

Survey of Economic Impact of Proposed Washington Process Safety Management Rule for Petroleum Refineries

INTRODUCTION:

The purpose of this survey is to estimate both new costs and benefits your business may incur due to the new and amended requirements in the proposed Process Safety Management rule for petroleum refineries. Your answers are very important for us to accurately estimate the economic impact of the proposed rule on affected businesses.

There are 16 sections in this survey:

- [Section 1](#): General Overview
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Each section includes the Washington State Department of Labor & Industries' internal cost estimates for significant components of the rule, including contracting costs. Annual average costs are estimated over ten years, and are presented in terms of 10,000 barrels per calendar day (bpd) of production capacity. Costs of corrective actions resulting from the various analyses required under the proposed rule (e.g. PHAs, HCAs, etc.) are attributed to the Corrective Action Program.

Please answer the questions the best you can. If you do not have the exact information, use your best estimate.

Per RCW 42.56.070(19), information gathered under chapter [19.85](#) RCW (Regulatory Fairness Act) or RCW [34.05.328](#) (Significant Legislative Rules) that can be identified to a particular business is exempt from public disclosure.

If you have any questions about the survey, please contact:

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Section 1: General Overview Questions

1. In qualitative terms, how many additional resources do you think your company will need to meet the new PSM requirements? **Please indicate the answer that best describes your refinery’s situation.**

- No additional resources required. We are meeting virtually all of the requirements already.
- Marginal additional resources required. We are doing many of the things required, but will need to adjust them somewhat and/or report them differently.
- Significant additional resources required. We will need to hire people, buy equipment, and redesign processes, etc. in order to meet the proposed regulatory requirements.
- Major additional resources required. We will have to make big changes and completely restructure our safety regime.

2. Does your refinery break out PSM costs from other refinery operations or production costs?

- Yes
- No

If you break out this cost, about how much do you spend CURRENTLY on the PSM related activities each year? **Please estimate to the nearest \$100,000.** _____.

3. Based on internal research, our preliminary estimate is that the PROPOSED rule will create NEW costs ranging from **\$104 thousand to \$1.12 million per year, per 10 thousand bpd** of capacity over a ten-year period (e.g. a refinery with an average capacity of 125 thousand bpd would incur costs of **\$1.3 million to \$13.9 million per year**)

Do you estimate that your costs of complying with the PROPOSED rule will significantly differ from this range?

- Yes
- No

If yes, please provide an estimate of the expected compliance cost for your facility.

4. How confident are you in the cost estimates given in response to the prior questions? Please indicate the answer that describes your confidence level.

- Not very confident.
- Somewhat confident. Significant uncertainty regarding cost.
- Confident. Informed estimate.
- Very confident. Data-driven analysis.

5. (Optional) What is the production capacity of your refinery measured in barrels per calendar day?

Section 2: Process Safety Management Program -WAC 296-67-311

1. Do you currently use the program management approaches required by the proposed rule?

Yes No

If no, please describe the ways in which your current program is similar and the ways in which it differs.

2. Please estimate the annual costs of your CURRENT program management, in terms of personnel and other costs.

3. Internal estimate of compliance cost under the PROPOSED rule:

- Employers are estimated to utilize 120-160 hours of manager’s time to revise their written program to cover new requirements, incurring a one-time cost of approximately \$15,000 - \$20,000 per refinery.
- Updating the written program is estimated to require 20 hours of manager’s time every three years, costing \$830 annually per refinery.
- *Note: Program management costs arising from other provisions are attributed and counted in those specific sections.*

Do you estimate that your cost of complying with these requirements will significantly differ from this range? Yes No

If yes, please detail how they will differ.

4. How much additional cost would you expect to incur under this PROPOSED rule? Please indicate whether each source of additional cost is a one-time upfront cost or recurring annual cost.

5. Please describe any potential cost savings associated with the revised program management procedures under the proposed rule.

Section 2.1: Process Safety Performance Indicators -WAC 296-67-311 (4)

1. Do you currently have a program for tracking and reporting process safety performance indicators (PIs)?

Yes No, skip to question 4.

2. Please estimate the costs of your CURRENT program for tracking and reporting performance indicators in terms of personnel and other costs.

3. Will your current PI program satisfy the requirements of the proposed rule?

Yes No

If not, please estimate the additional costs that would be incurred in terms of personnel, consulting, and other costs to comply with the PROPOSED rule. Indicate whether each source of cost is a one-time upfront cost or is a recurring annual cost.

4. Internal estimate of compliance cost under the PROPOSED rule:

- We estimate that establishing a new program for tracking PIs will require 440-550 hours of engineering time, and incur one-time costs in the range of \$42,000 - \$52,600 per refinery.
- We estimate that tracking and reporting PIs will create additional ongoing labor burden of 96-120 hours of engineering time annually, and will incur costs of \$9,200 - \$11,500 annually.
- Overall, we estimate the PI requirement will add **\$1,100 - \$1,400 per 10,000 bpd** in annual costs.

Do you estimate that your cost of complying with these requirements will significantly differ from this range? Yes No

If yes, please detail how your costs will differ.

5. Please describe any cost savings associated with the new performance indicator tracking and reporting processes in the proposed rule.

Section 3: Employee Collaboration - WAC 296-67-315

1. Do you anticipate that your program for employee collaboration (participation) will significantly change under the proposed rule?

Yes No

If yes, please describe how the program will change and estimate the costs associated with the change. Indicate whether the additional costs are one-time or recurring.

2. Internal estimate of compliance cost under the PROPOSED rule:

- We estimate that revision of the written employee collaboration plan, the development of stop work authority (SWA) procedures, and employee training for SWA will require 270-464 labor hours and incur one-time costs of \$18,700 - \$29,500 per refinery.
- Employee collaboration will also add initial and ongoing costs to various other PSM elements. These costs will be attributed and counted in those specific sections.

Do you expect your cost of complying with these requirements to differ significantly from this cost range?

Yes No

If yes, please detail how they will differ.

3. How frequently has your refinery experienced unplanned downtime over the past ten years?

4. How long (in approximate number of days) did these unplanned downtime events last?

5. What was the approximate percentage of refinery capacity lost in each incident?

Section 4: Process Safety Information -WAC 296-67-319

1. Will you need to develop or revise process safety information (PSI) for any processes not previously covered by PSM?

Yes No

If yes, please estimate the total costs of developing PSI for these processes in terms of personnel costs, costs of consultant services, and other costs.

2. Internal estimate of compliance cost under the PROPOSED rule:

- Development of a program for integrity operating windows and the review and compilation of RAGAGEP for PSI are estimated to require 212-380 labor hours per refinery and incur initial costs of \$12,000 - \$21,000.
- We estimate that developing new PSI requires 450-2,200 labor hours per process and costs \$29,000 - \$199,000.
- Overall, the proposed rule would create annual costs of **\$600 - \$10,700 per 10,000 bpd** of capacity over a ten year period.

Do you expect your cost of complying with these requirements to significantly differ from our estimates?

Yes No

If yes, please detail how your costs differ.

Section 5: Process Hazard Analysis -WAC 296-67-323

1. Internal estimate of PHA costs under the CURRENT rule:

- We estimate that initial PHA(s) require 680 – 1,100 labor hours to complete and cost \$63,000 - \$105,000 per process.
- Revalidations of PHAs in compliance with the current rule are estimated to require 340-550 labor hours and cost \$31,000 - \$53,000 per process.
- Corrective actions resulting from initial PHAs are estimated to require average capital expenditures of \$75,000 - \$105,000 per process.

Do your costs of conducting PHAs under the CURRENT rule significantly differ from our estimates?

Yes No

If yes, please detail how your costs differ.

2. Will your costs of conducting new PHAs or revalidating existing PHAs for a process change under the new rule? Yes No

If yes, please describe how the cost of PHAs will change and whether the additional costs are one-time or recurring costs?

3. Are there any processes not previously not covered by PSM that would require new initial PHAs to comply with the proposed rule?

Yes, approximate number _____ No.

4. Internal estimate of PHA costs under the PROPOSED rule:

- Considering the new elements that must be included in PHAs as well as the revised employee collaboration requirement in the proposed rule, we estimate that initial PHA(s) for a process will require 850 – 1,360 labor hours to complete and cost \$72,000 - \$118,000 per process.
- Revalidations of PHAs are estimated to require 424-678 labor hours and cost \$36,000 - \$59,000 per process.
- Excluding the cost of corrective actions, we estimate that the revised PHA requirement will add annual costs of **\$6,800 - \$21,400 per 10,000 bpd** of productive capacity.
- *Note: We include costs estimates for corrective actions in the corrective action program.*

Do you estimate that your cost of complying with these requirements will significantly differ from this range? Yes No

If yes, please detail how your costs differ.

5. Please estimate the costs associated with conducting the new PHAs in terms of personnel costs, costs of consultant services, and other costs. Indicate whether each source of cost is a one-time upfront cost or recurring annual cost.

6. Please estimate the costs of implementing recommendations resulting from new PHAs. Indicate whether each source of cost is a one-time cost or recurring annual cost.

Section 5.2: Safeguard Protection Analysis - WAC 296-67-323(2)

1. Do you currently do Layer of Protection Analyses (LOPA) or some other form of Safeguard Protection Analysis (SPA)?

Yes No if no, skip to 7.

2. Do you currently do SPAs in a way that would meet the requirements of the proposed rule?

Yes No, if no

3. How frequently do you currently conduct SPAs? Do you have a formal schedule for revalidation of SPAs? _____

4. Please estimate the annual costs of your current SPA procedure, in terms of personnel and other costs (excluding corrective actions). Indicate whether each cost is a one-time or recurring annual cost.

5. If your facility currently does SPAs, please describe typical corrective actions that follow SPA recommendations, along with the associated costs.

6. Would your procedures for doing SPAs change under the new requirements?

Yes No,

If yes, please explain how they would change.

7. Internal estimate of compliance cost under the PROPOSED rule:

- We estimate that program development for SPAs will require 280-560 labor hours and incur a one-time cost of \$22,900 - \$46,000 per refinery.
- We estimate that initial SPAs for a process will require 92-405 labor hours and cost \$7,300 - \$32,100.
- Revalidations of SPAs are estimated to require 46-202 labor hours and cost \$3,600 - \$16,000 per process.

- Excluding the cost of corrective actions, we estimate that the new SPA requirement will add annual costs ranging from **\$1,100 to \$6,000 per 10,000 bpd** of productive capacity.
- *Note: We include costs estimates for corrective actions in the corrective action program.*

Do you estimate that your cost of conducting SPAs as required by the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

8. How much new SPA work (expressed in terms of cost) would you estimate doing under the proposed rule? Indicate whether each source of additional cost is a one-time upfront cost or recurring annual cost.

9. Please describe corrective actions that you anticipate resulting from SPAs, along with the associated costs.

10. Please describe any cost savings associated with the SPA requirement and the actions that follow recommendations.

Section 5.3: Hierarchy of Hazard Control Analysis –WAC 296-67-323(3)

1. Do you currently do hierarchy of hazard controls analyses (HCAs) or a related method of inherently safer systems design (ISS/D) analyses?

- Yes No, skip to question 8.

2. Do you currently have a written program for conducting HCAs?

- Yes No

3. About how many HCAs do you currently do each year? _____

4. Do you conduct HCAs in all circumstances required by the proposed rule?

- Yes No

If no, please describe the situations in which HCAs are conducted.

5. Please estimate the total annual costs of current HCAs, in terms of personnel and other costs.

6. Please describe typical corrective actions (e.g. increased inspection frequency, repairs, or replacements/infrastructure costs) that follow HCA recommendations. Please estimate the costs of the actions.

7. Would your procedures for doing HCAs change under the new requirements?

- Yes No

8. Internal estimate of HCA compliance costs under the PROPOSED rule:

- | |
|---|
| <ul style="list-style-type: none">• We estimate that developing a new program for conducting HCAs would require 720 – 960 labor hours and incur one-time costs of \$57,400 – \$76,600 per refinery. |
|---|

- We estimate that ‘stand-alone’ HCAs for new or existing processes and HCAs resulting from ‘major changes’ will require 144-816 labor hours and cost \$12,400 - \$74,000 per HCA.
- Revalidation of HCAs are estimated to require 72–408 labor hours and cost \$6,200 - \$37,000 per process.
- HCAs originating from PHAs or incident investigations, which are narrower in scope, are estimated to require 20-144 total labor hours and have costs of \$1,500 - \$12,500 per HCA.
- Excluding the costs of corrective actions, we estimate that compliance with the HCA provision of the proposed rule will add annual costs of **\$12,000 - \$602,000 per 10,000 bpd** of capacity.
- *Note: We include costs estimates for corrective actions in the corrective action program.*

Do you estimate that your cost of conducting HCAs as required under the PROPOSED rule will significantly differ from this range?

Yes No

If yes, please detail how your estimated costs differ.

9. How many HCAs would you estimate doing annually under this proposed rule?

10. Please provide program cost estimates for a single HCA, broken out by staffing costs, contractor costs, equipment costs, and other costs.

11. Would the typical actions that follow HCA recommendations change under the new requirements? Please describe the costs associated with these changes.

12. Please describe any cost savings that may result from HCA procedures and the actions that follow the recommendations.

Section 6: Operating Procedures -WAC 296-67-327

1. Will you need to develop or revise operating procedures for any processes not previously covered by PSM?

Yes No

If yes, please estimate the total costs of developing operating procedures for these processes in terms of personnel costs, costs of consultant services, and other costs.

2. Internal estimate of compliance cost under the PROPOSED rule:

- The development of operating procedures for newly covered processes is estimated to require 126-140 labor hours and cost \$10,000 - \$11,000 per process.
- Annual updates of operating procedures are estimated to require 24-26 hours per process and cost \$1,700 - \$1,800.
- Overall, we estimate that the proposed rule will add annual costs of **\$400 - \$1,300 per 10,000 bpd** of capacity.

Do you expect your cost of complying with these requirements to significantly differ from our estimates?

Yes No

If yes, please detail how your costs differ.

Section 7: Training -WAC 296-67-331

1. Do you expect the proposed rule to prompt significant changes in your training programs?

Yes No

If yes, please describe the nature and estimated costs of these changes. Please indicate whether these costs are one-time or recurring costs.

2. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that revision of process safety training programs will require 500-644 labor hours and involve initial costs of \$44,500 - \$57,600 for the average refinery in Washington.
- Affected operators and maintenance employees are estimated to receive 24-40 of initial process safety training and 9-16 hours of refresher training every three years.
- We estimate that the revised training requirements for maintenance employees will add initial costs of \$80,000 - \$134,000 for the average refinery and ongoing annual costs of \$12,000-\$21,000.
- Employees of contractors are estimated to receive 16-24 hours of initial process safety training.
- We estimate that the revised training requirements for affected contractors will add one-time costs of \$344,000 - \$516,000 for the average refinery.
- Overall, we estimate that refineries will incur additional annual costs of **\$5,300 - \$8,200 per 10,000 bpd.**

Do you estimate that your cost of complying with these requirements will significantly differ from this range?

Yes No

If yes, please detail how your estimated costs differ.

Section 8: Pre-startup Safety Review -WAC 296-67-339

1. About how many pre-startup safety reviews (PSSRs) do you currently conduct each year?

_____.

2. Please estimate the cost of a typical PSSR under the current rule in terms of personal and other costs.

3. Will your procedures for PSSRs significantly change under the proposed rule?

Yes No

If yes, provide a brief explanation. _____

4. How many PSSRs do you anticipate doing each year under the proposed rule?

_____.

5. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that each PSSR will require 24-72 labors hours to conduct and will incur costs of \$1,500 - \$4,700.
- Compliance with the revised PSSR requirement is estimated to cost an additional **\$2,500 - \$15,400 per 10,000 bpd.**

Do you estimate that your cost of conducting PSSRs as required under the PROPOSED rule will significantly differ from this range?

Yes No

If yes, please detail how your estimated costs differ.

Section 9: Mechanical Integrity –WAC 296-67-343

1. Does your current Mechanical Integrity (MI) program meet the requirements of the proposed rule?

- Yes No

If not, explain what changes you will need to make to comply. _____

2. Do you have a process for evaluating new or updated codes and standards and implementing (internal or external) RAGAGEP changes?

- Yes No

3. Please estimate the costs of changes to your (internal or external) RAGAGEP and/or MI programs. Please indicate whether these costs are one-time or recurring costs.

4. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that development of a written program for updating codes and standards and implementing RAGAGEP will require 96-160 labor hours and incur a one-time cost of \$7,300 - \$12,200 per facility.
- We estimate that refineries will expend 1,344 – 3,840 labor hours annually and incur annual costs of \$96,000 - \$275,000 to comply with **(343)(5)(f)**.
- We estimate that bringing newly covered processes into compliance with MI will require initial costs of \$2,500 - \$5,400 per process and recurring annual costs of \$16,000 - \$120,000 per process.
- Overall, we estimate that the MI requirements in the proposed rule will add annual costs of **\$8,800 - \$68,100 per 10,000 bpd** of capacity.

Do you estimate that your cost of complying with these requirements will significantly differ from this range?

- Yes No

If yes, please detail how your estimated costs differ.

Section 10: Damage Mechanism Review -WAC 296-67-347

1. Do you currently conduct Damage Mechanism Reviews (DMRs)?

- Yes No, skip to question 7.

2. Do you currently do DMRs for all processes and circumstances covered in the proposed rule?

- Yes No

If not, please describe the situations in which DMRs are conducted.

3. How many DMRs do you currently do each year on average?

4. Please estimate the total annual costs of current DMR procedures, in terms of personnel and other costs.

5. Please describe typical actions that follow DMR recommendations and the associated costs. Please indicate which costs are one-time costs and which are recurring costs.

6. Would the typical actions that follow DMR recommendations change under the new requirements?

- Yes No

Please describe the costs associated with these changes. Please indicate which costs are one-time costs and which are recurring costs.

7. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that developing a new written program and methodology for conducting DMRs will require 280-560 labor hours and incur a one-time costs of \$23,000 - \$46,000 per refinery.
- We estimate that conducting an initial DMR for an entire process will require 160-560 labor hours and cost \$15,000 - \$52,500 per process.
- Revalidations of DMRs for processes are estimated to require 80-280 labor hours and cost \$7,500 - \$26,300.
- Excluding the cost of corrective actions, we estimate that compliance with the DMR provision will add annual costs of **\$2,100 - \$67,400 per 10,000 bpd** over a ten year period.
- *Note: We include costs estimates for corrective actions in the corrective action program.*

Do you estimate that your cost of conducting DMRs as required under the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

8. Please provide program cost estimates for a single “typical” DMR, broken out by staffing costs, contractor costs, and other costs. Please indicate which costs are one-time costs and which are recurring costs.

9. How many DMRs would you estimate doing annually to comply with the proposed rule?

10. Please describe any cost savings associated with the DMR process and the actions that follow the recommendations.

Section 11: Management of Change –WAC 296-67-355

1. About how many management of change reviews (MOCs) do you currently conduct on an annual basis? _____.

2. Please estimate the total annual costs of current MOC procedures, in terms of personnel and other costs.

3. Will your procedures for MOCs significantly change under the proposed rule?

Yes No

If yes, provide a brief explanation _____

4. How many MOCs do you anticipate doing each year under the proposed rule?

_____.

5. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that revision of written Management of Change (MOC) procedures will require 16-24 labor hours and incur one-time costs of \$2,000 - \$3,000 per refinery.
- Under the new requirements, MOCs for newly covered processes are estimated to require 122-217 labor hours and cost \$9,000 - \$16,000.
- We estimate that proposed revisions to MOC requirement will create additional annual costs of **\$9,900 – \$130,000 per 10,000 bpd** over a ten year period.

Do you estimate that your cost of conducting MOCs as required under the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

Section 12: Management of Organizational Change –WAC 296-67-359

1. Do you currently have written procedures to manage organizational changes?

Yes No

2. Will your current procedures need to be modified to comply with the rule?

Yes No

If yes, explain how your procedures will change _____

3. Given your understanding of the proposed rule, how many MOOC assessments would you expect to conduct annually? _____

4. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that developing a written program for Management of Organizational Change (MOOC) will require 90-120 labor hours and incur an initial cost of \$6,700 - \$9,000 per refinery.
- Each MOOC analysis will require an estimated 145-242 labor hours and cost \$12,100-\$20,200.
- Overall, we estimate that compliance with the MOOC provision will add annual costs of **\$250 - \$400 per 10,000 bpd** over a ten year period.

Do you estimate that your costs of conducting MOOCs as required under the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

Section 13: Incident Investigation --Root Cause Analysis -WAC 296-67-363

1. Taking the last three years as representative, about how many incident investigations do you currently conduct each year to comply with the PSM rule? _____

2. Given your understanding of the proposed rule, how many additional incident investigations do you anticipate conducting? _____

3. Please estimate the total annual costs of current incident investigation procedures, in terms of personnel and other costs.

4. Do you currently include root causes analysis (RCAs) as part of your incident investigation procedures? Yes No, skip to question 10.

5. For what type of incidents or events do you conduct RCAs? _____

6. Please provide program cost estimates for a single RCA, broken out by staffing costs, contractor costs, and other costs.

7. Please describe typical actions that follow RCA recommendations and provide estimates of the associated costs.

8. Would your procedures for doing RCAs change under the new requirements?

Yes No

If yes, describe how they would change.

9. Would the typical corrective actions that follow RCA recommendations change under the new requirements? Please describe the costs associated with these changes.

10. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that developing a new written program for conducting root cause analyses (RCAs) and training affected personal will require 1,080-1,880 labor hours and incur a one-time cost of \$73,000 - \$129,000 per refinery.
- We estimate that complying with the RCA requirement will increase the labor burden of each incident investigation by 54-157 hours and add costs of \$4,500 - \$16,000 per investigation.
- Excluding the costs of corrective actions and other recommended analyses, we estimate that the requirement to conduct RCAs for all investigations involving 'process safety incidents' will add annual costs of **\$5,900 - \$63,000 per 10,000 bpd** of capacity.
- *Note: The cost of corrective actions is estimated with the corrective action program.*

Do you estimate that your cost of conducting RCAs as required under the PROPOSED rule will significantly differ from this range?

Yes No

If yes, please detail how your estimated costs differ.

11. Please describe any cost savings associated with the RCA process and the actions that follow the recommendations.

Section 14: Process Safety Culture Assessment –WAC 296-67-375

1. Do you currently conduct process safety culture assessments (PSCAs) at your facility?

Yes No, skip to question 7.

2. Do you have a written PSCA program? Yes No

3. Do you currently do PSCAs using methods and frequency that would comply with the proposed rule?

Yes No

If not, briefly explain what would need to change.

4. Please estimate the total annual costs of current PSCAs, in terms of personnel and other costs.

5. Please describe typical actions and associated costs that follow the production of a safety culture report and action plan (e.g. increased training, restructuring of management systems or procedures). Please indicate which costs are one-time costs and which are recurring costs.

6. Would your procedures for doing PSCAs change under new requirements? Yes No

If yes, briefly explain what would need to change.

7. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that developing a new PSCA program and methodology as well as training employees will require 4,836 - 6,188 labor hours and incur a one-time initial cost of \$558,000 - \$856,000 per refinery.
- Ongoing costs from performing a PSCA and developing a report every five years, implementing a corrective action plan, and developing an interim written assessment are estimated to require 310-446 labor hours annually and incur cost of \$24,800 - \$36,800 per refinery.
- Overall, we estimate that the PSCA requirement will add annual costs of **\$7,000 - \$10,700 per 10,000 bpd** of capacity.

Do you estimate that your cost of conducting PSCAs as required under the PROPOSED rule will significantly differ from this range?

Yes No

If yes, please detail how your estimated costs differ.

8. Please describe any cost savings associated with the PSCA process and the actions that follow the recommendations.

Section 15: Human Factors -WAC 296-67-379

1. Do you currently conduct human factors (HF) analyses at your facility?

Yes No, skip to question 7.

2. Do you currently have a written human factors program?

Yes No

3. If you have such a program, does it meet all of the requirements of the proposed rule?

Yes No

If no, briefly describe how it differs. _____

4. Please estimate the annual costs of your current human factors program, in terms of personnel and other costs.

5. Please describe typical actions that follow human factors analyses and provide estimates of the associated costs.

6. Would your procedures for assessing and managing human factors change under the new requirements? Yes No

If yes, briefly describe how it would change _____

7. Internal estimate of compliance costs under the PROPOSED rule:

- We estimate that developing a new human factors program and training affected personnel will involve 2,462 – 4,008 labor hours and incur a one-time cost of \$164,000 - \$251,000 per refinery.
- An initial HF analysis for a process is estimated to require 176-648 labor hours and cost \$12,700 - \$50,100 per process.
- Revisions of operating and maintenance procedures resulting from HF analyses are estimated to require 24-160 labor hours and cost \$1,600 – \$12,200 per process.
- Excluding costs of corrective actions, we estimate that the proposed human factors requirement will add annual costs of **\$2,900 - \$10,700 per 10,000 bpd** of capacity.
- *Note: Cost of corrective actions estimated with the corrective action program.*

Do you estimate that your cost of complying with the human factors requirement under the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

8. How much new human factors work (expressed in terms of cost) would you estimate is required under the PROPOSED rule?

9. Would the typical actions that follow human factors analysis change under the new requirements? Please describe the cost associated with these changes and indicate which costs are one-time costs and which are recurring costs.

10. Please describe any cost savings associated with the human factors process and the actions that follow recommendations.

Section 16: Corrective Action Program –WAC 296-67-383

1. Do you currently have a written corrective action program to implement the recommendations of PHAs, incident investigations, and/or other related analyses?

Yes No

2. Will your current corrective action program require any changes to meet the requirements of the proposed rule?

Yes No

If yes, please describe how it would change _____

3. Internal estimate of compliance cost under the PROPOSED rule:

- We estimate that developing a new corrective action program will require 1,280-2,160 labor hours and incur a one-time initial cost of \$144,000 - \$295,000 per refinery.
- Ongoing annual costs of administering the program are estimated to be 288-384 labor hours and \$25,700 - \$34,400 per refinery.
- New annual costs of corrective actions resulting from all analyses required by the propose PSM rule are estimated to be **\$49,000 - \$104,000 per process** for the first five years and **\$24,000 - \$52,000 per process** in subsequent years.
- Including both the costs of administering the corrective action program and implementing recommended corrective actions, we estimate new annual costs of **\$34,000 - \$95,000 per 10,000 bpd** of capacity over a ten year period.

Do you estimate that your cost of complying with the corrective action requirement under the PROPOSED rule will significantly differ from this range? Yes No

If yes, please detail how your estimated costs differ.

4. Please estimate the additional costs that would be incurred in terms of personnel, consulting services, and other costs. Please indicate whether each cost is a one-time upfront cost or recurring annual cost.

Overall

How confident are you in the cost and cost saving estimates given in response to the prior questions?
Please indicate the answer that describes your confidence level.

- Not very confident.
- Somewhat confident. Significant uncertainty regarding costs and or cost savings.
- Confident. Informed estimate.
- Very confident. Data-driven analysis.