection 11 (2) at the petroleum refining facility is inspected using an OGI instrument at least one time in every four-month period to determine if VOCs are being discharged to the air from leaks in the storage vessel, including from leaks in the floating roof.

(2) Subsection (1) does not apply to a storage vessel that has been empty for the four-month period.

(3) The registered person shall ensure that a record of the following information is made with respect to the inspection required under subsection (1):

1. The date that the inspection was conducted.
2. The position title of the person who assigned a person to perform the inspection.
3. If it was determined that VOCs were being discharged to the air, a copy of the image produced by the OGI instrument.
4. The date of any repairs required under section 19, if applicable.
5. A copy of the image produced by the OGI instrument in the re-inspection required by subsection 19(5), if applicable.

Floating roof - seal gap inspection

18. (1) On and after January 1, 2018, for each storage vessel at a petroleum refining facility that meets the criteria set out in subsection 11 (2) and that has a floating roof, the registered person shall ensure that the following actions are performed in accordance with this section:

1. Inspect each rim seal to identify each gap between the rim seal and the two surfaces from which the rim seal is intended to minimize air emissions in accordance with the procedure set out in subsection (5).
2. Inspect each deck fitting to identify each gap between a deck fitting gasket and the two surfaces from which the gasket is intended to minimize air emissions in accordance with the procedure set out in subsection (6).
3. Determine the ratio of accumulated area of rim seal gaps to storage vessel diameter in accordance with the procedure set out in subsection (7).

(2) Each time a storage vessel described in subsection (1) is empty, the actions required by subsection (1) shall be performed.

(3) No later than 90 days after a storage vessel described in subsection (1) that has an external floating roof is re-filled, the actions required by paragraphs 1 and 3 of subsection (1) shall be performed with respect to both the primary and secondary rim seals.

(4) If during a 12-month period, a storage vessel described in subsection (1) that has an external floating roof has not been empty, the actions required by paragraphs 1 and 3 of subsection (1) shall be performed with respect to the secondary rim seal no later than 30 days after the end of the 12-month period.

(5) Each location where a 0.32 centimeter diameter probe passes freely between the following surfaces shall be identified as a gap for the purpose of paragraph 1 of subsection (1):

1. The rim seal and the storage vessel wall.
2. The rim seal and the floating deck rim.

(6) Each location where a 0.32 centimeter diameter probe passes freely between the following surfaces shall be identified as a gap for the purpose of paragraph 2 of subsection (1):

1. The gasket and the floating deck.
2. The gasket and the deck fitting.

(7) The ratio of accumulated area of rim seal gaps to storage vessel diameter shall be determined in accordance with the following procedure:

1. Identify each gap in the rim seal by inserting a 0.32 centimeter diameter probe between the rim seal and the storage vessel wall. Each location where the probe passes freely between the rim seal and the vessel wall constitutes a rim seal gap.
2. Slide the probe along the storage vessel wall in each direction as far as it will travel freely without binding between the rim seal and the storage vessel wall. The circumferential length along which the probe can move freely is the rim seal gap length.

3. Insert probes of various diameters between the rim seal and the storage vessel wall. The smallest probe diameter should be 0.32 centimeter and the larger probes should have diameters in increments of 0.32 centimetres. The diameter of the largest probe that can be inserted freely anywhere along the length of the gap is the maximum rim seal gap width.
 4. Determine the average width of each rim seal gap by averaging the minimum gap width (0.32 centimeter) and the maximum rim seal gap width determined under paragraph 3.
 5. Calculate the area of a rim seal gap by multiplying the rim seal gap length determined under paragraph 2 by the average rim seal gap width determined under paragraph 4.
 6. Repeat steps 2 to 5 for each rim seal gap identified under paragraph 1.
 7. Calculate the ratio of accumulated area of rim seal gaps to storage vessel diameter by adding the area of each rim seal gap determined under paragraph 6 and dividing the sum by the diameter of the storage vessel.
- (8) The registered person shall ensure that the following information is recorded for each inspection required by subsection (1):
1. The identification number of the storage vessel for which the inspection was conducted.
 2. The date of the inspection.
 3. The position title of the person who assigned a person to perform the inspection.
 4. The ratio of accumulated area of rim seal gaps to storage vessel diameter calculated in accordance with paragraph 7 of subsection (7).

Floating roof repair

- 19.** (1) A registered person shall ensure that each defect and gap is repaired in accordance with this section if,
- (a) the inspection required by subsection 16(1) indicates a defect listed in subsection 16(6);
 - (b) the inspection required by section 17 indicates that VOCs are being discharged to the air from leaks in the storage vessel;
 - (c) the inspection required by paragraph 1 or 2 of subsection 18(1) indicates one or more gaps; or
 - (d) the re-inspection required by subsection (5) indicates that a repair required under this subsection did not stop a leak.
- (2) Each defect and gap required to be repaired by subsection (1) shall be repaired,
- (a) prior to re-filling the storage vessel, if the inspection is performed while the storage vessel is not storing liquid; or
 - (b) subject to subsection (3), no later than 100 days after the date of the inspection, if the inspection is performed while the storage vessel is storing liquid.
- (3) Subsection (2) does not apply if the storage vessel is completely emptied and de-gassed no later than 100 days after the date of the inspection.
- (4) The registered person shall ensure that the defect or gap is repaired prior to re-filling a storage vessel described in subsection (3).
- (5) The registered person shall ensure that no later than 20 days following the repair required under subsection (1) the storage vessel is re-inspected using an OGI instrument to confirm that the repair has stopped the leak.

Requirement to notify

- 20.** (1) A registered person shall ensure that, a provincial officer is notified in writing forthwith if more than two repairs to a storage vessel are required under section 19 (1) in a 24-month period.
- (2) No later than 30 days after notification is required to be given under subsection (1), the registered person shall ensure that the following information is submitted, in writing, to a provincial officer:
1. A description of each gap or defect.
 2. A description of the repair made.
 3. An explanation of steps taken to prevent, minimize or reduce, the chance of the defect or gap recurring in the future.

Rim seal gap report

- 21.** (1) No later than 30 days after an inspection required by subsection 18(1) finds one or more of the following criteria are met, the registered person shall ensure that a report is prepared in accordance with subsection (2):

1. The ratio of accumulated area of rim seal gaps to storage vessel diameter exceeds 212 square centimetres per metre with respect to a primary rim seal.
 2. The ratio of accumulated area of rim seal gaps to storage vessel diameter exceeds 21.2 square centimetres per metre with respect to a secondary rim seal.
- (2) The report mentioned in subsection (1) shall include the following information:
1. The date of the inspection that identified the rim seal gap.
 2. The date of the previous inspection required by subsection 18(1) of the storage vessel, if applicable.
 3. A description of the results of the inspection, including the area of each rim seal gap identified in the inspection.
 4. A description of a plan of repair, including the anticipated date of the repair required by clause 19 (1) (c).
 5. A written record indicating that the highest-ranking individual at the petroleum refining facility has reviewed that the report has been prepared in accordance with this industry standard.

PART IV – AIR EMISSIONS FROM INDUSTRIAL SEWAGE

API separators – monitoring and control requirements

22. (1) A registered person shall ensure that each API separator at a petroleum refining facility meets at least one of the following requirements:

1. On and after July 1, 2017, the concentration of benzene in the air shall be measured by an ambient monitor that is located no more than 200 metres and no less than 100 metres downwind of the API separator.
2. On and after July 1, 2017, the annual average emission rate of benzene from the API separator shall be determined in accordance with subsection (3).
3. On and after January 1, 2019, the API separator shall meet at least one of the following criteria:
 - i. Subject to subsection (7), the API separator shall be equipped with an internal floating roof that meets the requirements set out in sections 12 and 14.
 - ii. The API separator shall be equipped with an external floating roof that meets the requirements set out in sections 13 and 14.
 - iii. Benzene which would otherwise be discharged from the API separator to the air shall be conveyed in a manner set out in section 3.

(2) A monitor mentioned in paragraph 1 of subsection (1) shall be located and operated in accordance with a plan that, in the opinion of the Director, will result in the accurate measurement of the concentration of benzene.

(3) The annual average emission rate of benzene mentioned in paragraph 2 of subsection (1) shall be determined by taking the following steps:

1. At least one time each calendar week, take the following measurements in accordance with a plan that, in the opinion of the Director, will result in accurate measurements:
 - i. The flow rate of sewage entering the API separator, in litres per second.
 - ii. The concentration of benzene in the sewage entering the API separator, in milligrams of benzene per litre of sewage.
 - iii. The flow rate of sewage leaving the API separator, in litres per second.
 - iv. The concentration of benzene in the sewage leaving the API separator, in milligrams of benzene per litre of sewage.
 - v. The flow rate of oil waste skimmed from the top of the API separator, in kilograms per second.
 - vi. The mass fraction of benzene in the oil waste skimmed from the top of the API separator, in milligrams of benzene per kilogram of oil waste.
 - vii. The flow rate of oil sludge leaving the API separator, in kilograms per second.
 - viii. The mass fraction of benzene in the sludge waste removed from the API separator, in milligrams of benzene per kilogram of sludge.

2. No later than March 31st of each year, perform the following calculation:

$$R = \frac{1}{n} \sum (Q_i * w_i - Q_o * w_o - Q_{sk} * w_{sk} - Q_{sl} * w_{sl}) / n$$

Where,

R = the annual average emission rate of benzene from the API separator, in milligrams per second,

n = is the number of measurements taken under paragraph 1 during the previous calendar year;

Q_i = each flow rate of sewage entering the API separator measured for the purpose of subparagraph 1 i during the previous calendar year,

w_i = each concentration of benzene in inlet sewage measured for the purpose of subparagraph 1 ii during the previous calendar year,

Q_o = each flow rate of sewage leaving the API separator measured for the purpose of subparagraph 1 iii during the previous calendar year,

w_o = each concentration of benzene in outlet sewage measured for the purpose of subparagraph 1 iv during the previous calendar year,

Q_{sk} = each flow rate of skimmed oil waste removed from the API separator measured for the purpose of subparagraph 1 v during the previous calendar year,

w_{sk} = each mass fraction of benzene in the skimmed oil waste measured for the purpose of subparagraph 1 vi during the previous calendar year,

Q_{sL} = each flow rate of waste sludge removed from the API separator measured for the purpose of subparagraph 1 vii during the previous calendar year.

w_{sL} = each mass fraction of benzene in the waste sludge measured for the purpose of subparagraph 1 viii during the previous calendar year,

(4) The registered person shall ensure that an API separator meets at least one of the criteria set out in paragraph 3 of subsection (1) if,

(a) the average concentration of benzene over a calendar year measured by a monitor required by paragraph 1 of subsection (1) in respect of the API separator is greater than 5.0 micrograms per cubic metre; or

(b) the average emission rate of benzene over a calendar year required to be determined by paragraph 2 of subsection (1) in respect of the API separator is greater than 2.0 milligrams per second.

(5) A thing required by subsection (5) shall be installed no later than 24 months after the measurement was taken or calculation was made, as applicable.

(6) If an API separator is required to meet the requirements set out in paragraph 3 of subsection (1), the following requirements apply with respect to the API separator, with necessary changes:

1. If the API separator is equipped with an internal or external floating roof, the requirements set out in sections 8 and 16 to 21.

2. If an API separator is not equipped with an internal or external floating roof, the requirements set out in section 17.

(7) The requirements set out in sections 12 and 14 do not apply to an existing API separator equipped with an internal floating roof.

(8) In this section,

“existing API separator” means an API separator that,

(a) was installed at a petroleum refining facility before January 1, 2018, and

(b) has not undergone a major modification after January 1, 2018.

API separators – requirement selection

23. (1) No later than three months after the date a person was first registered to this industry standard with respect to benzene, the registered person shall elect, in writing to the Director, with respect to each API separator at the petroleum refining facility, whether the API separator will meet the requirements set out in paragraph 1, 2 or 3 of subsection 22 (1).

(2) If a registered person does not make an election in accordance with subsection (1) with respect to an API separator, the registered person is deemed to have elected that the API separator will meet the requirements set out in paragraph 3 of subsection 22 (1).

(3) A registered person shall ensure that each API separator at a petroleum refining facility meets the requirements set out in the paragraph of subsection 22 (1) that the registered person elected under subsection (1), or was deemed by subsection (2) to have elected.

(4) If a registered person elects under subsection (1) that an API separator will meet the requirements set out in paragraphs 1 or 2 of subsection 22 (1), the registered person may change the election, in writing to the Director, to elect that the API separator will meet the requirements set out in paragraph 3 of subsection 22 (1).

API separator record

24. (1) A registered person shall ensure that the following information is recorded for each API separator at the petroleum refining facility:

1. Which requirement in subsection 22 (1) the registered person has elected that the API separator will meet.
2. Each measurement and calculation required by section 22.
3. If the registered person has elected that the API separator will meet the requirement set out in paragraph 1 of subsection 22 (1), the annual average of the concentration of benzene in the air measured by the ambient monitor.
4. If the registered person has elected that the API separator will meet the requirements set out in paragraph 2 of subsection 22 (1), the annual average emission rate of benzene from the API separator.
5. If the registered person has elected that the API separator will meet the requirement set out in paragraph 3 of subsection 22 (1), a description of the air pollution control method associated with the API separator.

(2) The records required by paragraphs 3 and 4 of subsection (1) shall be prepared no later than March 31 each year and shall pertain to the preceding calendar year.

Drains and maintenance access points – monitoring and control requirements

25. (1) No later than July 1, 2019, a registered person shall for each drain at the petroleum refining facility that meets the criteria set out in subsection (2),

- (a) implement a plan that, in the opinion of the Director, will minimize benzene emissions from the drain, or
- (b) measure the concentration of benzene in sewage in the drain in accordance with a plan, that in the opinion of the Director, will result in the accurate measurement of benzene in the sewage.

(2) A drain meets the criteria mentioned in subsection (1) if the drain,

- (a) is 200 metres or less from the property boundary of the facility; or
- (b) is connected by sewer line to a maintenance access point that is 200 metres or less from the property boundary of the facility.

(3) No later than 18 months after a measurement required by clause (1) (b) indicates that the annual average concentration of benzene in sewage is greater than 100 parts per million by weight, the registered person shall implement a plan mentioned in clause (1) (a).

Drain and maintenance access point record

26. A registered person shall ensure that the following information is recorded:

1. A map or schematic of the petroleum refining facility showing the location of each drain and maintenance access point mentioned in subsection 25 (1).
2. For each drain at the petroleum refining facility that meets the criteria set out in subsection 25 (2),
 - i. a description of how benzene emissions are minimized in accordance with subsection 25 (1) (a), or
 - ii. the results of the measurements required by subsection 25 (1) (b).

PART V – PRODUCT LOADING

Benzene-containing product loading operations – application

27. (1) Subject to subsection (5), no later than March 31, 2018 and March 31 in each following year, the registered person shall ensure that the throughput of benzene-containing product for each loading rack and loading berth at a petroleum refining facility during the preceding calendar year, in litres per year, is determined and recorded.

(2) Subject to subsection (3), the registered person shall ensure that discharges of VOCs from each loading rack and loading berth that meets the following throughput criteria are conveyed in a manner set out in section 3:

1. A loading rack that has a throughput of 14 million litres of benzene-containing product per year or greater.
2. A loading berth at a petroleum refining facility where the average total throughput of benzene-containing product for all loading berths at the petroleum refining facility is 1.6 billion litres per year or greater for a three year period.

(3) Subsection (2) does not apply until the date that is 18 months after the throughput criteria has been met.

(4) For greater certainty, the requirement set out in subsection (2) does not cease to apply if the loading rack or loading berth does not meet the throughput criteria set out in subsection (2) in a subsequent year.

(5) Subsection (1) does not apply with respect to a loading rack or loading berth, the discharges of VOCs from which are required by subsection (2) to be conveyed in a manner set out in section 3.

Cargo tank loading operations – general operating requirements

28. A registered person shall ensure that the tank filling line used to load benzene-containing product into a cargo tank is placed no higher than 10 centimetres above the bottom of the cargo tank.

Vapour-tight cargo tanks

29. On or after July 1, 2018 a registered person shall ensure that vapour-tight cargo tanks are used when benzene-containing product is loaded into a cargo tank at the petroleum refining facility.

PART VI – LEAK DETECTION AND REPAIR

Component tagging

30. (1) Subject to subsection (2), a registered person shall ensure that a written record is made of each of the following components at the petroleum refining facility that is in benzene service:

1. A compressor.
2. A pump.
3. A valve.
4. A pressure relief device.
5. A sample point.
6. An instrumentation system.
7. An agitator.
8. A connector.

(2) Subsection (1) does not apply to a component that,

(a) is operated at a pressure below atmospheric pressure;

(b) is a pump that is equipped with,

(i) a dual mechanical seal,

(ii) a barrier fluid that is at a higher pressure than the operating pump pressure; and

(iii) a system that alerts the operator when the seal or barrier fluid has failed; or

(c) is a valve or connector with a nominal diameter of less than 1.875 centimetres or $\frac{3}{4}$ of an inch.

(3) A registered person shall ensure that each component required to be recorded under subsection (1) is physically marked with a unique identifier in a clear and obvious manner and that each component and identifier is,

(a) marked on a plan of the facility;

(b) marked on a process and instrumentation diagram that depicts the process unit of which the component is part; and

(c) listed in a single electronic record with associated fields setting out:

(i) the name and model number of the component,

(ii) the name of the manufacturer of the component,

(iii) the serial number of the component, if the component was installed after January 1, 2018,

(iv) the purpose of the component,

(v) the process unit of which the component is part,

(vi) whether the component is an inaccessible component,

- (vii) if, in the opinion of the highest ranking individual at the petroleum refining facility, the component is unsafe to monitor,
 - (A) the name and position of the individual who provided the opinion that the component is unsafe to monitor,
 - (B) the date that the individual provided the opinion that the component is unsafe to monitor, and
 - (C) the basis for the opinion that the component is unsafe to monitor,
- (viii) the estimated percentage of benzene, by weight, that the component is exposed to (to the nearest tenth of a percent),
- (ix) an indication of the component's size,
- (x) the date the component was installed, and
- (xi) if the component replaced a component, the period of time the replaced component was in service.

(4) No later than five days after a change is made at the petroleum refining facility that would affect the information in the record required by subsection (3), the record shall be updated to reflect the change.

Component leak survey – general

31. (1) If the date is on or after January 1, 2018, a registered person shall ensure that a component leak survey is performed,

- (a) at least one time in each four month period, or
 - (b) at least one time in each 12-month period, if the combined annual percentage of leaking valves in the previous calendar year, calculated in accordance with section 39 is less than 1.0 per cent.
- (2) Subject to subsection (3), a component leak survey required by subsection (1) shall assess for leaks each component required to be recorded under subsection 30 (1).

(3) A component does not need to be included in a component leak survey if,

- (a) the component was in benzene service for less than 300 hours in the previous calendar year;
- (b) the component is identified in subclause 30 (3) (c) (vii) as unsafe; or
- (c) the date is before December 31, 2022 and the component is identified in subclause 30 (3) (c) (vi) as inaccessible.

(4) A component leak survey required by subsection (1) shall be completed no later than 45 days after the first component in the survey was assessed for leaks.

(5) The registered person referred to in subsection (1) shall ensure that a provincial officer is given written notice at least 60 days before a component leak survey required by subsection (1) is performed and that representatives of the Ministry are given an opportunity to witness the survey.

Component leak survey – assessment and measurement of leaks

32. (1) A registered person shall ensure that a component leak survey required by subsection 31 (1) is performed in accordance with this section, and the results of the survey are recorded in accordance with subsection (9).

(2) Subject to subsection (3), each component that is part of a component leak survey required by subsection 31 (1) shall be assessed for a gaseous leak using,

- (a) a portable gas detector in accordance with Appendix 6-D;
- (b) an OGI instrument in accordance with Appendix 6-E; or
- (c) a fixed leak detection system in accordance with Appendix 6-F.

(3) The concentration of VOCs discharged to air from each component that is part of a component leak survey required by subsection 31 (1) shall be measured using a portable gas detector mentioned in clause (2) (a) or a fixed leak detection system mentioned in clause (2) (c) at least one time in each 12-month period.

(4) On and after January 1, 2023, each component that is part of a component leak survey required by subsection 31 (1) shall be assessed for a liquid leak using an audio or visual method to measure the leak rate of liquid discharged from each leaking component. The liquid leak rate shall be measured in number of drops per minute.

(5) A registered person shall ensure that a person who is required to perform a component leak survey receives training on the leak assessment methods mentioned in subsection (2) and (4).

(6) No later than seven days after a leak is identified using an OGI instrument mentioned in clause (2) (b), the concentration of VOCs discharged to air from a leaking component shall be measured using a portable gas detector mentioned in clause (2) (a).

(7) The leak rate mentioned in subsection (4) shall be calculated in accordance with the following rules:

1. Observe the component for at least one minute and count the number of drops seen or heard.
2. Repeat the observation required by paragraph 1 at least three times in a period of no more than ten minutes.
3. Calculate the average of the leak rates observed under paragraph 2.

(8) Prior to performing a component leak survey required by subsection 31 (1), a component leak survey plan shall be prepared in accordance with section 33.

(9) For each component required to be listed in the electronic record required in clause 30 (3) (c), the following information shall be recorded in the electronic record:

1. The date the component was assessed for leaks.
2. The name of the individual who assessed the component for leaks and the date the individual received the training required by subsection (5), if applicable.
3. The method used to assess the component for leaks, in accordance with subsection (2) or (4).
4. If the method mentioned in paragraph 3 is a portable gas detector, the manufacturer and model number of the portable gas detector, the concentration of the calibration gas used, any adjustments made to the portable gas detector, the response time, calibration precision and response time determined in accordance with Appendix 6-D, on the day that the component was assessed for leaks.
5. If the method mentioned in paragraph 3 is an OGI instrument, the manufacturer and model number of the OGI instrument, the wind speed and ambient temperature at the start and end of the day on which the component was assessed for leaks, and if the follow-up measurement required by subsection (4) indicated that VOCs were being discharged to air in a concentration of 1,000 ppm by volume or greater,
 - i. a copy of the image or images produced by the OGI instrument,
 - ii. the time that an image mentioned in subparagraph i was taken,
 - iii. the ambient and wind speed measurements taken on the date that the component was assessed for leaks, and
 - iv. a description of the cloud cover at the time that the component was assessed for leaks.
6. If the method mentioned in paragraph 3 is a fixed leak detection system, the number of sensors used to assess the component for leaks, the manufacturer and model number of each sensor, the type of each analyzer linked to each sensor, the manufacturer and model number of each analyzer, the year each sensor was installed, the year each analyzer was installed, the distance from the component of each sensor.
7. An indication of whether the component was leaking, including the concentration of VOCs or liquid leak rate measured, as applicable.
8. If a concentration indicated in accordance with paragraph 7, is 1,000 ppm by volume or greater, the estimated mass emission rate of benzene, in grams per second, and a description of how the mass emission rate was estimated.
9. If the component is not included in a component leak survey because the component was in benzene service for less than 300 hours in the previous calendar year, a notation that subsection 31 (3) (a) applies and the dates and times during which the component was in benzene service in the previous calendar year.
10. If the component is not included in a component leak survey because it was identified in subsection 30 (3) (c) as inaccessible or unsafe, a notation that the component is identified as unsafe or inaccessible.

Component leak survey plan

33. (1) A registered person shall ensure that a component leak survey plan that meets the requirements in this section is prepared prior to each component leak survey required by subsection 31 (1).

(2) A component leak survey plan shall be in electronic form and shall include the following information:

1. A general description of the planned component leak survey including a description of,
 - i. the components that are to be part of the component leak survey,
 - ii. the location of each component that will be part of the component leak survey,
 - iii. the method that will be used to assess each component for leaks in accordance with subsections 31(2) and (4),

- iv. relevant operating conditions at the petroleum refining facility on each day of the component leak survey,
 - v. which VOCs can be expected to be detected and the percent by weight of benzene anticipated in leaks, based on the percentage of benzene by weight that components in a process unit are exposed to,
 - vi. the anticipated number of hours that the component leak survey will take, and
 - vii. the training and experience of the individuals performing the component leak survey.
2. A map or schematic of the petroleum refining facility illustrating the location of components at the facility that will be surveyed in the component leak survey and the date on which each component is anticipated to be assessed for leaks.
 3. If an OGI instrument will be used to perform the component leak survey, the number of view angles from which images will be taken for each component.
 4. A checklist of things to check or tasks to perform at the start of each day on which a component leak survey is performed including,
 - i. confirming that there is sufficient power for the technology or device to be used in the component leak survey,
 - ii. if a portable gas detector will be used to perform the component leak survey, determining and recording the following information, as required by paragraph 8, 9 and 10 of subsection 2 (1) of Appendix 6-D:
 - A. the response factor of the portable gas detector.
 - B. the calibration precision of the portable gas detector.
 - C. the response time of the portable gas detector, and
 - iii. if an OGI instrument will be used to perform the component leak survey,
 - A. confirming that there is sufficient electronic record-keeping capacity in the OGI instrument to record the data expected to be obtained that day,
 - B. confirming that the date and time settings of the OGI instrument are correct, and
 - C. confirming that the person or persons performing the component leak survey have a wind speed meter and a temperature meter.
 - iv. if a fixed leak detection system will be used to perform any part of the component leak survey, an automated check for any malfunctioning sensors.

Additional leak measurements - pumps, compressors and pressure relief devices

34. (1) A registered person shall ensure that a component required to be recorded under subsection 30 (1) is observed visually and audibly to identify gaseous and liquid leaks at least one time in every 12-hour period if,

- (a) the date is on or after January 1, 2023;
- (b) the component is a pump, compressor or pressure relief device; and
- (c) the component was in benzene service for at least 300 hours in the previous calendar year.

(2) No later than seven days after a gaseous leak is identified under subsection (1), the concentration of VOCs discharged to air from a leaking component shall be measured using a portable gas detector mentioned in clause 32 (2) (a).

(3) If a leak is identified under subsection (1), the information set out in subsection 32 (9) shall be recorded with respect to the leaking component in the electronic record required in clause 30 (3) (c).

Leaks - deviations and repair

35. (1) If the date is on or after January 1, 2018 and before January 1, 2020, and the concentration of VOCs discharged to air from a leaking component is greater than or equal to 1,000 ppm by volume, a registered person shall ensure that repairs are made so that the concentration of VOCs discharged to air from the component is less than 1000 ppm by volume.

- (2) A registered person shall ensure that repairs are made in accordance with subsection (3) if,
 - (a) the date is on or after January 1, 2020 and before January 1, 2023, and a measurement required by this industry standard indicates that the concentration of VOCs discharged to air from a leaking component is greater than or equal to 1,000 ppm by volume; or
 - (b) the date is on or after January 1, 2023 and a measurement required by this industry standard indicates that,
 - (i) the concentration of VOCs discharged to air from a leaking component is greater than or equal to 1,000 ppm by volume; or

- (ii) a component has a liquid leak rate of 3 three drops per minute or greater.
- (3) Subject to subsection (4), the repairs required by subsection (2) include,
 - (a) no later than five days after measuring the leak, making all repairs to prevent, minimize or reduce the leak that can feasibly be made in the five-day period such as,
 - (i) if the component is a pump, tightening the packing gland nuts and ensuring that the seal flush is operating at design pressure and temperature, and
 - (ii) if the component is a valve, tightening the bonnet bolts, replacing the bonnet bolts, tightening the packing gland nuts, and injecting a lubricant into lubricated packing;
 - (b) for a repair required by clause (2) (a), if the measurement is in the range set out in Column 1 of Table 6-35, repairing the component within the repair period set out opposite the range in Column 2 of Table 6-35 so that the concentration of VOCs discharged to air from the component is less than the concentration set out opposite the repair period in Column 3 of Table 6-35; and
 - (c) for a repair required by clause (2) (b), if the measurement is in the range set out in Column 1 of Table 6-35, repairing the component within the repair period set out opposite the range in Column 4 of Table 6-35 so that the leak rate or concentration of VOCs discharged to air from the component is less than the leak rate or concentration set out opposite the repair period in Column 5 of Table 6-35.
- (4) A component does not need to be repaired within the applicable repair period set out in clause (3) (b) or (c) if the component is taken out of service no later than the last day in the repair period set out Column 2 or 4 of Table 6-35, as applicable, and the component is repaired so that concentration of VOCs discharged to air from the component is less than 1,000 ppm by volume before the component is put back into service.
- (5) A registered person shall ensure that the measurements required by subsection 37 (1) are made following a repair required by subsection (2).

TABLE 6-35: Leak Repair

Item	Column 1 Measurement Range	Column 2 Repair Period (2020-2022)	Column 3 Repair Range (2020-2022)	Column 4 Repair Period (2023 and later)	Column 5 Repair Range (2023 and later)
1	1,000 ppm – 10,000 ppm of VOCs by volume	The 60-day period commencing the date the leak is measured.	Less than 1,000 ppm of VOCs by volume	The 30-day period commencing the date the leak is measured.	Less than 1,000 ppm of VOCs by volume
2	10,000 ppm – 25,000ppm of VOCs by volume	The 30-day period commencing the date the leak is measured.	Less than 10,000 ppm of VOCs by volume	The 15-day period commencing the date the leak is measured.	Less than 10,00 ppm of VOCs by volume
3	Greater than 25,000 ppm of VOCs by volume	The 15-day period commencing the date the leak is measured.	Less than 25,000 ppm of VOCs by volume	The 7-day period commencing the time the leak is measured.	Less than 25,000 ppm of VOCs by volume
4.	Greater than 3 drops per minute	N/A	N/A	The 7-day period commencing the date the leak is measured.	0 drops per minute

Delay of repair list

- 36.** (1) A component does not need to be repaired in accordance with the applicable repair period set out in section 35 if the following criteria are met:
1. The process unit in which the component is located must be shut down in order to repair the component.
 2. The sum determined under subsection (3) is less than 250,000 ppm, by volume.
- (2) The registered person shall ensure that the following information is recorded with respect to each component that is not repaired in accordance with the applicable repair period set out in section 35:
1. The name of the component, the component identifier, and, if the component was installed after January 1, 2018, the serial number of the component.
 2. The process unit of which the component is part.
 3. The estimated fraction of benzene, by volume, that the component is exposed to, expressed to the nearest tenth of a percent.
 4. The reason that the component could not be repaired within the applicable repair period set out in section 35.

5. The concentration of VOCs leaking from the component.
6. The calculated concentration of benzene leaking from the component, calculated as the product of the values set out in paragraphs 3 and 5.
7. A description of any repairs made to the leaking component.
8. The date and time of the next anticipated shut-down of the process unit of which the component is part.

(3) A registered person shall ensure the concentration of benzene recorded under paragraph 6 of subsection (2) is summed for each component recorded for the purpose of subsection (2) that is exposed to 50 per cent or greater benzene, by weight.

(4) A registered person shall ensure that a report, signed by the highest-ranking individual at the petroleum refining facility, is submitted to a provincial officer at least one time in every six-month period that sets out the following information:

1. Each component set out in the record required by subsection (2).
2. The sum determined under subsection (3).
3. Each component that was set out in the previous report that is not set out in the report.
4. For each component referred to in paragraph 3, the results of the measurement required by section 37 following the repair to the component.
5. A comparison of the number of components set out in the report to the number of components set out in the previous report.
6. A comparison of the sum mentioned in paragraph 2 to the sum set out in the previous report.

(5) A registered person shall ensure that the next time that a process unit is shut down, each component set out in the record required by subsection (2) that is part of the process unit is repaired so that the concentration of VOCs discharged to air from each component is less than 1,000 ppm by volume.

(6) A process unit mentioned in subsection (5) shall not be placed back into service until the measurements required by section 37 (1) are made and the measurements show that the concentration of VOCs discharged to air from the component is less than 1,000 ppm by volume.

(7) If a component set out in the record required by subsection (2) is a valve, a registered person shall ensure that the next time that the process unit in which the valve is located is shut down, the valve is replaced with a low emission valve or repacked with low emission valve packing that meets the criteria set out in subsection 38 (2).

(8) No later than six months after a component set out in the record required by subsection (2) is repaired, the registered person shall submit the following information, in writing, to a provincial officer:

1. The date of the shut-down of the process unit in which the component is located.
2. The date the component was repaired.
3. A description of how the component was repaired.
4. The concentration of VOCs leaking from the component after the repair was made.

Re-monitoring following component repair or replacement

37. (1) After a component is required to be repaired in accordance with section 35 or 36 or replaced in accordance with section 38, a registered person shall ensure that the following measurements are made no later than the dates set out in subsection (2):

1. One of the following methods is used to measure the concentration of VOCs discharged to air from the component that was required to be repaired or replaced,
 - i. a portable gas detector mentioned in clause 32 (2) (a), or
 - ii. a fixed leak detection system mentioned in clause 32 (2) (c).
2. An audio or visual method shall be used to measure the liquid leak rate from the component required to be repaired or replaced.

(2) The measurements required by subsection (1) shall be made,

- (a) if the component is required to be repaired in accordance with subsection 35 (3), no later than the last day in the repair period set out Column 2 or 4 of Table 6-35, as applicable;

- (b) if the component is required to be repaired in accordance with subsection 35 (4), no later than seven days after the component is put back into service;
 - (c) if the component is required to be repaired in accordance with subsection 36 (5), before the process unit of which the component is a part is put back in service;
 - (d) if the component is required to be replaced in accordance with section 38, no later than seven days after the component is replaced.
- (3) A registered person shall ensure that, for each component mentioned in subsection (1) , the following information is recorded in respect of the component in the electronic record required in clause 30 (3) (c):
1. The result of the measurement required by section 32.
 2. The date a repair required under section 35 or 36 was made.
 3. The position title of the person who assigned a person to make the repair.
 4. The likely cause of the leak.
 5. A description of all operational adjustments made to repair the leak.
 6. The date that measurements required by subsection (1) were made.
 7. The result of the measurements required by subsection (1), including the concentration of VOCs or leak rate measured, as applicable.
 8. If the component is required to be repaired in accordance with subsection 35 (3), an indication of whether the result mentioned in paragraph 6 is within the applicable repair range set out in Table 6-35.
 9. If the component is required to be repaired in accordance with subsection 35 (4) or 36 (5) or replaced in accordance with section 38, an indication of whether the result mentioned in paragraph 6 is less than 1000 ppm by volume.

Component replacement

38. (1) A registered person shall ensure that a component required to be recorded under subsection 30 (1) is replaced with a new component if the component has been repaired so that concentration of VOCs discharged to air from the component is less than 1,000 ppm by volume more than three times in a 24-month period.

(2) If the component mentioned in subsection (1) is a valve, the valve shall be replaced with a low emission valve or repacked with low emission valve packing that meets the following criteria:

1. The valve or valve packing has been tested by the manufacturer using generally-accepted good engineering practices.
2. The test mentioned in paragraph 1 shall include determining the concentration of VOCs discharged from the valve through the valve or valve packing.
3. The maximum concentration of VOCs determined under paragraph 2 shall not be greater than 500 ppm.
4. The average concentration determined under paragraph 2 shall not be greater than 100 ppm.

(3) Subject to subsection (4), a registered person shall ensure that a component required to be replaced under subsection (1) is replaced with a new component no later than the last day in the repair period set out in Column 2 or 4 of the Table 6-35, as applicable.

(4) Subsection (3) does not apply to the replacement of a component if,

- (a) the component is taken out of service no later than the last day in the applicable replacement period set out in subsection (3), and
- (b) the component is replaced before it is put back into service.

Percentage leaking valves

39. The combined annual percentage of leaking valves shall be calculated in accordance with the following formula:

$$A_T/B_T * 100$$

where,

A_T = the sum of the number of valves that required repair under sections 35 and 36 following each component leak survey required by subsection 31 (1) during a calendar year.

B_T = the sum of the total number of valves assessed in each component leak survey required by section 31 during a calendar year.

Notification - component leak survey

40. (1) A registered person shall ensure that, no later than one day after a component leak survey required by section 31 is completed, a provincial officer is notified in writing.

(2) No later than 7 days after notification is required to be given under subsection (1), the registered person shall ensure that the following information is submitted to a provincial officer :

1. The start date and end date of the component leak survey.
2. A summary of the methods used to assess each component.
3. The map or schematic of the petroleum refining facility mentioned in paragraph 2 of subsection 33 (2) showing the components that were assessed on each day of the component leak survey.
4. The percentage of leaking components, calculated in accordance with subsection (2).
5. If a fixed leak detection system was used for any part of the component leak survey, a record of any sensors that malfunctioned during the automated checks required by subparagraph 4 iv of subsection 33 (2).

(2) The percentage of leaking components shall be calculated in accordance with the following formula:

$$A/B * 100$$

where,

A = the number of components that require repair under sections 35 and 36.

B = the total number of components assessed in the component leak survey required by section 31.

PART VII – OPERATION

Operating parameter summary table

41. (1) Subject to subsections (2) to (4), on and after January 1, 2018, a registered person shall ensure that a table labelled “Operating Parameter Summary Table” is prepared that reproduces Table 6-41 in a manner that includes each method listed in Column 1 of Table 6-41 that is at the petroleum refining facility and that is associated with a registered contaminant.

(2) A registered person who is required under subsection (1) to reproduce Item 6 of Table 6-41 in the Operating Parameter Summary Table does not have to set out the information in Columns 3 to 6 of Item 6 of Table 6-41 if the person sets out the information in the following manner:

1. Column 3: Concentration of VOCs (ppm)
2. Column 4: Outlet
3. Column 5: One time in each 24-month period
4. Column 6: --

(3) If the date is before January 1, 2023, a registered person is not required under subsection (1) to reproduce items 1 and 2 of Table 6-41 in the Operating Parameter Summary Table.

(4) A registered person is not required to reproduce items 1 and 2 of Table 6-41 in the Operating Parameter Summary Table with respect to a flare that is not required to comply with the requirements set out in section 4.

(5) Where Table 6-41 refers to an operating parameter, location, or frequency that is to be consistent with a recommendation made by a professional, the recommendation and the source of the recommendation shall be set out in the Operating Parameter Summary Table.

(6) The source of the professional recommendation mentioned in subsection (5) shall be one of the following:

1. An operating and maintenance manual provided by a manufacturer of the thing for which the recommendation is being given.
2. Written instructions provided by a supplier of the thing for which the recommendation is being given.
3. A letter from a manufacturer mentioned in paragraph 1 or supplier mentioned in paragraph 2, setting out the recommendation.

4. A letter from a professional engineer setting out the recommendation, the rationale for the recommendation and a description of the relevant experience with respect to the recommendation being made. The engineer must have relevant experience with respect to the recommendation being made.
- (7) The Director may order a registered person to,
 - (a) include information in Columns 3 to 6 of the Operating Parameter Summary Table if the Director is of the opinion that the information is necessary to ensure the normal operation of the method; or
 - (b) remove information from Columns 3 to 6 of the Operating Parameter Summary Table if the Director is of the opinion that the information is not appropriate to ensure the normal operation of the method.
- (8) No later than five days after a change is made at the petroleum refining facility that would affect the information in the Operating Parameter Summary Table, the Table shall be updated to reflect the change.

TABLE 6-41: Structure for Operating Parameter Summary Table

Item	Column 1 Method	Column 2 Equipment Associated with the Method	Column 3 Operating Parameter	Column 4 Measurement Location	Column 5 Measurement Frequency	Column 6 Calculated Parameter
1.	Flare	Equipment	Flare gas composition	Inlet	Continuously	1. Flare Vent Net Heating Value 2. Flare Combustion Zone Net Heating Value 3. Flare Net Heating Value Dilution Parameter
2.	Flare	Equipment	Volumetric gas flow rate	Inlet	Continuously	1. Flare Tip Velocity
3.	Flare	Equipment	Pilot Flame On or Off	Pilot Flame	Continuously	
4.	Thermal Oxidizer	Equipment	Temperature	At the point that represents a residence time of 0.75 seconds	Continuously	--
5.	Catalytic Oxidizer	Equipment	Temperature	A location consistent with a professional recommendation	Continuously	--
6.	Air pollution control device mentioned in paragraph 2 of section 3	Equipment	Concentration of benzene	1. Inlet 2. Outlet	One time in each 24-month period	Per cent removal of benzene = $[1 - (C_{outlet}/C_{inlet})]$
7.	A method required by: section 45	Equipment	One or more operating parameters consistent with a professional recommendation	A location consistent with a professional recommendation	A frequency consistent with a professional recommendation	--

Measurement of operating parameters

42. (1) A registered person shall ensure that each operating parameter set out in Column 3 of the Operating Parameter Summary Table required by section 41 is measured at least as often as the frequency required to be set out in Column 5 of the Table at the location required to be set out in Column 4 of the Table.

(2) The results of the measurements required by subsection (1) shall be used to determine the calculated parameter in Column 6 of the Operating Parameter Summary Table required by section 41.

(3) The measurements required by subsection (1) for items 1, 2 and 6 shall be taken in accordance with a plan that, in the opinion of the Director, will result in the accurate measurement of the operating parameter mentioned in subsection (1).

(4) The calculations required by subsection (2) for items 1, 2 and 6 shall be made in accordance with a plan that, in the opinion of the Director, will result in the accurate calculation of the calculated parameter mentioned in subsection (2).

(5) Each time a measurement is required to be taken by subsection (1) for item 6 of Table 6-41, the registered person shall ensure that,

- (a) written notice is provided to the Director at least 15 days before the measurements are taken;
- (b) an opportunity is provided for representatives of the Ministry to witness the taking of the measurements; and

- (c) no later than four months after the measurements are taken, the results of the measurements are submitted to the Director.
- (6) Measurements required by subsection (1) with respect to Item 3 of Table 6-41 shall be taken using one or more of the following technologies:
 - 1. A thermocouple.
 - 2. An optical system that uses ultraviolet or infrared technology.
 - 3. Flame ionization.
 - 4. An acoustic system.
- (7) A registered person shall ensure that an instrument used to measure an operating parameter set out in items 1 to 5 of Table 6-41 is calibrated in accordance with a recommendation made by a professional.
- (8) A registered person shall ensure that the following information is recorded:
 - 1. Each measurement required to be taken under subsection (1).
 - 2. Each calculation required to be made under subsection (2).
 - 3. The date on which the measurement in paragraph 1 was taken and the calculation in paragraph 2 was made.

Consultation Question:

In other technical standards there is a requirement for registered persons to set out a normal operating range for operating parameters (to monitor whether air pollution control devices or other methods are operating effectively). If an operating parameter deviates from the normal operating range, this is not a contravention of the technical standard, but the registered person is required to make operational adjustments to return the operating parameter to the normal operating range.

In this proposal, a similar requirement is not included, because the air pollution control devices set out in items 1-6 of Table 6-41 all have performance requirements, set out in the technical standard, against which the measured or calculated values are compared. If an operating parameter (or calculated parameter) does not meet the performance requirements, this is a contravention of the technical standard. The registered person is therefore already required to take corrective action when an operating parameter diverges from the normal operating range.

QUESTION: Are there existing air pollution devices or other methods described in subsection 44 (3) at petroleum refining facilities (other than those mentioned in the above table) that would benefit from requiring operational adjustments should the device deviate from its normal operating range? In other words, what methods would be listed in the Table for the purpose of Item 7?

Phase-in for new air pollution control devices

43. Sections 41 and 42 do not apply in respect of an air pollution control device at a petroleum refining facility for a period of six months after the installation of the device if the device is installed after the date on which the petroleum refining facility is first registered with respect to this industry standard.

PART VIII – REQUIREMENT TO CONTINUE THE USE OF METHODS TO MANAGE EMISSIONS

Identifying managed sources

- 44. (1) A registered person shall ensure that a table is prepared in accordance with this section and updated in accordance with section 46.
- (2) The Table required by subsection (1) shall contain the following information:
 - 1. Column 1: Each piece of equipment at the petroleum refining facility from which the discharge of a registered contaminant is prevented, minimized or reduced by a method mentioned in subsection (3).
 - 2. Column 2: Opposite each piece of equipment required to be set out by paragraph 1, each method that prevents, minimizes or reduces the discharge of a registered contaminant from the piece of equipment.
- (3) A method mentioned in paragraph 2 of subsection (2) includes a method such as,
 - (a) the use of an air pollution control device;
 - (b) the selection and use of equipment that more effectively prevents, minimizes or reduces the discharge of a registered contaminant than the selection or use of other equipment;

- (c) the operation of a process in a manner that prevents, minimizes or reduces the discharge of a registered contaminant into the air from one or more sources of contaminant;
- (d) the design, installation and operation of a stack in a manner that increases the dispersion of a registered contaminant; and
- (e) the use of material to prevent, minimize or reduce the discharge of a registered contaminant to the air.

(4) If a method mentioned in paragraph 2 of subsection (2) is the selection of equipment in accordance with clause (3) (b), the equipment shall be listed as the method in Column 2 of the Table required by subsection (1) and as the equipment in Column 1 of the Table.

Requirement to continue the management of sources

45. A registered person shall not operate or cause or permit the operation of equipment set out in the Table required by section 44 unless the discharge of registered contaminants from the equipment is prevented, minimized or reduced by a method that is at least as effective at preventing, minimizing or reducing the discharge into the air as the associated method required to be listed opposite the equipment in Column 3 of the Table.

Changes to managed sources

46. (1) No later than 30 days after any of the following changes occur at a petroleum refining facility, the Table required by section 44 shall, having regard to subsection (2), be updated in accordance with the following rules:

- 1. If a method to prevent, minimize or reduce the discharge of a registered contaminant is added or replaced at the petroleum refining facility, the Table shall be updated to reflect the change.
- 2. If a piece of equipment that may discharge or from which may be discharged a registered contaminant is added or replaced at the petroleum refining facility, the Table shall be updated to reflect the change.
- 3. If a piece of equipment set out in the Table is removed from the petroleum refining facility, the piece of equipment shall be removed from the Table.
- 4. If all equipment associated with a method set out in the Table has been removed from the Table, the method shall be removed from the Table.
- 5. If a notice given under subsection (4) indicates that a method is no longer necessary, the method shall be removed from the Table.
- 6. If the Table is updated in accordance with paragraph 5 such that no method is set out opposite a piece of equipment in the Table, the piece of equipment shall be removed from the Table.

(2) Subject to subsections (3) and (4), a change mentioned in subsection (1) shall not be made unless the following criteria are met:

- 1. A change that adds, replaces or otherwise alters a method shall add, replace or alter the method in a manner that is at least as effective at preventing, minimizing or reducing the discharge of registered contaminants as the method that was listed in the Table immediately prior the change.
- 2. A change that adds a piece of equipment that is similar to a piece of equipment required to be set out in the Table shall only be made if Column 3 of the Table contains a method that is at least as effective at preventing, minimizing or reducing the discharge of registered contaminants as the most effective method associated with a similar piece of equipment.

(3) Subsection (2) does not apply if the change is required by a section of this industry standard, other than this section.

(4) The Director may, upon request, give a registered person written notice indicating that a change that does not meet the requirements mentioned in subsection (2) may be made, in accordance with the notice, if the Director is of the opinion that at least one of the following statements is true:

- 1. The method that is the subject of the request is comparable to the effectiveness of the method that would be required by subsection (2).
- 2. Any adverse effect would likely not be better prevented, eliminated or ameliorated if a method required by subsection (2) were used.
- 3. No adverse effect is likely to occur.
- 4. The registered contaminants affected by the change are discharged in an amount that is negligible.

(5) A request that is made in respect of subsection (4) shall be made by a registered person and shall include the following information:

1. A rationale for the request.
2. Each piece of equipment associated with the method that is the subject of the request.

(6) Before the Director gives a person a notice under subsections (4), the Director shall give the person a draft of the notice and an opportunity to make written submissions to the Director during the period that ends 30 days after the draft is given.

Specified source management

47. The Director may order a registered person to use a method if,
- (a) a change was made to a method that, in the opinion of the Director, does not meet the criteria set out in subsection 46 (2); or
 - (b) a piece of equipment is or was previously listed in the Table required by section 44 and the Director is of the opinion that discharges from the equipment may cause an adverse effect.

Notification of changes to management of sources

48. (1) Subject to subsection (2), no later than 30 days after a change mentioned in section 46 or 47 is made at a petroleum refining facility, the registered person shall ensure that a provincial officer is notified in writing of the change.

(2) Subsection (1) does not apply if the thing affected by the change is a thing which may discharge or from which may be discharged a registered contaminant in an amount that is negligible.

(3) The notification required by subsection (1) shall include the following information:

1. A description of the change, including a description of the equipment and methods affected by the change and the date that the change was made.
2. One of the following with respect to the change mentioned in paragraph 1:
 - i. An explanation of how the change meets the criteria set out in subsection 46 (2).
 - ii. If the change was authorized by a notice given under subsection 46 (4), the reference number of the notice.
 - iii. If the change was required by an order given under section 47, the reference number of the order.

PART IX – AMBIENT MONITORING

Ambient monitoring - benzene

49. (1) On and after January 1, 2018, a registered person shall ensure that the concentration of benzene discharged from the petroleum refining facility into the air is measured by at least 12 ambient monitors.

(2) Each monitor required by subsection (1) shall,

- (a) sample the air continuously over a two-week period;
- (b) be, in the opinion of the Director, adequate to effectively measure the concentration of benzene in the air; and
- (c) be, in the opinion of the Director, located in a manner that adequately reflects the benzene discharged from the petroleum refining facility.

(3) In forming the opinion required under clause (2) (b), the Director shall have regard to,

- (a) the type of monitor;
- (b) the make and model of the monitor;
- (c) the frequency of measurement of the monitor; and
- (d) the sampling and analytical protocols to be used with the monitor.

(4) In forming the opinion required under clause (2) (c), the Director shall have regard to,

- (a) the property boundary of the petroleum refining facility;
- (b) the wind rose or predominant wind direction at the petroleum refining facility;
- (c) the location and height of the sources of contaminant that discharge benzene to the air at the petroleum refining facility, including,
 - (i) storage vessels,

- (ii) product loading areas, and
- (iii) sewage treatment;
- (d) the presence of any of the following places near the petroleum refining facility,
 - (i) a health care facility,
 - (ii) a senior citizens' residence or long-term care facility,
 - (iii) a child care facility,
 - (iv) an educational facility, and
 - (v) a dwelling;
- (e) the interests of local First Nations, if any;
- (f) the location of the other monitors required by subsection (1).

(5) A registered person shall ensure that the air sampled over a two-week period by a monitor required by subsection (1) is analysed in a laboratory as soon as reasonably possible to determine the concentration of benzene in micrograms per cubic metre.

(6) A registered person shall ensure that the following information is recorded:

1. Each measured concentration of benzene mentioned in subsection (5).
2. For each value mentioned in paragraph 1, the period of time during which the monitor sampled air and the location of the monitor.

Benzene measurements baseline

50. (1) A registered person shall ensure that a baseline for benzene at a petroleum refining facility is determined in accordance with this section.

(2) No later than March 31 in the year following the first full three calendar years in which this section applies in respect of the petroleum refining facility mentioned in subsection (1), a baseline shall be determined by performing the following steps with respect to each ambient monitor required by subsection 49 (1):

1. For each two-week period in the previous calendar year record one of the following,
 - i. if the monitor indicates a measurement of a concentration of benzene, record the measured concentration of benzene, and
 - ii. if the monitor indicates that the measurement of the concentration of benzene was below the detection limit of the monitor, record half of the detection limit of the monitor as the concentration of benzene.
 - iii. if the monitor provides no indication of any measurements with respect to the concentration of benzene, do not record a concentration but instead record an explanation of why no measurement of benzene was taken.
2. Translate each concentration recorded in paragraph 1 to its equivalent natural logarithm.
3. Calculate the mean of all of the values translated in paragraph 2.
4. Calculate the square of the standard deviation of all of the values translated in paragraph 2 using the following equation:

$$S^2 = \frac{1}{m} \sum (x_i - X)^2 / (m-1)$$

Where,

S is the standard deviation;

m is the number of two-week average concentrations recorded in paragraph 1;

x_i is each value translated in paragraph 2; and

X is the value calculated in paragraph 3.

(3) Subject to subsection (4), no later than March 31 in each year following the fourth full calendar year after this section applies in respect of the petroleum refining facility, the baseline mentioned in subsection (1) shall be re-determined by performing the steps set out in subsection (2) using concentrations of benzene measured by the monitor in the previous calendar year.

- (4) Subsection (3) does not apply if the concentration of benzene measured by the monitor averaged over the calendar year mentioned in subsection (3) is higher than,
- (a) if no re-determination has previously been made under subsection (3), the concentration of benzene measured by the monitor averaged over the calendar year mentioned in subsection (2); or
 - (b) if a re-determination has previously been made under subsection (3), the concentration of benzene measured by the monitor averaged over the calendar year associated with the most recent re-determination under subsection (3).
- (5) The results of each step required to be performed under subsection (2) shall be recorded.

Statistical analysis of benzene measurements

51. (1) For the purpose of this section, reference to a statistically significant increase in the concentration of benzene is a reference to the determination of whether the concentration of benzene measured at a monitor during a calendar year is higher than the concentration of benzene measured at the monitor during the three-year period in which the most recent baseline was determined under section 50 and, if so, whether the increase in concentration is statistically significant.

(2) A registered person shall ensure that a determination of whether a statistically significant increase in the concentration of benzene has occurred in a year is made in accordance with this section.

(3) No later than March 31 in each year following the fourth full calendar year in which this section applies in respect of the facility mentioned in subsection (2), a statistical analysis shall be completed by performing the following steps with respect to each ambient monitor identified as adequate under section 49:

1. For each two-week period in the previous calendar year record one of the following,
 - i. if the monitor indicates a measurement of a concentration of benzene, record the measured concentration of benzene, and
 - ii. if the monitor indicates that the measurement of the concentration of benzene was below the detection limit of the monitor, record half of the detection limit of the monitor as the concentration of benzene.
 - iii. if the monitor provides no indication of any measurements with respect to the concentration of benzene, do not record a concentration but instead record an explanation of why no measurement of benzene was taken.
2. Translate each two-week average calculated in paragraph 1 to its equivalent natural logarithm.
3. Calculate the mean of all of the values translated in paragraph 2.
4. Calculate the square of the standard deviation of all of the values translated in paragraph 2 using the following equation:

$$S^2 = \left[\sum_{i=1}^n (x_i - X)^2 \right] / (n-1)$$

Where,

S is the standard deviation;

n is the number of two-week average concentrations recorded in paragraph 1;

x_i is each value translated in paragraph 2; and

X is the value calculated in paragraph 3.

5. Calculate the test statistic using the following equation:

$$T = (Y - X) / \sqrt{(S_1^2/m + S_2^2/n)}$$

Where,

T is the test statistic;

Y is the value calculated in paragraph 3;

X is the most recent value calculated in paragraph 3 of subsection 50 (2);

S_1 is the most recent value calculated in paragraph 4 of subsection 50 (2);

S_2 is the value calculated in paragraph 4;

m is the most recent number of values calculated in paragraph 1 of subsection 50 (2); and

n is the number of values calculated in paragraph 1.

6. Calculate the degrees of freedom using the following equation:

$$(v) = [(S_1^2/m + S_2^2/n)^2] / [(S_1^2/m)^2/(m-1) + (S_2^2/n)^2/(n-1)]$$

Where

(v) is the degrees of freedom; and

S₁, S₂, m and n have the same meanings as set out in paragraph 5.

7. Find the value calculated in paragraph 6 in Column 1 of Table 6-51 and determine the value set out opposite that value in Column 2.

8. Determine whether there has been a statistically significant increase in the concentration of benzene at the monitor by assessing whether the value calculated in paragraph 5 exceeds the value determined under paragraph 7.

(9) A registered person shall ensure that the following information is recorded for each monitor:

1. The results of each step performed for the purpose of this section.
2. Any changes to the baseline for the monitor.

TABLE 6-51: Statistical Analysis

Item	Column 1	Column 2
	Degrees of Freedom (v)	Test Statistic (T) with level of significance (%) = 0.0005
	1	636.6
	2	31.60
	3	12.92
	4	8.610
	5	6.869
	6	5.959
	7	5.408
	8	5.041
	9	4.781
	10	4.587
	11	4.437
	12	4.318
	13	4.221
	14	4.141
	15	4.073
	16	4.015
	17	3.965
	18	3.922
	19	3.883
	20	3.850
	21	3.819
	22	3.792
	23	3.768
	24	3.745

	25	3.725
	26	3.707
	27	3.690
	28	3.674
	29	3.659
	30	3.646
	40	3.551
	60	3.460
	120	3.373
	∞	3.291

Notification – ambient monitoring

52. (1) A registered person shall ensure that, as soon as practicable, a provincial officer is notified in writing if it is determined under section 51 that there has been a statistically significant increase in the concentration of benzene at an ambient monitor required by subsection 49 (1).

(2) No later than six months after notice is required to be given under subsection (1), the registered person shall ensure that the following information is submitted, in writing, to a provincial officer:

1. The measured and calculated values relating to the statistically significant increase in the concentration of benzene.
2. An explanation of the suspected cause of the statistically significant increase in the concentration of benzene.
3. A description of any steps taken or that will be taken to prevent, minimize, or reduce the risk of future statistically significant increases in the concentration of benzene.
4. An indication of the date by which each step mentioned in paragraph 3 will be implemented.
5. A written explanation of how each steps mentioned in paragraph 3 will prevent, minimize or reduce the risk of any future statistically significant increases in the concentration of benzene.

PART X – COMPLAINTS, RECORDS AND REPORTING

Complaints procedure

53. (1) A registered person shall ensure that the following steps are taken to properly respond to each complaint that relates to the discharge of a contaminant into the air from a petroleum refining facility:

1. A prompt response is made to the person who made the complaint, unless the person requests that a response not be made or fails to provide contact information
2. Action is taken to remedy the cause of the complaint.
3. A written record of the complaint is prepared that includes the following information:
 - i. A description of the complaint.
 - ii. The date and time that the complaint was received.
 - iii. The date, time and suspected cause of the incident to which the complaint relates, including whether any outdoor activities may have given rise to the complaint.
 - iv. Ambient temperature at the time of the incident to which the complaint relates.
 - v. The approximate wind direction and wind speed at the time of the incident to which the complaint relates.
 - vi. The general weather conditions at the time of the incident to which the complaint relates.
 - vii. A description of any actions taken to address the incident to which the complaint relates and the date each action was completed.

viii. A description of any actions taken to prevent a future incident similar to the incident to which the complaint relates and the date each action was completed.

(2) If a complaint is made that relates to a matter addressed in this industry standard, the registered person shall ensure that the Ministry's Spills Action Centre is notified of the complaint as soon as practicable after the complaint is made.

(3) No later than five days after notification is required to be given under subsection (2), the registered person shall ensure that the following information is submitted, in writing, to a provincial officer:

1. A description of the complaint.
2. The time and date of the incident to which the complaint relates.
3. A description of any actions taken or that will be taken to address the incident to which the complaint relates.
4. The dates on which each action mentioned in paragraph 3 was completed or is anticipated to be completed.

Annual summary reports

54. (1) On and after January 1, 2019, a registered person shall ensure that annual summaries are prepared and reviewed in accordance with this section.

(2) No later than March 31 each year, the following summaries shall be prepared and the information therein shall pertain to the preceding calendar year:

1. A table, labelled "Implementation Summary Table", that, for the calendar year, sets out,
 - i. A summary of the provisions of this industry standard that apply to the petroleum refining facility, in accordance with section 2.
 - ii. For each provision mentioned in subparagraph i,
 - A. an indication of the date on which the provision applies to the petroleum refining facility, and
 - B. if compliance with the provision has been achieved, an indication of the date on which compliance was achieved.
2. A report entitled "Annual Summary of Component Leak Detection and Repairs" that sets out,
 - i. the number of component leak surveys conducted during the calendar year at the petroleum refining facility in accordance with section 31,
 - ii. the start date and end date of each component leak survey conducted at the petroleum refining facility during the calendar year,
 - iii. if less than three component leak surveys were conducted during the calendar year, the combined annual percentage leaking valves during the previous calendar year,
 - iv. for each process unit at the petroleum refining facility that contains one or more components required to be recorded under subsection 30 (1),
 - A. The name and a description of the process unit.
 - B. Each date on which the process unit did not operate and the duration for which it did not operate.
 - C. The total number of components in the process unit.
 - D. The number of inaccessible components and number of components that have been identified as unsafe to monitor in the process unit.
 - E. The start date and end date of each component leak survey during the calendar year that assessed a component in the process unit.
 - F. The number of components in the process unit that were surveyed in the calendar year and the method used to assess each component.
 - G. If any component in the process unit was assessed using a fixed leak detection system, for each sensor:
 1. The maximum daily measurement of VOCs.
 2. The monthly average concentration of VOCs.
 3. The average concentration of VOCs for the calendar year.

- H. The number of components, expressed as a percentage of the total components in the process unit, that had leaks at the following concentrations:
 - 1. Greater than 0 and less than or equal to 1,000 ppm of VOCs by volume.
 - 2. Greater than 1,000 ppm and less than or equal to 5,000 ppm of VOCs by volume.
 - 3. Greater than 5,000 ppm and less than or equal to 10,000 ppm of VOCs by volume.
 - 4. Greater than 10,000 ppm and less than or equal to 25,000 ppm of VOCs by volume.
 - 5. Greater than 25,000 ppm of VOCs by volume.
 - I. A summary, by component type, of the repairs to components made during the calendar year, including the shortest, longest and average time between detecting a leak and repairing the component so that the concentration of VOCs discharged to air from the component was less than 1,000 ppm by volume.
 - J. A summary, by component type, of the number of repairs to components in the process unit each calendar year for the shorter of,
 - 1. the previous 10 calendar years, and
 - 2. the calendar years since the date the petroleum refining facility was first registered to this industry standard.
 - K. The number of components in the process unit, expressed as a percentage of the total components in the process unit, that have been repaired so that the concentration of VOCs discharged to air from the component is less than 1,000 ppm by volume more than one time in the calendar year.
 - L. The number of valves replaced with low-emission valves during the calendar year, and an indication of how many of the valves were required by subsection 38 (1) to be replaced.
- v. The most recent report mentioned in subsection 36 (4) for the petroleum refining facility.
- 3. A report entitled “Annual Summary of Defects and Repairs for Storage Vessels” that sets out, for each storage vessel at a petroleum refining facility that meets the criteria set out in subsection 11 (2),
 - i. a summary of the information required by paragraphs 3 and 4 of subsection 16(7), subsection 17 (3) and subsection 21 (2),
 - ii. an indication of any changes in the number of defects or repairs from the summary of the previous year,
 - iii. the number of times an event that caused one or more defects occurred at the facility during the calendar year,
 - iv. an indication of whether any of the events mentioned in subparagraph iii were of particular concern,
 - v. an indication of whether the number of events mentioned in subparagraph iii suggest a recurring issue, both in respect of the calendar year and in respect of previous calendar years, and
 - vi. an explanation of any actions taken to address the events mentioned in subparagraph iii..
 - 4. A report entitled “Annual Summary of Air Emissions from Industrial Sewage Treatment Systems” that sets out a summary of the information required by paragraph 3 or 4 of subsection 24 (1), as applicable, and subparagraph 2 ii of section 26 .
 - 5. A report entitled “Annual Benzene-containing Product Loading Report” that sets out a summary of the information required by subsection 27 (1).
 - 6. A report entitled “Annual Ambient Monitoring Report for Petroleum Refining – Industry Standard” that sets out,
 - i. a map showing the location of each monitor required by subsection 49 (1), the information required by subsection clause 49 (4) (d), and other topographical information including any nearby water bodies, roadways and adjacent land uses,
 - ii. for each monitor required by section 49,
 - A. the information required by subsection 49 (6),
 - B. the results of calculations required by subsection 51 (9) to identify whether a statistically significant increase in the concentration of benzene occurred,
 - C. a summary showing the annual average benzene concentration results from the time that the monitor was first required by section 49,

- iii. a summary of the suspected cause of a statistically significant increase in the concentration of benzene at a monitor during the calendar year, and
 - iv. a description of steps taken to address a statistically significant increase in the concentration of benzene at a monitor during the calendar year.
7. A summary that, for the calendar year, sets out changes made to the Operating Parameter Summary Table and summarizes the information that was required to be updated in accordance with subsection 41 (8).
 8. A table, labelled “Performance Summary Table”, that, for the calendar year, sets out,
 - i. a summary of all notifications required to be given under subsections 9 (1), and
 - ii. an indication of whether an order has been given to the petroleum refining facility under subsection 41 (7) or section 47.
 9. A table, labelled “Annual Summary of Changes to Source Information” that, for the calendar year, sets out the following information:
 - i. Column 1: Each piece of equipment at the petroleum refining facility that discharges or from which may be discharged a registered contaminant.
 - ii. Column 2: Opposite each piece of equipment required to be set out by paragraph i, each method that prevents, minimizes or reduces the discharge of a registered contaminant from the piece of equipment.
 - iii. Column 3: Opposite each piece of equipment required to be set out by paragraph i, an indication if the information in Columns 1 or 2 has changed from information set out in the previous calendar year.
 10. A table, labelled “Complaint Summary Table” that sets out the total number of complaints described in subsection 53 that have been received by the petroleum refining facility in the calendar year and compares the number to the number of complaints received by the petroleum refining facility in the previous calendar year.

Consultation Question:

Is there any other information that would be helpful to have summarized on an annual basis?

(3) No later than March 31 each year, the highest-ranking individual at the petroleum refining facility shall certify in writing that the summaries required by paragraphs 1 to 10 of subsection (2) have been prepared in accordance with this industry standard and that the information contained in the summaries is,

- (a) accurate and complete; and
 - (b) true to the best of his or her knowledge.
- (4) The summary tables required by paragraphs 1 and 8 of subsection (2) shall be,
- (a) made available for examination by any person, without charge, by ensuring it is posted and available on the website for the petroleum refining facility or by making it available during regular business hours at the place to which the report relates; and
 - (b) given, without charge, to any person within 15 days after the person requests it.

Public reporting – ambient monitoring

55. (1) On and after January 1, 2018, a registered person shall ensure that the following information is made available for examination by any person, without charge, by ensuring it is posted and available on a website for the petroleum refining facility or by making it available during regular business hours at the petroleum refining facility:

1. A map showing the location of each monitor required by section 49, the information required by subsection clause 49 (4) (d) and other relevant topographical information including any nearby water bodies, roadways and adjacent land uses.
2. A chart showing the information required by subsection 49 (6) for each monitor for the calendar year, updated in accordance with subsection (2).
3. A copy of the report mentioned in paragraph 6 of subsection 54 (2) for the previous 10 calendar years.

(2) No later than 60 days after a two-week air sample is taken by a monitor required by section 49, the information required by subsection 49 (6) shall be added to the chart mentioned in paragraph 2 of subsection (1).

Records

56. (1) Subject to subsection (2), a registered person shall ensure that each record, required in accordance with section 2 of this industry standard, is retained at the petroleum refining facility and, if applicable maintained on the Internet, for at least five years and made available to a provincial officer or Director upon request as soon as practicable.

(2) A registered person shall ensure that each record mentioned in subsection 49(6) is retained at the petroleum refining facility for at least 10 years and is made available to a provincial officer or Director upon request as soon as possible.

(3) A person required to make a record available under subsections (1) or (2) shall make it available in a form approved by the Director, including, if required by the Director, an electronic format specified by the Director.

(4) In addition to the records mentioned in subsection (1), a registered person shall ensure that each document relating to the recommendations of the manufacturer for each device at the petroleum refining facility with respect to the use, operation and maintenance of the device is retained for the period during which the device is used or operated.

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Appendix 6-A: All Contaminants

Item	Column 1 CAS No.	Column 2 Contaminant
1	71-43-2	Benzene
2	50-32-8	Benzo(a)pyrene

Appendix 6-B: Benzene

Item	Column 1 CAS No.	Column 2 Contaminant
1	71-43-2	Benzene

Appendix 6-C: Benzo(a)pyrene

Item	Column 1 CAS No.	Column 2 Contaminant
1	50-32-8	Benzo(a)pyrene

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Appendix 6-D: Portable Gas Detector - Methodology and Instrumentation

Calibration Gas

1. For the purposes of the procedures set out in this Appendix, the calibration gas used shall be a VOC of a concentration that is no less than 1,000 ppm by volume and no more than 5,000 ppm by volume.

VOCs Leak Monitoring - Instrument Requirements

2. (1) The portable gas detector mentioned in clause 32 (2) (a) of this industry standard shall meet the following criteria:
 1. The portable gas detector shall be designed to detect VOCs using a detector that uses, for example, catalytic oxidation, flame ionization, infrared absorption, or photoionization technologies.
 2. The portable gas detector shall be capable of measuring concentrations that are as low as 100 parts per million by volume.
 3. The scale of the portable gas detector meter shall be readable to ± 2.5 percent of 100 parts per million by volume.
 4. The probe of the portable gas detector shall be fitted with a glass wool plug or filter to prevent plugging of the portable gas detector.
 5. The portable gas detector shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be between 0.10 and 3.0 litres per minute.
 6. The portable gas detector shall be equipped with a probe or probe extension or sampling system not to exceed 6.4 mm (1/4in) in outside diameter, with a single end opening for admission of sample.
 7. The portable gas detector shall be intrinsically safe for operation in explosive airs.
 8. The response factor of the portable gas detector, determined in accordance with subsection (2), shall be less than 10.
 9. The calibration precision of the portable gas detector, determined in accordance with subsection (3), shall be equal to or less than 10 per cent of the calibration gas value.
 10. The response time of the portable gas detector, determined in accordance with subsection (4), shall be equal to or less than 30 seconds.
- (2) The response factor of the portable gas detector shall be determined by recording a response factor published for the portable gas detector or by taking the following steps:
 1. Introduce a calibration gas mixture to the probe of the portable gas detector and record the observed meter reading.
 2. Introduce a zero gas until a stable reading is obtained.
 3. Make a total of three measurements by alternating between the calibration gas and zero gas.
 4. Calculate the response factor for each repetition by dividing the concentration of the reference compound by the concentration observed under paragraph 2.
 5. Determine the response factor of the portable gas detector by taking the average of the three values calculated under paragraph 5.
- (3) The calibration precision shall be determined by taking the following steps:
 1. Introduce a calibration gas mixture to the probe of the portable gas detector and record the observed meter reading.
 2. Introduce a zero gas until a stable reading is obtained.
 3. Make a total of three measurements by alternating between the calibration gas and zero gas.
 4. Calculate the average algebraic difference between the meter readings and the known concentration of the calibration gas mixture.
 5. Divide the average difference mentioned in paragraph 4 by the known concentration of the calibration gas mixture and multiply the result by 100.
- (4) The portable gas detector response time shall be determined by taking the following steps:
 2. Introduce zero gas into the portable gas detector sample probe.
 3. When the meter reading has stabilized, switch quickly to a calibration gas.

4. After switching, measure the time required to attain a reading of 90 percent of the known concentration of the calibration gas.
5. Perform this test sequence three times and record the results. Calculate the average response time.
- (5) A cylinder calibration gas shall not be used for the purposes of this section unless the cylinder calibration gas,
 - (a) has been certified by the manufacturer of the gas to be accurate within 2 per cent and labelled with a shelf life, and
 - (b) the date is earlier than the expiry of the shelf life of the cylinder calibration gas.
- (6) Definitions.

VOCs Leak Monitoring - Methodology

3. (1) When using a portable gas detector for the purposes of this industry standard, the following steps shall be taken to detect a component leak and to determine the concentration of VOCs discharged to air from a leaking component:

1. At the beginning of each day on which part of a component leak survey is performed, the following steps shall be taken:
 - i. Assemble a portable gas detector that meets the criteria set out in subsection 2 (1) of this Appendix.
 - ii. Warm up the portable gas detector according to the manufacturer's instructions.
 - iii. Determine and record,
 - A. the response factor of the portable gas detector, in accordance with subsection 2 (2) of this Appendix,
 - B. the calibration precision of the portable gas detector, in accordance with subsection 2 (3) of this Appendix, and
 - C. the portable gas detector response time, in accordance with subsection 2 (4) of this Appendix.
 - iv. Perform a zero internal calibration procedure for the portable gas detector, and then introduce the calibration gas into the portable gas detector sample probe.
 - v. Adjust the portable gas detector meter readout to correspond to the calibration gas value. If the meter readout cannot be adjusted to the proper value, corrective actions shall be taken before use.
 - vi. If a cylinder calibration gas was used for any of the steps in subparagraphs iii to v, record the manufacturer of the cylinder calibration gas.
2. To assess a component for leaks, the following steps shall be taken:
 - i. Place the probe inlet of the portable gas detector at the surface of the component interface where leakage could occur.
 - ii. Move the probe along the interface periphery, placing the probe as close as possible to the interface periphery, while observing the portable gas detector readout.
 - iii. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained.
 - iv. Leave the probe inlet at this maximum reading location for approximately two times the portable gas detector response time.
 - v. Record the results.

(2) If the component is a valve, for the purpose of subparagraph 2i of subsection (1) place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, sample valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

(3) If the component is a connector, for the purpose of subparagraph 2i of subsection (1), place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of non-permanent joints (such as threaded connections) in a similar manner.

(4) If the component is a pump or compressor, for the purpose of subparagraph 2i of subsection (1), move the probe around the circumference of the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within one cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

(5) If the component is a pressure relief device that is equipped with an enclosed extension or horn, for the purpose of subparagraph 2i of subsection (1), place the probe inlet at approximately the center of the exhaust area to the air.

(6) If the component is an open-ended valve, for the purpose of subparagraph 2i of subsection (1), place the probe inlet at approximately the center of the opening to the air.

(7) If the component is a sample point, instrumentation system or agitator, for the purposes of subparagraph 2i of subsection (1), move the probe around the circumference of the outer surface of the component.

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Appendix 6-E: Optical Gas Imaging - Methodology and Instrumentation

Optical Gas Imaging– OGI Instrument Requirements

1. If this industry standard requires an OGI instrument to be used to determine if VOCs are being discharged to the air from leaks, the OGI instrument shall meet the following criteria:

1. The OGI instrument must be designed to visualize VOC air emissions that would normally be invisible to the naked eye.
2. The OGI instrument must be portable.
3. The OGI instrument must function in weather conditions that occur at the petroleum refining facility in the spring, summer, fall and winter.
4. An operating manual that enables the OGI instrument to be used with minimal training must be present at the facility where the OGI instrument is being used.
5. A written record of operating specifications that identify limits outside of which the OGI instrument may not be used must be present at the facility where the OGI instrument is being used. The specification shall include,
 - i. acceptable operating temperatures of the OGI instrument,
 - ii. maximum wind speed over which the OGI instrument must not be used,
 - iii. minimum and maximum ambient air temperature outside of which the OGI instrument must not be used, and
 - iv. minimum and maximum ambient air humidity outside of which the OGI instrument must not be used.
5. A written record of the detection limits of the OGI instrument for methane, propane, hexane and benzene must be present at the facility where the equipment is being used.
6. The OGI instrument must be capable of recording and storing images.
7. A written record of the maximum image storage capacity of the OGI equipment must be present at the facility where the OGI instrument is being used.
8. The OGI instrument must record the time and identifier code for each image.
9. The OGI instrument must be able to be used with a tripod.

Optical Gas Imaging– Methodology

2. (1) An OGI instrument used for the purposes of this industry standard shall be used in accordance with this section.
- (2) If an OGI instrument is used on a day, the technology shall be calibrated, in accordance with the operating manual prior to use on the day.
- (3) If an OGI instrument is used on a day, a person performing the component leak survey shall ensure that the OGI instrument is operating properly.
- (4) Subject to subsection (5), a tripod support shall be used when the OGI instrument is used to determine if VOCs are being discharged to the air from leaks.
- (5) Subsection (4) does not apply if using a tripod support would lead to unsafe circumstances and a record is made setting out why using a tripod would lead to unsafe circumstances.

Appendix 6-F: Fixed Leak Detection System - Methodology and Instrumentation

Fixed leak detection system – Instrument Requirements

1. A fixed leak detection system mentioned in clause 32 (2) (c) of this industry standard shall meet the following criteria:
 1. The fixed leak detection system shall be located close enough to a component to measure the concentration of VOCs discharged from the component.
 2. The fixed leak detection system shall be located no farther from a component mentioned in paragraph 1 than the distance set out in the operating and maintenance manual provided by a manufacturer or supplier of fixed leak detection systems.
 3. The fixed leak detection system shall sample the air at a time interval of at least one time every 15 minutes.
 4. The results of the sampling and analysis shall be stored in an electronic data acquisition system.
 5. The fixed leak detection system shall measure the concentration of VOCs discharged from a component in at least 32,000 samples per year.

Consultation Question:

Are there any other instrumentation requirements or operating methodology requirements that would be useful to include for a fixed leak detection system?