Comments of the American Fuel & Petrochemical Manufacturers on the U.S. Environmental Protection Agency's Accident Prevention Release Requirements: Risk Management Programs under the Clean Air Act

Proposed Rule

Docket No. EPA-HQ-OEM-2015-0725

83 Fed. Reg. 24,850 (May 30, 2018)

Lara Swett
American Fuel & Petrochemical Manufacturers
1667 K Street, NW, Suite 700
Washington DC 20006

Contents

INTRODUCTION

The American Fuel & Petrochemical Manufacturers ("AFPM") appreciate this opportunity to comment on the Proposal by the U.S. Environmental Protection Agency ("EPA") to improve the Risk Management Program ("RMP")[1] by reevaluating the 2017 amendments to the program (the "Amendments").[2]

AFPM's members encompass virtually all U.S. refining and petrochemical manufacturing capacity. Refiners and petrochemical manufacturers work with complex equipment and hazardous materials regulated under the Occupational Safety & Health Administration's ("OSHA's") Process Safety Management ("PSM") regulations and EPA's RMP regulations. Beyond basic compliance with the regulations, AFPM's members invest significant resources in their people, facilities, work processes, equipment, and procedures to enhance the safety of our employees, facilities, and communities. Our members' strong commitment to safety plays a key role in driving continuous improvement in risk management and process safety performance.

Given our members' significant interest in any RMP changes, AFPM appreciates the opportunity to engage with EPA on this important issue. AFPM incorporates by reference its earlier comments on the Amendments[3] and the RMP Coalition Petition for Reconsideration.[4]

---

[1] Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, 83 Fed. Reg. 24,850 (May 30, 2018) (Proposal).

[2] Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, 82 Fed. Reg. 4,594 (Jan. 13, 2017) (Amendments).

[3] AFPM Comments on EPA's Proposed Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7) (EPA-HQ-OEM-2015-0725-0579 and EPA-HQ-OEM-2015-0725-0580) (May 13, 2016) ("AFPM 2016 Comments"); Supplemental Comments on EPA's Proposed Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7) (EPA-HQ-OEM-2015-0725-0579 and EPA-HQ-OEM-2015-0725-0580) (Nov. 16, 2016).

[4] RMP Coalition Petition for Reconsideration and Request for Agency Stay Pending Reconsideration and Judicial Review of Final Rule entitled *Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act* (EPA-HQ-OEM-2015-0725-0759) (Feb. 28, 2017) (the "Petition").

AFPM discusses these earlier submissions in further detail below, so that they may inform EPA's deliberations on the Proposal.

EXECUTIVE SUMMARY

Safety is a core value of refiners and petrochemical manufacturers. AFPM's members have invested billions of dollars to protect workers, communities, first-responders, and facilities. That investment has resulted in a ten-fold decrease in the rate of injuries at refineries and petrochemical plants, making them among the nation's safest industrial sectors.

The RMP and PSM regulations provide a comprehensive framework for enhancing process safety. EPA and OSHA designed this framework to be performance-based. PSM and RMP set minimum compliance expectations, and allow facilities the flexibility necessary to apply best engineering practices to promote safety at a particular site. This innovative approach promotes continuous improvement because facilities regularly examine on-site processes, assess and reduce risks, and then audit those processes. As result, the rate of industrial incidents has fallen by 50% in the last ten years.

The Proposal represents a return to what makes the RMP program so successful. It largely abandons the prescriptive dictates of the Amendments in favor of the performance-based goals of RMP and PSM. And, the Proposal does so in a way that ensures coordination and consultation with OSHA, as Congress intended.

Specifically, AFPM supports EPA's proposed rescission of (1) mandatory third-party audits based on a reportable incident, (2) the requirement to conduct Safer Technology Alternative Analysis ("STAA") as part of the Process Hazard Analysis ("PHA") for existing covered process units, and (3) definitions and prescriptive methodologies for incident investigations. These requirements, finalized in the waning days of the last administration,

undermine process safety. They departed from the PSM requirements, creating an uncoordinated and overlapping dual system of regulation overseen by two different agencies. As a result, the Amendments fostered confusion and uncertainty among plant personnel, communities, first responders, and several states. Returning to the pre-existing RMP requirements for compliance audits, PHAs, and incident investigations provides a clear pathway for enhancing process safety and avoids the substantial legal and policy flaws raised by the Amendments.

Similarly, AFPM supports EPA's rescission of the requirement in the Amendments to conduct compliance audits for each covered process unit. Refineries and petrochemical plants may have dozens of covered process units. Best auditing practices and prior regulatory guidance allowed auditing of a representative sample of those units, with the audit findings applied across the site. Returning the RMP program to that approach promotes process safety, while avoiding unnecessary interference with site operations and burdens on plant personnel.

The Proposal also corrects the significant problems posed by the Amendment's provisions for emergency response, particularly community engagement and information-sharing. AFPM's members enjoy strong relationships with their community partners and routinely cooperate in holding meetings and sharing information. Despite that success, the Amendments imposed several prescriptive requirements, including open-ended information disclosures that posed substantial security risks, particularly when those receiving the information have not gone through background checks. The Proposal largely corrects these overreaching requirements and properly balances safety, security and community engagement.

In sum, the core principles of a successful RMP-PSM framework must include the following considerations:

1. Regulations for process safety management and risk management need to be performance-based and not prescriptive;

2. STAA is an engineering tool utilized in the design phase of a newly constructed process and inappropriate to include as a component of the PHA in any regulation;

3. Conducting compliance audits through a representative sampling approach provides the necessary evaluation of program performance, as well as compliance, with actions to follow up for the entire facility;

4. Facilities must have the flexibility to assemble the most knowledgeable audit team for their facility when conducting a compliance audit to ensure continuous improvement opportunities are adequately identified; and

5. Requirements to share certain facility information may increase facilities' and the communities physical and cyber security vulnerabilities.

Consistent with these principles, AFPM, on the whole, supports the Proposal. Our comments on specific issues are shared below. Where appropriate, AFPM has proposed additional modifications or information for EPA's review and consideration. We appreciate EPA's efforts to return the RMP program to a successful, performance-based regulatory model.

DISCUSSION

I. AFPM Members Prioritize Safety

Safety is a core value of America's fuel and petrochemical manufacturers. We have a responsibility to our employees, contractors, and our communities to manage risks and keep people safe. Our members work every day in facilities that use complex equipment to process hazardous materials. AFPM members consistently dedicate resources and personnel to numerous activities focused on managing risks and improving safety, including:

- Sponsoring educational organizations to advance new technologies and studies;
- Participating in industry-led programs designed to continually improve safety Performance;
- Developing improved industry safety standards; and
- Participating in technical forums to learn from others.

The performance-based approach under the existing PSM and RMP regulatory framework allows AFPM members to continuously improve by having the flexibility to adopt and implement new standards, learnings, and other risk reduction activities. Prescriptive standards would restrict adoption of new standards, learnings from previous events, and innovative new technologies. All AFPM members participate in voluntary activities through AFPM and other organizations to ensure that they continuously improve their safety performance and learn how best to ensure the safety of their employees, contractors, and nearby communities.

The refining and petrochemical industries invest in several initiatives designed to forge a strong process safety culture and drive safety improvements. One such initiative is the Annual Occupational & Process Safety Conference, where industry representatives share lessons learned from incidents and near misses, discuss recent safety challenges, and discover the latest innovations in safety technology and services. In addition, AFPM hosts over 50 meetings for a variety of safety committees to encourage peer-to-peer networking and exchanging ideas to enhance occupational and process safety. More than 500 personnel from over 50 companies participate in the national conference, workshops and regional meetings each year. AFPM also maintains an online educational resource dedicated to industry safety that collects key government agency reports on past incidents, presentations from safety conferences, safety alerts, statistical reports, and other analytical resources that help members continuously improve their process safety management systems and performance.

In addition, technological advances allow AFPM members and emergency responders to more quickly be notified of abnormal events, pinpoint the location and time period of an event, and effectively communicate risk, threat, and emergency response information to workers and

the public.[5] These advances continue to decrease the severity and duration of incidents moving forward as they are incorporated into the operations of existing facilities.[6]

As a result of these efforts, RMP reportable incidents have declined substantially. EPA estimates that incidents have gone down by more than 50% in the past 10 years under the original RMP and PSM performance-based regulations.[7] Data from the Bureau of Labor Statistics ("BLS") shows that ***the refining and petrochemical industries have reduced their rate of injuries by a factor of 10***, and accelerated this rate in recent years, in which safety events have decreased by over half between 2012 and 2016.[8] That data also reveals that the refining and petrochemical manufacturing industries have the lowest incident rates of non-fatal injuries or illnesses in any major industrial sector.[9]

The performance-based approach works. AFPM members need not spend resources on satisfying prescriptive requirements that may be irrelevant or inappropriate to a particular facility or incident, and are instead able to dedicate resources to performance-based regulatory and voluntary initiatives suited to their facilities, resulting in increased safety and better risk management for local communities.

II. EPA Possesses Ample Authority to Rescind the Amendments

The Proposal falls well within EPA's inherent authority to repeal or modify past decisions. *See Ctr. for Sci. in the Pub. Interest v. Dep't of Treasury*, 797 F.2d 995, 998-99 (D.C.

[5] AFPM 2016 Comments at 63-65.

[6] AFPM 2016 Comments at 64-65.

[7] U.S. Environmental Protection Agency, Regulatory Impact Analysis: Reconsideration of the 2017 Amendments to the Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7), at 35 (April 27, 2018) ("Proposal RIA").

[8] *See* AFPM 2016 Comments, at 13-19.

[9] *See* Bureau of Labor Statistics; Industry, Injury and Illness Data 2016, Summary Table 1, https://www.bls.gov/iif/oshsum.htm#16Summary_News_Release **(Attachment A)**.

Cir. 1986). An agency "need not demonstrate to a court's satisfaction that the reasons for . . . [a] new policy are *better* than the reasons for the old one; it suffices that the new policy is permissible under the statute, that there are good reasons for it, and that the agency *believes* it to be better, which the conscious change of course adequately indicates." *FCC v. Fox Television Stations*, 129 S. Ct. 1800, 1811 (2009) (emphasis in original). "A change in administration brought about by the people casting their votes is a perfectly reasonable basis for an executive agency's reappraisal of the costs and benefits of its programs and regulations." *Nat'l Ass'n of Home Builders v. EPA*, 682 F.3d 1032, 1043 (D.C. Cir. 2012). Thus, an agency may make new policy judgments based upon an existing rulemaking record, so long as there is sufficient material in the record to support the agency's decision. *Ctr. for Sci. in the Pub. Interest*, 797 F.2d at 1000.[10]

As demonstrated in these comments, the agency's proposal to reverse course and return to methodologies that are proven to enhance safety is a well-reasoned policy decision based on the voluminous administrative record.

III. STAA Does Not Belong in Any Regulation Because It Provides No Effective Risk Reduction in the PHA and Undermines the RMP Program's Performance-based Purpose

EPA proposes to excise the STAA regulatory requirements from the Amendments.[11] AFPM agrees. As finalized in the Amendments, STAA was deeply flawed. Requiring facilities to conduct Inherently Safer Technologies ("IST") and Inherently Safer Designs ("ISD") reviews for existing covered processes as part of the PHA raised numerous legal and policy concerns

[10]*See also, e.g., Chevron, U.S.A., Inc. v. NRDC, Inc.*, 467 U.S. 837, 863 (1984) ("An initial agency interpretation is not instantly carved in stone. On the contrary, the agency … must consider varying interpretations and the wisdom of its policy on a continuing basis.").

[11]*See* Proposal at 24,861.

with no corresponding improvement in safety. These concerns are discussed at length in prior comments and the Petition.[12] We summarize below a few of the salient concerns.

In the original RMP rulemaking in 1996, EPA recognized that mandating STAA would *not* incrementally improve process safety. As EPA explained in the preamble to that rule, where IST/ISD does exist for an in-use process unit, industry tends to recognize its benefits and implement it without regulation:

> PHA teams regularly suggest viable, effective (and inherently safer) alternatives for risk reduction, which may include features such as inventory reduction, material substitution, and process control changes. These changes are made as opportunities arise, without regulation or adoption of completely new and unproven processes technologies. . . .[13]

Consequently, EPA did "not believe that a requirement that sources conduct searches or analyses of alternative processing technologies for new or existing processes will produce additional benefits beyond those accruing to the rule already."[14]

Since the original RMP rule, two jurisdictions, New Jersey and Contra Costa, California, have implemented versions of STAA for refineries, chemical plants and certain other industrial facilities. In light of this development, the Small Business Administration recommended "that EPA explain what evidence it has that causes it to reconsider its 1996 assessment that analysis of inherently safer technology was unlikely to yield additional benefits."[15] EPA was unable to do so.[16] As a result, the "benefit analysis" for STAA was "qualitative" because "[t]here were no data to connect the specific rule elements with specific reductions in expected probabilities or

[12]AFPM 2016 Comments, at 133-45; Petition, at 4, 10-11, 13, 19-20.

[13]61 Fed. Reg. 31,699 (June 20, 1996).

[14]*Id.*

[15]SBAR Panel Report, at 51.

[16]Contra Costa County did not submit comments on the Amendments. While New Jersey submitted comments, it did not analyze whether its IST program had any impact on the rate of industrial incidents.

magnitudes of RMP chemical accidents."[17] The adoption of STAA in the absence of an analysis of data quantifying its benefits was arbitrary and capricious and represented a reversal of longstanding policy in the absence of supporting data.

EPA's inability to demonstrate a safety benefit from imposing STAA on existing processes reflects several factors. First, as EPA noted in the original RMP rule, it is difficult to discern any incremental safety benefit that would accrue from STAA, compared to existing program elements in RMP, such as PHAs and Management of Change ("MOC"), incident investigation, pre-startup safety reviews, operating procedures, and training which are designed to identify and reduce risk during the operational phase of a process. Typically, existing processes have been through several PHA cycles and have had risks managed through a combination of control methodologies.[18] While the PHA is revalidated every five years, the MOC process occurs continuously to manage and reduce risk on a more frequent interval when changes occur in the process. Conducting incident investigations is another way to identify opportunities to reduce risk in an existing process, while operating procedures and training control hazards through personnel education and management. These existing RMP program elements continuously identify and mitigate risk which allows for continuous improvement of an existing process and improved safety performance.

STAA, moreover, is a poor fit for existing processes. Engineers may conduct STAA during the *design* phase of a *new* process, in contrast to the PHAs and other existing tools used for an *existing* process. The available technological options and the feasibility of implementing those options significantly decreases over the lifecycle of the process, operating a process being

[17] 2016 RIA, at 138.

[18] 40 C.F.R. § 68.67(f)

the last step in the lifecycle. During the operational phase of the process lifecycle, passive or procedural controls may be the most appropriate risk reduction technique which are identified through existing risk management program and PSM elements in addition to equipment design and modifications that may further improve human performance and risk management.

Another significant problem with quantifying any benefit from STAA is that it focuses on eliminating or reducing hazards associated with a particular set of conditions. Given that conditions will vary greatly among sites, depending on industry, by facility, and by process, it may not be feasible to apply one inherent safety technology or concept to another facility. Even though several facilities may each use the same chemical, each facility has different configurations and designs that must be taken into account. Thus, EPA cannot rely on information received in response to its request for data on facility programs that conduct IST/ISD reviews or conduct chemical substitution to support the use of a new prescriptive regulatory mechanism or trigger. Doing so would create significant safety hazards and increased risk. A site needs to evaluate their own hazards and risks and identify the most appropriate methods to eliminate or reduce that risk.

While the Amendments failed to quantify the benefits of STAA and constitute nothing more than speculative conclusions, the costs would be real and substantial. EPA estimates that STAA would cost $70 million annually, which EPA characterizes as the costliest provision of the Amendments. [19] Separate and apart from the quantified costs presented, EPA properly acknowledges that its cost estimates for STAA are substantially understated in that the Amendments failed to take account of indirect costs such as the actions facilities might take

[19]Proposal RIA at 55-56.

based on a completed STAA. [20] If anything, EPA's cost estimates for STAA are substantially understated. For example, STAA provisions would impose expenses for retraining or hiring additional qualified personnel and compensating personnel for conducting STAA.[21]

Notwithstanding the proposed repeal of the STAA regulation, EPA suggests that STAA might be considered as part of an "enforcement-led approach" in individual enforcement cases targeting facilities with multiple accidents.[22] EPA similarly floats in the Proposal the idea that STAA might be appropriate for "compliance assistance."[23]

Keeping the door open to resurrecting STAA through enforcement and compliance assistance does little to alleviate the regulated community's concerns. The opposite is true: regulated entities would be subject to the vagaries and surprises of unwritten "enforcement discretion" in determining their STAA obligations. Further, as stated above, STAA is not an effective or appropriate tool to use on existing process. The enforcement cases that EPA cited as imposing STAA were *settlements* that individual companies decided to make in order to avoid the cost and uncertainty of litigation.[24] The settlements are essentially voluntarily entered contracts between EPA and the defendant companies, which are enforced as judicial or administrative orders.[25] Prior settlements provide no legal authority for EPA to shift its demands for STAA from a rulemaking into an "enforcement led" initiative. Certainly nothing in Section 113 of the Act – which provides EPA's enforcement authority for RMP – suggests an amorphous

[20] 83 Fed. Reg. at 24,871-72.

[21] *See* AFPM 2016 Comments at 67-71, 86-89.

[22] 83 Fed. Reg. at 24,872.

[23] 83 Fed. Reg. at 24,873.

[24] Proposal, at 24,872-73.

[25] *See Firefighters v. Cleveland*, 478 U.S. 501, 521-22 (1986) ("[The voluntary nature of a consent decree is its most fundamental characteristic.") (citations omitted).

power to impose a repealed regulation on facilities.[26] A regulation either remains in the Code of Federal Regulations, or it is rescinded.

AFPM supports EPA's proposal to improve the RMP by removing the STAA provisions from the Amendments, but opposes leaving the door open to imposing STAA through "enforcement discretion" or "compliance assistance." EPA should restore the RMP to its pre-Amendments version that allows facilities to use performance-based tools informed by recognized engineering practices to best address risk management and process safety.

IV. AFPM Supports EPA's Return to Representative Sampling for Compliance Audits, Rather than the Unworkable, Burdensome and Costly Auditing of Every Covered Process Unit

In the Amendments, EPA changed the triennial compliance audit provisions in Sections 68.58 and 68.79 to require audits at "each covered process unit."[27] The Proposal would undo this change. In the preamble, EPA explains that this revision would "prevent unnecessary divergence from the language in compliance audits in the OSHA PSM standard."[28]

AFPM supports EPA's proposal to remove "each covered process" from the compliance audit obligation because it was a procedurally defective amendment made without an opportunity for the regulated community to comment on EPA's abrupt departure from decades of auditing practice and guidance based on statistically significant representative sampling. In the Amendments rulemaking, EPA added "each covered process" as a stealth change to the RMP regulations. Nothing in the preamble to the proposed Amendments alerted the public to the issue, much less provided a rationale for the change. In the final rule promulgating the

[26] *See* 42 U.S.C. § 7413.

[27] 40 CFR §§ 68.58(a), 68.79(a).

[28] 83 Fed. Reg. at 24,865.

Amendments, EPA alleged that the amendment was necessary because facilities arbitrarily designated process units for auditing to evade compliance obligations, but the agency provided no data—or even case studies—to back up that serious charge of malfeasance.[29] Nor did EPA justify its position in the final rule that auditing each covered process was a mere "clarification" of existing practice.

On the contrary, longstanding agency guidance, auditing standards, and industry experience all recognize that compliance audits properly rely on examining a representative sample of covered process units.[30] For decades, EPA and OSHA recognized that representative sampling represents a best practice for ensuring a quality audit at a complex facility with numerous covered process units.[31] Both agencies have referenced the Center for Chemical Process Safety ("CCPS") guidelines that recommend using a representative unit sampling to conduct effective compliance audits.[32] In those guidelines, CCPS recommends two alternative methodologies for selecting units for process safety compliance audits:

---

[29]Petition, at 11-12.

[30] AFPM 2016 Comments at 39-42; Petition, at 12 & n.38. OSHA adopted the representative sampling approach in 2007 guidance to compliance health and safety officers as part of the Refinery National Emphasis Program (RNEP). The guidance was updated in August 2009. OSHA Directive No. CPL 03-00-010, Petroleum Refinery Process Safety Management National Emphasis Program, at Section XI.E.7 (effective Aug. 18, 2009) https://www.osha.gov/sites/default/files/enforcement/directives/CPL_03-00-010.pdf.

[31]In the preamble to the Amendments, EPA asserts that its "each covered process" point-of-view is consistent with OSHA's Appendix C to § 1910.119. On the contrary, Appendix C recognizes representative sampling is appropriate. Subsection 14 of Appendix states: "An audit is a technique used to gather sufficient facts and information, including statistical information, to verify compliance with standards. Auditors should select as part of their preplanning a sample size sufficient to give a degree of confidence that the audit reflects the level of compliance with the standard."

[32]EPA, General Guidance on Risk Management Programs for Chemical Accident Prevention, § 7.9, at 7-13, *available at* https://www.epa.gov/sites/production/files/2013-11/documents/chap07-final.pdf; OSHA, Process Safety Management Guidelines for Compliance: OSHA 3133, at 27 (1994), *available at* https://www.osha.gov/Publications/osha3133.pdf. It is common practice for AFPM members to perform a PSM compliance audit to meet the requirements of both OSHA PSM and EPA RMP. This practice was affirmed by the EPA in the preamble to the original RMP rule: "The Program 3 prevention program includes the requirements of the OSHA PSM standard, 29 CFR 1910.119 (c) through (m) and (o), with minor wording changes to address statutory differences. This makes it clear that one accident prevention program to protect the general public, and the environment will satisfy OSHA and EPA." 61 Fed Reg. 31672 (1996).

> In medium-to-large facilities with PSM programs, there are generally multiple processes or units covered by that program. If there are 20-25 complex processing units included within the scope of the PSM program (as would be typical of an oil refinery) and there are 15-25 elements in the program, the amount of potential auditing is almost always beyond the available time and resources. Therefore, to reduce the audit to a manageable scope, the choices are the following:
> • Audit some elements of the PSM program in all covered process and units; or
> • Audit all elements of the PSM program in some of the process and units. In many instances, the latter choice is selected . . . .[33]

EPA's general audit policy accords with this representative sampling approach, recognizing that an environmental audit need only collect, analyze and interpret data "sufficient" to achieve audit objectives.[34]

Representative sampling produces a robust audit. Under the representative sampling approach, an auditor can effectively devote time to focusing on the details and records for the selected process areas, providing a more in-depth audit. Once audit findings are uncovered, the findings are addressed throughout the plant regardless of the covered process units chosen for the sample. In other words, audit findings in one covered process are considered for application across the entire facility.[35] For example, the identification and correction of concerns in the management system used for one covered unit could address those concerns in all other covered

[33]Center for Chemical Process Safety of the American Institute of Chemical Engineers, Guidelines for Auditing Process Safety Management Systems at 83-84, (2d ed. 2011) ("CCPS Guidelines").

[34]EPA, Environmental Auditing Policy Statement, 51 Fed. Reg. 25004, 25009 (July 9, 1986).

[35]*See, e.g.*, CCPS Guidelines, at 127 ("If the evidence is found in at least one unit in all operating areas (e.g., Units #2 and #5 in the East Plant, Units #1 and #4 in the West Plant, and Unit #2 in the South Plant), the evidence documented in the finding will need to be corrected for the areas/units where it was found, and a documented investigation should be conducted to determine the extent of the issue across the entire facility, with a subsequent plan documented and completed to resolve the issue across the entire facility. For example, if a PHA revalidation is overdue or was performed late in one area, it would be appropriate to require the facility do investigate the dates of all PHAs to see if the issue is isolated to the area audited or pervasive throughout the facility.").

process units at the facility. The auditor will *not* have to waste time uncovering redundant results for the same management systems in different covered processes.[36]

Representative sampling is more cost-effective. AFPM members overwhelmingly report that refineries and petrochemical facilities engage in representative sampling for compliance audits, consistent with agency guidance and audit best practices. Reversing that practice to impose audits on every process unit would impose significant financial hardships and undue burdens. Refineries and petrochemical chemical facilities often have multiple process units.[37] For such complex facilities, auditing every covered process unit may cost about $800,000 more than a representative sampling approach.[38] These costs were not quantified and evaluated as part of the Amendments.

At the end of the day, mandating audits on "each covered process unit" is a solution in search of a problem. Nowhere in the voluminous record for the Amendment or the Proposal has EPA identified incidents that arose because of the use of representative sampling when conducting compliance audits. Nor has OSHA flagged this as a concern. On the contrary, OSHA's National Emphasis Program for both petroleum refineries and chemical facilities found only 4% of all citations issued were related to compliance audits (1910.119(o)). Nearly all of those citations related to the failure to conduct an audit, failure to address audit findings, audits not completed timely, or the number of pressure vessels audited was not an adequate

[36]It is important to note that a compliance audit for mechanical integrity is not a physical inspection of equipment. The compliance audit would assess the mechanical integrity inspection *program*, which is the program that identifies when, where, and how equipment is inspected. The inspection program itself is based on industry standards, recommended practices, and the knowledge of the site. Findings from the audit are then used to make improvements to the inspection program that is applied across the entire facility.

[37]AFPM 2016 Comments at 83, Table 3-10 (member survey of number of process units, reporting several facilities with multiple process units); 2016 RIA at 16 (noting that refineries and chemical manufacturers often have multiple process units).

[38]*See* AFPM, EPA RMP Compliance Auditing-Representative Sampling Approach, at Appendix A, Table 3-10 (**Attachment B**).

representative sample. No citations were issued for audits that did not include all covered processes and our members are unaware of any OSHA or EPA Notice of Violation requiring all process units to be audited for all program elements.

Representative sampling for audits provides an effective way to demonstrate, with a high degree of confidence, that all covered processes comply with all RMP elements. AFPM encourages EPA to codify what has already been common practice by regulatory agencies and the auditing community.

V. AFPM Supports Excising the Unlawful, Arbitrary and Unduly Burdensome Third-Party Audit Requirements from the RMP Program

EPA proposes to remove the third-party audit requirements in Sections 68.58, 68.59, 68.79, and 68.80, finalized in the Amendments. These provisions would have required third-party audits after every reportable incident at a Program 2 or Program 3 facility *and* where an agency might decide there are conditions that *could* lead to an accidental release.[39]

AFPM supports EPA's proposal to improve the RMP program by removing the third-party audit provisions.[40] In the Petition and prior comments, AFPM has written at length about its legal and policy objections to mandating third-party audits for the RMP program.[41] By way of summary, the flaws include:

- The lack of the statutory authority under Section 112(r) to impose third-party audits for alleged RMP violations;[42]

[39] *See* 82 Fed. Reg. 4,697-99 (codified at 40 C.F.R. § 68.59).

[40] 83 Fed. Reg. at 24,861.

[41] *See* AFPM 2016 Comments at 91-144; Petition, at 7-8, 13-14.

[42] AFPM 2016 Comments at 92-96. No discussion of EPA's legal authority to impose third-party audits appeared in the proposed Amendments. When commenters pointed out that omission, the final rule purported to rely on a 1989 Senate Report as authority. That report, however, merely makes a passing reference to "consultants" and does not discuss third-party audits. Nor did EPA make any arguments to show that the text of Section 112(r)(7) as enacted in 1990, confers authority to impose third-party audits. Petition at 13. *See also English v. Trump*, 279 F. Supp. 3d 307, 330 (D.D.C. 2018), *appeal dismissed*, No. 18-5007, 2018 WL 3526296 (D.C. Cir. July 13, 2018) ("'[T]he

- Section 114 of the Act bars EPA from using private parties for enforcement, including third-party auditors;[43]
- The unconstitutional delegation of EPA's enforcement authority to private third parties;[44]
- The arbitrary and unexplained departure from past agency precedents recognizing the success of first-party audits and second-party audits;45
- Imposing infeasible46 and duplicative third-party audit requirements;47 and
- Eroding essential protections for confidential business information (CBI) and attorney-client privileged information.[48]

The Proposal to rescind third-party audits properly takes account of these objections and should be finalized.

EPA also requests comment on whether to consider a future proposal to mandate third-party audits based on different regulatory criteria such as multiple accidents or violations.[49] Absent data indicating that these accidents or violations were a direct result of a deficient audit, the agency should not entertain future proposals on third-party audits. The existing RMP program has proven remarkably effective at reducing accidents and improving safety, as the data discussed above demonstrates. That success flows from the performance-based nature of the RMP and PSM programs. Performance-based regulations prudently recognize that identifying

---

authoritative statement is the statutory text, not the legislative history or any other extrinsic material.'") (quoting *Exxon Mobil Corp. v. Allapattah Servs., Inc.*, 545 U.S. 546, 568, 125 S. Ct. 2611, 162 L.Ed.2d 502 (2005)).

[43]*See* AFPM 2016 Comments at 94-96.

[44]*Id.* at 96-100.

[45]*Id.* at 102-105.

[46]*Id.* at 39-42.

[47]*Id.* at 113-15.

[48]*Id.* at 115-120.

[49]83 Fed. Reg. at 24,872.

what improvements are needed to manage risks varies from facility-to-facility.[50] That variation may result from several factors, including (1) differences in Recognized and Generally Accepted Good Engineering Practices (RAGAGEP) applicable to each industry, (2) facility configurations, (3) the facility location,[51] and (4) the size and quality of internal and external audit teams available for a particular facility.

Prescribed regulatory triggers for requiring third-party audits would undermine the performance-based design of the RMP and PSM programs, disregarding the circumstances of a particular incident in favor of a prescriptive, one-size-fits-all approach. For example, the best team for a particular audit may involve engaging or locating available auditors who have a particular combination of industry knowledge or institutional knowledge of a particular facility or process. A third-party auditor may be appropriate in some cases, but that is not true for all cases. Experienced company auditors may be preferable over third parties who lack the in-depth experience with plant processes. Facilities should, for example, continue to be allowed to assemble the most effective audit team and, thus, most effectively manage risks and improve safety performance.

---

[50]*See, e.g.,* James C. Belke, U.S. EPA Chemical Emergency Preparedness and Prevention Office, The Case for Voluntary Third Party Risk Management Program Audits, at 3 (unpublished but presented at the 5th Bi-Annual Process Plant Safety Symposium) (April 22-26, 2001), *available at*, https://pdfs.semanticscholar.org/cc13/1c33854f423ea12f4e4905a494d55d7727ac.pdf ("In contrast to the traditional 'command and control' style of regulation, these [RMP and PSM] rules have many aspects of a 'performance-based' approach. That is, they do not specify how much of a particular chemical a facility is allowed to store, or what sort of process design a facility must use, or what type of safety equipment a facility must have. . . . Instead, these regulations embody a philosophy toward industrial safety and loss prevention that can be loosely described as use best safety practices. The regulations require implementation of certain management systems and safety practices, and in some cases particular features of those systems, that are aimed at minimizing industrial risks and preventing accidents from occurring. . . . For many of the safety program elements required under the PSM and RMP regulations, there is no universally accepted standard against which an auditor or inspector may objectively measure a facility's performance. This is not necessarily a bad thing, nor did it happen by accident. Rather, it reflects the government's recognition that the wide variety of process technologies used at hazardous chemical facilities, and constant innovations in industrial safety practice, require a flexible regulatory structure instead of a 'one-size fits all' approach.").

[51]For example, a refinery in the northern United States may need to winterize, while a Hawaiian refinery would not face that issue.

Additionally, the compliance audit is not the best mechanism to improve risk management in a facility after an event. The incident investigation and resulting action items are the tools used to identify what happened and how to improve process safety. The purpose of the audit is to ensure the improvements made after an incident have enhanced the management system elements. Mandating that audits potentially be conducted before incident investigation action items are complete would provide no meaningful risk management benefits.

In light of the circumstances, EPA was unable to quantify in the Amendments any incremental process safety benefit to third-party audits.52 There is simply no literature, data or other analysis that shows that rigidly requiring third-party audits enhances process safety more than the existing performance-based approach in the RMP program of utilizing as appropriate first-, second-, or third-party compliance audits, incident reports, and process hazard reviews.53

While mandated third-party audits provide little or no safety benefit, the costs are significant. EPA estimates the annual cost of the Amendments' third-party audit requirement at nearly $10 million annually.[54] This is a substantial underestimation of the costs. As AFPM pointed out in its prior comments, EPA omitted the following categories of expenses

- Locating and evaluating qualified auditors under the Amendments' arbitrary and stringent criteria for auditor selection;
- The time and expense for educating auditors who lack institutional knowledge that may be needed to facilitate a successful audit; and
- The costs of expediting audits in light of the tight reporting timelines under the Amendments.[55]

[52]83 Fed. Reg. at 24,871-72; AFPM 2016 Comments, at 79-83.

[53] AFPM 2016 Comments at 103-05; 2016 SBA Advocacy Comments at 4.

[54]Proposal RIA at 55-56.

[55]AFPM 2016 Comments, at 79-84.

EPA suggests in the preamble to the Proposal that past enforcement settlements may provide a basis for an "enforcement-led" approach to requiring third-party audits.[56] As discussed above with STAA, past enforcement settlements do not provide the agency with authority to lead an enforcement campaign to demand third-party audits. What individual companies may decide to do as part a voluntary compromise of potential litigation is irrelevant to the agency's authority to demand third-party audits in a regulation.

For these reasons, and as AFPM explained in its 2016 Comments and in the Petition, third-party audit requirements are not appropriate for the RMP and PSM regulatory programs.[57] AFPM strongly supports EPA's proposal to remove the third-party audit provisions from the RMP regulations.

VI. AFPM Supports EPA's Proposed Adjustments to the Incident Investigation Requirements

In the Proposal, EPA would maintain the incident investigation requirements from the original RMP rule, which AFPM supports. Instead of modifying those existing requirements, EPA requests comment on rescinding and clarifying certain provisions of the Amendments governing incident investigations.[58] AFPM generally supports EPA's proposed approach to incident investigation, as explained below.

A. "Near Misses"

Sections 68.60 and 68.81 of the RMP regulations require Program 2 and Program 3 facilities to conduct incident investigations, including a root cause analysis, for (1) "catastrophic releases," and (2) an incident that "could have reasonably resulted in a catastrophic release."

[56] 83 Fed. Reg. at 24,872.

[57] AFPM 2016 Comments at 91-144; Petition at 3-5, 7-8, 13-14, 17-18.

[58] 83 Fed. Reg. at 24,858-59.

The Amendments added a third trigger for incident investigations, "near misses." No definition of near miss appears in the Amendments.

AFPM supports EPA's proposal to remove near misses as requiring an incident investigation. The concept of "near misses" is unnecessary and confusing. As noted, incident investigations are already required for incidents that "could reasonably have resulted in a catastrophic release." If EPA intended "near misses" to be coextensive with incidents that could have resulted in catastrophic releases, then near misses add nothing to process safety and should be deleted to avoid confusion and uncertainty.[59]

If, however, EPA intended near misses to cover incidents other than could have resulted in a release, then that term is impermissibly vague. Due Process, fairness and good government policy require regulations that reasonably put the public on notice of obligations and prohibitions, particularly where, as here, violations may give rise to severe consequences such as civil penalties.[60] As the U.S. Supreme Court recently explained regulatory clarity is crucial so that "regulated parties should know what is required of them so they may act accordingly," and to avoid agencies "enforcing the law do not act in an arbitrary or discriminatory way."[61]

AFPM, moreover, supports EPA's conclusion that interjecting near misses as an investigation trigger would intrude on OSHA's jurisdiction. As discussed in detail below, Congress carefully crafted Section 112(r)(7) of the Clean Air Act to lodge primary jurisdiction over on-site process safety issues with OSHA, reserving to EPA those incidents with significant off-site impacts. Near misses are necessarily on-site events, completely blurring any

[59]Amendments Preamble, 82 Fed. Reg. at 4605.

[60]AFPM 2016 Comments at 34-35.

[61]*See FCC v. Fox Television Stations, Inc.*, 132 S. Ct. 2307, 2317 (2012).

jurisdictional line between OSHA and EPA.[62] Not only is that contrary to congressional intent, but it creates significant uncertainty when two separate regulators occupy the same regulatory space.[63]

B. "Root" Cause Methodology

AFPM supports EPA's proposed removal of the definition of "root cause" and the removal of the prescriptive requirement to use the "root cause" methodology to conduct incident investigations.[64] The Amendments defined "root cause" to mean a "fundamental, underlying, system-related reason why an incident occurred."[65] This definition arbitrarily assumes that system-related reasons are always relevant factors that contribute to an incident. This prescriptive language thus creates a requirement for facilities to search for and document a cause that may not exist, while potentially increasing the likelihood that valuable information for preventing a future incident is ignored.[66]

Instead, facilities must be able to use any incident investigation methodology that gets to the relevant factors that contributed to an incident. There are several methods utilized by AFPM members when conducting root cause investigations. Methods for conducting incident investigations could include Brainstorming, 5-Why's, Advanced Cause & Effect Analysis, and Process Mapping. Rather than adopt a prescriptive requirement to use a "root cause

[62]The preamble to the Amendments provided examples of what might constitute a near miss that plainly encroach on OSHA jurisdiction, as they focused on onsite workplace safety. There, EPA posed hypothetical onsite situations where effects could be limited to only onsite personnel, and explained that near misses include situations that "*could potentially lead to* a catastrophic release" or "any incidents or nearby processes or equipment outside of a regulated process *if the incident had the potential to cause* a catastrophic release from a nearby regulated process." Amendments Preamble, 82 Fed. Reg. at 4606 (emphases added).

[63]AFPM 2016 Comments at 178-79.

[64]*See* 40 C.F.R. §§ 68.60(d)(7), 68.81(d)(7).

[65]40 C.F.R. § 68.3.

[66]AFPM 2016 Comments at 176-77.

methodology" as defined by the agency, EPA should follow a performance-based approach that recognizes effective industry practice to utilize one of several methods of incident investigation methodologies that identify the underlying causes of an incident that might prevent future incidents from occurring and avoids limiting incident investigations to the "root cause methodology" finalized in the Amendments.

C. Incident Investigations for De-registered Units

EPA proposes to remove from Section 68.190(c) the amendment that requires a facility to complete a pending incident investigation before a unit may be deregistered from RMP. AFPM supports the Proposal on this score. As EPA notes in the Proposal, no parallel requirement exists in the PSM program. Further coordination and consultation with OSHA is required, so as to synchronize RMP and PSM elements. Additionally, EPA has provided no quantifiable safety improvement from requiring de-registering facilities to meet incident investigation requirements prior to de-registration.

VII. AFPM Supports EPA's Proposed Modifications to the Hazard Reviews and Process Hazard Analyses

EPA proposes to revise Section 68.50(a)(2) to remove the requirement for Program 2 facilities to include findings from incident investigations in hazard reviews. EPA proposes to revise Section 68.67(c)(2) to remove the requirement for Program 3 facilities that PHAs include findings from incident investigations, and to be replaced with the pre-Amendments requirement that a PHA "address . . . [t]he identification of any previous incident which had a likely potential for catastrophic consequences." EPA also proposes to return Section 68.175 to the 1996 version, which requires Program 3 facilities to provide the date of the most recently completed PHA and the expected date of completing any changes resulting from a PHA. In the alternative, EPA

proposes to retain the requirement in Section 68.50(a)(2) for the hazard review to include findings from incident investigations.

AFPM agrees with EPA that these PHA requirements should be removed to avoid inconsistency with PSM. In place of a complementary regulatory regime between RMP and PSM, the Amendments impose specific paperwork requirements for PHAs, while PSM would not do so, even though both agencies impose regulations over the same process for Program 3 facilities.

These PHA requirements are also duplicative and overly burdensome. PHAs already involve significant documentation obligations, one of which is to "identify any previous incident that had potential for catastrophic consequences in the workplace."[67] The requirement to include this information in a hazard review is essentially a requirement to repackage this information, placing burdens on facilities already expending resources on implementing findings from the incident investigation, while providing no new benefit. It places an even heavier burden on small businesses, which make up a greater percentage of processes subject to Program 2 requirements.

VIII. AFPM Supports EPA's Proposed Approach on Emergency Response, Subject to Certain Clarifications

EPA proposes to retain the emergency response provisions of Subpart E that were added through the Amendments with a few clarifications to address security concerns.[68] In particular, EPA is proposing to retain Section 68.90 in its entirety, which sets out the requirements for

[67] 29 C.F.R. § 1910.119(e)(3)(ii) (PSM); 40 C.F.R. § 68.67(c)(2) (RMP Program 3 requirements).

[68] 83 Fed. Reg. at 24,865.

responding and non-responding stationary sources.[69] EPA is also proposing to retain Sections 68.93 and 68.96, with modifications to address security concerns.

AFPM supports EPA's approach, subject to certain adjustments discussed below. These adjustments are necessary because of security concerns. But it is also crucial for EPA to recognize that RMP is one of several emergency planning regulations, as illustrated by Exhibit 8-2 from EPA's General RMP Guidance, reproduced below.[70] In crafting the RMP regulations, this pre-exiting – and often overlapping – web of regulations must be considered when weighing whether to impose additional requirements.

Exhibit 8-2
Federal Emergency Planning Regulations

The following is a list of some of the federal emergency planning regulations:

- EPA's Oil Pollution Prevention Regulation (SPCC and Facility Response Plan Requirements) - 40 CFR part 112.7(d) and 112.20-.21;
- MM's Facility Response Plan Regulation - 30 CFR part 254;
- RSPA's Pipeline Response Plan Regulation - 49 CFR part 194;
- USCG's Facility Response Plan Regulation - 33 CFR part 154, Subpart F;
- EPA's Risk Management Programs Regulation - 40 CFR part 68;
- OSHA's Emergency Action Plan Regulation - 29 CFR 1910.38(a);
- OSHA's Process Safety Standard - 29 CFR 1910.119;
- OSHA's HAZWOPER Regulation - 29 CFR 1910.120;
- OSHA's Fire Brigade Regulation - 29 CFR 1910.156;
- EPA's Resource Conservation and Recovery Act Contingency Planning Requirements - 40 CFR part 264, Subpart D, 40 CFR part 265, Subpart D, and 40 CFR 279.52.
- EPA's Emergency Planning and Community Right-to-Know Act Requirements - 40 CFR part 355. (These planning requirements apply to communities, rather than facilities, but will be relevant when facilities are coordinating with local planning and response entities).
- EPA's Storm water Regulations - 40 CFR 122.26.

Facilities may also be subject to state and local planning requirements.

[69] 83 Fed. Reg. at 24,859-61.

[70] *See* EPA, General RMP Guidance – Chapter 8: Emergency Response, at 8-8, Exhibit 8-2, *available at* https://www.epa.gov/rmp/general-rmp-guidance-chapter-8-emergency-response-program

A. Emergency Response Coordination

AFPM members support proactive engagement with local stakeholders to promote safety at their facilities, in the communities in which they operate. EPA proposes to retain Section 68.93 regarding emergency response coordination in large part, and to remove the provision requiring owners or operators to provide "any other information that local emergency planning and response organizations identify as relevant to local emergency response planning."[71]

1. The Proposal Will Address Many of the Security Risks Triggered by the Amendments

For the reasons explained in the Petition, AFPM strongly supports EPA's removal of this language in Section 68.93.[72] This language—added when the Amendments were finalized, but that was never proposed—created an open-ended provision that EPA now correctly recognizes could allow third parties to obtain security-sensitive or classified information about highly protected processes, threatening public health and heightening national security risks.[73]

Further, this language from the Amendments represented another inconsistency with OSHA's PSM program. OSHA does not provide non-governmental entities with regulatory authority to require documentation from facility owners or operators, and such an arrangement by any federal agency would present significant legal issues.[74] Additionally, OSHA is currently conducting a rulemaking to address emergency response, and EPA should understand OSHA's approach to avoid creating contradictory, duplicative, burdensome, or confusing requirements that could in fact heighten security risks.

[71] *See* 83 Fed. Reg. at 24,866.

[72] *See* Petition at 6, 17-19.

[73] *See* 83 Fed. Reg. at 24,866.

[74] Petition at 6-7.

Facilities already devote significant resources to addressing these security resources. The U.S. Senate Committee on Homeland Security & Governmental Affairs recently held a hearing on the Chemical Facility Anti-Terrorism Standards ("CFATS") program, implemented by the Department of Homeland Security.[75] The hearing included a discussion of the range of efforts undertaken at various facilities to maintain security, including electronic inventory management and verification, only allowing shipments from pre-verified bona fide businesses, background checks for employees, and employing cybersecurity consultants, to name a few.[76] Facilities take security seriously, and are often the best equipped to address their individual security considerations.[77]

2. EPA Should Clarify Who Is Authorized to Receive Sensitive Information.

Throughout the rulemaking process, law enforcement agencies have expressed significant security concerns about the loose and open-ended disclosure requirements in the Amendments. For example, other government agencies noted during the OMB inter-agency review process that the lack of standards for dissemination "could assist terrorists in selecting targets and/or increasing the severity of an attack by decreasing first responder capability."[78] Because of these concerns, the Attorneys General of several states objected to the RMP rulemaking.

---

[75] *See* Roundtable - Examining the Chemical Facility Anti-Terrorism Standards Program Before the Senate Comm. on Homeland Sec. & Governmental Affairs, 115th Cong. (June 12, 2018) (CFATS Hearing), available at, https://www.hsgac.senate.gov/hearings/roundtable_-examining-the-chemical-facility-anti-terrorism-standards-program

[76] Testimony of Randall Eppli, President & CEO, Columbus Chemical Industries, Inc. at 4-5, CFATS Hearing (June 12, 2018) https://www.hsgac.senate.gov/imo/media/doc/Testimony-Eppli-2018-06-12.pdf (Eppli Testimony).

[77] Testimony of David Wulf, Acting Deputy Assistant Secretary for Infrastructure Protection, National Protection and Programs Directorate, U.S. Department of Homeland Security at 2-3, CFATS Hearing (June 12, 2018) http://www.hsgac.senate.gov/download/2018-06-12-wulf-statement; Testimony of Justin Louchheim, The Fertilizer Institute at 4, CFATS Hearing (June 12, 2018), https://www.hsgac.senate.gov/imo/media/doc/Testimony-Louchheim-2018-06-12.pdf.

[78] *See* EO 13866 Interagency Review Risk Management Modernization RIN 2050-AG82 NPRM Proposal Rule 20160223 (Redline) 20160223 REV, Docket# EPA-HQ-OEM-2015-0725-0004, at 150 (Mar. 14, 2016).

Unfortunately, the Proposal fails to resolve a few remaining vulnerabilities. Specifically, Section 68.93 of the Proposal leaves unanswered who would receive the sensitive information that a facility must provide. Section 68.93 states that the owner or operator must coordinate its response needs with "local emergency planning and response organizations," and must ensure "local response organizations" have certain information, and must document coordination with "local authorities."[79] It is unclear who these different entities are, and whether they are the same as LEPCs, parts of the LEPC, or emergency response organizations (e.g., local fire department).

Additionally, LEPC members themselves present substantial security risks.[80] LEPCs are not governmental entities. LEPC members are not subject to a background check and have no duty to protect sensitive information they receive. EPA defines them as a mix of "at a minimum, local officials including police, fire, civil defense, public health, transportation, and environmental professionals, as well as representatives of facilities subject to the emergency planning requirements, community groups, and the media."

For these same reasons, AFPM encourages EPA to remove the sentence appended to Section 69.95(c) by the Amendments, which provides, "Upon request of the LEPC or emergency response officials, the owner or operator shall promptly provide to the local emergency response officials information necessary for developing and implementing the community emergency response plan."

Without knowing to whom this information is being provided, the same security risks remain. Facility owners and operators will remain in a position where they must risk divulging

[79] 40 C.F.R. § 69.93; 83 Fed. Reg. at 24,866-67.

[80] AFPM 2016 Comments at 72 ("LEPCs are not subject to security background checks and include individuals from many segments of the community. Furthermore, as EPA notes in the preamble, data submitted to the LEPC becomes public. As correctly predicted by EPA's 1997 security assessment, third-party organizations could, and likely would, collect this information and make it easy for the public to access.").

sensitive information to potential bad actors, and, even in the case of third parties with the best intentions, third parties with no commercial or governmental duty to avoid improper disclosure of sensitive information.[81] Instead, EPA should narrow the information sharing to "responding organization" in Section 68.93. The responding organization is the only entity that could have a need for certain facility information after an incident.

As noted, other federal programs such as EPCRA already provide information to communities and non-governmental organizations. Information needed to enhance emergency response efforts should be narrowly construed in both the scope of the information provided and the targeted audience with a need for this information.

3. EPA Should Not Finalize Its Proposed Alternative, Which Presents the Same Security Concerns and Creates a Duplicative, Overly Burdensome Requirement.

AFPM strongly opposes EPA's suggested alternative to replace "any other information that local emergency planning and response organizations identify as relevant to local emergency response planning" with the phrase "other information necessary for developing and implementing the local emergency response plan."[82] EPA suggests that this provision is consistent with Section 303 of EPCRA.[83] It is not.

The fundamental distinction is that, under EPCRA, facilities must disclose certain information to LEPCs established under 42 U.S.C. § 11001(c).[84] As noted above, in addition to LEPCs, the Proposal would require disclosure to "local emergency planning and response organizations," "local response organizations," and "local authorities." None of these terms are

[81] *See* AFPM 2016 Comments at 151, Petition at 18.

[82] 83 Fed. Reg. at 24,866.

[83] 42 U.S.C. § 11003(d)(3).

[84] *See* 40 C.F.R. § 68.3.

defined in the Proposal. It is thus unclear who EPA intends to capture with these terms and whether additional security risks may be created.

Additionally, this provision would change a requirement that regulated entities provide certain information into a requirement that regulated entities also be prepared to provide some unknown universe of "other information necessary" as decided by an undefined third party. This presents the risk of large burdens put on regulated entities to comply with such a request, without any mechanism provided in the regulation to request review of unreasonable requests. This type of unfettered discretion from a third party is plainly unlawful, as AFPM discussed at length in its 2016 Comments.[85]

Even if EPA were to streamline language to clarify it applies only to LEPCs or the "responding organization," EPA is at best creating duplicative requirements that present security risks.[86] As noted in testimony to the U.S. Senate in the CFATS Hearing, "Government agencies performing compliance inspections have sometimes required separate, comprehensive contingency plans for their particular agency program, even while acknowledging that such separate plans may be redundant with other agency plans. A single master contingency plan, with appropriate sections and nuance, would be much more efficient and, more importantly, effective in meeting the intent of a contingency plan. Further, there are real security/confidentiality concerns, and inevitable jurisdictional conflicts, with multiple agency personnel delving into a chemical company's contingency plans."[87]

[85]AFPM 2016 Comments at 152-58.

[86]Eppli Testimony at 5 ("While each agency has a particular focus and certain subject-specific nuance, multiple agencies and programs require contingency plans/procedures, which entail multiple, often duplicative elements. These include DHS (CFATS/RBPS); DOT; EPA (RCRA – hazardous waste); EPA (Risk Management Plan (RMP)); WDNR (Off-Site Facility Plan); OSHA (Process Safety Management Plan (PSM)); DEA (especially for List 1 chemicals); FDA (especially the Food Safety Modernization Act (FSMA)).").

[87]Eppli Testimony at 5.

4. EPA Should Clarify That Facilities Need Not Disclose Non-Public Information to Non-Governmental Third Parties.

EPA proposes modifications to Sections 69.93(d) and (e) to address protections for classified information and CBI potentially subject to release to an LEPC or other non-government entity. EPA proposes adding the following language to Section 69.93:

> (d) *Classified information.* The disclosure of information classified by the Department of Defense or other Federal agencies or contractors of such agencies shall be controlled by applicable laws, regulations, or executive orders concerning the release of classified information.
>
> (e) *CBI.* An owner or operator asserting CBI for information required under this section shall provide a sanitized version to the local emergency planning and response organizations. Assertion of claims of CBI and substantiation of CBI claims shall be in the same manner as required in §§ 68.151 and 68.152 for information contained in the RMP required under subpart G. As provided under § 68.151(b)(3), an owner or operator of a stationary source may not claim five-year accident history information as CBI. As provided in § 68.151(c)(2), an owner or operator of a stationary source asserting that a chemical name is CBI shall provide a generic category or class name as a substitute.[88]

AFPM appreciates EPA's recognition that protection is necessary for this highly sensitive information, and EPA must take the next step and revise these proposed provisions. As written, they fail to identify how a facility can protect CBI or classified information potentially subject to a release to a *non*-governmental entity.

The proposed CBI protections in Section 68.93(e) fail to protect information that is not submitted to EPA but instead provided to a non-governmental entity as part of regulatory compliance. Section 68.93(e) incorporates by reference Sections 68.151 and 68.152, which lay out how a facility should assert *to EPA* that it is providing CBI in its Risk Management Plans submitted *to EPA*.[89] Section 68.151 allows CBI claims for information that meets the

[88] 83 Fed. Reg. at 24,882.

[89] 40 C.F.R. §§ 68.151(a), 68.152(a).

requirements of 40 C.F.R. § 2.301.[90] But 40 C.F.R. § 2.301 only applies to information obtained *by EPA,* voluntarily or through a Clean Air Act information request or subpoena.[91]

In contrast, EPA's proposed Section 68.93(e) lacks clear direction on how facilities can protect CBI. It explains how an entity can make an "assertion" of CBI claims, but leaves unanswered to whom a facility should make this assertion. As non-governmental entities, LEPCs and other emergency responders are not in a position to receive CBI claims. Nor does the Proposal explain how LEPCs and emergency responders would contest a CBI claim over information that a facility asserts to EPA, and the mechanisms or timelines through which such a dispute would be processed. Additionally, AFPM notes that a cause of this confusion is that both proposed provisions apply to information "required by this section." The regulation should be written to clarify that LEPCs or emergency responders have no authority to "require" information from facilities. That ability rests with governmental authorities only.

AFPM encourages EPA to promote public safety and certainty for the regulated community by clarifying the third parties entitled to receive information from facilities. OMB recognizes this need, noting that documents reflecting high-level information without sensitive details could present fewer security risks, as LEPCs may be required to disclose information under state and local open records acts or sunshine laws.[92] EPA should revise its CBI and classified information provisions in Sections 68.93(d) and (e) to clarify that regulated entities must provide public versions of the specific items identified in the regulation: a stationary source's emergency response plan if one exists, its emergency action plan, and updated

[90]40 C.F.R. § 68.151(a).

[91]40 C.F.R. §2.301(b).

[92]*See* Interagency Review Communications Between OMB and EPA - Email from Danielle Jones of OMB to EPA with EO 12866 Interagency Review Comments on Proposed RMP Reconsideration Rule. Office of Land and Emergency Management, USEPA at 3 (EPA-HQ-OEM-2015-0725-0901) (Apr. 4, 2018).

emergency contact information.[93] EPA should clarify that regulated entities are under no obligation to provide to LEPCs or other emergency responders any information that is not already publicly available. For the same reasons, EPA should also ensure that its clarifications of these provisions include sensitive security information ("SSI"), in addition to classified information and CBI.

B. Emergency Response Exercises

EPA proposes to retain Section 68.96 regarding emergency response exercises in its identical form with few exceptions. EPA proposes to require facilities to coordinate with local officials to conduct field exercises to establish the appropriate frequency and timing.[94] EPA would also retain the elements of field exercises, but would change these into recommendations instead of requirements.[95] EPA proposes to remove the minimum frequency requirement for field exercises. EPA would retain the requirement to conduct tabletop exercises every three years and would likewise list recommended elements of tabletop exercises.[96] EPA also proposes to allow facility owners and operators to exercise reasonable judgment in deciding what to include in an evaluation report due 90 days after each exercise.[97]

EPA proposes two other alternatives, namely (1) removing the minimum frequency of the field exercises, consistent with its proposal, but retaining all other field and tabletop exercise scope and document requirements that were finalized in the Amendments, and (2) fully rescinding the field and tabletop exercise requirements.

---

[93] *See* 40 C.F.R. § 68.93(b).

[94] 83 Fed. Reg. at 24,860.

[95] *Id.* at 24,860-61.

[96] *Id.* at 24,860.

[97] *Id.* at 24,860-61.

AFPM supports EPA's Proposal regarding Section 68.96 with some modifications.[98] First, AFPM supports EPA's decision to remove the prescriptive frequency requirements for conducting field exercises. As AFPM explained in its 2016 Comments, some facilities may choose to "over-report" releases in order to conservatively ensure compliance with the RMP, potentially creating a never-ending cycle of being required to conduct field exercises.[99] Additionally, facilities must coordinate with local response officials to determine appropriate frequencies and plans for exercises. The Amendments' prescriptive timing requirement would interrupt this cycle, to no identified benefit. EPA should finalize its proposal to rescind the minimum frequency requirement for field exercises.

Second, EPA should permit extensions for preparing evaluation reports where appropriate.[100] AFPM members' experience is that correctly conducted, field and tabletop exercises include many elements that may take longer than 90 days to document.

Third, it is inappropriate to include as a recommended data element "the names and organizations of each participant" in an exercise. As AFPM has noted, this can involve hundreds of individuals. Providing this information places undue burden on facilities, risks these individuals' safety, and provides no perceivable benefit.[101] EPA should remove this element from the evaluation report requirements under Section 68.96(b)(3).

Fourth, EPA should finalize its modifications to retain the elements of field exercises in Section 68.96(b)(1)(ii) and of tabletop exercises in Section 68.96(b)(2)(ii), as recommendations instead of requirements. These provisions reflect various elements that are appropriate in some

[98] *See* AFPM 2016 Comments at 148-51.

[99] *See id.* at 149.

[100] *See* AFPM 2016 Comments at 150.

[101] *See id.* at 151.

but not all communities in which facilities operate, and facilities thus should retain the flexibility to work with local communities, emergency responders, and local authorities, among others, to identify the appropriate scope and requirements for field or tabletop exercises. AFPM supports EPA's performance-based approach in changing these requirements to recommendations. For these reasons, EPA should not finalize its proposed alternative of retaining these requirements.

Finally, AFPM supports EPA's decision to retain Section 68.96(c), which recognizes that exercises conducted to meet other federal, state, or local exercise requirements, and actions to respond to an accidental release, all can satisfy the exercise requirements of Section 68.96. This provision reduces unnecessary duplication and expense and allows for more effective use of resources to address risk management.

IX. Information Availability

Under the rigorous requirements of RMP – both as effective and as proposed – and under EPCRA, facilities make available significant amounts and types of information relevant to local communities' right to know about covered processes. This includes five-year accident histories which contain detailed information on each reportable incident, emergency response program information, Risk Management Plans, and chemical hazard information, to name just a few.

Pushing beyond these existing disclosure requirements raises the legitimate question of whether security would be compromised, making facilities more vulnerable to sabotage or attack. In the Proposal, EPA appropriately considers these security concerns and proposes to modify the RMP Amendments.

Specifically, EPA proposes to modify Section 68.180(a) to eliminate the phrase "organizational affiliation" from the requirement to provide information on local emergency planning and response organizations. EPA also proposes in Section 68.210 to retain the

requirement that RMP plans be made available to the public and to retain provisions for protecting classified information and CBI from disclosure.[102] Additionally, EPA proposes to remove requirements that are duplicative or pose significant security risks in Section 68.210(b).[103] EPA proposes to retain the requirement that a facility hold a public meeting within 90 days, but to modify it to require that a facility provide information elements in its five-year accident history for only the incident at issue. As an alternative, EPA proposes to require that facilities provide in public meetings this information as well as a list of scheduled exercises.

AFPM appreciates EPA's proposal, but certain additional modifications are needed to strike the appropriate balance between communicating certain information to local communities and preventing highly sensitive information from landing in the hands of bad actors.

A. Some of EPA's Proposed Information-Sharing Requirements Provide Clarity and Reduce Security Risks

AFPM agrees with EPA's position that the information elements required in Section 68.210(b) as finalized in the Amendments were already available to the public through other avenues. In addition, the requirements in Sections 68.210(c)-(d) to synthesize this information into a single outlet not only required facilities, including small businesses, to undergo the burdensome and expensive effort of repackaging existing public information, but also posed grave security risks.[104] These security risks manifest in the form of facility owners and operators being required to provide information without knowing who is requesting the information, the lack of any appeals or vetting process for such requests, and the risk that bad

[102] 83 Fed. Reg. at 24,867, 24,883; 40 C.F.R. § 68.210(a), (c).

[103] 83 Fed. Reg. at 24,867-68.

[104] 83 Fed. Reg. at 24,867-68.

actors can synthesize this information to better identify targets for terrorist or other criminal activity.[105]

Addressing the security risks triggered by Sections 68.210(c)-(d)'s requirement to synthesize information into a single outlet imposes costs that the Proposal RIA fails to acknowledge. Unintended consequences result from making this information publicly available through a single, streamlined medium, such as a website. Facilities must devote additional resources toward hiring qualified personnel and providing any needed training for managing information-sharing through online access or other forms of distribution, and toward providing additional security measures and trained security personnel to address potential attacks to cyber or physical infrastructure that could arise from this greater streamlined access to information. These costs, compounded with the costs EPA has already acknowledged in its Proposal, are high, while the Amendments' provisions do not produce net benefits. AFPM thus strongly supports EPA's proposal to remove Section 68.210(b)-(d) from the RMP regulations.

AFPM also agrees that EPA's proposal to modify Section 68.180(a) to eliminate the phrase "organizational affiliation" from the requirement to provide information on local emergency planning and response organizations clarifies that EPA is only requiring public disclosure of organizational, and not individual-level information.[106] Providing individual information does not further risk management and instead puts the safety of the named individual at risk.

AFPM does not support EPA's proposed alternative to retain the requirement in Section 68.210(b) that a facility make available its field and exercise schedules. Making field

[105] *Id.* at 24,867-68.

[106] *See id.* at 24,868.

and exercise schedules publicly available poses significant security concerns. It increases the likelihood that bad actors, rather than the local affected community, could obtain access to this sensitive information. Thus, EPA should not finalize this proposed alternative.

B. Facility Owners and Operators Should Retain Flexibility in Providing the Best Method for Engaging with Local Communities after an Incident with Major Offsite Impacts

As noted above, EPA proposes to retain the requirement finalized in the Amendments that facilities must hold public meetings within 90 days of a reportable incident. AFPM's members support community engagement. The question is what provides the best way to engage with our communities. For example, a foul odor in the community might be best addressed by contacting the local news to report that the odor poses no health concerns, rather than waiting 90 days to have a public meeting. Therefore, AFPM supports a flexible, performance-based approach to community engagement that provides information on incidents with off-site impacts. EPA should, therefore, adopt certain modifications to its approach on community engagement, as described below.

As discussed further below, meetings with the local community are just one of the various ways that could serve as an appropriate means for community engagement. In any approach, this engagement should be limited to the information elements of five-year accident history reports in Section 68.42, regarding only the incident at issue. Additional information is already subject to public availability requirements and repackaging this information introduces significant security risks and related costs, while providing no additional risk management benefit.

EPA clarifies in the Proposal that any public meetings should relate to the incident at issue, and not to all incidents in the five-year accident history.[107] AFPM supports this clarification. Providing information on past incidents is irrelevant to the purpose of community engagement after an incident and negates any benefit of engaging the local community regarding the incident actually at issue.

Consistent with EPA's jurisdiction, any final public engagement requirement may only be triggered for incidents that have offsite consequences for public health and the environment, as opposed to every reportable incident.[108] For example, as a practical matter, members of local communities for certain facilities are extremely unlikely to attend a public meeting in light of the existing tools available to gain access to publicly available information, and even less likely to do so where there is no major offsite impact.[109] Holding such a meeting for incidents with only onsite impact or minor offsite consequence is likely to impose significant expense and burden on regulated entities while providing little public benefit.

After an incident, including those with major offsite consequences, facilities will be dedicating resources to conducting incident investigations, assessing personnel needs, allocating personnel to address any operational decisions needed, and meeting other regulatory and commercial requirements. This intensive resource commitment is even more burdensome for small businesses.[110]

---

[107]83 Fed. Reg. at 24,868.

[108]*Id.* at 24,868-69. AFPM agrees with EPA's definition of those off-site consequences: "accidents with offsite impacts specified in 68.42(a) (i.e., known offsite deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage)."

[109]AFPM 2016 Comments at 171 (describing weeks of effort and expense to prepare for public meetings that no one attended under former public meeting requirement).

[110]2016 SBA Advocacy Comments at 11-12.

Depending on the incident, certain information is sometimes readily available, while other information may not become available until after an incident investigation is complete. Information that is inappropriate for release or that may require closer assessment before determining whether it can be safely released may also require time and personnel to manage. The timelines for community engagement thus should not be prescribed. For example, a bulletin may be appropriate to release in the nearer term, but a facility may have more complete and accurate information after the completion of an incident investigation. As a second example, preparing to hold a public meeting within 90 days, as EPA proposes, including providing all the data elements required by Section 68.42—*e.g.*, initiating event and contributing factors if known, operational or process changes that resulted, numerical estimates to two significant digits—creates an extreme burden on a facility already busy with addressing the aftermath of an incident. It also creates a risk of providing incomplete or inaccurate information to the public that could inadvertently be misleading, thereby undermining the purpose of a public meeting. EPA's proposal of 90 days is arbitrary, ignores these realities, and should not be finalized.

In this context, incident investigations gather much of the information that would be pertinent in a public meeting, including the factors that contributed to the incident, root causes, and recommendations resulting from the incident. Once a facility has actually gathered this information, it will be better positioned to provide the data required in the five-year accident history that would be discussed in a public meeting under EPA's proposal. AFPM again notes that this information is required to be publicly available regardless of the public meeting requirement. But if EPA requires this information to be discussed in the additional format of a public meeting, then EPA should allow public meetings to be held after the incident investigation is complete, such as within 30 days of the completion of an incident investigation.

Some AFPM members engage with local communities through holding regular meetings with Community Advisory Panels. Those panels comprise the engaged members of the communities in which facilities operate. AFPM members meet with these community members regularly and will continue to do so, particularly in the event of an incident with major offsite consequences. Additionally, citizens who normally attend Community Advisory Panels are ones that live or work in the community surrounding the facilities and are true stakeholders in the process and are potentially directly impacted by facility activities.

There is a high likelihood for some facilities that individual community members who are otherwise uninterested in accessing the information already publicly available or in participating in facilities' existing meetings with the community, are unlikely to take advantage of this additional avenue of information availability.[111] For example, some community members may have difficulty traveling—either through driving or finding adequate available public transportation—or affording the time and costs to travel to the location of a public meeting. In this scenario, a press release or bulletin may be a more effective route to get relevant information to an affected community member. In others, blog entries with comment sections for feedback or publication in a local newspaper with a mailing location or phone number for community members to send questions on the incident could serve as an effective and sometimes more affordable or safer option. Regularly held CAP meetings might serve as the expected route of engaging with the community after an incident in certain communities.

[111] *See* AFPM 2016 Comments at 171 (describing weeks of effort and expense to prepare for public meetings that no one attended under former public meeting requirement).

Even without the avenue of the proposed public meeting requirement, community members have various options for accessing information on reportable incidents and have various other avenues for communicating with a facility. Examples include:

- Calling a facility's main phone line listed in the local phone directory or posted on the company website. Operators staffing these lines can route calls, including calls received on nights and weekends, to appropriate personnel;
- Contacting the local county emergency management office, which has a copy of the facility's emergency response plan and relevant contact information for the site; and
- Attending local community meetings, including CAP and LEPC meetings.

Additionally, some facilities automatically contact the community, such as through automated text messaging and phone calls through an LEPC, or through activating a reverse 911 system, in the event an emergency response plan is triggered.

EPA does not define what it means by "public meeting," leaving a facility owner or operator not knowing what it would take to satisfy this requirement—the forum, the location relative to residents or to the facility, the amount or type of notice, or timing during or outside of work hours, to name a few. As written, this requirement is too vague to be implemented, and is at best impractical.

Public meetings impose high costs on facilities, due in part to the costs of holding a public meeting, but also due to the costs to address the security risks associated with a public meeting. As with the costs associated with the requirements in Sections 68.210(c)-(d) to synthesize certain information into a single outlet, a facility must devote resources to addressing the threat of attacks when holding a public meeting, such as through ensuring sufficient additional staff is on duty for a public meeting, hiring and training qualified security personnel, and other security and safety enhancements that could be merited to address security risks during and after a public meeting.

Instead, EPA should allow facilities to tailor their engagement to their knowledge of the communities in which they operate. The methods discussed above suit different scenarios, but share a goal of transparency and active engagement. AFPM members continue to provide relevant and correct information to local communities when needed after an incident, and offer various avenues for receiving questions and comments from affected stakeholders.

X. Training

EPA requested comment in the Proposal on deleting (1) the provisions in Sections 68.54 and 68.71 for training requirements to apply to supervisors responsible for process operations and (2) changes to Section 6.54 involving the description of employees operating a process.

EPA should finalize its Proposal to delete these provisions. The Amendments' requirements would lead to expanding operator training to training for supervisors, which EPA has interpreted to potentially include engineers and others who may give direction to operators. This requirement conflicts with PSM, dramatically increases the costs for training by extending training requirements beyond those for whom training would be relevant, and has not been demonstrated to improve risk management. Thus, AFPM supports EPA's proposed deletion of these training provisions.

XI. EPA Properly Recognizes OSHA's Primacy in Regulating Workplace Safety

In its first RMP rulemaking in 1993, EPA explained that "OSHA's focus is on workplace impacts while EPA's focus is on *offsite consequences*, reflecting the different statutory mandates of the two programs."[112] The Proposal aims to return to this original interpretation by removing provisions that encroach upon OSHA's jurisdiction over workplace safety and onsite issues.

[112] 58 Fed. Reg. 54,190, 54,192 (Oct. 20, 1993); AFPM 2016 Comments at 48.

EPA has identified specific provisions that diverge from EPA's long-standing practice of harmonizing the RMP with the PSM regulations, including:

- requiring compliance audits for each covered process;
- third-party auditing requirements; and
- imposing requirements to conduct a STAA as part of process hazard analyses for Program 3 facilities.

As EPA explained, it is prudent to understand OSHA's approach to any future PSM amendments before considering changes to the RMP that affect onsite issues.[113] AFPM concurs in EPA's approach. Working with OSHA would enhance regulatory clarity to improve compliance, enhance process safety, and respect the jurisdictional boundaries that Congress set on EPA's authority to address process safety.

A. OSHA has Exclusive Authority over Onsite Workplace Safety

OSHA's existing regulations comprehensively and effectively address onsite workplace safety by addressing worker safety with respect to hazardous chemical processes. OSHA's ammonia nitrate standard, for example, regulates the chemicals at issue in the West, Texas explosion. OSHA PSM in particular serves as the basis for EPA regulations under the RMP provisions of the CAA; the two regulatory programs are each rendered more effective when properly harmonized, as they had been until the Amendments were finalized.

The Proposal correctly acknowledges that OSHA, and not EPA, has primary jurisdiction to regulate workplace safety for onsite issues. Specifically, Section 112(r)(7) of the CAA expressly states that "in exercising any authority under this subsection, [EPA] shall not . . . be deemed to

[113] 83 Fed. Reg. at 24,863-64.

be exercising statutory authority to prescribe or enforce standards or regulations affecting occupational safety and health."[114]

Congress limited EPA's jurisdiction to prevention of offsite impacts—*i.e.*, consequences to the public health and the environment.[115] Specifically, the CAA provides that the objective of the RMP is to prevent and minimize the consequences of accidental releases.[116] "Accidental release" means an unanticipated emission of a regulated substance or other extremely hazardous substance into the ambient air from a stationary source.[117] EPA should return its focus to these issues, where it can exercise its expertise and where it will not infringe on OSHA in applying its specialized expertise to onsite employee safety. EPA's proposal to rescind the Amendment provisions that sought to address onsite issues correctly aligns with Congress' direction that EPA not intrude upon OSHA's jurisdiction over onsite incidents that do not cause emissions of a regulated substance into the ambient air.[118]

B. EPA's Proposal to Coordinate with OSHA and Other Agencies Allows for Safer Workplaces

Congress also expressly directed EPA to coordinate with OSHA and other agencies before regulating workplace safety for offsite issues. CAA section 112(r)(7) directs EPA to utilize "the expertise of the Secretaries of Transportation and Labor in promulgating [these RMP] regulations."[119] Likewise, Section 112(r)(7)(D) states that EPA "shall consult with the Secretary of Labor . . . and shall coordinate any requirements under this [accident prevention]

[114]42 U.S.C. § 7412(r)(7)(G).

[115]AFPM 2016 Comments at 46-47.

[116]42 U.S.C. § 7412(r)(1).

[117]42 U.S.C. § 7412(r)(2)(A).

[118]AFPM 2016 Comments at 46.

[119]AFPM 2016 Comments at 47; 42 U.S.C. § 7412(r)(7)(B)(i).

paragraph with any requirements established for comparable purposes by the Occupational Safety and Health Administration . . . ."[120]

AFPM agrees with EPA's conclusion that the agency's approach in finalizing the Amendments diverged from its settled practice of coordinating with DOL and the Department of Transportation (DOT).[121] AFPM agrees with the Proposal's acknowledgment that both the EPA RMP regulations and OSHA PSM regulations "were written to complement each other in accomplishing" Congress' goals in amending the Clean Air Act in 1990.[122] As AFPM explained in further detail in its 2016 Comments, EPA has recognized OSHA's jurisdiction since the 1990 CAA Amendments were enacted.[123] In fact, EPA and OSHA issued joint reports prior to the creation of the Chemical Safety Board.[124]

The result of this coordination was a harmonized process safety and risk management framework that has a proven track record of success. Before the Amendments, the RMP

---

[120] 42 U.S.C. § 7412(r)(7)(D).

[121] 83 Fed. Reg. at 24,863-64; Petition at 18-19.

[122] 83 Fed. Reg. at 24,863.

[123] AFPM 2016 Comments at 48-49.

[124] *E.g.*, EPA/OSHA, EPA/OSHA Joint Chemical Accident Investigation Report: Surpass Chemical Co., Albany, NY, EPA 550-F-98-019 (Sept. 1998), https://nepis.epa.gov/Exe/ZyNET.exe/100038K6.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000011%5C100038K6.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL; EPA/OSHA Joint Chemical Accident Investigation Report: Shell Chemical Company, Deer Park, Texas, EPA 550-R-98-005 (June 1998), https://nepis.epa.gov/Exe/ZyNET.exe/100039YA.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000011%5C100039YA.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.

regulations imposed requirements that were nearly identical to those in PSM. As EPA notes in the Proposal, "[m]easures taken by sources to comply with the OSHA PSM standard for any process that meets OSHA's PSM standard are sufficient to comply with the RMP requirements of all three [RMP] Programs."[125] Thus, until the Amendments, facilities regulated under Program 3—the most stringent program level under the RMP—have been able to satisfy RMP requirements by implementing PSM, typically resulting in one effective accident prevention program to protect workers, the general public, and the environment.[126]

EPA "pushed forward" with finalizing the Amendments before it had an understanding of OSHA's future actions.[127] This resulted in a rule rife with legal and policy problems. EPA's Proposal will correct many of these issues, and AFPM offers additional input on how EPA can further improve the RMP.

The Proposal also rectifies EPA's failure to coordinate with small businesses as part of the rulemaking process for the Amendments. As noted in the Petition, EPA failed to adequately address concerns expressed as part of Small Business Advocacy Review (SBAR) and from the Small Entity Representatives (SERs) during the Amendments rulemaking.[128] EPA ignored its statutory duty to "take into consideration the concerns of small business in promulgating regulations under [CAA section 112(r)]."[129] Small businesses make up a substantial share of

[125]83 Fed. Reg. at 24,863 (citing 61 FR 31,671 (June 20, 1996) (1996 RMP Rule)).

[126] AFPM 2016 Comments at 50; 83 Fed. Reg. at 24,863 (citing 61 FR 31,672). Additionally, AFPM agrees with EPA's acknowledgment that until the Amendments, EPA relied on Department of Transportation definitions for key terms and allowed compliance with hazardous material regulations to satisfy requirements of EPA's program. Proposal at 24,863.

[127]83 Fed. Reg. at 24,863.

[128]Petition at 5; *see* U.S. Small Business Administration (SBA) Office of Advocacy Comments on EPA's Proposed Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act (EPA-HQ-OEM-2015-0725-0502) (May 13, 2016) (2016 SBA Advocacy Comments).

[129]83 Fed. Reg. at 24,864 (citing CAA section 112(r)(7)(C)).

facilities subject to Program 2 requirements, and duplicative requirements lead to undue burdens on small businesses.[130]

C. EPA Should not Adopt its Alternative Proposals Because They Suffer from Other Legal and Practical Flaws

EPA proposes, in the alternative, a suite of requirements for Program 2 and Program 3 facilities. EPA suggests that its alternative proposals remain consistent with PSM for Program 3 facilities, streamline Program 2 requirements, and make Program 3 training provisions more consistent with PSM.[131] EPA explains that, under the alternative, Program 2 requirements would not be more rigorous than Program 3 requirements.[132]

AFPM opposes these alternatives. As explained above, EPA should coordinate with OSHA before attempting to promulgate changes that may or may not align with future OSHA PSM regulation. Importantly, EPA failed to recognize that these proposed alternatives can lead to other legal and practical issues.[133] AFPM addresses these issues in the discussion of specific provisions below in these Comments.

XII. The Amendments Are Not "Appropriate" Because Their Costs Far Exceed Any Benefits

EPA is proposing to revise the Amendments to remove provisions that cost far more than the projected benefits. In particular, EPA proposes to rescind the provisions finalized in the Amendments regarding requirements for third-party audits, root cause analyses, and STAA.

---

[130] *See, e.g.*, 2016 SBA Advocacy Comments at 12 (burden of repackaging existing publicly available information under public information provision).

[131] 83 Fed. Reg. at 24,865.

[132] *Id.* at 24,865.

[133] These revisions are inappropriate for various other reasons—the definition of "near miss" and the costs to small businesses—as explained above.

EPA explains that these provisions should be rescinded based on the agency's calculation of these provisions' extreme costs and limited benefits, if any.

CAA Section 112(r)(7)(B)(i) requires EPA to consider costs when promulgating RMP amendments.[134] That section of the Clean Air Act prescribes "*reasonable* regulations and *appropriate* guidance to provide, to the greatest extent *practicable*, for the prevention and detection of accidental releases of regulated substances and for response to such releases by the owners or operators of the sources of such releases."[135]

The U.S. Supreme Court interpreted a similar provision of the CAA to require EPA to consider costs in *Michigan v. EPA*, 135 S. Ct. 2699, 2707 (2015). There, the Court held that EPA arbitrarily declined to consider costs when deciding whether the Mercury Air Toxics (MATs) regulation was "appropriate" for the electric utility industry under Section 112(n) of the Act.[136] "No regulation is 'appropriate' if it does significantly more harm than good."[137] Specifically:

> Agencies have long treated cost as a centrally relevant factor when deciding whether to regulate. Consideration of cost reflects the understanding that reasonable regulation ordinarily requires paying attention to the advantages *and* the disadvantages of agency decisions. It also reflects the reality that too much wasteful expenditure devoted to one problem may well mean considerably fewer resources available to deal effectively with other (perhaps more serious) problems.[138]

Because EPA failed to weigh "the advantages *and* disadvantages of" MATs to ensure that it would not "do[] significantly more harm than good," the Court held that EPA's determination

---

[134]AFPM 2016 Comments at 56-59.

[135]42 U.S.C. § 7412(r)(7)(B)(i) (emphasis added).

[136]42 U.S.C. § 7412(n).

[137]135 S. Ct. 2699, 2707 (2015) ("One would not say that it is even rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits."); Petition at 8-11.

[138]135 S. Ct. at 2707-08 (emphasis in original).

that it was "appropriate" to regulate was arbitrary and capricious. [139] *Michigan* squarely applies here because the statutory language authorizing RMP requires regulations to be "appropriate" and "reasonable." [140]

Here, EPA should finalize its proposal to remove certain provisions, but EPA must expand its justification to account for all of the costs that regulated entities would face under the Amendments. EPA also should not rely on the faulty and unsupported benefits analysis included with the Amendments to now assert that benefits from the Amendments would be foregone under this Proposal. And, EPA's regulatory impact analysis should reflect the continuous progress by regulated entities in reducing RMP incidents using accurate and complete data.

A. The Proposal Overstates the Benefits of the Amendments.

EPA claims certain benefits from the Amendments may be foregone under its current Proposal.[141] However, claiming any foregone benefits appears problematic. The agency's benefits assessment for the Amendments was deeply flawed and made a number of erroneous assumptions.[142] EPA itself was unable to quantify any safety benefit from the Amendments.[143] This stands in sharp contrast with the quantification of safety benefits in the original PSM and RMP rules,[144] illustrating that EPA certainly could have quantified benefits from the Amendments had they been readily apparent. In the preamble to the Proposal, EPA candidly

[139] *Id.* (emphasis in original).

[140] 42 U.S.C. § 7412(r)(7)(B)(i) (emphasis added).

[141] 83 Fed. Reg. at 24,854-855.

[142] *See* Petition at 10-11; AFPM 2016 Comments; AFPM Supplemental Comments.

[143] 2016 RIA, at 138.

[144] *See* EPA, Economic Analysis in Support of Final Rule on Risk Management Program Regulations for Chemical Accident Release Prevention, As Required by Section 112(r) of the Clean Air Act, at ES-9 (June 1996); OSHA, Final Regulatory Impact and Regulatory Flexibility Analysis of the Final Standard for Process Safety Management of Highly Hazardous Chemicals, at I-8 (Feb. 1992); AFPM 2016 Comments, at 60-61.

acknowledges that "[i]t is also possible that the existing rule's prevention program measures already encompass many of the benefits of the Amendments rule prevention provisions ….."[145] Because the Amendments' benefits analysis was deficient, EPA should not now assume that those alleged benefits would be lost. Rather, EPA should conclude that RMP, in tandem with PSM, will continue to drive improvement in safety for employees, communities, and facilities. EPA must quantify the costs and benefits of the underlying program, the Amendments, and this proposed revision of the Amendments to withstand judicial scrutiny

B. AFPM Members Effectively Address Chemical Safety Under the Currently Effective RMP and Continue to Do So

EPA states that RMP incidents have declined by over 50% in the past 10 years[146] but ignores 2014-2016 data, which show an additional 10% decline in incidents. EPA discounts the continued improvements in 2014-2016 because it assumed that that there will be a "wave" of reported RMP incidents for 2014, 2015, and 2016. That assumption reflects EPA's belief that numerous facilities will update their five-year accident history in 2019 for incidents over the preceding five years, i.e., incidents dating back to 2014. EPA assumed that several facilities will report incidents only every five years, even though the RMP regulations have long required updating the RMP accident history within 6 months of any reportable incident.[147]

EPA's discounting of recent incident data is unfounded. Figure 1 below shows below RMP reportable incidents from 2004 through 2016 in blue, with the dotted line showing the trend line.[148] As Figure 1 shows, there is no wave every five years due to reporting cycles, as EPA

[145]83 Fed. Reg. at 24,873.

[146]Proposal RIA at 35.

[147]*See, e.g.*, Proposal RIA at 32-33, 36.

[148]*See* Proposal RIA at 34.

claims. In 2009, the number of reportable incidents declined by 19. The next five-year reporting cycle was in 2014 where no significant increase occurred – rather incidents rose only by three events. In any case, RMP reportable incidents such as serious injuries or fatalities rarely occur, making year-to-year comparisons not a statistically valid indicator of real change. Instead, the data should be presented as a trend line. As Figure 1 demonstrates, the trend is toward decreasing incidents, making it inappropriate to discount 2014-2016 incident data.

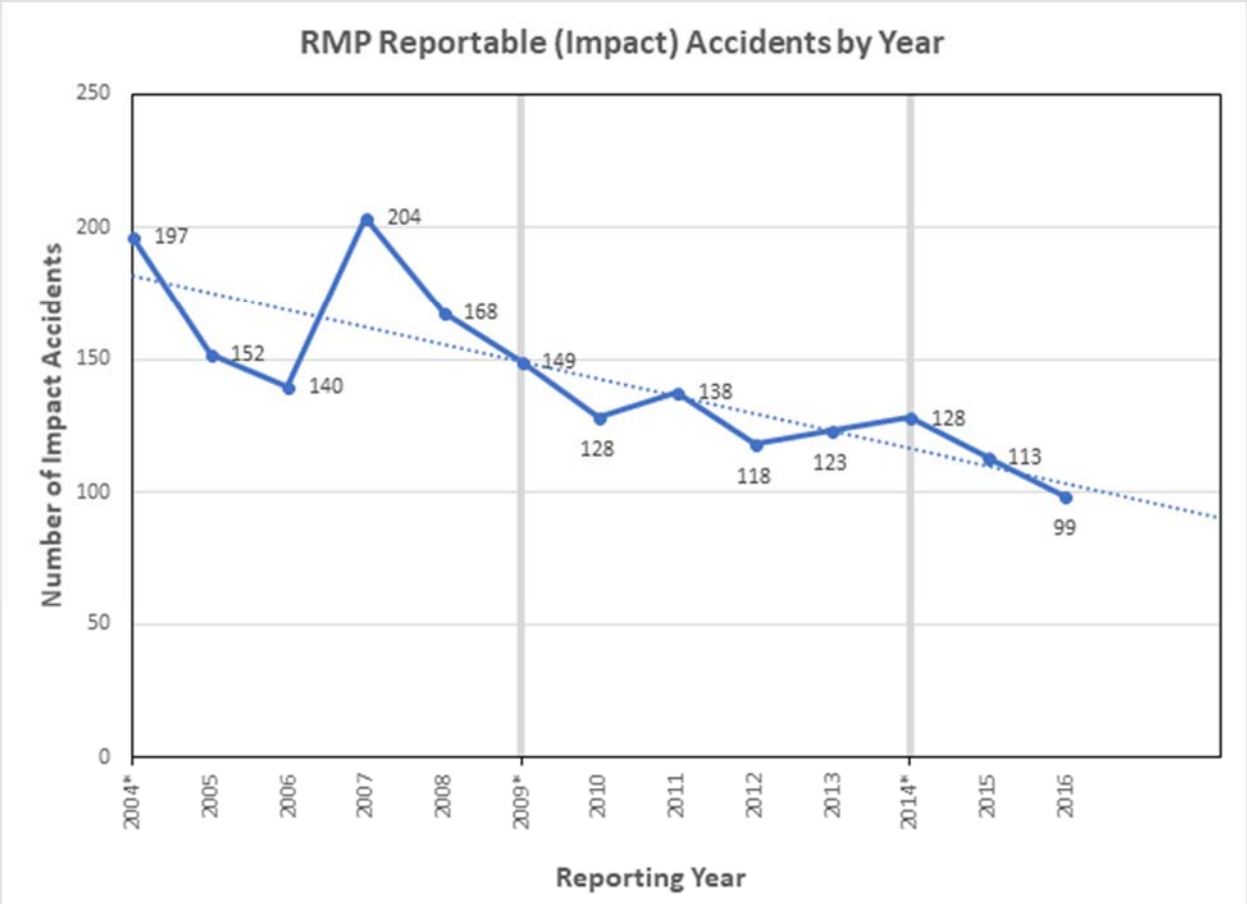

Figure 1. RMP Reportable Incidents: Incident Counts vs. Trend Lines

Moreover, as discussed above, data demonstrate that safety events have decreased by over half in recent years. And, the refining and petrochemical manufacturing industries have the lowest incident rates of non-fatal injuries or illnesses in any major industrial sector.[149]

AFPM supports EPA's acknowledgment that the continual decrease in accidental releases pursuant to the existing RMP rule shows that the system works. Additional costs do not justify the requirements that were added in the Amendments.[150] In supporting its approach, EPA should not discount the most recent data demonstrating these continued improvements.

XIII. Compliance Dates

AFPM supports EPA's proposal to allow regulated entities adequate time to implement the various proposed programmatic changes that EPA may ultimately decide to finalize.[151] AFPM agrees that these windows will allow its members to familiarize themselves with the revised rule and implement appropriate programmatic changes. EPA's proposed implementation dates for provisions from the Amendments that EPA may ultimately retain also serve to recognize that regulated entities should not have been expected to expend resources on provisions that may ultimately change. AFPM agrees with EPA's reasoning.

AFPM also agrees with EPA's proposal to retain the requirement that owners or operators have exercise programs and schedules in place within four years of the effective date of a final rule, but that the deadline for holding the first such exercise would be established in the exercise schedule developed with the local responders, as opposed to imposed by EPA outside of

[149] *See* Bureau of Labor Statistics; Industry, Injury and Illness Data 2016, Summary Table 1, https://www.bls.gov/iif/oshsum.htm#16Summary_News_Release.

[150] 83 Fed. Reg. at 24,871.

[151] *Id.* at 24,875.

this schedule. AFPM agrees that this will allow for better emergency response coordination and reduce undue burdens on regulated facilities upon the effectiveness of a final rule.

While AFPM believes that EPA should rescind the STAA requirements in their entirety, if EPA retains any STAA provisions, then EPA should tie the implementation date to the date on which EPA completes guidance to address the issues raised by AFPM in its comments here and in its 2016 Comments and the RMP Coalition Petition.

XIV. Terminology

EPA proposes several changes to the terms used in in Section 68.3 of the RMP. EPA proposes to remove the definitions of "active measures," "inherently safer design or technology," "passive measures," "practicability," and "procedural measures." AFPM agrees. The terms that EPA proposes to remove will align with EPA's proposal to remove the STAA and third-party audit provisions. AFPM also agrees with the removal of the definitions of "root cause" and "third-party audit," as explained above. Additionally, EPA is correct to use "Safety Data Sheets (SDS)" instead of the outdated term "Material Safety Data Sheets" in Sections 68.48 and 68.65.[152]

CONCLUSION

AFPM appreciates the opportunity to provide these comments for EPA's review and consideration. EPA's Proposal enhances process safety, promotes security and streamlines unnecessary burdens—particularly on small businesses. AFPM largely supports it, subject to the proposed modifications discussed above.

[152] 83 Fed. Reg. at 24,865.

Attachment A

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
All industries including private, state and local government[5]		3.2	1.7	1.0	0.7	1.5
Private industry[5]		2.9	1.6	0.9	0.7	1.3
Goods-producing[5]		3.5	2.1	1.1	1.0	1.5
Natural resources and mining[5,6]		4.2	2.5	1.3	1.2	1.7
Agriculture, forestry, fishing and hunting[5]	11	6.1	3.6	1.7	1.9	2.5
Crop production[5]	111	5.9	3.2	1.8	1.4	2.7
Oilseed and grain farming[5]	1111	3.7	1.1	0.9	-	2.6
Vegetable and melon farming[5]	1112	5.3	2.7	1.5	1.2	2.6
Fruit and tree nut farming[5]	1113	7.3	4.1	2.4	1.7	3.2
Greenhouse, nursery, and floriculture production[5]	1114	4.9	2.8	1.4	1.5	2.1
Other crop farming[5]	1119	6.2	3.2	2.1	1.1	3.0
Animal production and aquaculture[5]	112	5.7	3.2	1.7	1.5	2.5
Cattle ranching and farming[5]	1121	5.5	3.1	1.8	1.3	2.4
Beef cattle ranching and farming, including feedlots[5]	11211	5.3	3.1	1.9	1.2	2.2
Dairy cattle and milk production[5]	11212	5.6	3.1	1.8	1.3	2.4
Hog and pig farming[5]	1122	6.8	3.5	1.7	1.8	3.2
Poultry and egg production[5]	1123	5.7	3.5	1.4	2.1	2.2
Forestry and logging	113	3.6	2.5	2.3	0.2	1.1
Forest nurseries and gathering of forest products	1132	5.4	3.1	1.9	-	-
Logging	1133	3.8	2.7	2.5	0.2	1.2
Soil preparation, planting, and cultivating	115112	2.5	0.9	0.9	-	1.6
Crop harvesting, primarily by machine	115113	3.2	1.9	0.7	1.2	1.3
Postharvest crop activities (except cotton ginning)	115114	5.8	3.6	1.9	1.7	2.2
Farm management services	115116	4.2	2.9	1.9	1.0	1.3
Support activities for animal production	1152	2.5	1.7	1.1	-	0.8
Support activities for forestry	1153	2.8	1.4	1.1	-	1.4
Mining, quarrying, and oil and gas extraction[6]	21	1.5	0.9	0.6	0.3	0.6
Oil and gas extraction	211	0.9	0.4	0.3	0.1	0.5
Oil and gas extraction	2111	0.9	0.4	0.3	0.1	0.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Oil and gas extraction	21111	0.9	0.4	0.3	0.1	0.5
Crude petroleum and natural gas extraction	211111	0.9	0.4	0.3	0.1	0.5
Natural gas liquid extraction	211112	1.1	-	-	-	1.0
Mining (except oil and gas)[7]	212	2.5	1.6	1.2	0.5	0.9
Coal mining[7]	2121	3.7	2.4	2.1	0.2	1.3
Coal mining[7]	21211	3.7	2.4	2.1	0.2	1.3
Bituminous coal and lignite surface mining[7]	212111	1.6	1.0	0.9	0.1	0.6
Bituminous coal underground mining[7]	212112	5.5	3.5	3.2	0.4	2.0
Anthracite mining[7]	212113	4.6	3.5	3.1	-	-
Metal ore mining[7]	2122	2.1	1.4	0.9	0.5	0.6
Iron ore mining[7]	21221	2.4	1.6	1.1	0.6	0.7
Gold ore and silver ore mining[7]	21222	1.5	1.0	0.6	0.4	0.5
Gold ore mining[7]	212221	1.3	0.9	0.5	0.4	0.4
Silver ore mining[7]	212222	3.7	2.6	2.2	-	1.1
Copper, nickel, lead, and zinc mining[7]	21223	2.5	1.8	1.0	0.8	0.8
Lead ore and zinc ore mining[7]	212231	5.2	3.9	1.0	2.8	1.3
Copper ore and nickel ore mining[7]	212234	2.1	1.4	1.0	0.4	0.7
Other metal ore mining[7]	21229	2.5	1.8	1.6	-	0.7
Uranium-radium-vanadium ore mining[7]	212291	-	-	-	-	-
All other metal ore mining[7]	212299	2.6	1.9	1.7	-	0.8
Nonmetallic mineral mining and quarrying[7]	2123	2.0	1.3	0.8	0.5	0.7
Stone mining and quarrying[7]	21231	2.2	1.4	0.8	0.6	0.8
Dimension stone mining and quarrying[7]	212311	2.8	2.0	1.5	0.5	0.9
Crushed and broken limestone mining and quarrying[7]	212312	2.1	1.3	0.7	0.6	0.8
Crushed and broken granite mining and quarrying[7]	212313	1.6	1.0	0.5	0.6	0.6
Other crushed and broken stone mining and quarrying[7]	212319	2.4	1.6	0.9	0.7	0.7
Sand, gravel, clay, and ceramic and refractory minerals mini	21232	1.9	1.2	0.7	0.5	0.6
Construction sand and gravel mining[7]	212321	2.0	1.3	0.8	0.5	0.7

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Kaolin and ball clay mining[7]	212324	1.1	0.8	0.4	0.4	0.4
Clay and ceramic and refractory minerals mining[7]	212325	2.4	1.5	-	0.8	0.9
Other nonmetallic mineral mining and quarrying[7]	21239	1.6	1.0	0.7	0.4	0.6
Potash, soda, and borate mineral mining[7]	212391	1.5	1.0	0.7	-	0.5
Phosphate rock mining[7]	212392	1.2	0.8	-	-	-
Other chemical and fertilizer mineral mining[7]	212393	2.3	1.3	0.8	0.5	1.0
All other nonmetallic mineral mining[7]	212399	1.3	0.9	0.6	-	-
Support activities for mining	213	1.2	0.8	0.5	0.3	0.4
Support activities for mining	2131	1.2	0.8	0.5	0.3	0.4
Support activities for mining	21311	1.2	0.8	0.5	0.3	0.4
Drilling oil and gas wells	213111	1.5	0.9	0.4	0.5	0.6
Support activities for oil and gas operations	213112	1.1	0.7	0.5	0.3	0.4
Construction		3.2	1.9	1.3	0.6	1.3
Construction	23	3.2	1.9	1.3	0.6	1.3
Construction of buildings	236	2.8	1.6	1.2	0.4	1.2
Residential building construction	2361	3.3	2.0	1.7	0.3	1.3
Nonresidential building construction	2362	2.4	1.3	0.7	0.5	1.1
Heavy and civil engineering construction	237	2.8	1.7	1.0	0.7	1.1
Utility system construction	2371	2.6	1.5	0.9	0.7	1.1
Water and sewer line and related structures construction	23711	4.1	2.2	1.2	1.0	1.9
Oil and gas pipeline and related structures construction	23712	0.7	0.4	0.2	0.1	0.4
Power and communication line and related structures constr	23713	2.8	1.9	1.1	0.8	0.9
Land subdivision	2372	2.3	0.7	0.5	0.2	1.6
Highway, street, and bridge construction	2373	3.5	2.3	1.4	0.9	1.2
Other heavy and civil engineering construction	2379	1.8	1.0	0.6	0.4	0.7
Specialty trade contractors	238	3.5	2.1	1.4	0.6	1.4
Foundation, structure, and building exterior contractors	2381	5.0	3.0	2.1	0.9	1.9
Poured concrete foundation and structure contractors	23811	4.5	3.0	1.8	1.1	1.6
Structural steel and precast concrete contractors	23812	6.3	3.5	2.5	1.0	2.8
Framing contractors	23813	7.0	4.7	3.3	1.4	2.3

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Masonry contractors	23814	4.0	2.4	1.7	0.7	1.6
Glass and glazing contractors	23815	3.7	2.4	1.5	0.9	1.3
Roofing contractors	23816	5.6	3.6	2.7	0.9	-
Siding contractors	23817	3.6	2.2	1.6	0.6	1.4
Building equipment contractors	2382	3.3	1.8	1.2	0.6	1.4
Electrical contractors and other wiring installation contractors	23821	2.7	1.5	1.0	0.5	1.2
Plumbing, heating, and air-conditioning contractors	23822	3.8	2.1	1.5	0.6	1.7
Other building equipment contractors	23829	2.6	1.8	1.2	0.6	0.8
Building finishing contractors	2383	3.5	2.0	1.5	0.6	1.4
Drywall and insulation contractors	23831	4.1	2.3	1.4	0.9	1.9
Painting and wall covering contractors	23832	3.0	1.9	-	0.5	-
Flooring contractors	23833	2.4	1.1	0.9	0.3	1.2
Tile and terrazzo contractors	23834	2.6	1.6	1.3	0.4	1.0
Finish carpentry contractors	23835	4.2	2.2	1.8	0.4	2.0
Other building finishing contractors	23839	3.3	2.5	1.8	0.6	0.8
Other specialty trade contractors	2389	2.6	1.7	1.2	0.5	0.9
Site preparation contractors	23891	2.5	1.6	1.1	0.5	0.9
All other specialty trade contractors	23899	2.8	1.9	1.4	0.5	0.9
Manufacturing		3.6	2.1	0.9	1.1	1.5
Manufacturing	31-33	3.6	2.1	0.9	1.1	1.5
Food manufacturing	311	4.7	3.2	1.3	1.9	1.5
Animal food manufacturing	3111	3.7	2.2	1.5	0.8	1.5
Animal food manufacturing	31111	3.7	2.2	1.5	0.8	1.5
Dog and cat food manufacturing	311111	3.3	1.9	0.9	1.0	1.4
Other animal food manufacturing	311119	4.0	2.5	1.8	0.6	1.5
Grain and oilseed milling	3112	3.0	1.7	0.9	0.8	1.3
Flour milling and malt manufacturing	31121	3.8	2.3	1.5	0.9	1.5
Flour milling	311211	4.1	2.3	1.5	0.8	1.8
Rice milling	311212	3.0	2.0	1.1	0.9	1.0
Starch and vegetable fats and oils manufacturing	31122	2.6	1.5	0.7	0.8	1.2
Wet corn milling	311221	1.7	0.9	0.4	0.5	0.8

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Soybean and other oilseed processing	311224	3.3	1.7	1.0	0.8	1.6
Breakfast cereal manufacturing	31123	2.6	1.4	0.7	0.7	1.2
Sugar and confectionery product manufacturing	3113	4.6	3.0	1.2	1.8	1.6
Sugar manufacturing	31131	7.1	3.8	2.1	1.6	3.3
Beet sugar manufacturing	311313	8.5	3.8	2.1	1.7	4.6
Cane sugar manufacturing	311314	5.8	3.7	2.1	1.5	2.1
Nonchocolate confectionery manufacturing	31134	3.3	1.8	0.7	1.0	1.5
Chocolate and confectionery manufacturing	31135	4.4	3.4	1.1	2.3	1.0
Confectionery manufacturing from purchased chocolate	311352	4.1	3.1	1.2	2.0	1.0
Fruit and vegetable preserving and specialty food manufactu	3114	4.1	2.8	1.4	1.4	1.3
Frozen food manufacturing	31141	4.4	3.1	1.6	1.5	1.3
Frozen fruit, juice, and vegetable manufacturing	311411	5.8	3.7	2.2	1.5	2.0
Frozen specialty food manufacturing	311412	3.6	2.7	1.2	1.5	0.9
Fruit and vegetable canning, pickling, and drying	31142	3.8	2.5	1.2	1.3	1.3
Fruit and vegetable canning	311421	3.9	2.6	1.2	1.4	1.3
Specialty canning	311422	2.6	1.8	0.8	1.0	0.8
Dried and dehydrated food manufacturing	311423	4.3	2.7	1.4	1.3	1.6
Dairy product manufacturing	3115	5.1	3.4	1.7	1.7	1.7
Dairy product (except frozen) manufacturing	31151	5.2	3.5	1.7	1.8	1.7
Fluid milk manufacturing	311511	5.6	4.0	2.1	1.9	1.5
Creamery butter manufacturing	311512	3.4	2.7	1.6	1.1	0.7
Cheese manufacturing	311513	5.6	3.5	1.4	2.1	2.1
Dry, condensed, and evaporated dairy product manufacturir	311514	3.1	2.0	1.2	0.8	1.1
Ice cream and frozen dessert manufacturing	31152	4.7	2.8	1.5	1.3	1.9
Animal slaughtering and processing	3116	5.3	3.8	1.0	2.8	1.5
Animal slaughtering and processing	31161	5.3	3.8	1.0	2.8	1.5
Animal (except poultry) slaughtering	311611	6.9	4.7	1.0	3.7	2.1
Meat processed from carcasses	311612	5.7	4.4	1.4	3.0	1.2
Rendering and meat byproduct processing	311613	6.6	3.7	1.5	2.2	2.9
Poultry processing	311615	4.2	2.9	0.8	2.1	1.3
Seafood product preparation and packaging	3117	6.8	4.3	2.4	1.9	2.4

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Bakeries and tortilla manufacturing	3118	4.3	2.9	1.4	1.5	1.3
Bread and bakery product manufacturing	31181	4.4	3.0	1.5	1.6	1.3
Retail bakeries	311811	2.6	1.5	0.8	0.6	1.1
Commercial bakeries	311812	5.0	3.5	1.8	1.8	1.4
Frozen cakes, pies, and other pastries manufacturing	311813	7.3	5.8	1.7	4.2	1.5
Cookie, cracker, and pasta manufacturing	31182	3.6	2.5	1.1	1.4	1.2
Cookie and cracker manufacturing	311821	3.7	2.3	1.1	1.2	1.4
Dry pasta, dough, and flour mixes manufacturing from purcl	311824	3.5	2.7	1.0	1.7	0.8
Tortilla manufacturing	31183	4.7	3.2	1.5	1.7	1.6
Other food manufacturing	3119	4.1	2.6	1.1	1.4	1.5
Snack food manufacturing	31191	4.5	2.8	1.3	1.6	1.7
Roasted nuts and peanut butter manufacturing	311911	5.8	3.6	1.8	1.8	2.2
Other snack food manufacturing	311919	4.1	2.6	1.1	1.5	1.5
Coffee and tea manufacturing	31192	3.6	2.3	1.0	1.3	1.3
Flavoring syrup and concentrate manufacturing	31193	1.8	0.9	0.4	0.5	0.9
Seasoning and dressing manufacturing	31194	3.1	2.1	1.0	1.2	1.0
Mayonnaise, dressing, and other prepared sauce manufactu	311941	3.7	2.5	1.1	1.4	1.2
Spice and extract manufacturing	311942	2.7	1.9	0.8	1.0	0.8
All other food manufacturing	31199	4.7	2.8	1.2	1.6	1.8
Perishable prepared food manufacturing	311991	5.0	3.0	1.2	1.8	2.0
All other miscellaneous food manufacturing	311999	4.2	2.6	1.3	1.3	1.6
Beverage and tobacco product manufacturing	312	4.7	3.2	1.2	2.0	1.5
Beverage manufacturing	3121	4.8	3.3	1.2	2.0	1.5
Soft drink and ice manufacturing	31211	5.8	4.5	1.6	2.8	1.4
Soft drink manufacturing	312111	6.3	4.9	1.7	3.2	1.3
Bottled water manufacturing	312112	3.6	2.7	1.1	1.6	0.9
Ice manufacturing	312113	6.0	3.0	1.9	1.1	3.0
Breweries	31212	4.4	2.2	0.8	1.4	2.2
Wineries	31213	3.4	2.0	1.0	1.1	1.4
Distilleries	31214	2.3	1.3	0.6	0.7	1.0
Tobacco manufacturing	3122	3.1	2.1	1.1	1.0	1.0

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Textile mills	313	3.2	1.9	0.8	1.1	1.4
Fiber, yarn, and thread mills	3131	2.6	1.5	0.5	1.0	1.1
Fabric mills	3132	3.3	2.0	0.9	1.1	1.3
Broadwoven fabric mills	31321	2.9	1.7	0.7	1.1	1.2
Nonwoven fabric mills	31323	4.6	2.9	1.6	1.3	1.7
Knit fabric mills	31324	2.9	1.5	0.7	0.8	1.5
Textile and fabric finishing and fabric coating mills	3133	3.7	2.1	1.0	1.1	1.6
Textile and fabric finishing mills	31331	2.9	1.7	0.9	0.8	1.2
Fabric coating mills	31332	6.5	3.3	1.0	2.3	3.1
Textile product mills	314	2.8	1.7	0.8	0.9	1.1
Textile furnishings mills	3141	2.3	1.5	0.6	0.9	0.8
Carpet and rug mills	31411	2.2	1.5	0.5	1.0	0.7
Curtain and linen mills	31412	2.4	1.4	0.6	0.8	1.0
Other textile product mills	3149	3.3	1.9	1.1	0.8	1.4
Textile bag and canvas mills	31491	3.0	1.6	0.9	0.7	1.4
All other textile product mills	31499	3.5	2.1	1.2	0.9	1.4
Rope, cordage, twine, tire cord, and tire fabric mills	314994	5.3	2.3	0.8	1.5	3.0
All other miscellaneous textile product mills	314999	3.1	2.1	1.4	0.7	1.1
Apparel manufacturing	315	2.0	1.1	0.4	0.7	0.9
Apparel knitting mills	3151	2.6	1.5	0.5	1.1	1.0
Hosiery and sock mills	31511	2.5	1.7	0.4	1.3	0.8
Other apparel knitting mills	31519	2.7	1.0	0.6	-	1.7
Men's and boys' cut and sew apparel manufacturing	31522	2.1	1.0	0.6	0.5	1.0
Women's, girls', and infants' cut and sew apparel manufactu	31524	2.4	1.3	0.2	1.1	1.1
Other cut and sew apparel manufacturing	31528	2.5	1.6	0.9	0.8	0.9
Apparel accessories and other apparel manufacturing	3159	3.0	1.4	0.4	0.9	1.6
Leather and allied product manufacturing	316	5.5	3.5	1.5	2.0	2.0
Leather and hide tanning and finishing	3161	6.9	4.5	1.4	3.1	2.5
Footwear manufacturing	3162	6.7	4.1	2.1	2.0	2.6
Other leather and allied product manufacturing	3169	3.4	2.4	-	1.6	1.0
Other leather and allied product manufacturing	31699	3.4	2.4	-	1.6	1.0

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Wood product manufacturing	321	6.4	3.6	1.8	1.8	2.9
Sawmills and wood preservation	3211	5.4	3.0	2.0	1.0	2.5
Sawmills and wood preservation	32111	5.4	3.0	2.0	1.0	2.5
Sawmills	321113	5.5	3.0	2.0	1.0	2.4
Wood preservation	321114	5.1	2.6	1.3	1.3	2.6
Veneer, plywood, and engineered wood product manufacturi	3212	6.2	3.5	1.8	1.7	2.7
Veneer, plywood, and engineered wood product manufacturi	32121	6.2	3.5	1.8	1.7	2.7
Hardwood veneer and plywood manufacturing	321211	5.0	3.0	1.6	1.3	2.0
Softwood veneer and plywood manufacturing	321212	3.7	2.2	1.2	1.0	1.5
Engineered wood member (except truss) manufacturing	321213	5.5	2.9	1.4	1.4	2.6
Truss manufacturing	321214	10.2	5.6	2.7	2.9	4.6
Reconstituted wood product manufacturing	321219	2.9	1.8	0.8	1.0	1.1
Other wood product manufacturing	3219	7.0	3.9	1.8	2.1	3.1
Millwork	32191	5.6	2.8	1.5	1.4	2.7
Wood window and door manufacturing	321911	4.8	2.4	1.3	1.1	2.3
Cut stock, resawing lumber, and planing	321912	8.5	4.2	2.5	1.7	4.3
Other millwork (including flooring)	321918	5.5	2.9	1.4	1.5	2.7
Wood container and pallet manufacturing	32192	7.7	5.2	2.4	2.8	2.5
All other wood product manufacturing	32199	8.5	4.2	1.6	2.6	-
Manufactured home (mobile home) manufacturing	321991	8.6	5.4	1.7	3.7	3.2
All other miscellaneous wood product manufacturing	321999	6.7	2.6	1.4	1.2	4.1
Paper manufacturing	322	2.7	1.6	0.8	0.8	1.1
Pulp, paper, and paperboard mills	3221	1.9	1.1	0.7	0.4	0.8
Pulp mills	32211	1.4	0.9	0.5	0.4	0.5
Paper mills	32212	1.9	1.0	0.7	0.4	0.9
Paper (except newsprint) mills	322121	1.9	1.0	0.6	0.4	0.8
Newsprint mills	322122	2.4	1.0	0.8	-	1.3
Paperboard mills	32213	2.0	1.2	0.7	0.5	0.8
Converted paper product manufacturing	3222	2.9	1.7	0.9	0.9	1.2
Paperboard container manufacturing	32221	2.7	1.6	0.7	0.9	1.1
Corrugated and solid fiber box manufacturing	322211	2.5	1.5	0.7	0.9	1.0

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Folding paperboard box manufacturing	322212	3.1	1.8	0.8	1.0	1.3
Other paperboard container manufacturing	322219	3.1	1.8	1.0	0.8	1.3
Paper bag and coated and treated paper manufacturing	32222	3.0	1.7	0.9	0.9	1.3
Stationery product manufacturing	32223	4.5	2.6	1.9	0.7	1.9
Other converted paper product manufacturing	32229	3.0	1.8	0.9	0.9	1.2
Sanitary paper product manufacturing	322291	2.5	1.4	0.6	0.8	1.1
All other converted paper product manufacturing	322299	3.9	2.4	1.3	1.1	1.4
Printing and related support activities	323	2.6	1.4	0.7	0.7	1.1
Printing and related support activities	3231	2.6	1.4	0.7	0.7	1.1
Printing	32311	2.5	1.4	0.7	0.7	1.1
Commercial printing (except screen and books)	323111	2.6	1.4	0.8	0.6	1.2
Commercial screen printing	323113	2.1	1.5	0.7	0.8	0.6
Books printing	323117	2.9	1.6	0.7	0.9	1.3
Support activities for printing	32312	3.7	2.0	0.7	1.3	1.7
Petroleum and coal products manufacturing	324	1.3	0.8	0.5	0.3	0.5
Petroleum and coal products manufacturing	3241	1.3	0.8	0.5	0.3	0.5
Petroleum refineries	32411	0.6	0.3	0.2	0.1	0.4
Asphalt paving, roofing, and saturated materials manufactur	32412	2.2	1.5	0.8	0.7	0.7
Asphalt paving mixture and block manufacturing	324121	2.2	1.4	0.7	0.7	0.8
Asphalt shingle and coating materials manufacturing	324122	2.2	1.7	0.9	0.8	0.5
Other petroleum and coal products manufacturing	32419	2.9	2.1	1.4	0.7	0.8
Petroleum lubricating oil and grease manufacturing	324191	2.6	1.9	1.0	0.8	0.8
Chemical manufacturing	325	2.0	1.2	0.6	0.6	0.8
Basic chemical manufacturing	3251	1.3	0.7	0.3	0.4	0.6
Petrochemical manufacturing	32511	0.6	0.2	0.2	-	0.4
Industrial gas manufacturing	32512	0.9	0.5	0.3	-	0.4
Synthetic dye and pigment manufacturing	32513	2.1	1.2	0.5	0.7	0.9
Other basic inorganic chemical manufacturing	32518	1.1	0.6	0.3	0.4	0.4
Other basic organic chemical manufacturing	32519	1.8	1.1	0.4	0.7	0.8
Ethyl alcohol manufacturing	325193	3.5	1.6	0.7	0.9	1.9
All other basic organic chemical manufacturing	325199	1.2	0.8	0.3	0.6	0.4

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Resin, synthetic rubber, and artificial synthetic fibers and filar	3252	1.5	0.9	0.5	0.5	0.6
Resin and synthetic rubber manufacturing	32521	1.4	0.8	0.5	0.3	0.5
Plastics material and resin manufacturing	325211	1.4	0.8	0.5	0.4	0.6
Synthetic rubber manufacturing	325212	1.5	1.0	0.7	0.3	0.5
Artificial and synthetic fibers and filaments manufacturing	32522	1.8	1.2	0.4	0.8	0.7
Pesticide, fertilizer, and other agricultural chemical manufactu	3253	2.2	1.2	0.4	0.7	1.1
Fertilizer manufacturing	32531	2.3	1.2	0.4	0.7	1.1
Phosphatic fertilizer manufacturing	325312	2.0	1.0	0.6	0.4	1.0
Pesticide and other agricultural chemical manufacturing	32532	2.2	1.1	0.4	0.7	1.1
Pharmaceutical and medicine manufacturing	3254	2.0	1.2	0.6	0.7	0.8
Pharmaceutical and medicine manufacturing	32541	2.0	1.2	0.6	0.7	0.8
Medicinal and botanical manufacturing	325411	3.1	2.2	1.0	1.2	0.9
Pharmaceutical preparation manufacturing	325412	2.0	1.2	0.5	0.7	0.8
In-vitro diagnostic substance manufacturing	325413	1.8	0.8	0.4	0.4	0.9
Biological product (except diagnostic) manufacturing	325414	1.4	0.7	0.4	0.4	0.6
Paint, coating, and adhesive manufacturing	3255	3.3	1.8	1.1	0.7	1.5
Paint and coating manufacturing	32551	3.2	1.6	1.1	0.5	1.6
Adhesive manufacturing	32552	3.3	2.1	1.0	1.1	1.2
Soap, cleaning compound, and toilet preparation manufactur	3256	2.3	1.4	0.7	0.7	0.9
Soap and cleaning compound manufacturing	32561	2.0	1.1	0.6	0.5	0.8
Soap and other detergent manufacturing	325611	2.2	1.3	0.6	0.7	0.9
Polish and other sanitation good manufacturing	325612	1.8	0.9	0.6	0.4	0.8
Surface active agent manufacturing	325613	1.6	1.1	0.6	0.4	0.6
Toilet preparation manufacturing	32562	2.7	1.7	0.8	0.9	1.1
Other chemical product and preparation manufacturing	3259	2.1	1.4	0.7	0.7	0.7
Printing ink manufacturing	32591	1.8	1.5	1.2	0.3	0.4
All other chemical product and preparation manufacturing	32599	2.0	1.3	0.6	0.7	0.7
Custom compounding of purchased resins	325991	2.9	1.6	0.5	1.1	1.3
Photographic film, paper, plate, and chemical manufacturing	325992	1.9	1.4	0.6	0.9	0.5
All other miscellaneous chemical product and preparation m	325998	1.7	1.2	0.6	0.5	0.5
Plastics and rubber products manufacturing	326	3.9	2.4	1.1	1.3	1.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Plastics product manufacturing	3261	3.9	2.3	1.1	1.2	1.6
Plastics packaging materials and unlaminated film and shee	32611	4.2	2.6	1.1	1.5	1.6
Plastics bag and pouch manufacturing	326111	3.6	2.6	1.1	1.5	0.9
Plastics packaging film and sheet (including laminated) mar	326112	3.0	1.7	0.7	1.0	1.3
Unlaminated plastics film and sheet (except packaging) ma	326113	5.3	3.1	1.3	1.8	2.2
Plastics pipe, pipe fitting, and unlaminated profile shape mar	32612	3.8	2.2	1.1	1.1	1.6
Unlaminated plastics profile shape manufacturing	326121	3.5	1.9	1.1	0.8	1.6
Plastics pipe and pipe fitting manufacturing	326122	4.1	2.4	1.1	1.3	1.7
Laminated plastics plate, sheet (except packaging), and sha	32613	4.6	3.0	1.2	1.9	1.5
Polystyrene foam product manufacturing	32614	3.4	2.3	1.4	0.9	1.1
Urethane and other foam product (except polystyrene) manu	32615	3.1	1.8	0.6	1.1	1.4
Plastics bottle manufacturing	32616	2.8	1.4	0.7	0.7	1.4
Other plastics product manufacturing	32619	4.0	2.3	1.2	1.2	1.6
Plastics plumbing fixture manufacturing	326191	5.1	3.3	1.4	1.9	1.8
All other plastics product manufacturing	326199	3.9	2.3	1.2	1.1	1.6
Rubber product manufacturing	3262	3.9	2.6	1.1	1.5	1.3
Tire manufacturing	32621	3.9	2.7	1.1	1.7	1.2
Tire manufacturing (except retreading)	326211	4.0	2.8	1.0	1.8	1.2
Tire retreading	326212	3.0	2.1	1.3	0.8	0.9
Rubber and plastics hoses and belting manufacturing	32622	4.3	2.5	1.2	1.3	1.9
Other rubber product manufacturing	32629	3.6	2.5	1.0	1.5	1.1
Rubber product manufacturing for mechanical use	326291	3.6	2.5	1.0	1.5	1.2
All other rubber product manufacturing	326299	3.6	2.5	1.0	1.5	1.1
Nonmetallic mineral product manufacturing	327	4.1	2.5	1.3	1.2	1.6
Clay product and refractory manufacturing	3271	3.9	2.3	1.2	1.1	1.7
Pottery, ceramics, and plumbing fixture manufacturing	32711	3.1	2.0	1.0	1.0	1.1
Clay building material and refractories manufacturing	32712	4.4	2.4	1.3	1.1	2.0
Glass and glass product manufacturing	3272	3.9	2.2	1.0	1.2	1.7
Glass and glass product manufacturing	32721	3.9	2.2	1.0	1.2	1.7
Flat glass manufacturing	327211	3.3	2.2	0.3	1.8	1.1
Other pressed and blown glass and glassware manufacturir	327212	3.2	1.7	0.8	0.9	1.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Glass container manufacturing	327213	4.7	2.6	0.9	1.7	2.1
Glass product manufacturing made of purchased glass	327215	4.1	2.3	1.2	1.1	1.8
Cement and concrete product manufacturing	3273	4.3	2.8	1.6	1.2	1.5
Cement manufacturing	32731	2.7	1.0	0.2	0.8	1.7
Ready-mix concrete manufacturing	32732	4.1	3.1	1.8	1.3	1.0
Concrete pipe, brick, and block manufacturing	32733	4.4	2.0	1.1	0.9	2.4
Concrete block and brick manufacturing	327331	4.0	2.1	1.1	1.0	1.9
Concrete pipe manufacturing	327332	5.6	1.9	1.1	0.7	3.7
Other concrete product manufacturing	32739	5.0	3.2	1.7	1.4	1.9
Gypsum product manufacturing	32742	3.5	1.1	0.6	0.5	2.4
Other nonmetallic mineral product manufacturing	3279	4.0	2.4	1.3	1.2	1.5
Abrasive product manufacturing	32791	4.6	2.6	0.8	1.7	2.0
All other nonmetallic mineral product manufacturing	32799	3.9	2.4	1.3	1.1	1.5
Cut stone and stone product manufacturing	327991	4.8	3.1	1.8	1.3	1.6
Mineral wool manufacturing	327993	3.1	1.8	1.0	0.8	1.3
All other miscellaneous nonmetallic mineral product manufa	327999	3.3	2.1	1.1	1.0	1.2
Primary metal manufacturing	331	4.5	2.6	1.1	1.5	1.9
Iron and steel mills and ferroalloy manufacturing	3311	2.6	1.5	0.7	0.8	1.1
Steel product manufacturing from purchased steel	3312	5.4	2.8	1.3	1.5	2.6
Iron and steel pipe and tube manufacturing from purchased	33121	5.0	2.7	1.3	1.4	2.2
Rolling and drawing of purchased steel	33122	5.8	2.8	1.3	1.6	3.0
Rolled steel shape manufacturing	331221	5.4	2.7	1.2	1.5	2.6
Steel wire drawing	331222	6.7	3.0	1.3	1.7	3.6
Alumina and aluminum production and processing	3313	3.2	1.8	0.8	1.0	1.4
Alumina and aluminum production and processing	33131	3.2	1.8	0.8	1.0	1.4
Secondary smelting and alloying of aluminum	331314	5.0	2.8	1.0	1.9	2.2
Aluminum sheet, plate, and foil manufacturing	331315	1.8	1.1	0.3	0.7	0.7
Other aluminum rolling, drawing, and extruding	331318	3.7	2.2	1.1	1.1	1.5
Nonferrous metal (except aluminum) production and process	3314	4.1	2.6	1.2	1.4	1.5
Nonferrous metal (except aluminum) smelting and refining	33141	4.5	3.7	1.4	2.3	0.8
Copper rolling, drawing, extruding, and alloying	33142	4.0	2.5	1.2	1.3	1.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Nonferrous metal (except copper and aluminum) rolling, dra	33149	4.1	2.3	1.2	1.1	1.8
Nonferrous metal (except copper and aluminum) rolling, dra	331491	3.9	2.0	1.3	0.7	1.9
Secondary smelting, refining, and alloying of nonferrous me	331492	4.4	2.7	1.1	1.6	1.7
Foundries	3315	6.1	3.7	1.5	2.2	2.4
Ferrous metal foundries	33151	6.0	3.2	1.5	1.7	2.8
Iron foundries	331511	6.1	3.2	1.4	1.8	2.9
Steel investment foundries	331512	4.4	3.1	1.4	1.6	1.3
Steel foundries (except investment)	331513	6.9	3.2	1.7	1.5	3.7
Nonferrous metal foundries	33152	6.3	4.3	1.5	2.8	2.0
Nonferrous metal die-casting foundries	331523	5.3	3.5	1.5	2.1	1.8
Aluminum foundries (except die-casting)	331524	7.0	4.4	1.2	3.2	2.6
Other nonferrous metal foundries (except die-casting)	331529	7.8	6.0	1.9	4.1	1.8
Fabricated metal product manufacturing	332	4.4	2.2	1.1	1.1	2.2
Forging and stamping	3321	6.0	3.1	1.4	1.7	2.9
Forging and stamping	33211	6.0	3.1	1.4	1.7	2.9
Iron and steel forging	332111	6.8	4.2	2.0	2.3	2.6
Custom roll forming	332114	5.6	2.5	0.6	1.8	3.1
Powder metallurgy part manufacturing	332117	3.4	2.1	1.3	0.8	1.3
Metal crown, closure, and other metal stamping (except aut	332119	6.0	2.6	1.2	1.4	3.4
Cutlery and handtool manufacturing	3322	4.0	2.2	0.8	1.3	1.8
Cutlery and handtool manufacturing	33221	4.0	2.2	0.8	1.3	1.8
Metal kitchen cookware, utensil, cutlery, and flatware (excep	332215	5.1	3.1	0.8	2.3	2.0
Saw blade and handtool manufacturing	332216	3.6	1.8	0.9	1.0	1.7
Architectural and structural metals manufacturing	3323	5.4	2.7	1.3	1.5	2.7
Plate work and fabricated structural product manufacturing	33231	5.6	2.7	1.3	1.3	2.9
Prefabricated metal building and component manufacturing	332311	6.0	3.2	1.1	2.0	2.8
Fabricated structural metal manufacturing	332312	5.4	2.4	1.3	1.2	3.0
Plate work manufacturing	332313	5.9	2.9	1.6	1.3	3.0
Ornamental and architectural metal products manufacturing	33232	5.3	2.8	1.2	1.6	2.5
Metal window and door manufacturing	332321	5.2	3.2	1.2	2.0	2.0
Sheet metal work manufacturing	332322	5.6	2.6	1.1	1.4	3.0

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Ornamental and architectural metal work manufacturing	332323	4.6	2.6	1.4	1.2	1.9
Boiler, tank, and shipping container manufacturing	3324	4.1	2.0	1.1	1.0	2.0
Power boiler and heat exchanger manufacturing	33241	3.5	1.6	0.8	0.8	1.9
Metal tank (heavy gauge) manufacturing	33242	3.9	1.7	1.0	0.7	2.1
Metal can, box, and other metal container (light gauge) manu	33243	4.7	2.7	1.3	1.5	2.0
Metal can manufacturing	332431	3.9	2.3	0.8	1.5	1.6
Hardware manufacturing	3325	4.7	2.4	1.5	0.9	2.4
Spring and wire product manufacturing	3326	4.8	2.8	1.2	1.6	1.9
Spring and wire product manufacturing	33261	4.8	2.8	1.2	1.6	1.9
Spring manufacturing	332613	4.7	2.8	1.6	1.1	2.0
Other fabricated wire product manufacturing	332618	4.8	2.9	1.0	1.9	1.9
Machine shops; turned product; and screw, nut, and bolt mar	3327	3.6	1.6	0.9	0.7	2.1
Machine shops	33271	3.6	1.5	0.9	0.6	2.1
Turned product and screw, nut, and bolt manufacturing	33272	3.7	1.7	0.8	0.9	2.0
Precision turned product manufacturing	332721	4.1	1.7	1.0	0.7	2.4
Bolt, nut, screw, rivet, and washer manufacturing	332722	3.4	1.7	0.7	1.0	1.7
Coating, engraving, heat treating, and allied activities	3328	4.4	2.5	1.1	1.4	1.9
Coating, engraving, heat treating, and allied activities	33281	4.4	2.5	1.1	1.4	1.9
Metal heat treating	332811	3.0	1.4	0.5	0.9	1.6
Metal coating, engraving (except jewelry and silverware), ar	332812	5.3	3.3	1.5	1.8	2.0
Electroplating, plating, polishing, anodizing, and coloring	332813	4.1	2.2	1.0	1.2	1.9
Other fabricated metal product manufacturing	3329	3.3	1.7	0.8	0.9	1.6
Metal valve manufacturing	33291	2.5	1.4	0.7	0.7	1.0
Industrial valve manufacturing	332911	1.9	0.8	0.4	0.4	1.0
Fluid power valve and hose fitting manufacturing	332912	2.3	1.5	0.8	0.7	0.8
Plumbing fixture fitting and trim manufacturing	332913	3.2	2.2	0.5	1.7	1.0
Other metal valve and pipe fitting manufacturing	332919	3.5	1.8	1.1	0.7	1.7
All other fabricated metal product manufacturing	33299	3.7	1.8	0.8	0.9	1.9
Ball and roller bearing manufacturing	332991	3.0	1.8	0.7	1.1	1.2
Small arms ammunition manufacturing	332992	2.7	1.7	0.8	0.9	1.0
Ammunition (except small arms) manufacturing	332993	1.2	0.4	0.2	0.2	0.8

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Small arms, ordnance, and ordnance accessories manufact	332994	3.0	1.9	0.9	1.0	1.1
Fabricated pipe and pipe fitting manufacturing	332996	3.0	1.1	0.7	0.4	1.9
All other miscellaneous fabricated metal product manufactu	332999	5.0	2.3	1.0	1.3	2.7
Machinery manufacturing	333	3.4	1.7	0.8	0.9	1.7
Agriculture, construction, and mining machinery manufacturir	3331	3.4	1.7	0.9	0.9	1.7
Agricultural implement manufacturing	33311	4.8	2.5	1.1	1.3	2.3
Farm machinery and equipment manufacturing	333111	5.0	2.6	1.2	1.4	2.5
Lawn and garden tractor and home lawn and garden equipr	333112	3.8	2.1	1.1	1.1	1.7
Construction machinery manufacturing	33312	4.3	2.1	1.0	1.0	2.2
Mining and oil and gas field machinery manufacturing	33313	1.4	0.7	0.4	0.3	0.7
Mining machinery and equipment manufacturing	333131	3.2	1.5	1.0	0.5	1.7
Oil and gas field machinery and equipment manufacturing	333132	1.1	0.6	0.3	0.2	0.5
Industrial machinery manufacturing	3332	2.9	1.4	0.8	0.6	1.5
Industrial machinery manufacturing	33324	2.9	1.4	0.8	0.6	1.5
Food product machinery manufacturing	333241	4.9	2.4	1.6	0.8	2.5
Semiconductor machinery manufacturing	333242	1.1	0.4	0.2	0.3	0.7
Sawmill, woodworking, and paper machinery manufacturing	333243	3.7	1.4	0.6	0.8	2.3
Printing machinery and equipment manufacturing	333244	2.0	1.5	0.9	0.7	0.5
Other industrial machinery manufacturing	333249	2.7	1.3	0.7	0.6	1.3
Commercial and service industry machinery manufacturing	3333	2.5	1.2	0.5	0.7	1.3
Commercial and service industry machinery manufacturing	33331	2.5	1.2	0.5	0.7	1.3
Optical instrument and lens manufacturing	333314	1.1	0.6	0.4	0.2	0.6
Photographic and photocopying equipment manufacturing	333316	2.2	0.7	0.5	0.2	1.5
Other commercial and service industry machinery manufact	333318	3.0	1.5	0.6	0.9	1.5
Ventilation, heating, air-conditioning, and commercial refriger	3334	3.5	1.7	0.7	1.1	1.7
Ventilation, heating, air-conditioning, and commercial refrige	33341	3.5	1.7	0.7	1.1	1.7
Industrial and commercial fan and blower and air purificatio	333413	4.9	2.0	1.0	1.0	2.9
Heating equipment (except warm air furnaces) manufacturi	333414	3.8	1.7	0.6	1.1	2.0
Air-conditioning and warm air heating equip and commercia	333415	2.9	1.6	0.6	1.1	1.3
Metalworking machinery manufacturing	3335	4.3	2.0	1.0	1.0	2.3
Metalworking machinery manufacturing	33351	4.3	2.0	1.0	1.0	2.3

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Industrial mold manufacturing	333511	3.4	1.4	0.8	0.6	2.0
Special die and tool, die set, jig, and fixture manufacturing	333514	4.5	2.1	1.1	1.0	2.4
Cutting tool and machine tool accessory manufacturing	333515	4.0	1.4	0.7	0.6	2.7
Machine tool manufacturing	333517	5.6	2.9	1.3	1.6	2.7
Rolling mill and other metalworking machinery manufacturir	333519	2.4	1.3	0.7	0.6	1.1
Engine, turbine, and power transmission equipment manufac	3336	3.0	1.7	0.8	0.9	1.3
Engine, turbine, and power transmission equipment manufa	33361	3.0	1.7	0.8	0.9	1.3
Turbine and turbine generator set units manufacturing	333611	3.1	2.0	0.9	1.1	1.1
Speed changer, industrial high-speed drive, and gear manu	333612	3.7	1.7	1.2	0.6	1.9
Mechanical power transmission equipment manufacturing	333613	3.4	1.8	1.1	0.7	1.5
Other engine equipment manufacturing	333618	2.8	1.5	0.6	0.8	1.3
Other general purpose machinery manufacturing	3339	3.3	1.7	0.8	0.9	1.6
Pump and compressor manufacturing	33391	2.2	1.1	0.6	0.5	1.1
Pump and pumping equipment manufacturing	333911	2.1	1.1	0.7	0.4	1.0
Air and gas compressor manufacturing	333912	2.3	1.1	0.6	0.5	1.2
Measuring and dispensing pump manufacturing	333913	2.5	1.4	-	1.2	1.1
Material handling equipment manufacturing	33392	4.2	2.3	1.0	1.3	1.9
Elevator and moving stairway manufacturing	333921	3.2	2.2	1.0	1.2	1.0
Conveyor and conveying equipment manufacturing	333922	4.2	2.1	0.9	1.2	2.0
Overhead traveling crane, hoist, and monorail system manu	333923	5.9	3.1	1.4	1.7	2.8
Industrial truck, tractor, trailer, and stacker machinery manu	333924	3.7	2.1	0.8	1.4	1.6
All other general purpose machinery manufacturing	33399	3.2	1.6	0.8	0.8	1.6
Power-driven handtool manufacturing	333991	2.2	1.1	0.6	0.5	1.1
Welding and soldering equipment manufacturing	333992	2.1	0.7	0.4	0.3	1.4
Industrial process furnace and oven manufacturing	333994	1.6	1.3	0.5	0.8	-
Fluid power cylinder and actuator manufacturing	333995	6.0	3.3	1.8	1.5	2.6
Fluid power pump and motor manufacturing	333996	2.6	1.1	0.5	0.5	1.5
All other miscellaneous general purpose machinery manufa	333999	3.4	1.6	0.6	1.0	1.9
Computer and electronic product manufacturing	334	1.2	0.7	0.4	0.3	0.5
Computer and peripheral equipment manufacturing	3341	0.7	0.4	0.2	0.2	0.3
Computer and peripheral equipment manufacturing	33411	0.7	0.4	0.2	0.2	0.3

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Electronic computer manufacturing	334111	0.7	0.4	0.2	0.2	0.3
Computer storage device manufacturing	334112	0.5	0.4	0.2	0.2	0.1
Computer terminal and other computer peripheral equipmer	334118	0.6	0.4	0.3	0.1	0.3
Communications equipment manufacturing	3342	1.0	0.6	0.3	0.3	0.4
Telephone apparatus manufacturing	33421	0.6	0.4	0.3	0.2	0.2
Radio and television broadcasting and wireless communicat	33422	1.1	0.6	0.3	0.3	0.5
Other communications equipment manufacturing	33429	1.1	0.6	0.3	0.3	0.5
Audio and video equipment manufacturing	3343	1.1	0.7	0.5	0.2	0.4
Semiconductor and other electronic component manufacturir	3344	1.4	0.8	0.4	0.4	0.6
Semiconductor and other electronic component manufacturi	33441	1.4	0.8	0.4	0.4	0.6
Bare printed circuit board manufacturing	334412	1.2	0.8	0.3	0.4	0.5
Semiconductor and related device manufacturing	334413	1.2	0.5	0.3	0.2	0.7
Capacitor, resistor, coil, transformer, and other inductor ma	334416	2.7	1.7	-	0.9	0.9
Electronic connector manufacturing	334417	1.6	0.9	0.4	0.5	0.7
Printed circuit assembly (electronic assembly) manufacturin	334418	1.0	0.6	0.5	0.1	0.4
Other electronic component manufacturing	334419	2.4	1.7	0.7	1.0	0.7
Navigational, measuring, electromedical, and control instrum	3345	1.3	0.7	0.3	0.4	0.6
Navigational, measuring, electromedical, and control instrum	33451	1.3	0.7	0.3	0.4	0.6
Electromedical and electrotherapeutic apparatus manufactu	334510	1.0	0.5	0.4	0.2	0.5
Search, detection, navigation, guidance, aeronautical, and r	334511	1.0	0.5	0.3	0.3	0.5
Automatic environmental control manufacturing for resident	334512	3.1	1.7	0.4	1.3	1.4
Instruments and related products manufacturing for measur	334513	1.3	0.7	0.2	0.5	0.6
Totalizing fluid meter and counting device manufacturing	334514	2.1	1.3	0.6	0.8	0.7
Instrument manufacturing for measuring and testing electric	334515	1.0	0.6	0.4	0.2	0.5
Analytical laboratory instrument manufacturing	334516	1.5	1.0	0.5	0.4	0.6
Irradiation apparatus manufacturing	334517	1.3	0.5	0.3	0.3	0.7
Other measuring and controlling device manufacturing	334519	1.8	0.9	0.4	0.5	0.9
Manufacturing and reproducing magnetic and optical media	3346	0.9	0.6	0.4	0.2	0.3
Manufacturing and reproducing magnetic and optical media	33461	0.9	0.6	0.4	0.2	0.3
Blank magnetic and optical recording media manufacturing	334613	1.2	0.4	-	-	0.8
Software and other prerecorded compact disc, tape, and re	334614	0.8	0.7	0.5	0.2	-

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Electrical equipment, appliance, and component manufacturir	335	2.9	1.8	0.8	1.0	1.1
Electric lighting equipment manufacturing	3351	2.5	1.5	0.6	0.9	1.0
Electric lamp bulb and part manufacturing	33511	3.5	2.9	1.2	1.7	0.5
Lighting fixture manufacturing	33512	2.3	1.3	0.5	0.8	1.1
Residential electric lighting fixture manufacturing	335121	1.2	0.7	0.3	0.4	0.5
Commercial, industrial, and institutional electric lighting fixtu	335122	2.5	1.5	0.7	0.8	1.0
Other lighting equipment manufacturing	335129	3.3	1.3	0.3	1.0	2.0
Household appliance manufacturing	3352	3.0	1.7	0.6	1.1	1.2
Small electrical appliance manufacturing	33521	2.5	1.2	0.7	0.6	1.3
Major appliance manufacturing	33522	3.1	1.8	0.6	1.2	1.2
Household cooking appliance manufacturing	335221	3.7	2.0	0.5	1.6	1.7
Household refrigerator and home freezer manufacturing	335222	3.6	2.2	0.9	1.4	1.3
Electrical equipment manufacturing	3353	3.1	1.9	0.9	1.0	1.2
Electrical equipment manufacturing	33531	3.1	1.9	0.9	1.0	1.2
Power, distribution, and specialty transformer manufacturing	335311	4.9	2.6	1.4	1.3	2.3
Motor and generator manufacturing	335312	3.2	1.9	1.0	0.9	1.3
Switchgear and switchboard apparatus manufacturing	335313	3.5	2.6	1.1	1.5	0.9
Relay and industrial control manufacturing	335314	1.4	0.8	0.5	0.3	0.6
Other electrical equipment and component manufacturing	3359	2.8	1.8	0.7	1.1	1.0
Battery manufacturing	33591	3.5	2.6	0.8	1.8	0.9
Communication and energy wire and cable manufacturing	33592	2.0	1.1	0.5	0.6	0.9
Fiber optic cable manufacturing	335921	1.2	0.6	0.3	0.4	0.5
Other communication and energy wire manufacturing	335929	2.6	1.5	0.7	0.8	1.2
Wiring device manufacturing	33593	2.9	1.7	0.7	1.0	1.3
Current-carrying wiring device manufacturing	335931	2.6	1.5	0.6	0.8	1.1
Noncurrent-carrying wiring device manufacturing	335932	4.2	2.3	0.9	1.4	1.9
All other electrical equipment and component manufacturing	33599	2.7	1.7	0.8	0.9	1.0
Carbon and graphite product manufacturing	335991	3.2	1.8	0.7	1.1	1.4
All other miscellaneous electrical equipment and componen	335999	2.6	1.7	0.8	0.9	0.9
Transportation equipment manufacturing	336	4.4	2.5	1.0	1.5	1.9
Motor vehicle manufacturing	3361	6.5	3.8	1.7	2.2	2.7

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Automobile and light duty motor vehicle manufacturing	33611	6.7	4.0	1.8	2.2	2.8
Automobile manufacturing	336111	6.2	4.0	1.9	2.0	2.2
Light truck and utility vehicle manufacturing	336112	7.7	4.0	1.5	2.5	3.8
Heavy duty truck manufacturing	33612	5.1	3.1	1.2	1.9	2.1
Motor vehicle body and trailer manufacturing	3362	7.4	3.7	1.5	2.2	3.8
Motor vehicle body and trailer manufacturing	33621	7.4	3.7	1.5	2.2	3.8
Motor vehicle body manufacturing	336211	6.4	3.2	1.4	1.8	3.2
Truck trailer manufacturing	336212	7.3	3.4	1.3	2.1	3.9
Motor home manufacturing	336213	8.7	4.9	1.5	3.4	3.8
Travel trailer and camper manufacturing	336214	8.6	4.1	1.7	2.4	4.4
Motor vehicle parts manufacturing	3363	4.1	2.4	0.9	1.5	1.7
Motor vehicle gasoline engine and engine parts manufacturi	33631	3.6	2.1	0.8	1.3	1.6
Motor vehicle electrical and electronic equipment manufactu	33632	3.3	2.1	0.5	1.6	1.2
Motor vehicle steering and suspension components (except	33633	3.6	2.2	1.0	1.3	1.4
Motor vehicle brake system manufacturing	33634	4.3	2.8	1.6	1.2	1.5
Motor vehicle transmission and power train parts manufactu	33635	3.0	1.8	0.8	1.0	1.2
Motor vehicle seating and interior trim manufacturing	33636	4.2	2.8	0.8	1.9	1.4
Motor vehicle metal stamping	33637	6.3	2.9	1.1	1.8	3.4
Other motor vehicle parts manufacturing	33639	4.2	2.6	1.0	1.6	1.6
Aerospace product and parts manufacturing	3364	2.7	1.6	0.5	1.0	1.1
Aerospace product and parts manufacturing	33641	2.7	1.6	0.5	1.0	1.1
Aircraft manufacturing	336411	3.4	2.2	0.6	1.6	1.1
Aircraft engine and engine parts manufacturing	336412	2.1	0.9	0.5	0.4	1.2
Other aircraft parts and auxiliary equipment manufacturing	336413	2.9	1.3	0.5	0.8	1.6
Guided missile and space vehicle manufacturing	336414	0.8	0.5	0.3	0.2	0.4
Guided missile and space vehicle propulsion unit and propu	336415	1.4	0.8	0.3	0.6	0.6
Other guided missile and space vehicle parts and auxiliary e	336419	1.8	1.2	0.5	0.7	0.6
Railroad rolling stock manufacturing	3365	2.9	1.6	0.6	1.0	1.2
Ship and boat building	3366	5.7	3.4	1.9	1.5	2.3
Ship and boat building	33661	5.7	3.4	1.9	1.5	2.3
Ship building and repairing	336611	6.0	3.8	2.3	1.6	2.2

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Boat building	336612	5.0	2.4	1.0	1.4	2.6
Other transportation equipment manufacturing	3369	2.3	1.0	0.5	0.5	1.2
Other transportation equipment manufacturing	33699	2.3	1.0	0.5	0.5	1.2
Motorcycle, bicycle, and parts manufacturing	336991	1.6	0.7	0.4	0.3	0.8
Military armored vehicle, tank, and tank component manufa	336992	3.2	1.4	0.7	0.7	1.8
All other transportation equipment manufacturing	336999	2.6	1.1	0.5	0.7	1.4
Furniture and related product manufacturing	337	4.6	2.7	1.2	1.5	1.9
Household and institutional furniture and kitchen cabinet mar	3371	4.7	2.7	1.2	1.5	2.0
Wood kitchen cabinet and countertop manufacturing	33711	4.1	2.2	1.1	1.1	1.9
Household and institutional furniture manufacturing	33712	5.3	3.1	1.2	1.9	2.1
Upholstered household furniture manufacturing	337121	5.0	2.9	1.0	1.9	2.1
Nonupholstered wood household furniture manufacturing	337122	5.4	3.0	1.6	1.4	2.4
Metal household furniture manufacturing	337124	4.8	3.1	-	2.0	1.6
Household furniture (except wood and metal) manufacturing	337125	5.4	4.0	1.3	2.7	1.4
Institutional furniture manufacturing	337127	5.7	3.7	1.1	2.6	2.0
Office furniture (including fixtures) manufacturing	3372	4.8	2.9	1.3	1.6	1.9
Office furniture (including fixtures) manufacturing	33721	4.8	2.9	1.3	1.6	1.9
Wood office furniture manufacturing	337211	3.6	2.1	0.6	1.5	1.5
Custom architectural woodwork and millwork manufacturing	337212	3.7	2.4	1.7	0.7	1.4
Office furniture (except wood) manufacturing	337214	3.0	2.0	0.6	1.4	1.0
Showcase, partition, shelving, and locker manufacturing	337215	6.6	3.9	1.7	2.1	2.8
Other furniture related product manufacturing	3379	3.7	2.4	1.0	1.3	1.3
Mattress manufacturing	33791	4.2	2.5	1.2	1.4	1.7
Blind and shade manufacturing	33792	2.7	2.1	0.8	1.3	0.6
Miscellaneous manufacturing	339	2.4	1.4	0.7	0.6	1.1
Medical equipment and supplies manufacturing	3391	2.0	1.0	0.5	0.5	0.9
Medical equipment and supplies manufacturing	33911	2.0	1.0	0.5	0.5	0.9
Surgical and medical instrument manufacturing	339112	1.7	0.9	0.4	0.5	0.8
Surgical appliance and supplies manufacturing	339113	2.4	1.2	0.7	0.5	1.2
Ophthalmic goods manufacturing	339115	2.9	2.1	0.9	1.2	0.8
Dental laboratories	339116	0.9	0.4	0.2	0.2	0.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Other miscellaneous manufacturing	3399	3.0	1.7	1.0	0.7	1.3
Jewelry and silverware manufacturing	33991	1.8	1.2	0.7	0.5	0.6
Sporting and athletic goods manufacturing	33992	2.9	1.7	0.8	0.9	1.1
Doll, toy, and game manufacturing	33993	1.8	1.1	0.5	0.6	0.7
Office supplies (except paper) manufacturing	33994	2.4	1.6	0.7	0.9	0.8
Sign manufacturing	33995	3.6	1.6	1.0	0.6	2.0
All other miscellaneous manufacturing	33999	3.2	2.0	1.2	0.8	1.1
Gasket, packing, and sealing device manufacturing	339991	2.7	1.5	0.9	0.6	1.2
Musical instrument manufacturing	339992	3.9	2.9	1.4	1.5	0.9
Fastener, button, needle, and pin manufacturing	339993	2.5	1.9	0.5	1.4	0.7
Broom, brush, and mop manufacturing	339994	4.5	2.7	1.2	1.5	1.8
Burial casket manufacturing	339995	6.3	2.9	2.2	0.7	3.3
All other miscellaneous manufacturing	339999	2.9	1.9	1.3	0.6	1.0
Service-providing		2.8	1.5	0.9	0.6	1.3
Trade, transportation, and utilities[8]		3.4	2.2	1.2	1.0	1.2
Wholesale trade	42	2.8	1.8	1.0	0.8	1.0
Merchant wholesalers, durable goods	423	2.6	1.5	0.8	0.7	1.1
Motor vehicle and motor vehicle parts and supplies merchant	4231	3.4	2.0	1.1	0.8	1.5
Furniture and home furnishing merchant wholesalers	4232	2.9	1.7	0.8	0.9	1.3
Lumber and other construction materials merchant wholesale	4233	4.7	3.2	1.7	1.5	1.5
Professional and commercial equipment and supplies merch	4234	1.3	0.7	0.4	0.2	0.6
Metal and mineral (except petroleum) merchant wholesalers	4235	5.0	3.4	1.9	1.5	1.6
Household appliances and electrical and electronic goods me	4236	1.5	0.8	0.5	0.4	0.6
Hardware, and plumbing and heating equipment and supplies	4237	3.0	1.9	0.9	1.0	1.1
Machinery, equipment, and supplies merchant wholesalers	4238	2.7	1.3	0.8	0.6	1.4
Miscellaneous durable goods merchant wholesalers	4239	2.4	1.5	0.7	0.7	1.0
Sporting and recreational goods and supplies merchant who	42391	2.3	1.1	0.6	0.5	1.2
Toy and hobby goods and supplies merchant wholesalers	42392	1.4	1.0	-	0.6	0.4
Recyclable material merchant wholesalers	42393	4.2	2.5	1.3	1.2	1.7
Jewelry, watch, precious stone, and precious metal merchar	42394	0.3	0.2	0.2	-	0.1
Other miscellaneous durable goods merchant wholesalers	42399	1.6	1.1	0.5	0.6	0.4

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Merchant wholesalers, nondurable goods	424	3.7	2.6	1.3	1.3	1.1
Paper and paper product merchant wholesalers	4241	2.1	1.1	0.7	0.4	1.1
Drugs and druggists' sundries merchant wholesalers	4242	1.6	1.1	0.6	0.5	0.6
Apparel, piece goods, and notions merchant wholesalers	4243	1.3	0.9	0.4	0.5	0.4
Grocery and related product merchant wholesalers	4244	4.7	3.6	1.8	1.9	1.1
Farm product raw material merchant wholesalers	4245	-	1.8	1.3	0.4	2.3
Chemical and allied products merchant wholesalers	4246	3.0	-	-	0.4	1.2
Petroleum and petroleum products merchant wholesalers	4247	2.3	0.9	0.7	0.2	1.4
Beer, wine, and distilled alcoholic beverage merchant wholes	4248	6.0	4.4	-	2.7	1.7
Miscellaneous nondurable goods merchant wholesalers	4249	3.2	2.1	-	0.8	1.0
Wholesale electronic markets and agents and brokers	425	1.2	0.9	0.5	-	0.4
Retail trade	44-45	3.3	2.0	1.0	0.9	1.4
Motor vehicle and parts dealers	441	3.3	1.7	1.1	0.6	1.6
Automobile dealers	4411	3.2	1.5	1.0	0.5	1.7
New car dealers	44111	3.3	1.5	1.0	0.4	1.8
Other motor vehicle dealers	4412	4.0	2.0	1.4	0.6	-
Recreational vehicle dealers	44121	4.7	2.0	1.3	0.7	2.7
Motorcycle, boat, and other motor vehicle dealers	44122	-	1.9	1.4	0.5	-
Automotive parts, accessories, and tire stores	4413	3.3	2.2	1.1	1.1	1.1
Automotive parts and accessories stores	44131	2.7	1.8	0.8	1.0	1.0
Tire dealers	44132	4.4	3.1	1.6	1.5	1.3
Furniture and home furnishings stores	442	3.2	2.1	1.4	0.7	1.1
Furniture stores	4421	2.7	1.9	1.2	0.7	0.8
Home furnishings stores	4422	3.7	2.3	1.7	0.6	1.4
Floor covering stores	44221	1.7	1.3	0.7	-	0.4
Other home furnishings stores	44229	4.9	2.9	2.3	0.6	2.0
Electronics and appliance stores	443	1.2	0.6	0.5	0.1	-
Electronics and appliance stores	4431	1.2	0.6	0.5	0.1	-
Electronics and appliance stores	44314	1.2	0.6	0.5	0.1	-
Household appliance stores	443141	2.2	0.8	0.5	0.3	1.4
Electronics stores	443142	1.1	0.6	0.5	0.1	0.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Building material and garden equipment and supplies dealers	444	4.6	3.1	1.5	1.5	1.5
Building material and supplies dealers	4441	4.7	3.2	1.5	1.6	1.5
Home centers	44411	5.3	3.6	1.5	2.1	1.7
Paint and wallpaper stores	44412	2.6	1.9	-	0.7	0.6
Hardware stores	44413	3.0	1.9	1.2	0.7	1.1
Other building material dealers	44419	4.6	3.1	1.9	-	1.5
Lawn and garden equipment and supplies stores	4442	3.8	2.4	1.5	0.9	1.3
Outdoor power equipment stores	44421	0.9	0.7	0.3	0.4	0.3
Nursery, garden center, and farm supply stores	44422	4.7	3.0	2.0	1.1	1.7
Food and beverage stores	445	4.0	2.5	1.3	1.2	1.5
Grocery stores	4451	4.3	2.7	1.4	1.3	1.6
Supermarkets and other grocery (except convenience) store	44511	4.5	2.9	1.5	1.4	1.7
Convenience stores	44512	1.7	0.9	0.7	0.2	0.9
Specialty food stores	4452	2.7	1.3	0.9	0.3	1.4
Meat markets	44521	4.9	2.0	1.5	0.5	2.9
Fish and seafood markets	44522	2.2	1.3	1.2	-	1.0
Fruit and vegetable markets	44523	2.5	1.5	0.8	0.6	1.0
Other specialty food stores	44529	2.0	1.0	0.7	0.2	1.0
Beer, wine, and liquor stores	4453	0.9	0.6	0.4	0.2	0.3
Health and personal care stores	446	2.0	0.8	0.5	0.3	1.2
Health and personal care stores	4461	2.0	0.8	0.5	0.3	1.2
Pharmacies and drug stores	44611	2.4	1.0	0.6	0.3	1.4
Cosmetics, beauty supplies, and perfume stores	44612	1.2	0.5	0.4	0.1	0.7
Other health and personal care stores	44619	1.3	0.5	0.2	0.3	0.8
Gasoline stations	447	2.8	1.1	0.7	0.5	1.7
Gasoline stations	4471	2.8	1.1	0.7	0.5	1.7
Gasoline stations with convenience stores	44711	2.9	1.1	0.7	0.4	1.8
Other gasoline stations	44719	1.9	1.0	0.4	0.5	0.9
Clothing and clothing accessories stores	448	1.8	0.8	0.6	0.2	1.0
Clothing stores	4481	2.1	0.9	0.6	0.3	1.2
Men's clothing stores	44811	1.8	1.2	1.1	-	0.6

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Women's clothing stores	44812	2.2	1.0	0.7	0.2	1.2
Family clothing stores	44814	2.5	1.0	0.7	0.3	1.6
Clothing accessories stores	44815	0.9	0.7	-	-	0.2
Other clothing stores	44819	2.0	0.7	0.3	0.4	1.3
Shoe stores	4482	1.8	1.1	0.8	0.3	0.8
Jewelry, luggage, and leather goods stores	4483	0.5	0.3	0.3	-	0.2
Jewelry stores	44831	0.5	0.3	0.3	-	0.2
Luggage and leather goods stores	44832	1.0	0.2	0.1	-	-
Sporting goods, hobby, book, and music stores	451	2.0	1.1	0.5	0.6	0.9
Sporting goods, hobby, and musical instrument stores	4511	2.1	1.2	0.6	0.6	0.9
Sporting goods stores	45111	2.0	1.1	0.4	0.6	0.9
Hobby, toy, and game stores	45112	2.6	1.5	0.7	0.7	1.2
Musical instrument and supplies stores	45114	1.5	1.2	1.1	-	0.3
Book stores and news dealers	4512	0.9	0.5	0.2	0.3	0.4
Book stores and news dealers	45121	0.9	0.5	0.2	0.3	0.4
Book stores	451211	0.9	0.5	0.2	0.3	0.5
General merchandise stores	452	4.3	2.7	1.1	1.6	1.6
Department stores	4521	3.8	2.3	1.1	1.2	1.5
Other general merchandise stores	4529	4.5	2.9	1.1	1.8	1.6
Warehouse clubs and supercenters	45291	4.6	3.0	1.1	1.9	1.6
All other general merchandise stores	45299	4.2	2.5	1.0	1.5	1.6
Miscellaneous store retailers	453	2.8	1.5	0.8	0.7	1.3
Florists	4531	1.1	0.5	0.2	-	0.7
Office supplies, stationery, and gift stores	4532	2.4	1.0	0.7	0.4	1.4
Office supplies and stationery stores	45321	2.3	1.0	0.5	0.4	1.3
Gift, novelty, and souvenir stores	45322	2.4	1.1	0.8	0.3	1.4
Used merchandise stores	4533	4.4	3.1	1.5	1.6	1.2
Other miscellaneous store retailers	4539	2.7	1.2	0.7	0.5	1.5
Pet and pet supplies stores	45391	6.1	2.6	1.6	1.0	3.5
All other miscellaneous store retailers	45399	0.7	0.4	0.2	0.2	0.3
Nonstore retailers	454	2.4	1.5	0.9	0.5	0.9

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Electronic shopping and mail-order houses	4541	1.4	0.8	0.5	0.4	0.5
Electronic shopping and mail-order houses	45411	1.4	0.8	0.5	0.4	0.5
Electronic shopping	454111	1.1	0.7	0.4	0.3	0.4
Electronic auctions	454112	0.3	0.2	-	-	-
Mail-order houses	454113	1.8	1.1	0.5	0.6	0.7
Vending machine operators	4542	3.0	1.5	0.6	0.9	1.5
Direct selling establishments	4543	4.7	3.1	-	0.8	1.6
Fuel dealers	45431	5.5	3.2	2.1	1.0	2.3
Transportation and warehousing[8]	48-49	4.6	3.3	2.1	1.2	1.3
Air transportation	481	6.7	5.1	3.7	1.4	1.6
Scheduled air transportation	4811	7.3	5.5	4.0	1.6	1.7
Scheduled air transportation	48111	7.3	5.5	4.0	1.6	1.7
Scheduled passenger air transportation	481111	7.4	5.7	4.1	1.6	1.8
Scheduled freight air transportation	481112	1.3	1.0	0.7	0.2	0.3
Nonscheduled air transportation	4812	2.1	1.2	0.8	0.4	0.9
Rail transportation[8]	482	2.0	1.4	1.3	0.1	0.5
Water transportation	483	2.2	1.2	0.9	0.3	1.0
Deep sea, coastal, and great lakes water transportation	4831	2.6	1.2	0.9	0.3	1.4
Deep sea, coastal, and great lakes water transportation	48311	2.6	1.2	0.9	0.3	1.4
Coastal and great lakes freight transportation	483113	3.3	1.9	1.8	-	1.4
Coastal and great lakes passenger transportation	483114	3.7	1.8	0.9	0.9	1.9
Inland water transportation	4832	1.8	1.2	0.9	0.3	0.6
Inland water transportation	48321	1.8	1.2	0.9	0.3	0.6
Inland water freight transportation	483211	1.5	1.0	0.7	0.4	0.5
Inland water passenger transportation	483212	3.5	2.3	2.3	-	1.2
Truck transportation	484	4.3	3.0	2.1	0.9	1.2
General freight trucking	4841	4.2	3.0	2.1	0.9	1.2
General freight trucking, local	48411	3.7	2.7	2.0	0.7	1.0
General freight trucking, long-distance	48412	4.4	3.1	2.1	1.0	1.2
Specialized freight trucking	4842	4.3	3.0	2.1	0.9	1.3
Used household and office goods moving	48421	7.6	5.1	3.0	2.2	2.5

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Specialized freight (except used goods) trucking, local	48422	3.3	2.3	1.7	0.6	1.0
Specialized freight (except used goods) trucking, long-distar	48423	4.0	2.8	2.3	0.5	1.2
Transit and ground passenger transportation	485	4.6	3.1	2.3	0.8	1.5
Urban transit systems	4851	6.2	4.9	3.6	1.3	1.3
Interurban and rural bus transportation	4852	7.3	4.1	1.8	2.3	3.2
Taxi and limousine service	4853	2.6	2.0	1.6	0.4	0.7
Taxi service	48531	2.8	1.9	1.6	0.3	0.9
Limousine service	48532	2.4	2.0	1.6	0.4	0.4
School and employee bus transportation	4854	4.6	2.6	1.9	0.7	1.9
Charter bus industry	4855	4.4	3.4	2.6	0.8	1.0
Other transit and ground passenger transportation	4859	4.8	3.2	2.5	0.7	1.6
Pipeline transportation	486	1.0	0.4	0.2	0.2	0.6
Pipeline transportation of natural gas	4862	1.2	0.3	0.2	0.1	1.0
Other pipeline transportation	4869	0.7	0.4	0.4	-	-
Pipeline transportation of refined petroleum products	48691	0.8	0.4	0.4	-	-
Scenic and sightseeing transportation	487	3.6	1.6	1.2	0.4	2.0
Scenic and sightseeing transportation, land	4871	4.1	2.0	1.9	-	2.1
Scenic and sightseeing transportation, water	4872	2.9	1.4	0.7	-	1.5
Scenic and sightseeing transportation, other	4879	4.4	0.9	0.7	-	3.4
Support activities for transportation	488	3.3	2.2	1.5	0.7	1.1
Support activities for air transportation	4881	4.3	2.9	1.6	1.3	1.3
Support activities for rail transportation	4882	2.8	2.2	1.7	0.5	0.6
Support activities for water transportation	4883	5.1	3.2	2.7	0.5	1.9
Marine cargo handling	48832	6.1	3.7	3.3	0.4	2.3
Navigational services to shipping	48833	3.2	1.8	1.3	0.5	1.4
Support activities for road transportation	4884	3.6	2.5	2.0	0.4	1.2
Motor vehicle towing	48841	4.1	2.7	2.5	0.2	1.4
Freight transportation arrangement	4885	1.7	1.2	0.8	0.4	0.5
Other support activities for transportation	4889	4.0	2.1	1.2	0.9	1.9
Couriers and messengers	492	7.0	5.5	2.8	2.7	1.5
Couriers and express delivery services	4921	7.4	5.8	3.0	2.8	1.6

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Warehousing and storage	493	5.0	3.7	1.7	2.0	1.3
Warehousing and storage	4931	5.0	3.7	1.7	2.0	1.3
General warehousing and storage	49311	5.0	3.7	1.7	2.0	1.3
Refrigerated warehousing and storage	49312	5.6	4.0	2.1	1.9	1.6
Farm product warehousing and storage	49313	2.7	1.4	1.1	-	1.3
Other warehousing and storage	49319	4.7	3.7	1.3	2.4	1.1
Utilities	22	2.1	1.2	0.7	0.5	0.9
Utilities	221	2.1	1.2	0.7	0.5	0.9
Electric power generation, transmission and distribution	2211	1.7	0.9	0.5	0.3	0.8
Electric power generation	22111	1.0	0.5	0.3	0.2	0.5
Hydroelectric power generation	221111	2.3	1.8	1.4	0.4	0.6
Fossil fuel electric power generation	221112	1.4	0.6	0.4	0.3	0.8
Nuclear electric power generation	221113	0.3	0.1	(- [9] -)	-	0.2
Electric power transmission, control, and distribution	22112	2.1	1.1	0.7	0.4	1.0
Biomass electric power generation	221117	-	-	-	-	-
Natural gas distribution	2212	2.8	1.8	0.9	0.9	1.0
Water, sewage and other systems	2213	3.8	2.5	1.7	0.8	1.3
Water supply and irrigation systems	22131	4.2	2.7	1.9	0.8	1.5
Information		1.3	0.7	0.5	0.2	0.6
Information	51	1.3	0.7	0.5	0.2	0.6
Publishing industries (except internet)	511	0.8	0.4	0.3	0.1	0.4
Newspaper, periodical, book, and directory publishers	5111	1.3	0.6	0.4	0.2	0.7
Newspaper publishers	51111	2.1	1.0	0.8	0.3	1.0
Periodical publishers	51112	0.3	0.1	0.1	(- [9] -)	0.2
Book publishers	51113	0.6	0.2	0.2	(- [9] -)	0.4
Software publishers	5112	0.3	0.2	0.1	(- [9] -)	0.1
Motion picture and sound recording industries	512	2.0	0.5	0.4	0.1	1.5
Motion picture and video industries	5121	-	0.6	0.4	0.1	-
Motion picture and video exhibition	51213	3.2	1.0	0.7	0.3	2.3
Postproduction services and other motion picture and video	51219	0.5	0.4	-	0.2	-
Record production	51221	-	-	-	-	-

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Broadcasting (except internet)	515	1.5	0.8	0.5	0.3	0.7
Radio and television broadcasting	5151	1.1	0.5	0.3	0.2	0.6
Radio broadcasting	51511	0.7	0.3	0.3	-	0.4
Television broadcasting	51512	1.4	0.6	0.3	0.2	0.8
Cable and other subscription programming	5152	2.5	1.8	1.0	0.8	0.8
Telecommunications	517	2.0	1.4	1.1	0.3	0.6
Wired telecommunications carriers	5171	2.5	1.7	1.3	0.4	0.8
Wireless telecommunications carriers (except satellite)	5172	0.6	0.4	0.3	(- [9] -)	0.2
Satellite telecommunications	5174	3.1	2.4	1.7	0.7	0.7
Other telecommunications	5179	0.8	0.6	-	0.2	0.2
Data processing, hosting, and related services	518	0.4	0.3	0.2	0.1	0.1
Other information services	519	0.2	0.1	0.1	(- [9] -)	0.2
Other information services	5191	0.2	0.1	0.1	(- [9] -)	0.2
Libraries and archives	51912	1.1	0.3	0.2	-	-
Internet publishing and broadcasting and web search portals	51913	0.1	(- [9] -)	(- [9] -)	-	0.1
Finance, insurance, and real estate		1.1	0.5	0.3	0.1	0.6
Finance and insurance	52	0.6	0.2	0.1	(- [9] -)	0.4
Credit intermediation and related activities	522	0.6	0.2	0.2	0.1	0.4
Depository credit intermediation	5221	0.7	0.2	0.2	0.1	0.5
Commercial banking	52211	0.6	0.2	0.1	0.1	0.4
Savings institutions	52212	1.2	0.4	0.4	(- [9] -)	0.7
Credit unions	52213	1.0	0.4	0.3	0.1	0.7
Nondepository credit intermediation	5222	0.5	0.2	0.2	(- [9] -)	0.3
Credit card issuing	52221	0.6	0.2	0.1	-	0.5
Sales financing	52222	0.7	0.1	0.1	(- [9] -)	0.6
Other nondepository credit intermediation	52229	0.4	0.2	0.2	(- [9] -)	0.2
Activities related to credit intermediation	5223	0.4	0.2	0.1	0.1	0.2
Mortgage and nonmortgage loan brokers	52231	0.3	0.1	0.1	-	0.2
Financial transactions processing, reserve, and clearinghous	52232	0.4	0.2	0.1	0.1	0.2
Other activities related to credit intermediation	52239	0.6	0.3	0.3	(- [9] -)	0.3

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Securities, commodity contracts, and other financial investme	523	-	0.1	0.1	-	0.2
Investment banking and securities dealing	52311	0.2	(- [9] -)	(- [9] -)	-	0.1
Securities brokerage	52312	0.2	(- [9] -)	(- [9] -)	-	0.2
Other financial investment activities	5239	0.3	0.2	0.1	-	0.2
Portfolio management	52392	0.5	0.2	0.2	(- [9] -)	0.3
Investment advice	52393	0.1	(- [9] -)	(- [9] -)	-	0.1
Insurance carriers and related activities	524	0.6	0.2	0.1	(- [9] -)	0.4
Insurance carriers	5241	0.7	0.2	0.2	0.1	0.5
Direct life, health, and medical insurance carriers	52411	0.7	0.2	0.1	0.1	0.4
Direct insurance (ex. life, health, and medical) carriers	52412	0.8	0.3	0.2	0.1	0.5
Reinsurance carriers	52413	0.6	0.1	0.1	-	0.5
Agencies, brokerages, and other insurance related activities	5242	0.5	0.2	0.1	(- [9] -)	0.4
Insurance agencies and brokerages	52421	0.4	0.1	0.1	(- [9] -)	0.2
Other insurance related activities	52429	0.9	0.3	0.2	0.1	0.6
Real estate and rental and leasing	53	2.7	1.4	1.0	0.4	1.3
Real estate	531	2.5	1.2	0.9	0.3	1.2
Lessors of real estate	5311	3.0	1.6	1.1	0.4	-
Lessors of residential buildings and dwellings	53111	3.8	2.2	1.6	0.6	-
Lessors of nonresidential buildings (except miniwarehouses)	53112	-	0.7	0.6	0.1	-
Offices of real estate agents and brokers	5312	0.6	0.3	0.2	0.1	0.3
Activities related to real estate	5313	2.9	1.3	1.0	0.3	1.5
Real estate property managers	53131	3.2	1.5	1.1	0.4	1.7
Other activities related to real estate	53139	1.0	0.7	0.5	-	-
Rental and leasing services	532	3.4	1.9	1.2	0.7	1.5
Automotive equipment rental and leasing	5321	4.6	2.4	-	0.7	2.2
Truck, utility trailer, and RV (recreational vehicle) rental and	53212	-	2.6	1.5	1.1	2.2
Consumer electronics and appliances rental	53221	0.9	0.3	-	-	0.6
Formal wear and costume rental	53222	2.3	1.4	1.0	-	0.9
General rental centers	5323	4.6	3.0	2.0	1.0	1.7
Commercial and industrial machinery and equipment rental a	5324	1.8	0.9	0.4	0.4	0.9

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Construction, transportation, mining, and forestry machinery	53241	1.4	0.6	0.3	0.2	0.8
Office machinery and equipment rental and leasing	53242	2.1	0.7	-	-	1.4
Other commercial and industrial machinery and equipment r	53249	2.3	1.3	0.5	0.7	1.1
Professional and business services		1.4	0.7	0.5	0.2	0.7
Professional, scientific, and technical services	54	0.9	0.3	0.2	0.1	0.6
Professional, scientific, and technical services	541	0.9	0.3	0.2	0.1	0.6
Legal services	5411	0.4	0.1	0.1	(- [9] -)	0.2
Accounting, tax preparation, bookkeeping, and payroll servic	5412	0.4	0.1	0.1	0.1	0.3
Accounting, tax preparation, bookkeeping, and payroll servic	54121	0.4	0.1	0.1	0.1	0.3
Offices of certified public accountants	541211	0.1	(- [9] -)	(- [9] -)	-	0.1
Other accounting services	541219	0.7	0.3	0.1	0.2	0.4
Architectural, engineering, and related services	5413	0.7	0.3	0.2	0.1	0.4
Architectural services	54131	0.5	0.1	0.1	-	-
Engineering services	54133	0.7	0.3	0.2	0.1	0.4
Testing laboratories	54138	1.0	0.5	0.2	0.3	0.5
Specialized design services	5414	0.4	0.2	0.1	0.1	0.3
Computer systems design and related services	5415	0.2	0.1	0.1	(- [9] -)	0.1
Computer systems design and related services	54151	0.2	0.1	0.1	(- [9] -)	0.1
Custom computer programming services	541511	-	0.1	0.1	(- [9] -)	0.2
Computer systems design services	541512	0.2	0.1	0.1	(- [9] -)	0.1
Computer facilities management services	541513	0.4	0.2	0.1	0.1	0.2
Other computer related services	541519	0.4	0.2	0.1	0.1	0.3
Environmental consulting services	54162	0.5	0.2	0.1	-	0.3
Other scientific and technical consulting services	54169	-	0.9	0.8	0.2	0.5
Scientific research and development services	5417	0.8	0.3	0.2	0.1	0.5
Advertising, public relations, and related services	5418	0.7	0.4	0.2	0.2	0.4
Other professional, scientific, and technical services	5419	6.2	1.4	0.8	0.6	4.8
Marketing research and public opinion polling	54191	0.1	(- [9] -)	(- [9] -)	-	0.1
Photographic services	54192	1.0	0.4	0.3	0.1	0.6
Veterinary services	54194	12.3	2.6	1.4	-	9.7

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
All other professional, scientific, and technical services	54199	0.7	0.4	-	-	0.3
Management of companies and enterprises	55	0.9	0.4	0.3	0.2	0.5
Administrative and support and waste management and reme	56	2.3	1.4	1.0	0.5	0.9
Administrative and support services	561	2.2	1.3	0.9	0.4	0.9
Office administrative services	5611	1.0	0.4	0.3	0.2	0.6
Facilities support services	5612	3.2	1.8	1.2	0.7	1.4
Employment services	5613	1.6	0.9	0.6	0.2	0.7
Employment placement agencies and executive search serv	56131	-	0.7	0.7	0.1	0.6
Business support services	5614	0.9	0.5	0.3	-	0.4
Document preparation services	56141	0.2	0.1	0.1	-	0.1
Telephone call centers	56142	0.8	0.4	0.3	0.1	0.4
Collection agencies	56144	0.5	0.2	0.2	(- [9] -)	0.2
Other business support services	56149	1.8	1.2	1.0	0.3	0.5
Travel arrangement and reservation services	5615	1.0	0.7	0.5	0.2	0.3
Tour operators	56152	1.0	0.6	0.5	-	0.4
Other travel arrangement and reservation services	56159	1.2	0.7	0.3	0.4	0.5
Investigation and security services	5616	1.6	0.8	0.7	0.2	0.8
Investigation, guard, and armored car services	56161	1.7	0.8	0.7	0.2	0.8
Security guards and patrol services	561612	1.5	0.8	0.6	0.1	0.7
Armored car services	561613	6.1	3.0	2.1	0.9	3.1
Security systems services	56162	1.2	0.7	0.5	0.2	0.5
Services to buildings and dwellings	5617	3.7	2.4	1.7	0.8	1.3
Exterminating and pest control services	56171	4.5	2.8	2.0	0.8	1.7
Janitorial services	56172	3.2	2.1	1.3	0.8	1.1
Landscaping services	56173	4.4	2.9	2.0	0.8	1.6
Carpet and upholstery cleaning services	56174	1.5	0.9	0.6	0.3	0.6
Other services to buildings and dwellings	56179	3.1	2.4	2.0	0.4	0.7
Other support services	5619	1.9	1.0	0.7	0.4	0.8
Waste management and remediation services	562	4.0	2.6	1.7	1.0	1.4
Waste collection	5621	5.0	3.2	1.7	1.5	1.8
Waste collection	56211	5.0	3.2	1.7	1.5	1.8

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Solid waste collection	562111	5.2	3.4	1.9	1.5	1.8
Hazardous waste collection	562112	3.4	2.0	-	1.5	1.4
Other waste collection	562119	3.7	1.9	1.2	0.7	1.9
Waste treatment and disposal	5622	3.7	2.3	1.5	0.8	1.3
Waste treatment and disposal	56221	3.7	2.3	1.5	0.8	1.3
Hazardous waste treatment and disposal	562211	2.6	1.3	0.6	0.7	1.4
Solid waste landfill	562212	4.9	3.3	2.2	1.1	1.6
Solid waste combustors and incinerators	562213	1.0	0.9	-	-	-
Other nonhazardous waste treatment and disposal	562219	3.7	2.7	2.0	0.8	1.0
Remediation and other waste management services	5629	3.1	-	-	0.5	0.9
Materials recovery facilities	56292	6.0	4.5	2.3	2.2	1.5
Educational and health services		3.9	1.8	1.0	0.8	2.1
Educational services	61	2.0	0.9	0.6	0.2	1.1
Educational services	611	2.0	0.9	0.6	0.2	1.1
Elementary and secondary schools	6111	2.8	1.3	0.9	0.3	1.5
Colleges, universities, and professional schools	6113	1.7	0.7	0.4	0.2	1.0
Business schools and computer and management training	6114	0.3	0.2	0.1	0.1	0.2
Business and secretarial schools	61141	-	-	-	-	-
Professional and management development training	61143	0.5	0.2	0.1	-	0.3
Technical and trade schools	6115	1.0	0.3	0.2	0.1	0.8
Fine arts schools	61161	2.0	1.5	1.5	-	0.5
Sports and recreation instruction	61162	2.9	1.7	1.4	0.3	1.2
All other schools and instruction	61169	1.9	1.1	1.0	-	0.8
Educational support services	6117	-	0.3	0.3	(- [9] -)	-
Health care and social assistance	62	4.2	1.9	1.1	0.8	2.2
Ambulatory health care services	621	2.3	0.8	0.5	0.3	1.5
Offices of physicians	6211	1.7	0.4	0.2	0.1	1.3
Offices of physicians	62111	1.7	0.4	0.2	0.1	1.3
Offices of physicians (except mental health specialists)	621111	1.7	0.4	0.2	0.1	1.3
Offices of physicians, mental health specialists	621112	0.6	0.2	0.1	-	0.4
Offices of dentists	6212	1.5	0.2	0.2	(- [9] -)	1.3

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Offices of other health practitioners	6213	1.1	0.4	0.3	0.1	0.7
Outpatient care centers	6214	3.5	1.0	0.6	0.4	2.5
Medical and diagnostic laboratories	6215	2.1	0.7	0.4	0.3	1.4
Home health care services	6216	3.0	1.6	1.2	0.4	1.4
Other ambulatory health care services	6219	6.6	3.3	1.8	1.5	3.2
Ambulance services	62191	7.8	4.1	2.5	1.5	3.7
All other ambulatory health care services	62199	5.1	2.4	1.0	1.4	2.6
Hospitals	622	5.9	2.3	1.3	1.0	3.5
General medical and surgical hospitals	6221	5.9	2.3	1.3	1.0	3.6
Psychiatric and substance abuse hospitals	6222	6.9	3.8	2.3	1.6	3.1
Specialty (except psychiatric and substance abuse) hospitals	6223	5.0	2.7	1.6	1.1	2.3
Nursing and residential care facilities	623	6.4	3.9	1.9	2.0	2.5
Nursing care facilities (skilled nursing facilities)	6231	6.5	4.2	2.0	2.2	2.3
Residential intellectual and developmental disability, mental h	6232	6.1	3.2	1.8	1.5	2.9
Continuing care retirement communities and assisted living fa	6233	6.5	4.0	1.8	2.2	2.6
Other residential care facilities	6239	6.9	3.8	2.4	1.4	3.0
Social assistance	624	3.2	1.7	1.1	0.6	1.5
Individual and family services	6241	3.3	1.7	1.2	0.5	1.6
Child and youth services	62411	2.8	1.2	0.8	0.4	1.6
Services for the elderly and persons with disabilities	62412	3.3	1.7	1.3	0.4	1.6
Community food and housing, and emergency and other relie	6242	3.3	1.8	1.2	0.6	1.4
Community food services	62421	4.2	2.8	1.7	1.2	1.3
Community housing services	62422	2.6	1.3	0.9	0.4	1.3
Emergency and other relief services	62423	4.3	2.5	1.7	0.8	1.8
Vocational rehabilitation services	6243	5.6	3.1	1.7	1.4	2.5
Child day care services	6244	2.2	1.2	0.8	-	1.0
Leisure, entertainment, and hospitality		3.4	1.5	0.9	0.6	1.9
Arts, entertainment, and recreation	71	4.4	2.2	1.1	1.1	2.2
Performing arts, spectator sports, and related industries	711	6.5	3.0	1.6	-	3.5
Performing arts companies	7111	-	1.8	1.2	0.7	-
Racetracks	711212	4.2	1.9	1.4	0.5	2.2

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Other spectator sports	711219	1.5	0.7	0.5	0.2	0.8
Promoters of performing arts, sports, and similar events	7113	3.9	1.3	0.8	0.5	2.6
Agents and managers for artists, athletes, entertainers, and c	7114	0.2	-	-	-	0.1
Independent artists, writers, and performers	7115	1.5	0.5	0.1	0.4	1.0
Museums, historical sites, and similar institutions	712	4.0	1.9	1.3	0.6	2.1
Amusement, gambling, and recreation industries	713	3.8	2.0	1.0	1.0	1.8
Amusement parks and arcades	7131	6.7	5.1	1.4	3.7	1.6
Amusement and theme parks	71311	7.1	5.5	1.5	3.9	1.6
Gambling industries	7132	3.3	1.8	1.0	0.8	1.5
Other amusement and recreation industries	7139	3.4	1.4	0.9	0.6	2.0
Golf courses and country clubs	71391	4.2	1.7	1.1	0.6	2.5
Skiing facilities	71392	8.5	5.2	2.2	3.0	3.3
Marinas	71393	4.3	2.2	1.4	0.8	2.1
Fitness and recreational sports centers	71394	2.4	1.0	0.6	0.4	1.5
Bowling centers	71395	2.6	0.8	0.5	-	1.8
All other amusement and recreation industries	71399	3.4	1.4	1.0	0.4	2.0
Accommodation and food services	72	3.3	1.4	0.9	0.5	1.9
Accommodation	721	4.4	2.4	1.3	1.1	2.0
Traveler accommodation	7211	4.3	2.4	1.3	1.2	1.9
Hotels (except casino hotels) and motels	72111	4.4	2.4	1.3	1.1	1.9
Casino hotels	72112	4.3	2.4	0.9	1.5	1.9
Other traveler accommodation	72119	2.6	1.3	1.2	-	1.3
RV (recreational vehicle) parks and recreational camps	7212	-	2.7	1.5	1.1	3.7
RV (recreational vehicle) parks and recreational camps	72121	-	2.7	1.5	1.1	3.7
RV (recreational vehicle) parks and campgrounds	721211	5.5	3.2	2.5	0.6	2.3
Recreational and vacation camps (except campgrounds)	721214	7.4	2.2	0.5	1.7	5.2
Food services and drinking places	722	3.1	1.2	0.8	0.4	1.9
Special food services	7223	3.9	2.5	1.4	1.0	1.4
Drinking places (alcoholic beverages)	7224	1.4	0.6	0.5	0.1	0.9
Restaurants and other eating places	7225	3.1	1.1	0.8	0.3	2.0
Restaurants and other eating places	72251	3.1	1.1	0.8	0.3	2.0

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Full-service restaurants	722511	3.0	1.0	0.8	0.3	1.9
Limited-service restaurants	722513	3.0	1.2	0.8	0.4	1.8
Cafeterias, grill buffets, and buffets	722514	2.6	1.0	0.6	0.4	1.6
Snack and nonalcoholic beverage bars	722515	4.3	1.2	1.0	0.3	3.1
Other services (except public administration)		2.3	1.2	0.8	0.4	1.1
Other services (except public administration)	81	2.3	1.2	0.8	0.4	1.1
Repair and maintenance	811	2.6	1.4	1.0	0.3	1.3
Automotive repair and maintenance	8111	2.6	1.4	1.1	0.3	1.3
Electronic and precision equipment repair and maintenance	8112	1.3	0.6	0.4	0.2	0.6
Commercial and industrial machinery and equipment (ex aut	8113	3.5	1.7	1.1	0.6	-
Personal and household goods repair and maintenance	8114	1.5	0.8	0.5	0.3	0.6
Personal and laundry services	812	2.4	1.3	0.8	0.6	1.0
Death care services	8122	-	1.5	1.4	0.2	1.2
Drycleaning and laundry services	8123	3.1	2.2	0.9	1.3	0.9
Coin-operated laundries and drycleaners	81231	3.0	2.3	1.3	-	0.7
Drycleaning and laundry services (except coin-operated)	81232	1.6	0.9	0.5	0.4	0.7
Linen and uniform supply	81233	4.4	3.3	1.3	2.1	1.1
Linen supply	812331	4.4	3.4	1.3	2.2	0.9
Industrial launderers	812332	4.4	3.2	1.3	1.9	1.2
Other personal services	8129	4.2	1.7	0.7	-	-
Photofinishing	81292	1.3	0.7	0.4	0.3	0.5
Parking lots and garages	81293	2.4	1.3	0.7	0.5	1.2
Religious, grantmaking, civic, professional, and similar organi	813	1.8	0.8	0.6	0.2	1.0
State and local government[5]		4.7	2.2	1.6	0.6	2.5
State government[5]		3.7	1.9	1.5	0.4	1.8
Service-providing		3.7	1.9	1.5	0.4	1.8
Educational and health services		3.5	1.8	1.3	0.5	1.7
Educational services	61	1.8	0.8	0.5	0.3	1.0
Educational services	611	1.8	0.8	0.5	0.3	1.0
Colleges, universities, and professional schools	6113	1.8	0.8	0.5	0.3	1.0
Health care and social assistance	62	7.8	4.4	3.5	1.0	3.4

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Hospitals	622	8.2	4.5	3.3	1.3	3.7
Nursing and residential care facilities	623	13.7	8.4	7.2	1.3	5.2
Public administration		3.9	1.9	1.6	0.3	2.0
Public administration	92	3.9	1.9	1.6	0.3	2.0
Justice, public order, and safety activities	922	5.7	3.0	2.5	0.4	2.8
Justice, public order, and safety activities	9221	5.7	3.0	2.5	0.4	2.8
Police protection	92212	6.7	3.5	3.0	0.5	3.2
Correctional institutions	92214	7.7	4.1	3.5	0.6	3.7
Local government[5]		5.0	2.3	1.6	0.7	2.7
Goods-producing[5]		9.1	5.7	4.2	1.5	3.4
Construction		9.1	5.7	4.2	1.5	3.4
Construction	23	9.1	5.7	4.2	1.5	3.4
Heavy and civil engineering construction	237	9.1	5.8	4.2	1.5	3.3
Service-providing		5.0	2.3	1.6	0.7	2.7
Trade, transportation, and utilities[8]		5.9	3.7	2.6	1.1	2.3
Transportation and warehousing[8]	48-49	6.6	4.2	3.4	0.8	2.3
Transit and ground passenger transportation	485	6.8	4.5	3.7	0.8	2.3
Utilities	22	5.3	3.0	1.7	1.3	2.2
Utilities	221	5.3	3.0	1.7	1.3	2.2
Water, sewage and other systems	2213	6.0	3.5	1.9	1.5	2.6
Educational and health services		4.1	1.5	1.1	0.5	2.6
Educational services	61	4.0	1.5	1.0	0.4	2.5
Educational services	611	4.0	1.5	1.0	0.4	2.5
Elementary and secondary schools	6111	4.2	1.5	1.1	0.4	2.7
Health care and social assistance	62	4.7	2.0	1.2	0.7	2.7
Hospitals	622	4.9	1.8	1.1	0.7	3.1
Nursing and residential care facilities	623	6.1	3.8	2.7	1.2	2.3
Public administration		6.4	3.3	2.4	0.9	3.1
Public administration	92	6.4	3.3	2.4	0.9	3.1
Justice, public order, and safety activities	922	9.0	4.9	4.0	1.0	4.1
Justice, public order, and safety activities	9221	9.0	4.9	4.0	1.0	4.1

TABLE 1. Incidence rates[1] of nonfatal occupational injuries and illnesses by industry and case types, 2016

Industry[2]	NAICS code[3]	Total recordable cases	Cases with days away from work, job transfer, or restriction			Other recordable cases
			Total	Cases with days away from work[4]	Cases with job transfer or restriction	
Police protection	92212	10.2	5.5	4.3	1.2	4.7
Fire protection	92216	9.5	5.9	5.2	0.7	3.6

[1] The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) x 200,000, where
N = number of injuries and illnesses
EH = total hours worked by all employees during the calendar year
200,000 = base for 100 equivalent full-time workers (working 40 hours per week, 50 weeks per year)

[2] Totals include data for industries not shown separately.

[3] *North American Industry Classification System* -- United States, 2012

[4] Days-away-from-work cases include those that result in days away from work with or without job transfer or restriction.

[5] Excludes farms with fewer than 11 employees.

[6] Data for Mining (Sector 21 in the *North American Industry Classification System* -- United States, 2012) include establishments not governed by the Mine Safety and Health Administration rules and reporting, such as those in Oil and Gas Extraction and related support activities. Data for mining operators in coal, metal, and nonmetal mining are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor. Independent mining contractors are excluded from the coal, metal, and nonmetal mining industries. These data do not reflect the changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002; therefore, estimates for these industries are not comparable to estimates in other industries.

[7] Data for mining operators in this industry are provided to BLS by the Mine Safety and Health Administration, U.S. Department of Labor. Independent mining contractors are excluded. These data do not reflect the changes the Occupational Safety and Health Administration made to its recordkeeping requirements effective January 1, 2002; therefore, estimates for these industries are not comparable to estimates in other industries.

[8] Data for employers in railroad transportation are provided to BLS by the Federal Railroad Administration, U.S. Department of Transportation.

[9] Data too small to be displayed.

NOTE: Because of rounding, components may not add to totals. Dash indicates data do not meet publication guidelines.

SOURCE: U.S. Bureau of Labor Statistics, U.S. Department of Labor

Attachment B

American
Fuel & Petrochemical
Manufacturers

1800 M Street, NW
Suite 900 North
Washington, DC
200036

202.457.0480 office

EPA RMP Compliance Auditing – Representative Sampling Approach

Summary

Sections 68.58(a) and 68.79(a) of the EPA Risk Management Plan (RMP) regulations at 40 CFR Part 68, require an owner or operator to certify that they have evaluated compliance with the procedures and practices developed under the rule for "each covered process[1]" at least every three years. This paper demonstrates that for facilities with multiple RMP covered processes, it is not necessary to audit "each" covered process if the audit includes an appropriate statistical or representative sample of covered processes. Statistical sampling is (1) a scientifically proven, robust method; (2) a longstanding and accepted industry practice; (3) recognized by OSHA, CCPS, etc.

Background

Audits, by their nature, almost universally require "sampling" of the material under review. There are multiple reasons and benefits to this approach, particularly in the context of RMP.

- The primary purpose of the RMP compliance audits is to review the systems and processes by which RMP is implemented at the site. As discussed below, these systems and processes are applied in the same fashion across all covered process units which creates commonality between covered units in, for instance, Training, Management of Change, and Mechanical Integrity. The identification and correction of concerns in the system used for one covered process unit will address those concerns in all other covered process units at the facility. Thus, it is unnecessary to audit all covered units for the same RMP element since auditing the systems using a representative sample of the covered processes ensures that the RMP elements are properly implemented at all covered process units.
    - For example, if an audit of training records in a coker reveals that there is no mechanism for verifying that an employee has retained the training knowledge, then that deficiency would be addressed in the training programs used for all of the facility's covered processes (not just within the audited process). Similarly, if an MOC audit of a hydrotreater reveals that appropriate management signoffs were not obtained prior to commencement of work, then that deficiency would be corrected in the MOC system used by the entire facility (not just in the audited hydrotreater).

- Employing a sampling methodology for the audit process is a statistically sound, robust way to demonstrate, with a high degree of confidence, that all covered processes are in compliance for all RMP elements.

[1] "for each covered process" was added to the 2017 rule amendments and was not included in the 1996 RMP regulatory language

- The processes found in refineries and petrochemical facilities are complex and the implementation of RMP systems in those processes is itself quite complex. Auditing these complex RMP systems in these facilities requires significant resources and is very disruptive to operations. Given the plant-wide nature of the RMP compliance systems and the robustness of statistical sampling, a complete audit of all RMP elements in every covered process would fail to provide any meaningful improvement over the effectiveness of sampled compliance audits, would waste time and resources, and would create unnecessary operational disruptions.

An effective audit of a facility based on a statistically valid representative sample of the covered processes in a facility will consider several factors when selecting covered processes to include in an audit. These factors can be divided into two main categories: management systems and physical layout.

[NOTE: The concepts covered in this paper can also apply to OSHA Process Safety Management compliance audits.]

Management System Considerations

A Management System is formally established set of activities designed to produce specific results in a consistent manner on a sustainable basis[2]. Management systems factors to consider include the facility's policies, procedures, and practices and how the facility's organization is structured.

RMP contains several prevention program elements (consistent with OSHA Process Safety Management). It would be rare to have more than one documented program for different covered processes in a facility since nearly all facilities have one set of policies, procedures, and/or practices that are applied to assure compliance. If, however, the stationary source has separate policies, procedures and/or practices for different areas within the facility, each distinct program should be included in the audit scope.

Some facility organizations have a single department responsible for an RMP program element. However, department organizations vary from site to site and company to company. The organizational structure of element ownership is an important consideration for the audit team leader to understand before determining which covered processes to include in the sample for the audit. For example, if there is more than one inspection department which is responsible for the Mechanical Integrity systems then the audit should sample from each of the departments. The audit team should also consider sampling from each maintenance area/business unit/zone and for each trade within the maintenance department. Finally, the audit scope should include interviewing contractors performing maintenance, inspection, or non-destructive examination.

[2] Guidelines for Implementing Process Safety Management, Second Edition, CCPS, 2016

Physical Layout Considerations

The efficiency and effectiveness of the compliance audit can be improved by considering the physical layout of covered processes when determining which processes to include in the sample covered by the audit scope. The Center for Chemical Process Safety's (CCPS) *Guidelines for Auditing Process Safety Management Systems, Second Edition (2011)* states that two to four units are typically selected for the audit scope and that it is common practice to schedule one work week for a process safety audit. OSHA's CPL 03-00-004, *Petroleum Refinery Process Safety Management National Emphasis Program* provides direction to its Compliance Safety and Health Officers (CSHOs) to select one or more sections of a facility when performing a Refinery National Emphasis Program (R-NEP) inspection (see the Reference section for more details).

There are benefits to limiting the scope of the audit to a representative sample of covered processes:

- If the program is the same across the entire facility then limiting the scope to a representative sample of process units (e.g., two to four units) allows the auditor(s) to spend more time focusing on the details and records for the selected process areas. Valuable auditing time is wasted traveling to/from the different areas of the facility if the number of sampled units is too large. Also, the resolution plans for findings based on a statistically valid sample of covered processes should be the same as those for a larger sample from more areas in the facility which saves time and effort by avoiding the documentation of redundant issues.
- A limited sample size places less burden on facility resources. If the sample is limited, the rest of the facility is allowed to operate at status quo and it allows the managers and supervisors who are not involved in the audit to provide coverage for the employees and leadership team members who are involved in the audit.

Factors to consider when selecting covered processes to include in the audit scope should include the risks associated with covered processes, the age of the covered processes, and the audit history for the covered processes.

Risk is typically characterized by two components: 1) consequence; and 2) likelihood of a release or near miss.

The audit team should consider the following to be potential high-consequence process areas:

- High pressure and high temperature operating units;
- Areas where damage mechanisms are known to be present;
- Processes with higher than site average active equipment deficiencies;
- Processes with large quantities of highly hazardous chemicals; and
- Process areas involving worst-case and alternate case scenarios in RMP plan submittals.

Another component of risk is the likelihood of a process safety related incident or near miss at a covered process unit. The audit team should consider the number of reported incidents and near misses within a process when selecting covered processes to include in the scope of the audit.

The years of service for each covered process is also an important consideration when selecting covered processes for the audit. When auditing the Mechanical Integrity element, covered process with more years of service should have more inspection, testing, and preventive maintenance history to audit. The covered process with more years of service should also have established corrosion rates and, if applicable, a history of inspection for identified damage mechanisms. It is important to consider units with fewer years of service for the audit scope as well. Covered processed with less years of service are more likely to have quality assurance (QA) records demonstrating how the facility was fabricated, constructed, installed, and commissioned. These units with fewer years of service are typically good sources to audit for positive material identification, welding records, and non-destructive examination reports as well.

The audit team should also consider the audit history when selecting covered processes to include in the scope of the audit. The audit team should avoid sampling equipment from covered processes included in the previous audit.

Summary

Petroleum refineries and petrochemical facilities have multiple RMP covered processes and it is not necessary for an owner/operator to audit each of those covered processes every three years in order to determine that the facility is in compliance with RMP practices and procedures. That determination may be achieved through the audit of a representative sample of covered processes at the facility.

The RMP compliance audit report should describe the basis for selecting the covered processes for the audit scope. When determining the covered processes for the audit scope, consider selecting the following units:

- one of the processes with more years of service because they typically have significant inspection records due to the length of time the equipment has been in operation;
- one of the processes with fewer years of service to audit QA practices and records (e.g., fabrication, construction, installation and commissioning);
- a covered process with higher than site average process safety-related incidents or near misses because these can be indicators of the likelihood of a process safety event occurring within that process;
- a process that operates at high pressures and/or temperatures, and/or is susceptible to unique damage mechanisms (i.e., other than general corrosion) because these can be

indicators of the consequences related to a process safety event within that process; and

- covered processes that were not included in the previous compliance audit scope.

AFPM, API, and ACC all support inclusion of language in the RMP reconsideration that provides guidance as to what is considered an adequate representative sample. For facilities with multiple covered processes that choose to engage in representative sampling, EPA should require documentation of the considerations for unit selection in the audit report when conducting audits. Lastly, it is appropriate to add supporting language in the regulation as to why representative sampling is appropriate for larger facilities. We provide additional cost justification for representative sampling in Appendix A, *infra.*

References

Center for Chemical Process Safety (CCPS), *Guidelines for Auditing Process Safety Management Systems, Second Edition*, American Institute of Chemical Engineers, New York, 2011

The *Guidelines for Auditing Process Safety Management Systems* book addresses sampling and testing strategies and techniques in Chapter 2, *Conducting Process Safety Management Audits.* The book acknowledges that the purpose of auditing is to check or verify PSM system implementation. The chapter goes on to state that sampling is typically performed for large populations of records and testing involves verifying validity of the sampled records. Finally, the chapter discusses a typical audit duration of one work week.

Occupational Safety and Health Administration (OSHA) CPL 03-00-010, *Petroleum Refinery Process Safety Management National Emphasis Program*, Effective Date: August 18, 2009

OSHA issued CPL 03-00-004 when it initiated the Refinery National Emphasis Program (R-NEP) in 2007, providing guidance to Compliance Safety and Health Officers (CSHOs) regarding how to determine what equipment to select as part of the R-NEP inspections and the number of equipment types to include. The guidance was updated in August 2009 (see Section XI E.7, Selection of Units - page 31). More specifically, the document states that the CSHOs selection shall be based on the factors listed below, and shall be documented in the case file:

a. Nature (e.g., tendency to form unconfined vapor cloud, high toxicity, operating pressures and temperatures) and quantity of chemicals involved;
b. Incident reports and other history;
c. Lead operators' input;
d. Age of the process unit;
e. Factors observed during the walkaround;
f. Employee representative input;
g. Number of employees present;

h. Existence of blowdown(s); and
i. Current hot work, equipment replacement, or other maintenance activities.

The CPL goes on to discuss the number of records to review for relief valves, pressure vessels, and process piping circuits during the inspection. The guidance includes the following:

- Randomly select five PRVs from a list of all PRVs
- Regarding pressure vessels, select a total of six:
- One from the three oldest pressure vessels in the scope of selected units
- One from the three highest pressure vessels
- One from the three highest temperature pressure vessels
- One from the three oldest pressure vessels with integrally bonded liners (OSHA meant non-integrally bonded liners here)
- One from the three oldest in the Alkylation unit
- One from the three oldest operating at the highest pressure in the Alkylation unit
- Pick five piping circuits from P&IDs of the selected units

APPENDIX A

The Regulatory Impact Analysis from the 2016 final rule highlights the potential magnitude of requiring audits for every covered process in the petroleum refining and petrochemical manufacturing industries.

> Approximately 12,500 currently regulated facilities have filed RMPs for approximately 17,000 processes. Most facilities have only one process, but certain industries, such as chemical manufacturing and petroleum refining, often have more than one regulated process; about 100 facilities have more than 10 regulated processes.[3]

AFPM provided EPA with information on the potential total costs associated with these audits. This information was derived from a member survey and is summarized in the chart below:

Table 3-10. AFPM Member Cost for Auditing All Process Units

	Cost per process	Number of Processes	Total Cost	Marginal Cost Increase
Single Process Unit	$36,500	1	$36,500	N/A
"Simple" Refinery/ Petrochemical Plant	$36,500	2.5	$91,250	N/A
"Medium Complex" Refinery/ Petrochemical Plant	$36,500	14	$511,000	$365,206.90
"Complex" Refinery/ Petrochemical Plant	$36,500	25.8	$941,700	$795,906.90
Largest Facility Reported to AFPM	$36,500	39	$1,423,500	$1,277,406.90
EPA Average for NAICS 32411	$36,500	9.3	$339,450	$253,656.90

[3] U.S. Environmental Protection Agency, Regulatory Impact Analysis: Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act, Section 112(r)(7), p. 16, (December 16, 2016).