

(Effective December 27, 2024)

WAC 296-67-323 Hazard analyses. (1) Process hazard analysis (PHA).

(a) The employer must perform and document an effective PHA appropriate to the complexity of each process, in order to identify, evaluate, and control hazards associated with each process. All initial PHAs for processes not previously covered by WAC 296-67-017 must be completed within three years of the effective date of Part B of this chapter. PHAs performed in accordance with the requirements of WAC 296-67-017 must satisfy the initial PHA requirements of Part B of this chapter. All modes of operation pursuant to WAC 296-67-327 Operating procedures, must be covered by the PHA.

(b) The employer must determine and document the priority order for performing PHAs based on the complexity, severity, and extent of process hazards, the number of potentially affected employees, the age of the process and the process operating history. The employer must use at least one of the following methodologies:

- (i) What-if;
- (ii) Checklist;
- (iii) What-if/checklist;
- (iv) Hazard and operability study (HAZOP);
- (v) Failure mode and effects analysis (FMEA);
- (vi) Fault tree analysis; or

(vii) Other PHA methods recognized by engineering organizations or governmental agencies.

(c) The PHA must address:

- (i) The hazards of the process;
- (ii) Previous publicly documented process safety incidents in the petroleum refinery and petrochemical industry sectors that are relevant to the process;
- (iii) DMR reports that are applicable to the process;
- (iv) HCA reports that are applicable to the process;
- (v) Potential consequences of failures of process equipment;
- (vi) Facility siting, including the placement of processes, equipment, buildings, employee occupancies and work stations, in order to effectively protect employees from process safety hazards;
- (vii) Human factors;
- (viii) A qualitative evaluation of the types, severity and likelihood of possible incidents that could result from a failure of the process or of process equipment;
- (ix) The potential effects of external events, including seismic events, if applicable;
- (x) The findings of incident investigations relevant to the process;
- (xi) A review of applicable management of change (MOC) documents completed since the last PHA; and
- (xii) Engineering and administrative controls associated with the process.

(d) The PHA must be performed by a team with expertise in engineering and process operations, and must include at least one refinery operating employee who currently works in or provides training about the process, and who has experience and knowledge specific to the process being evaluated. The team must also include one member with expertise in the specific PHA methodology being used. As necessary, the team must consult with individuals with expertise in damage mecha-

nisms, process chemistry, safeguard protection analysis, and control systems.

(e) The team must document its findings and recommendations in a PHA report, which must be available to affected employees whose work assignments are in the petroleum refinery and who may be affected by the findings and recommendations.

(f) The PHA report must include:

(i) The methodologies, analyses and factors considered by the PHA team;

(ii) The findings of the PHA team; and

(iii) The PHA team's recommendations, including additional safeguards to address any deficiencies identified by the SPA.

(g) At least every five years, the written PHA must be updated and revalidated in accordance with the requirements of this section to ensure that the PHA is consistent with the current process.

(2) Safeguard protection analysis.

(a) For each scenario in the PHA that identifies the potential for a process safety incident, the employer must perform:

(i) An effective written safeguard protection analysis (SPA) to determine the effectiveness of existing individual safeguards;

(ii) The combined effectiveness of all existing safeguards for each failure scenario in the PHA;

(iii) The individual and combined effectiveness of safeguards recommended in the PHA; and

(iv) The individual and combined effectiveness of additional or alternative safeguards that may be needed.

(b) All independent protection layers for each failure scenario must be independent of each other and independent of initiating causes.

(c) The SPA must utilize a quantitative or semi-quantitative method, such as layer of protection analysis (LOPA), or an equally effective method to identify the most protective safeguards. The risk reduction attainable by each safeguard must be based on site-specific failure rate data, or in the absence of such data, industry failure rate data for each device, system, or human factor.

(d) The SPA must be performed by at least one individual with expertise in the specific SPA methodology being used. The SPA may be performed as part of the PHA or as a stand-alone analysis.

(e) The SPA must document the likelihood and severity of all potential initiating events, including equipment failures, human factors, loss of flow control, loss of pressure control, loss of temperature control, loss of level control, excess reaction, and other conditions that may lead to a loss of containment. The SPA must document the risk reduction achieved by each safeguard for all potential initiating events.

(f) The employer must complete all SPAs within six months of the completion or revalidation of the PHA.

(3) Hierarchy of hazard controls analysis.

(a) The employer must perform an HCA in a timely manner as follows:

(i) For all recommendations made by a PHA team for each scenario that identifies the potential for a process safety incident;

(ii) For all recommendations that result from the investigation of a process safety incident;

(iii) As part of managing changes, whenever a major change is proposed; and

- (iv) During the design and review of new processes, new process units, new facilities, and their related process equipment.
- (b) All HCAs for facility processes must be updated and revalidated as standalone analyses at least once every five years, and can be performed in conjunction with the PHA schedule.
- (c) HCAs must be documented and performed by a team with expertise in engineering and process operations. The team must include one member knowledgeable in the HCA methodology being used, and at least one operating employee who currently operates the process and has expertise and experience in the process being evaluated. As necessary, the team must consult with individuals with expertise in damage mechanisms, process chemistry, and control systems.
- (d) The HCA team must:
 - (i) Compile or develop all risk-relevant data for each process;
 - (ii) Identify, characterize, and prioritize risks posed by each process safety hazard;
 - (iii) Identify, analyze, and document all inherent safety measures and safeguards for each process safety hazard in the following sequence and priority order, from most preferred to least preferred:
 - (A) First order inherent safety measures;
 - (B) Second order inherent safety measures;
 - (C) Passive safeguards;
 - (D) Active safeguards; and
 - (E) Procedural safeguards.
 - (iv) For purposes of this section, first order inherent safety measures are considered to be most effective and procedural safeguards are considered to be least effective;
 - (v) Identify, analyze, and document relevant, publicly available information on inherent safety measures and safeguards. This information must include inherent safety measures and safeguards that have been:
 - (A) Achieved in practice by the petroleum refining industry and related industrial sectors; and
 - (B) Required or recommended for the petroleum refining industry by a federal or state agency or in a regulation or report.
 - (vi) For each process safety hazard identified, develop written recommendations in the following sequence and priority order:
 - (A) Eliminate hazards to the greatest extent feasible using first order inherent safety measures;
 - (B) Reduce any remaining hazards to the greatest extent feasible using second order inherent safety measures;
 - (C) Effectively reduce remaining risks using passive safeguards;
 - (D) Effectively reduce remaining risks using active safeguards;and
 - (E) Effectively reduce remaining risks using procedural safeguards.
 - (e) The HCA team must complete an HCA report within 90 calendar days of developing the recommendations. The employer must append the HCA report to the PHA report. The report must include:
 - (i) A description of the composition and qualification of the team;
 - (ii) A description of the HCA methodology used by the team;
 - (iii) A description of each process safety hazard analyzed by the team;
 - (iv) A description of the inherent safety measures and safeguards analyzed by the team; and

(v) The rationale for the inherent safety measures and safeguards recommended by the team for each process safety hazard.

(4) The employer must implement all recommendations pursuant to WAC 296-67-383 Corrective action program.

(5) Employers must retain the initial, updated and revalidation of PHAs, SPAs, and HCAs for each process covered by this part, as well as the documented resolution of recommendations described in this section, for the life of the process.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060, and chapter 49.17 RCW. WSR 24-02-037, § 296-67-323, filed 12/27/23, effective 12/27/24.]